

Patients as Consumers: the coadaptation and consumption of health at urgent care  
centers

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# Introduction

Over the last two decades, urgent care centers have proliferated in the United States, growing to 9,000 facilities as of 2014 (Yee 2013). Such recent and rapid expansion of the industry has been heavily examined by the media, which often attribute growth to a diverse set of market factors such as long wait times for primary care appointments, crowded emergency departments and patient demand for more accessible care, including after-hours appointments (Yee, Lechner, and Boukus 2013).

Yet despite the rapid development of the industry and the great interest sociologists have historically taken in America's health care system, hardly any scholarly research has been done on why these centers are coming to play a major part of the healthcare system or what their patterns of use are. While many are quick to point towards long wait times, and the difficulty of finding doctors in the current healthcare system, the repercussions of the new turn towards urgent care centers.

In the following analysis, I will attempt to situate the rise of such clinics within the existing sociological research, generating hypotheses about why patients are turning towards such centers and away from primary care and/or emergency department use. Drawing on research studying the sociology of medicine and using advanced statistical clustering methods, this thesis seeks to understand what the key characteristics are of individuals choosing to go to urgent care. To do so, I will utilize the clustering method of unsupervised learning in order to better understand if and what subgroups appear within the group of patients who have begun to use urgent care rather than traditional means of procuring healthcare.





# Chapter 1

## Literature Review

The first “urgent care” centers opened in the United States in the early 1980’s., with no more than a handful in operation at the time. Unfortunately, (at least as far as early investors were concerned), the industry rapidly declined, and the few clinics which had opened were largely absorbed into larger hospitals and healthcare groups. Ten years later, in the mid-1990’s , the industry again began growing rapidly, quickly growing to between 12,000 and 20,000 centers today. By the UCAOA’s estimate, in 2014 approximately two new urgent care centers were opening in the United States each week. By definition, urgent care centers focus on acute episodic care with a substantial emphasis on customer service. There is no nationally accepted definition of what constitutes an urgent care center — the scope of services provided generally falls between that of a primary care doctor’s office and an emergency department. While urgent care centers may be owned and operated by hospitals or multi-specialty group practices, this report focuses on those that are independently owned or that are part of chains of urgent care centers.

\*\* Set up more informative view of what urgent care centers are and how they target consumers\*\*

## 1.1 Moving away from Primary Care

The shift towards urgent care centers will undoubtedly have profound consequences for the patient-practitioner relationship and the patient's role in the medical care system, but so far these consequences remain largely unknown. Fortunately, sociologists have had a long-standing concern with such professional-client interactions, particularly within medicine (Freidson 1961, Bloom 1963, Mechanic 1968), and in order to better understand what effects the shift away from primary care may have on patients, one can look to a large body of research on how institutional and organizational environments directly affect a patient's experience in health care.

A major sociological theory of the doctor-patient relationship begins by speculating that the bureaucratization of modern social institutions has had drastic consequences on the medical profession: as opportunities for close personal contacts diminish, problems which were originally handled in familial, social, and religious contexts are transferred to 'formal sustaining practitioners' (Mechanic 1966). In such societies, the prescribed structure of the doctor patient relationship then provides a legitimation for the expression of intimacy and the request for help, offering an explanation as to why sociologists and anthropologists of medicine have long observed the variance and social nature of health problems brought to a physician (*The Doctor, His Patient, and the Illness*).

These same theorists locate the stability of this doctor-patient relationship in the fact that the physician acts as the patient's agent, yet one can immediately recognize that urgent care centers may not be equipped to facilitate this relationship in the same way that the traditional primary care practice is seen to (Lupton 1997). The premise of urgency in such practices, the quickness with which patients are seen, and the targeted focus on acute problems all serve to create considerable doubt towards the ability of physicians within such an organizational context to fulfill the sociological role thought so important in previous literature.

Additionally, those who study health services have recognized that a patient's medical history is a primary source of information regarding treatment, and primary care practitioners have been known to draw upon this as a valuable resource (Draper and Smits 1975; Miller et al. 2010). The Millis report, commissioned by the American Medical Association to review the current status of physicians, recalls the archetype of the medical professional:

“The general practitioner of revered memory knew his patients. . . and provided continuing care through the course of minor ailments and majors emergencies. His deficiencies. . . were partly offset by intimate knowledge of his patients, the support he gave them, and the trust and confidence his services engendered.”

Urgent care centers however have no emphasis on maintaining patient-doctor ties and there is no reliable system to ensure a patient sees the same doctor even if they have been there before.

Yet while this may seem problematic, a large body of recent sociological literature belongs to a growing number of scholars who are challenging the importance, and even relevance, of the traditional primary care physician in modern medicine. Those who have been observing developments in the patient-physician relationship over the past 30 years argue that the last quarter of the 20th century saw a dramatic reconfiguration of society, especially in regards to health services, which has had profound effects on an individual's relationship to the healthcare system. So while some were witnessing what was, for Starr (1982), “the social transformation of medicine,” and for many, “the end of the golden age of doctoring” (McKinlay & Marceau 2002).

### **1.1.1 The end of Medical Professional Dominance in the US?**

Almost since sociologists first became interested in the medical profession, the sociology of medicine was deeply joined with studies of professionalism. In the U.S., Doctors were seen as the paragon of the ‘professional’: respected, organized, in control, and

above all else, firmly established in their positions. Such traits led many to study what effects this had on medical care and how such professional dominance of medical practitioners shaped what services were provided. Many found that such dominance allowed the profession to block off areas of study entirely, or to ignore diseases they did not want to pursue. Such “modern doctors” worked within a “sovereign profession” (Starr 1982), serenely dispensing both medical care and authoritative judgment. Freidson (1988, p.384) comments that before 1970’s, U.S. medicine “was at a historically unprecedented peak of prestige, prosperity and political and cultural influence—perhaps as autonomous as it is possible for a profession to be.”

When one thinks of the healthcare industry today, it is hard to call to mind such professional cohesion. While doctors remain one of the more highly respected career choices in America, their prestige has certainly dropped since the 20th century (Heritage and Maynard 2006). The term doctor is now applicable to a wide variety of sub-professions and specialties and the medical profession has become extremely diversified. Along with such specialization, big changes to Medicare and Medicaid legislation and the growth of third-party payers and for-profit medical service corporations created conditions which further removed the doctor from their traditional roles, eroding the political and cultural influence of the profession and threatening the cultural authority and technical autonomy of medicine (Starr 1982, Freidson 1988). It should be noted that such changes may not have necessitated a loss of professional dominance. In fact, with the expansive growth on spending in the healthcare sector, it is possible that doctors could have further cemented their professional medical authority. But most scholars have observed that the opposite has happened, and instead many view the past 30 years as the end of the authoritative medical professional.

With such a history of professional sominence, many have examined the observed decline in depth, and the change is largely seen as a consequence of a loss of trust with the medical profession as a whole that began some time around the late 1970’s

(Timmermans and Oh 2010). During the ‘golden age’, public surveys reported extremely high levels of trust in physicians, however this declined from 72 percent in 1966 to 37 percent in 1981 (Lipset and Schneider 1982). With high levels of doubt towards medical professionals, suspicion grew about physicians acting in patients’ best interests (Reeder 1972) and patients began to question the validity of the medical doctor as an authoritative figure of biological truth.

These shifts in the medical profession occurred parallel to changing norms surrounding the role of the patient in their own health care, and the last 30 years of scholarly research have seen a reconfiguration of the patient from passive recipient of care from their doctor to a critical consumer of health services (Barker 2008; Lupton, Donaldson, and Lloyd 1991; Timmermans and Oh 2010). Theories of medical consumerism developed from economists studying the healthcare sector, and they begin with a similar hypothesis as the economic rational choice model, assuming that patients act as rational actors in the context of a medical encounter (Timmermans and Oh 2010). In other words, individuals act in a calculated manner to engage in self-improvement or health, and they are generally skeptical about expert knowledge (Lupton 1997). According to the literature, this trend began to express itself in the form of solicitation of second opinions and a sense of interchangeability of medical practitioners during the 1980’s, just as distrust of the industry reached its peak (Gray 1997). The idea that patients could shop around and compare services and prices was heavily popularized, and patients increasingly began to make autonomous decisions when selecting physicians (Hibbard and Weeks 1987, Lupton 1991).

Urgent care centers fit neatly into such a conceptualization of health services, and thus offer a key area of analysis in better understanding the developing roles of the consumer-patient within the larger healthcare industry. An important aspect of the research on the developing patient-consumers emphasizes the expansion of bargaining power on the part of the patient that came with the shift (Reeder 1972). A patient

may now shop around the marketplace of health care, and that many are now choosing urgent care centers is undeniable given the industry's rapid expansion.

### **1.1.2 What does this mean for health care?**

In light of such research, sociologists and those who study at the intersection of health and social behaviors have begun to re-examine the importance of a close relationship between doctor and patient in an attempt to respond to the consumer-patient model, developing a growing body of research which seeks to define the most effective components of patient-physician interactions and to reaffirm the place of the primary care physician in modern medicine. Common to most of these studies are the elements of 'trust, compassion, communication, and clinical competence' (Heritage and Maynard 2006; Phillips and Bazemore 2010, others at bottom). As an example, a 2002 study on clinical outcomes for low income women over the age of forty found that women who rated highest their doctor's ability to take care of all of their health care needs had 11 times the odds of 'trusting their physician' and 6 times the odds of finding their physicians 'compassionate and communicative', compared to those with the lowest level of comprehensiveness (O'Malley and Forrest 2002).

With such knowledge that close ties between physicians and patients have a direct impact on the perceived quality of care, the importance of examining the rise of urgent care centers become obvious. If patients are acting as rational consumers, which of them are choosing to receive their care outside of a primary care office, and what consequences does this have for their medical outcomes? The lack of research into the characteristics of urgent care patients make it difficult to answer such questions. Indeed, as of now, there has been no academic attempt to place the rapidly growing industry within the sociology of medicine, nor does there even exist an official definition of what constitutes an urgent care center.

## 1.2 Urgent Care Centers as an extension of the Welfare State

The prevailing understanding of urgent care centers interprets the industry's growth as a development that grew out of emergency department overcrowding that began during the financial tightening of the 1980's. Thus, each clinic is often conceptualized as a smaller instance of a traditional hospital's triage center, supplying many services which one could receive at an emergency department (Anon n.d.; Mehrotra et al. 2008; Rubin 2012). One study which compared emergency department services with urgent care centers found that, for all but the most extreme care and emergent care needs, urgent care centers could handle almost all of emergency department traffic and that their services were remarkably analogous (Anon n.d.). Similarly, the unique features of emergency departments which set them apart from more traditional avenues of care such as the promise to be seen regardless of insurance coverage and the flexible hours are mirrored in most urgent care centers (Weinick and Betancourt n.d.).

Given these similarities, urgent care could in many ways be considered a response by the healthcare industry to emergency department overuse, which continue to struggle underneath a lack of resources. Suitably, the body of sociological research on emergency departments can be used to better comprehend how urgent care centers are impacting the allocation of healthcare. Many medical sociologists have analyzed the public/private divide in the healthcare industry, emphasizing the unequal quality of care received depending upon which type of health service you utilize (Dutton 1978; Luftey and Freese 2005). In response to these inequalities in the private sector, the emergency room has long been understood as a response to a stratified system, and it is largely considered a social welfare institution (Gordon 1999). "The hospital emergency department is perhaps the only local institution where professional help is mandated by law, with guaranteed availability for all persons, all the time, regardless

of the problem” (Ullman, Block, and Stratmann n.d.), and was for a long time widely considered one of the few access points into the healthcare system for very low income individuals.

Accordingly, because urgent care centers offer a similar alternative to primary care for those who cannot procure a conventional family practitioner, they can be considered an extension of a much needed welfare institution necessary to circumvent an extremely stratified healthcare industry. This becomes more credible when trends in urgent care centers are examined in conjunction with emergency departments. By all indications, the demand for emergency departments far outweighs their capacity, and this is only expected to grow in the future (Weinick 2010). Around the time that urgent care centers began to emerge in the U.S., emergency departments were seeing record breaking levels of non-acute visits, resulting in severe overcrowding and shortages (Shortcliffe). These numbers have only risen in the past 20 years, especially in urban areas with large populations of low-income residents (Anon n.d.). Not only does this rise in demand correspond to the growth of the urgent care industry, one economic analysis which took cities with comparably high levels of non-emergent ED usage and examined the effect of a growing number of urgent care centers found that cities which have seen a large growth in these facilities have statistically lower overcrowding in emergency departments (O’Malley 2013).

Thus, urgent care centers usage would be expected to closely resemble that of the emergency department, especially regarding non-emergent care. This leads to the first hypothesis which will be tested by current data on urgent care center usage. Emergency department usage has been studied by many medical professions and sociologists, with a particular focus on the ways in which it serves as a welfare institution, and a few central patterns will be used here in the comparison with urgent care centers. Primarily, the low average income of patients and high levels of uninsured visits to emergency department patients have been a steady trend in the last 30 years (Ullman



et al. n.d.). Patterns of use for emergency departments also show low levels of ‘returns’ (individuals who come back with the same problem) and higher traffic during hours when normal primary care physician offices are closed, such as late at night and on the weekend (Anon n.d.; O’Malley 2013; Ullman et al. n.d.). Accordingly, if like emergency departments, urgent care centers act as a welfare institution for those who cannot procure a traditional primary care physician, we would expect to see similar trends as have been observed in hospital emergency departments. These are summarized in Hypothesis 1 below.

**Hypothesis 1: Urgent care centers will experience high levels of visits from uninsured and low SES patients, have low rates of second visits, and higher rates of visits during non-traditional hours (weekends).**

### 1.3 Urgent Care Centers as a New Model of Primary Care

Yet another understanding of urgent care centers arises when one considers the larger institutional context within which the overuse of emergency departments and the boom in the urgent care industry occurred. According to medical and organizational sociologists, the institutional narrative of the American healthcare industry since the 1980’s is one of privatization and the transfer of power from professionals and the government towards the private sector and market control (Waitzkin 2000). Urgent Care centers thus fall into a rapidly expanding category of new, privately funded modes of healthcare services—other examples being retail clinics, private hospitals and home care organizations—which are provided and predominantly paid for by private actors (Anon n.d.).

This framework has yet to be fully examined by scholars, but a few studies which

have attempted to examine the place of urgent care centers in new healthcare markets have pointed towards such change, highlighting the privatization phenomenon as a possible explanation in the rise in numbers of such clinics over the last two decades or so (Rubin 2012; Weinick, Bristol, and DesRoches 2009; Yee et al. 2013). Shortages in public hospital staffing and facilities and the rising cost of care in the U.S. are seen as having created both demand and an opening for a new market within healthcare, which has been filled by new forms of medical service (Weinick and Betancourt n.d.). And while the trend towards privatization has been seen at times as both a symptom of the loss of professional dominance by medical practitioners and the cause of it, the similarities in organizational structure to primary care practices cast doubt on the hypothesis that these new forms of care are simply emergency department overflow. As one analysis observed: “while urgent care reflects some similarities to emergency departments, we find that in other areas – most notably reimbursements, primary payer distribution, and physicians’ salaries – urgent care centers seem far more similar to office-based family medicine practices” (Weinick and Bristol 2008).

Such observations lead one to a different conclusion about urgent care than those who liken the clinics to smaller triage centers created to handle emergency department overflow. Instead, urgent care centers can be conceptualized as a move by the healthcare industry towards deeper privatization, and possibly a response to medical professional authority in jeopardy. When medical sociologists first began pointing to “the end of the golden era of doctoring,” Stefan Timmermans responded by pointing to the long history of adaptability by the medical profession, which has managed to transform itself before in the wake of institutional change many times before (Timmermans, Whooley).

Consequently, if the privatization of healthcare proves to be the primary explanation of why urgent care centers are beginning to dominate the acute-care market, one would expect to see trends in use mirror those of traditional primary care physicians

rather than emergency departments. Historically, primary care often acted as a first contact point for insured patients for any acute, non-emergent health concerns of these individuals (Jost 2003). While many primary care offices will accept at least a small number of Medicaid and Medicare payments, they often have a large patient base of privately insured, financially well-off individuals (Cunningham et al. 1999). Such offices are often only open during a standard work week's hours, a facet often noted as functioning to limit access for those who cannot take off work to go to the doctor. Lastly, primary care is often set apart from other forms of care due to the relationship and medical history that develops between the doctor and patient over years of care exchange (Miller et al. 2010). Primary care physicians thus emphasize holistic view of health care, and for those patients that do have a primary doctor, they are encouraged to return to the same clinic. If urgent care facilities are to be understood as a new face on a conventional sector of the health services industry, we should expect to see this last factor of primary care present in those going to urgent care centers. These usage trends are summarized in Hypothesis 2 below:

**Hypothesis 2: Urgent care centers will experience high levels of visits from insured patients across SES statuses, have high rates of second visits, and will not have significantly higher rates of visits on weekends.**

## **1.4 Urgent Care Centers: Emergency Rooms for the Wealthy?**

An alternative explanation for the rise of urgent care use combines both of the previous theories by conceptualizing the urgent care center as an occurrence of boundary work by upper middle class and wealthy Americans who have been pushed out of emergency departments by low SES patients. Sociologists have long been interested in the

ways that class can be defined and reconstituted through boundary work (Pachucki, Pendergrass, and Lamont 2007). Research on symbolic boundaries—the conceptual distinctions made by social actors in categorizing people, practices, tastes, attitudes and manners—and their interactions with more durable and institutionalized social differences such as class and race has shown that individuals often use methods of exclusion through organizational settings in order to solidify social boundaries Zietsma and Lawrence 2010.

Thus, if it is true that urgent care centers are largely operationally analogous to emergency departments as is often observed, it could be that such organizations serve as an alternative for wealthy individuals who seek to socially distance themselves from a space largely inhabited by low SES patients. Such a hypothesis would explain why the industry’s rapid growth coincides with a remarkable strain on emergency departments’ capacities due to an influx of low SES patients. This explanation also accounts for the fact that urgent care centers are often more expensive due to their pay-per-service model than emergency departments (Anon n.d., Anon n.d.; Ullman et al. n.d., n.d.). Lastly, this theory offers an explanation as to why urgent care centers have developed along side of, and with many of the same services as, emergency departments Weinick et al. 2009.

If this hypothesis were the case, one would expect to observe usage trends much like Hypothesis 1, but with key differences. Primarily, regardless of insurance coverage, we should expect to see little to no low-SES users in such clinics. We would also expect to see patterns of use by the wealthy to mimic their would-be use of emergency departments, such as high volumes of visits during times when their primary care physicians are closed, emergency and injury related visits and almost no return visits.

**Hypothesis 3: Urgent care centers will experience high levels of visits from high SES patients, have low rates of second visits and will have large**

**proportions of visits which qualify as acute and emergent care during non-primary care hours.** If such trends were observed, the urgent care center could then be understood as analogous to an emergency department for the wealthy.

Warning: package 'knitr' was built under R version 3.2.3



# Chapter 2

## Methods

In this thesis I am attempting to accomplish three distinct goals: to examine the current health-seeking trends in America, something that has yet to have been done in medical sociology with urgent care in consideration; then, to examine the question of *whom*: by clustering the groups who have chosen to go to urgent care; and finally, to use the quantitative data and sociological theories to hypothesize on the reasons behind the decisions.

Using National Ambulatory Medical Care Survey data for the years 2008-2012, I utilize unsupervised machine learning methods in order to develop a descriptive categories of urgent care center patients. From the exploratory analysis, I then test the resulting variables in a logarithmic regression analysis, developing a model of urgent care seekers.

The initial exploratory nature of the analysis is motivated by the current lack of statistical analysis and social theory surround urgent care centers, despite their rapid progression as an acceptable replacement for primary care (erhm). The results of the findings will hopefully allow those intent on locating urgent care centers within the larger contextual framework of the American health care system to draw on the revealed typologies of urgent care seekers in order to better understand the industry's

rapid growth.

## 2.1 Data

Empirical exploration of the theories proposed in chapter 1 require data that provides an abundance of variables which may or may not be statistically important but which we cannot initially rule out, as well as a large size since the phenomenon is still comparatively rare when talking about how patients access primary care in the US. I thus chose the National Ambulatory Medical Care Survey (NAMCS), which is a national survey designed to provide researchers in the medical and social science fields “accurate and reliable information about the provision and use of ambulatory medical care services in the United States”.

Ambulatory care is defined by the survey as health services or acute care services provided to patients on an outpatient basis, without an overnight stay, and every year NAMCS surveys visits to non-federal employed office-based physicians are collected from a representative sample of the United States. These surveys contain information about how the patients utilize physician services and hospital outpatient and emergency department services, the conditions most often treated, and the diagnostic and therapeutic services rendered, including medications prescribed. This data served the purpose of the current study because it is both representative of the larger trends in the United States and includes specific information regarding urgent care centers which can be used to explore that particular American health care trend in particular.

I specifically examined the group of visits were coded as having been at “Urgent Care Centers/Freestanding clinics” by the NAMCS. While the combined years produced a dataset of 123,123 observations, only 3,863 of those occurred at urgent care centers (about 3 percent). Of these visits, I limited the analysis to patients over the age of 18, bringing the sample to 3,224 visits to urgent care centers.



Some limitations to the data should be noted. There may be related errors given that as the popularity of urgent care centers have risen, so too have the number that participated in the NAMCS. In 2008, there were 842 visits surveyed compared to 1168 surveyed in 2010.

## 2.2 Variable Selection and Summary Statistics

The variables I chose to include in my analysis were chosen with both data availability and sociological theory in mind. Initially I am interested in looking at demographics surrounding age, race, gender, and socio economic status. Initial clusters included dummy variables for self-pay, private insurance, race (white, black, hispanic, asian, 2+), sex, rural, and wealthy. To identify the subsets, I took random samples from the cases which were recording as having been at urgent care centers using the dplyr package `sample_n`, which allows for a random sampling of rows from a table. From the cases which were recording as having been at urgent care centers. For the three years in question a total of 2459 visits to urgent care were surveyed. In order to get workable training data for the unsupervised clustering, I set aside a random sample of 250 visits for test data, and proceeded to randomly sample from the 2209 cases available, running the analysis on 250 observations at a time.

Table 2.1: Summary Statistics 1

Variable	Category	Percentage
Sex		100.00
	Female	57.10
	Male	42.90
AgeGroup		100.00
	15-24 years	8.68
	25-44 years	22.89
	45-64 years	29.63
	65-74 years	13.93
	75 years and over	12.58
	Under 15 years	12.30
Race		100.00
	Black	9.15
	Other	3.87
	White	86.98
PaymentType		100.00
	All sources of payment are blank	0.44
	Medicaid	10.67
	Medicare	26.37
	No charge	0.58
	Other	3.07
	Private insurance	46.90
	Self-pay	4.86
	Unknown	1.93
	Worker's compensation	5.17
UrbanCategory		100.00
	Large central metro	24.60
	Large fringe metro	14.62
	Medium metro	34.55
	Micropolitan/noncore (nonmetro)	15.98
	Missing data	0.00
	Small metro	10.25
PercentPoverty		100.00
	Missing data	0.00
	Quartile 1 (Less than 5.00 percent)	18.16
	Quartile 2 (5.00-9.99 percent)	30.24
	Quartile 3 (10.00-19.99 percent)	39.22
	Quartile 4 (20.00 percent or more)	12.38

Below are the summary statistics for an example sample:

```
summarize_each(sample1, funs(mean))
```

**insert table here**

Within just this one random sample, we can observe that urgent care visitor are mostly white, urban and not wealthy. There is an almost even mix of those who have private insurance and those who don't, only about 7% pay out of pocket, and there seems to be an even mix of sexes.

Four other methodological decisions were made by following either statistical convention or similar previous analyses. All variables were created as dummy variables, and the distances between these were standardized on a scale from 0 to 1, so as to prevent any skewness which might result. Second, I chose to use the measure of distance known as the Jaccard method, which is specifically created to measure the distance between 0 to 1 scaled variables. It also has the unique feature of not including as significant pairs which both have 0 for a parameter. This is substantively important since though two visits may both have 0's for Private Insurance for example, the fact that they both don't have private insurance is not enough to consider them theoretically similar by negation: one may be on medicare while the other may be uninsured. Third, for the actual grouping themselves, I have chosen the standard Ward's method, which attempts to minimize the variance within groups and thus maximizes the homogeneity within groups. Fourth, in keeping with similar exploratory analyses, I have limited the clusters to a theoretically interesting number while keeping a manageable representation of reality.

This can be thought of as us having a set of

$$X_1, X_2, X_3, \dots, X_n$$

observations.

First, we have standardized all the variables we used on a scale from 0 to 1, to prevent the sort of skewed analysis that might result if some variables with a broad range of absolute values were allowed to dominate the data analysis. Second, we have chosen the classic measure of distance known as ‘squared Euclidean’ to evaluate the similarities between cases, as it gives more importance to greater distances, and thus makes it possible to bring out the differences between countries whose profiles still show high degrees of similarity.<sup>12</sup> Third, for the actual groupings themselves, we have adopted the usual Ward’s method, which minimizes the variance within groups and thus maximizes their homogeneity. Fourth, in keeping with normal practices for exploratory analyses

In the supervised learning world, the data in question has an obvious response variable, which is tested against a null hypothesis based on theory. For this case, we do not know exactly what the outcome of interest is for those patients who went to urgent care, rather we are interested in who is choosing to go there. For such a data set, clustering methods allow us to examine the data in an *unsupervised* manner — mainly in that we let the statistical software find the patterns rather than test for patterns at the start.

## 2.3 Hierarchical Cluster Analysis

To examine such data, I have chosen to use hierarchical cluster analysis. This method allows for grouping patients that have similar characteristics across a set of variables by dividing a set of cases into ever more numerous and specific subsets, thus leading to homogenous empirical types (Rapkin and Luke, 1993). One of the most powerful exploratory aspects of cluster analysis is that you do not need to have a response variable in order to better understand your data. For this project, this is extremely useful since we initially only know who is going to urgent care and who is not, but

would like to understand them as a group better before drawing comparisons between patients who visited a traditional primary care clinic. Also a plus for cluster analysis, such inductive methodologies are based only on quantitative similarities among cases, only two factors may be responsible for trends in the data: the actual structure of the observed phenomenon and the methodological decisions I made concerning choosing the cases and variables (including the statistical method used to identify subsets).

Because I am interested in two somewhat distinct aspects of the patients of Urgent Care— both their demographics and their patterns of use — The clustering was performed in two batches of parameters which aimed to help us understand the two different side to a visit to urgent care. Variables for *Age, Sex, Race, Urban Type, % Neighborhood Poverty, % Neighborhood college degree attainment, and Pay Type*, what I will refer to as the *demographic variables* from this point forward were first analyzed for subgroups. Secondly, some of the same variables were again analyzed with the behavior parameters of *Injury related, Primary Caregiver, Seen Before?, Past Visits, Major Reason, and the day of the week*, what I will refer to as the *behavior parameters*.

While clustering methods are increasingly being used to generate scientific hypotheses, this analysis rather aims to apply clustering as a method of retrodution on a phenomenon that is currently vastly under studied. The methodological decisions of this study are divided into three areas: (1) the determination of the number of clusters, (2) the examination of how the clusters differ in terms of multiple parameters, and (3) examining the clusters in light of the theoretical hypotheses posed in the introduction.

### 2.3.1 Determining the number of Clusters

*soon to be in the appendix*

Because urgent care centers have been greatly ignored by sociologists studying medical practices, there was little theoretical guidance in selecting a likely number of subgroups for the analysis. Similarly, because I am interested in understanding how an

unsupervised analysis of patient data will reveal trends, it was particularly important to the analysis that the number of clusters were both mathematically achievable and substantively small enough for analysis.

To accomplish this, I began with hierarchical clustering of the random samples chosen from the data. Using a mixed-methods tool to calculate the distance matrix between the various observations, I placed each point into an algorithm which subsequently minimized the variance between clusters. Figure 1 shows the banner for the initial agglomerative cluster methods for the behavioral variables. .

The white lines extending to the right represent clusters which differ from each other. After running the hierarchical, bottom up method for a number of trials, the agglomerative coefficient was always between .73 and .8, indicating that as the height for which the clusters should stop combining. Again, Figure 1 demonstrates that at that height, 8 clusters are have clearly separated.

# Chapter 3

## Analysis

### 3.1 not rly sure what this section is anymore . . . .

A quick summary of the data shows that by and large most of the observations continue to choose traditional means of obscuring primary care. Great quote: For our purposes, we do not presume to go quite this far, but we are applying this method as a form of retrodution, using observed evidence to create a research hypothesis that accounts for the observed facts *Sayer, 1992*.

### 3.2 Identifying Typologies with Cluster Analysis

While clustering methods are incresingly being used to generate scientific hypotheses, this analysis rather aims to apply clustering as a method of retrodution on a phenomenon that is currently vastly under studied. The results of this study are divided into three areas: (1) the determination of the number of clusters, (2) the examination of how the clusters differ in terms of multiple parameters, and (3) examining the clusters in light of the theoretical hypotheses posed in the introduction.

Because I am interested in two somewhat distinct aspects of the patients of Urgent Care– both their demographics and their patterns of use – The clustering was

performed in two batches of parameters which aimed to help us understand the two different side to a visit to urgent care. Variables for *Age, Sex, Race, Urban Type, % Neighborhood Poverty, % Neighborhood college degree attainment, and Pay Type*, what I will refer to as the *demographic variables* from this point forward were first analyzed for subgroups. Secondly, some of the same variables were again analyzed with the behavior parameters of *Injury related, Primary Caregiver, Seen Before?, Past Visits, Major Reason, and the day of the week*, what I will refer to as the *behavior parameters*.

### 3.2.1 Determining the number of Clusters

*soon to be in the appendix*

Because urgent care centers have been greatly ignored by sociologists studying medical practices, there was little theoretical guidance in selecting a likely number of subgroups for the analysis. Similarly, because I am interested in understanding how an unsupervised analysis of patient data will reveal trends, it was particularly important to the analysis that the number of clusters were both mathematically achievable and substantively small enough for analysis.

To accomplish this, I began with hierarchical clustering of the random samples chosen from the data. Using a mixed-methods tool to calculate the distance matrix between the various observations, I placed each point into an algorithm which subsequently minimized the variance between clusters. **Figure** shows the banner for the initial agglomerative cluster methods for the behavioral variables. .

The white lines extending to the right represent clusters which differ from each other. After running the hierarchical, bottom up method for a number of trials, the agglomerative coefficient was always between .73 and .8, indicating that as the height for which the clusters should stop combining. Again, **fig** demonstrates that at that height, 8 clusters are have clearly separated.



### 3.2.2 Differences in Demographic and Behavioral Factors Between Clusters

With cluster assignments established, I then analyzed how the identified groups differed from each other in terms of critical demographic characteristics and behaviors that are described in the literature. Most importantly—in order to better understand the characteristics of individuals choosing to go to urgent care we must understand which characteristics or behaviors most distinguished the clusters in the analysis.

Beginning with demographic trends, it is immediately clear that there are large homogenous groups within the selection of patients who utilize urgent care. Of the 8 clusters, 7 are predominantly or exclusively white.

\*\* old table location \*\*

## 3.3 With commentary

The exploratory analysis to follow was motivated by the current lack of statistical analysis and social theory surround urgent care centers, despite their rapid progression as an acceptable replacement for primary care (erhm). The exploratory nature of the findings will allow those intent on locating urgent care centers within the larger contextual framework of the American health care system to draw on the revealed typologies of urgent care seekers in order to better understand the industry's rapid growth. [UNNECESSARY!]

Because I am particularly interested in two somewhat individual facets of the patients of urgent care—both their demographics and their patterns of use—the clustering was performed in two batches of parameters which aimed to help develop an understanding of the two components which are involved in a visit to urgent care[WHOA TORTURED SENTENCE] . Variables for Age, Sex, Race, Urban Type, % Neighborhood Poverty, % Neighborhood college degree attainment, and Pay Type,

which I will refer to as the demographic variables from this point forward, were first analyzed for subgroups.

Subsequently, some of the same variables were again analyzed with the parameters of Injury related, Primary Caregiver, Seen Before, Past Visits, Major Reason, and the day of the week, which I will refer to as the behavior parameters. *[FYI, you should have a section of your methods discussion dedicated to explaining each of these variables.]*

The analysis of this study is divided into three areas: (1) the determination of the number of clusters, (2) the examination of how the clusters differ in terms of multiple parameters, and (3) examining the clusters in light of the theoretical hypotheses posed in the introduction.

#### *Determining the number of Clusters*

**[Most of this can go in an appendix]**

Because urgent care centers have been significantly overlooked by sociologists studying medical practices, there was little theoretical guidance in selecting a likely number of subgroups for the cluster analysis, often the first step in such examinations. Similarly, because I am interested in understanding how an unsupervised analysis of patient data will reveal trends, rather than imposing them onto the data, it was particularly important to the investigation that the number of clusters be both mathematically achievable and substantively small enough for analysis while still remaining unsupervised. The general rule of thumb for cluster analysis suggested by Mardia, Kent and Bibbby (1997) stipulates that the number of clusters  $k$  is approximately the square root of  $n / 2$ . However, in the case of our comparably small sample of urgent care visitors recorded in the NAMCS data set, such a rule would indicate at least 30 clusters—clearly not a workable number to make sense of patterns in urgent care patients and their use.

Instead, to estimate a  $k$  which would produce heterogeneous groups while still

remaining theoretically enlightening, I began with non-guided hierarchal clustering of samples of 200 visits to urgent care centers randomly chosen from the data. Using the Gower methodology of finding the distance between dissimilar variable types, I calculated the distance matrix between the various observations for each sample. These distance measures were then used as the input to a hierarchal clustering algorithm which attempted to minimize the distance between observations within the same groups while maximizing the distance between them. Figure 1 shows the ‘banner’ for the initial agglomerative cluster methods for the behavioral variables, and can be understood as a graphical representation of the points at which a cluster breaks away from the pack of observations. The white lines extending to the right represent clusters at their separation point, where larger red areas between white lines indicate stronger outside group variance.

*Figure 1. Agglomerative Cluster Banner*

After running the hierarchal method for a number of trials (on-going), the agglomerative coefficient for the behavioral parameters remained between .73 and .8 (so-far), indicating that level as the most-likely optimal height for which the clusters should stop combining in order to maximize their heterogeneity and avoid overfitting the groups. For the demographic variables, the coefficient ranged between .8 and .85, with an average of 12 clusters at those heights. Again, Figure 1 demonstrates graphically that at roughly height .75, 8 clusters have clearly separated and to go further left would dramatically decrease the differences between groups. For the demographic variables, the coefficient ranged between .8 and .85, with an average of 12 clusters at those heights. Accordingly, the demographic set of parameters and the behavioral set of parameters were assigned 8 and 12 clusters respectively, which were then used to sort the samples into homogenous groups.

### 3.3.1 Differences in Demographic and Behavioral Factors Between Clusters

In order to better understand the characteristics of individuals choosing to go to urgent care, we must first understand which characteristics or behaviors most distinguished the clusters in the cluster analysis, and to do this I used the k-modes clustering algorithm to situation observations into similar groups of patients. With cluster assignments established by the hierarchal agglomerative methods above, I then analyzed how the identified groups or 8 and 12 differed from each other in terms of critical demographic characteristics and visit behaviors that were described in the literature review.

Beginning with demographic trends, the cluster analysis makes immediately clear that there are distinct homogenous groups within the selection of patients who utilize urgent care. Race in particular is immediately noticeable for its lack of variety: of the 12 clusters, 9 are predominantly or exclusively white, an unsurprising trend when one looks at the summary statistics (of the 3863 urgent care visits included in the data, 87% (3352) of those were white individuals). Table 1 shows the modes of each cluster for an illustrative sample of patients, and it is immediately clear that the majority of urgent care goers are white, but that within clusters of white patients there is further segmentation.

For an example of such segmentation, we can examine the socioeconomic indicators for the patients' ZIP codes which were included as demographic parameters. Unsurprisingly, these appeared to cluster and correlate with both race and income: for both males and females, there were consistent clusters of White, 25-44-year-old patients with private insurance, and both of these clusters were in the highest quartile of percent population with Bachelor's degrees, the second lowest percent population under the poverty line (5-10%), and both visited clinics coded as being located in a "Large central metro" (Table 1.).

In fact, if one predominant trend becomes clear from the demographic clustering,

it is that urgent care centers are almost entirely an urban affair. Of the clusters found, all but one consisted of visits located in medium to large metros, indicating that while other variation between patients exists, most urgent care consumers are located in larger cities. And if its singularity wasn't enough, the cluster of visits which did occur in a rural setting also differed from most other clusters in the other parameters as well. As can be seen in the first row of Table 1., the rural ("Micropolitan/noncore") cluster of visits had one of the highest levels of localized poverty, one of the lowest levels of educational attainment, and was one of only two clusters where the majority of visits were paid with Medicaid.

Also informative are the clusters' most occurring payment types, which complicate some of the theoretical notions of urgent care described in Chapter 1. While the largest clusters were consistently comprised of private insurance payers, Medicare without a doubt plays a role in getting people to urgent care centers. Medicaid had the lowest numbers of visits across all trials, averaging around 12 % of the observations. These clusters are crucial to understanding the decision process behind choosing a health care provider, while simultaneously raising the question of the relationship between the surprising number of elderly patients on Medicare seeking treatment at an urgent care centers.[THIS PARAGRAPH SHOULD OFFER A CLEARER STORY – AND CLARIFY THE DISTINCTION BETWEEN MEDICARE AND MEDICAID]

If the demographic clusters illuminate the subgroup characteristics of urgent care seekers with socioeconomic status in mind, the behavioral parameters included in the second wave of cluster analyses allow us to go further in examining how urgent care is utilized by different groups. [READ THAT SENTENCE AND THINK OF YOUR POOR MOTHER.] It should be noted that though the analyses were performed in two waves, the clusters should be examined with each other in mind, and I have included some of the key demographic variables in with the behavioral variables to that end. [OH YEAH, THIS IS GOING IN THE APPENDIX]

*Figure 2. Color coded clusters.*

Figure 1 above shows the typical spread of the behavioral parameters' clusters, and is useful for keeping the proportions of clusters in mind. By far the largest and most homogenous clusters isolated consist of white, privately insured patients in medium to large urban environments. These trends match those found in the demographic clusters, and we can learn even more about this group by examining the cluster segmentation that occurred across their behavioral parameters in the second wave. Of the two clusters which consist almost entirely of white, 25-44-year-old men and women (yellow and light pink in Figure 1 above), both were almost entirely classed as "established patients", with at least one past visit. Also theoretically interesting, neither cluster had observations whose reason for visiting was "injury related" and neither had recorded visits on weekends. Cluster one in particular (Row 1, Table 2), consisted of 25-44-year-old white females with private insurance, an established history of visiting urgent care, and a reason for their current visit coded as a "chronic, routine problem". [SUGGESTION: LOW-TECH TABLE TO ILLUSTRATE YOUR CLUSTERS. COLUMNS FOR URBAN/RURAL, RACE, AND OTHER KEY VARIABLES.]

In fact, only 32 visits in the example model were coded as new patients (Figure 2, purple and orange), and examining these two clusters reveals what I referred to earlier as the traditional patient characteristics ascribed to urgent care visits. These two cluster show what many would expect, both consisted of white, privately insured, new patients, and both clusters contain the only observations which occurred on a weekend or were coded as injury related. These characteristics are in line with what many hold as the purpose of urgent care centers, but they remain a small fraction of the recorded number of visits. Completely contradicting this idea, the other seven of the nine clusters identified have high levels of established patients with chronic or routine problems, with ages ranging for 15 to over 75.

As for the Medicare question, if the clusters which consist of primarily elderly patients are examined—rows 5 and 9 in Table 2 (Figure 2, magenta and blue)—we can begin to understand a little better the relatively large percentage of what many would consider non-emergent care utilizers and their relationship to urgent care. Cluster 5 consists entirely of white patients between 65 and 74, whose visits were recorded as routine and who have a minimum of 3 past visits at the same center. Cluster nine on the other hand has a slightly older age range of above 75, and visits which were all considered new problems. Also distinguishing, cluster nine is the only cluster with a majority of rural observations. When compared, it appears that there are two typologies of elderly urgent care seekers, the first of which may be using urgent in much the same ways as the younger and larger clusters of privately insured urbanites, while the second seems to rely on urgent care much more as an actual resource for urgent problems.

### **3.3.2 What do these mean?**

The question remains how the observed trends align with the literature that assess

(working on making aggregated/pretty/readable versions of these)