

Emergency Department Utilization Among Kansas Medicaid Aged, Blind, and Disabled
Beneficiaries with Severe Mental Illness: the Context and Extent of Ambulatory Care
Sensitive Visits

By

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MBA, Purdue University, 2010

Submitted to the graduate degree program in Health Policy and Management and the
Graduate Faculty of the University of Kansas in partial fulfillment of the requirements
for the degree of Doctor of Philosophy.

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Emergency Department Utilization Among Kansas Medicaid Aged, Blind, and Disabled
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Date approved: June 9, 2015

Abstract

This research examines severe mental illness (SMI) and avoidable emergency department (ED) utilization among Kansas Medicaid beneficiaries. We compared SMI and non-SMI subgroups in relation to ED rates and proportion of avoidable or ambulatory care sensitive (ACS) visits over time. We also evaluated the distribution of visits over the course of a year as well as the effect of SMI on ED and ACS ED visits. Finally, we compared clinical reasons behind ACS visits for the SMI and non-SMI subgroups.

Paper one evaluated ED utilization and ACS ED use from a longitudinal perspective for the SMI and non-SMI subgroups. ED visit rates for the SMI group were approximately two times higher than the non-SMI group, year over year. Rates for the non-SMI group peaked in 2010, while they peaked for the SMI group in 2011. The proportion of visits considered ACS by the NYU ED algorithm were higher each year for the non-SMI group in comparison to the SMI group. However, for both subgroups, ACS visit rates slightly declined from 2007-2012. Although rates are not rising, they are still concerning at current levels.

The second study suggests that, although beneficiaries with SMI use the ED more than individuals without SMI, they do not use it more for ACS visits. SMI significantly increased the likelihood of an ED visit but it did not do so for an ACS ED visit. There was also a significant positive association between primary care utilization and ED use as well as ACS ED use. SMI beneficiaries are appropriate targets for policies aimed at reducing ED utilization but not ACS ED use.

Finally, we found that the clinical reasons for ACS visits between SMI and non-SMI beneficiaries are mostly consistent based on ICD9 diagnosis codes. ACS visits are also highly concentrated among these ICD9 codes. Common conditions for ACS categories regardless of SMI status include asthma, upper respiratory conditions, abdominal issues, and diabetes. A strategy focused on targeting individuals by chronic condition in order to reduce ACS visits may be more successful than one zeroing in on SMI status.

Acknowledgements

It is with gratitude that I recognize the individuals who supported this research and my journey to reach this milestone. First, to my advisor Theresa Shireman. Your patience and direction throughout the past four years has taught me to be a more critical thinker, a better writer, and a more curious individual. Thank you for reading countless drafts of my work, for encouraging me to push forward, and for being a tough critic.

To the rest of my committee, each of you has been of value to me during this process. Through conversations, classroom learning, and other outside research projects I have continually learned from each of you. I appreciate the time and effort you all have put into the completion of my dissertation. Additional thanks to Suzanne Hunt for her efforts on this work during its beginning stages as part of the Medicaid Health Home project.

To my classmates and friends, Jackie Hill and Karen Johnson, thank you for coming on this journey with me. Your feedback and encouragement has been incredible. To Norb Belz, thank you for being the most wonderful sounding board and for encouraging me to keep moving forward. To Kevin Sykes, thank you for paving the way. You have been instrumental in getting me to this point and showing me first hand that it can happen.

To my family, your continual support has lifted me up and allowed me to pursue my dreams. Thank you for being my biggest cheerleader and motivation throughout my life, and especially during the last five years.

To Jeff, I am forever grateful that you have pushed me to complete my degree as we begin our life together. You have done everything possible to help me succeed, at times even putting my needs before your own. Your kindness, patience, and love are incredible. Thank you for standing by me.

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Chapter 1: Introduction

Background

In 2006, the Institute of Medicine (IOM) published a report on the future of emergency medicine in the United States and warned that it was reaching its “breaking point” (The Institute of Medicine, 2006). Rising utilization, nationwide closures, and an increase in safety-net care provided by the emergency department (ED) together created significant pressure on the emergency care system. Overall, the demand for ED services was outstripping its capacity, creating an environment that was not conducive to the emergency department’s intended function. Despite this alarming report, we still do not know how to fully solve the problems surrounding ED utilization, or whom these types of policies should target.

Although researchers have investigated various aspects of emergency care, there is much to be learned about the ED and its users. Utilization has been studied from a broad perspective but the landscape surrounding ED use by certain populations and subgroups is not fully understood. The characteristics and health status of individuals who most often use the ED for non-urgent issues, for example, is less established than the role of insurance coverage or income level. When analyzed using Anderson’s model of healthcare utilization, certain groups of factors have been more extensively studied than others (Andersen & Newman, 1973). Many of the basic predisposing and enabling elements associated with an increase in utilization have been studied at length, but the examination of health-based or need characteristics influencing ED use is still in its

infancy. In the absence of a full understanding of this information, it will be difficult to devise an effective solution that addresses the utilization problems facing the ED.

The Role of the ED

Modern EDs were developed after World War II in conjunction with the rise of hospital-based medicine but their role in the healthcare system has increased and expanded over time (Morganti, Bouhoff, & Blanchard, 2013). Unlike other healthcare settings, the original purpose of the ED was to treat patients with severe injuries or critical illnesses, and respond to unexpected public health emergencies and disasters (Delia & Cantor, 2009). Today however, the ED is often used in a different context, as it has become the only healthcare setting where patients can be seen at any day or time, for any condition, and regardless of a patient's ability to pay. This legal requirement, known as the federal Emergency Medical Treatment and Active Labor Act (EMTALA) mandates that all hospitals participating in the Medicare program must evaluate and provide stabilizing treatments for emergency conditions regardless of an individual's insurance status or ability to pay (Centers for Medicare and Medicaid Services, 2012).

EMTALA has significantly altered the role of the ED. While it still functions as a site of care catered toward serious illness and injuries, the emergency department has also taken on the expanded role of providing care for those with less urgent conditions and for patients unable to visit a primary care physician or other site of care. For this reason, today many policymakers and researchers refer to the ED as the "safety net for the safety net"(Siegel, 2004).

ED Utilization, Mental Health, and Medicaid

The ED is undoubtedly a sector of the healthcare industry necessitating additional research, novel interventions, and policy changes. Studying the ED in its entirety, however, is inefficient and redundant. There are certain elements of emergency utilization such as the role of insurance, gender, and primary care provider (PCP) access that have been studied repeatedly. In order to move the study of ED utilization forward, more specific research examining high-impact groups is needed. These high-impact groups are comprised of individuals who are expected to use the ED frequently or more inappropriately than others, resulting in excessive cost and negatively impacting ED capacity constraints. Two such subgroups are individuals with a severe mental illness (SMI) and individuals with Medicaid coverage.

Individuals with SMI have different healthcare needs than those without such conditions. They have high rates of co-occurring chronic conditions and are twice as likely to experience barriers to care such as cost or access (Dickerson et al., 2003; Druss & Rosenheck, 1998; J. Sokal et al., 2004). Simultaneously, those with SMI are high users of overall healthcare services when compared to the general population (Hackman et al., 2006; Nossel et al., 2010). SMI also contributes to an increased risk of non-psychiatric hospitalizations, ED utilization, and a longer than average ED length of stay (Fogarty, Sharma, Chetty, & Culpepper, 2008; Little, Clasen, Hendricks, & Walker, 2011). Medicaid beneficiaries with SMI have been found to have high levels of outpatient services including the ED, but low levels of preventive and primary care (Berren, Santiago, Zent, & Carbone, 1999; Salsberry, Chipps, & Kennedy, 2005). In summary,

people with SMI tend to use more healthcare and more outpatient services in particular. Since they may also experience barriers to preventive services, we can expect individuals with SMI to use the ED for routine, non-emergency type care.

Like people with SMI, Medicaid beneficiaries are a unique subpopulation that is susceptible to high rates of ED utilization. Medicaid beneficiaries have multiple chronic conditions, poor overall health status, and frequently experience barriers to preventive care and behavioral health services (Cheung, Wiler, Lowe, & Ginde, 2012; The Kaiser Commission on Medicaid and the Uninsured, 2013; The Kaiser Family Foundation, 2014). Medicaid beneficiaries are the highest users of ED services for non-urgent and frequent care but the variation within this population is unknown (Hunt, Weber, Showstack, Colby, & Callahan, 2006; Sharma et al., 2000; Suruda, Burns, Knight, & Dean, 2005; Wolfson, Schragger, Khanna, Coates, & Kipke, 2012; Zuckerman & Shen, 2004). Medicaid beneficiaries are more likely to have multiple visits to the emergency department than those with private insurance and the uninsured. In 2007, nearly 25% of children and 40% of adults with Medicaid coverage had at least one ED visit during the course of the year. Furthermore, 5% of Medicaid beneficiaries during this twelve month period had four or more ED visits compared to 2% of the uninsured and 1% of the privately insured (Garcia, 2010) population.

Past healthcare utilization trends and ED use for Medicaid beneficiaries and individuals with SMI support the need to investigate further the way in which these groups use emergency services. Due to their health conditions and obstacles in

obtaining primary care it is probable to expect these individuals to use the ED for non-urgent reasons.

Research Aims

A better understanding of the healthcare utilization landscape requires a more in-depth look at emergency department services and trends. In order to address unnecessary ED use indicated by national surveys and reviews, we need to know who is using emergency care and why. Although utilization policies may be a necessary component of cost reform, they must be targeted at the appropriate populations and behaviors in order to maximize their efficiency and effectiveness. If the increase in ED visits over the last several decades is due to a rise in trauma, natural disasters, and true emergencies, then there is a need to reevaluate capacity, ED operations, staffing, and hospital specific elements. If, however, the rise in ED care is associated with an increase in use for other, less appropriate reasons, then solutions to the problem must address patients' behavior and access to other, more appropriate healthcare settings. These policies would emphasize individual characteristics such as environmental factors, social constraints, and specific diseases that influence patients' choice to utilize the ED when other forms of healthcare would be more suitable.

This dissertation will help us more fully understand the wider ED utilization problem. In particular, it will assess the appropriateness of ED visits for a subset of the population. This group is known to be a high-cost population with high overall healthcare utilization, complex healthcare needs, and an increased reliance on the safety net. Our specific research questions addressing this topic along with their

associated hypotheses found in this dissertation are discussed below. The first research question is longitudinal in nature and looks at the same group of individuals over six years in order to reveal historical patterns of ED and ACS ED utilization while research questions two and three evaluate ED utilization and ACS utilization among only those beneficiaries continuously enrolled during one fiscal year. Thus the study populations between the research questions differ.

Research Question 1:

1a) How does the rate of ED visits for Kansas Medicaid beneficiaries with SMI compare to that of beneficiaries without SMI over time for a continuously enrolled cohort? 1b) What proportion of historical ED visits for the same SMI and non-SMI populations are avoidable or ambulatory care sensitive (ACS) and are these visits increasing?

This question will be addressed using historical Medicaid claims data. It will provide context of the ED and avoidable ED landscape from a trend perspective within a continuously eligible group of beneficiaries. Does ED use fluctuate over time for the same eligible beneficiaries within Kansas Medicaid? Does the rate differ based on SMI status? Is there a rise or decline in avoidable ED use and does it differ based on the presence of serious mental illness? These questions will help inform the findings of our other research questions by establishing the degree of urgency surrounding problems within the ED. It will also add to the literature by providing a much-needed longitudinal analysis of ACS visits for a high-risk population. We will use a subset of Medicaid beneficiaries who are continuously enrolled over a six-year study period for this set of

questions. Thus, we will be able to evaluate the ED utilization and ACS use of the same individuals as they age and presumably as their health declines.

Hypothesis 1:

Based on national utilization trends, the aging and increasing health burden of the population, and system-wide changes in the healthcare delivery landscape, we hypothesize that there will be an increase in both general ED utilization and ACS ED use among a cohort of Kansas Medicaid beneficiaries from 2007-2012. We do not necessarily expect ED utilization to increase at a faster rate for one group over another. In other words, we hypothesize that the 2007-2012 growth rates for the SMI group and the remainder of the cohort will be similar.

Research Question 2:

2a) What is the rate of ED visits and ACS ED visits per 1,000 Kansas Medicaid beneficiaries (SMI versus non-SMI) during FY2012 2b) What is the distribution of ED visits among Kansas Medicaid beneficiaries during FY2012 (SMI versus non-SMI), 2c) Does the presence of SMI influence ED utilization among Kansas Medicaid beneficiaries? 2d) Does the presence of SMI impact the likelihood of an ACS ED visit among Kansas Medicaid beneficiaries?

Our second research question contains four smaller related questions. It will first address and compare basic rates of ED use and ACS ED utilization within one fiscal year. Although we will measure rates of ED use and proportion of ACS ED utilization in research question one, rates in research question two will differ due to varying population selection criteria. Research question one requires a continuously eligible

cohort of beneficiaries from FY2007-FY2012 whereas research question two is separate and cross-sectional in design and only applies to beneficiaries enrolled for 12 continuous months during FY2012. This cross-sectional sample was not pulled from the longitudinal population in research question one, but was drawn independently from all FY2012 ABD beneficiaries. We then evaluated if the presence of SMI increases the likelihood that an individual will use emergency services. Furthermore, we identified the types of ED visits common for mental health beneficiaries. Are these visits appropriate or are they linked to less urgent or preventable conditions that could have been treated at other, more appropriate healthcare settings? Does the presence of an SMI increase the likelihood of a non-urgent ED visit? These questions were answered using an algorithm to classify the appropriateness of ED visits. Unlike research question one, this research question is cross sectional in nature and will tell us more detailed ED utilization information by SMI and non-SMI beneficiaries over the course of one fiscal year.

Hypothesis 2:

Individuals with severe mental health conditions differ from Medicaid beneficiaries without such conditions. They use more healthcare services overall, but often face barriers to preventive and primary care. Furthermore, they tend to have a high illness burden and are at risk for other chronic conditions and substance use disorders. Based on this information, we anticipate that individuals with SMI will visit the ED more often than individuals without mental health issues. We hypothesize that mental illness will significantly increase the likelihood of an avoidable ED visit as well.

In comparison to research question one, we expect the rates of ED utilization and ACS ED utilization for FY2012 in research question two to be lower than those presented in research question one. Although both are estimating rates for the same fiscal year, the population criteria for the two analyses differ. The cohort in research question one is continuously eligible for six years, resulting in a population that meets the Medicaid selection criteria for an extended period of time. It does not contain beneficiaries who have died during the study period, those who transferred in and out of Medicaid periodically, nor does it include those too young to qualify for the cohort during FY2007. This group of beneficiaries is aging over the course of the study period and are also most likely experiencing a decline in their health. Therefore ED rates and ACS ED rates presented for FY2012 in research question one will likely differ from those presented for the same fiscal year in research question two.

Research Question 3:

What are the most frequently occurring clinical reasons for ACS ED visits within a Kansas Medicaid population during FY2012 and do these conditions differ by SMI status?

Hypothesis 3:

We anticipate different reasons for ACS visits for beneficiaries with SMI compared to those without such conditions. Two factors may play a role in this result. First are the previous patterns of healthcare use for persons with SMI and their barriers to primary and preventive services. Second is the diversity among the Kansas Medicaid ABD population in regards to utilization, demographics, and disease burden. The ABD

population consists of beneficiaries with intellectual and developmental disabilities, physical disabilities, SMI, older adults in long-term care, and a small group of unclassified individuals. These disability subgroups vary in their use of Medicaid resources. It should also be noted that ABD beneficiaries do not include mothers and children who are covered by Medicaid (Shireman, Reichard, & Hunt, 2013). Like question two, research question three is also cross sectional.

Each chapter following the literature review of this dissertation will address these research questions independently. They are designed to contribute to the understanding of ACS ED utilization in a slightly different context, each through the analysis of claims data for a Medicaid population.

Chapter 2: Literature Review

National ED Utilization Trends

Recent national trends highlight the growing tension between ED cost, utilization, and capacity. Although the percentage of Americans visiting the ED has remained fairly stable over the past 10 years, ED expenditures have nearly doubled. On average, the total cost of an ED visit (hospital facility and physician spending) in 2000 was \$546 compared to \$969 in 2010. However, during the same ten year period, the total number of ED visits has increased 34% (Gindi, Cohen, & Kirzinger, 2012; National Center for Health Statistics, 2013) indicating a higher visit rate per person. Between 1999 and 2010 the national rate of ED visits per 100 persons has increased from 34.2 to 42.9. Adults between the ages of 25-64 years represented nearly half of all ED visits in 2010 but children less than 1 year and individuals over 75 had the highest visit rate per 100 persons (93.1 visits per 100 persons for children under the age of 1, and 63.5 for those 75 years old and above). Privately insured patients and those with Medicaid coverage comprised the majority of ED visits at 36.9% and 31.4% respectively (Centers for Disease Control and Prevention, 2010).

The growing number of annual ED visits and changes in ED utilization patterns not only impact expenditures, but they also influence ED capacity constraints and quality of care. As more individuals seek care and the number of visits per person increases, EDs can reach their capacity limit and experience overcrowding (National Center for Health Statistics, 2013). This capacity problem is exacerbated by the closure

of emergency departments across the US, due in large part to cost considerations. Since the late 1990's, the number of hospitals in the US operating emergency rooms has decreased by nearly 11% (National Center for Health Statistics, 2013). Between 1990 and 2009 one in four non-rural EDs closed. Those at a higher risk of closure included EDs that were privately owned, located in a competitive market, EDs with low profit margins, and facilities that functioned as a safety net (Hsia, 2011).

Nationwide, 40-50% of hospital EDs experience consistent daily overcrowding. Urban EDs are especially susceptible to this issue with approximately two-thirds reporting overcrowding (Burt & McCaig, 2006; Kaskie et al., 2010). Studies have linked overcrowding with longer ED wait times, treatment delays, and increases in the number of patients who leave the ED without being seen by a physician. Each of these repercussions can ultimately negatively impact quality of care and the health of the patient (Burt & McCaig, 2006; Centers for Disease Control and Prevention, 2013). Perpetual overcrowding also has the potential to strain the ED's staff and resources. Doing so raises additional concerns about the ability of emergency providers to handle a sudden surge in patients in response to a national disaster or public health crisis. In this way, overcrowding, closures, and utilization patterns are making it more difficult for the ED to perform one of its most critical and necessary functions (Delia & Cantor, 2009).

Tied to the issues of ED overcrowding, capacity constraints, and quality of care are ambulance diversions. In 2010, one third of all emergency departments diverted patients to other locations (Centers for Disease Control and Prevention, 2013). For EDs with an annual visit volume over 50,000 patients, this figure is even higher with 46.1%

reporting ambulance diversions (Centers for Disease Control and Prevention, 2010). According to the National Center for Health Statistics, an ambulance is diverted and rerouted to another available hospital every minute in the US (Burt, McCaig, & Valverde, 2006) increasing transport time on average between 1.7 and 5 minutes per patient (Pham, Patel, Millin, Kirsch, & Chanmugam, 2006). These delays result in occupied ambulances that are unable to transport other patients with potentially more serious life-threatening conditions. Diversions can also impact care treatment time and the long-term health outcomes of patients in critical condition (The Institute of Medicine, 2006).

Avoidable ED Utilization: Problem

The distress surrounding escalating ED costs and utilization is augmented by the triage and appropriateness of emergency medicine visits. Although the ED is intended to treat seriously ill and critically injured patients, research indicates that some individuals use it for less urgent conditions. This use of the ED can partially be linked to a failure of the healthcare system to provide appropriate, coordinated, and high quality care for individuals with chronic conditions and timely access to care (for example extended hours, seeing urgent cases quickly) (Delia & Cantor, 2009).

Inappropriate ED visits are problematic for a number of reasons. If EDs are occupied by individuals with non-urgent complaints, these facilities are less likely to be able to provide care to individuals requiring immediate attention. Non-urgent patients add to ED capacity constraints by occupying staff members and draining other limited resources. According to the National Hospital Ambulatory Medical Survey, 25.1% of

patients visiting the ED in 2010 were seen by a professional within 15 minutes of arrival (Centers for Disease Control and Prevention, 2013). In the case of true emergencies, this response time could pose serious health risks to patients needing more urgent medical care. Individuals utilizing the ED for non-urgent purposes, in effect, “crowd out” those who visit the hospital emergency room for life-threatening conditions. Non-urgent utilization simply intensifies the problem of ED overcrowding and ultimately impacts quality of care. Unlike primary care physicians, providers in the ED are not equipped to provide continuous, comprehensive care (New England Healthcare Institute, 2010).

Avoidable ED utilization is also a financial issue contributing to the overall problem of rising US healthcare costs. Emergency care related to minor illnesses and injuries tends to be more costly than equivalent care in other ambulatory care settings (Morganti et al., 2013; Weinick, Burns, & Mehrotra, 2010). Furthermore, it has been estimated that national ED overuse (non-urgent illness/injury and primary care treatable visits) represents approximately \$38 billion in unnecessary healthcare spending (New England Healthcare Institute, 2010).

Finally, inappropriate ED use signals some type of system-wide problem related to access and use of primary care services. As reported by the 2011 National Health Interview Survey, approximately 79.9% of all adults who visited the ED did so because they did not have access to other providers (Gindi et al., 2012). Other surveys and research estimate that nearly half of ED patients cited the inability to make a timely appointment and see their healthcare provider as a reason for their visit (Billings, Parikh, & Mijanovich, 2000b; D'Avolio, Strumpf, Feldman, Mitchell, & Rebholz, 2013; Gill &

Riley, 1996; Hefner, Wexler, & McAlearney, 2014; Redstone, Vancura, Barry, & Kutner, 2008). Although it is a unique and seemingly isolated setting, the ED is linked to utilization and continuity of care in all other healthcare delivery settings. Excessive ED use draws away from primary care utilization and other preventive environments.

Avoidable ED Utilization: Extent

Currently there is no standard measurement, consensus, or criteria for explaining what constitutes inappropriate or non-urgent ED care (Lowe & Schull, 2011). This absence of a universal definition has resulted in wildly different estimates regarding the portion of ED visits that are unnecessary. However, regardless of measurement technique, the literature suggests that a substantial portion of ED use is preventable or avoidable. Approximately 40% of ED visits were classified as semi-urgent or non-urgent in 2010 (Centers for Disease Control and Prevention, 2010). According to Billings and colleagues, nearly 75% of ED visits in New York were non-emergent or emergent but primary care treatable. In other words, these ED visits could have been avoided with greater access and proper utilization of ambulatory care services (2000b). Studies of EDs in North Carolina, Texas, and New Jersey that used Billing's algorithm demonstrated avoidable and non-urgent ED rates between 50-54% (Begley, Vojvodic, Seo, & Burau, 2006; Delia & Cantor, 2009; McWilliams, Tapp, Barker, & Dulin, 2011). Similarly, 49% of total ED volume and 45.1% of ED costs in Massachusetts were found to be preventable or avoidable according to the same algorithm (Massachusetts Division of Healthcare Finance and Policy, 2012). According to Weinick's analysis based on Billing's algorithm,

27.1% of all ED visits could potentially be treated at retail clinics or urgent care centers. (2010).

Other methods of classifying and measuring avoidable ED utilization estimate non-urgent visits at 60%. These studies labeled ED visits as non-urgent if they did not require hospital admission, include a procedure or imaging diagnostic for an accident or injury, or if the reason for the visit was within three days of a related accident or injury (Cunningham, Clancy, Cohen, & Wilets, 1995; Sarver, Cydulka, & Baker, 2002).

In contrast, Wolinsky et al., found that 5.8% of Medicare beneficiaries visited the ED for low intensity visits. This method utilized CPT codes (low to moderate severity problems and self-limited problems) to create an aggregate “low intensity visit” category. Wolinsky did not account for frequency of visits, making it difficult to assess what percentage of total ED utilization could be classified as low intensity (2008).

Avoidable ED Utilization: Predictors

One major limitation of the ED utilization literature that prevents a full synthesis is the variety of outcome measures utilized throughout studies. ED utilization is operationalized using many different definitions, both on a visit and person level and there is no consensus regarding its measurement. Dependent variables in the literature consist of total number of visits, ambulatory care visits not resulting in an admission, frequent users, ambulatory care sensitive visits, and non-urgent users, among others. Even within each of these categories, outcomes are operationalized and measured differently.

Despite this inconsistency in measurement of dependent variables, predictors of ED utilization are fairly established. Factors shown to be positively associated with higher utilization (regardless of urgency) include female gender, older age, African American race, lower levels of education, single marital status, insurance status (uninsured or Medicaid), low income, and poor health status (Begley et al., 2006; Chiou, Campbell, Myers, Culbertson, & Horswell, 2010; W. G. Johnson & Rimsza, 2004; Kwong, 2007; Lowe, McConnell, Vogt, & Smith, 2008; Ludwick, Fu, Warden, & Lowe, 2009; Matteson, Weitzen, Lafontaine, & Phipps, 2008; Merrick, Perloff, & Tompkins, 2010; Rust et al., 2008; Sun, Burstin, & Brennan, 2003; Wolfson et al., 2012).

As the ED utilization problem has become more severe, researchers have built on to these findings and investigated further the determinants of frequent ED users as well as factors contributing to avoidable ED use. Studies indicate that uninsured individuals, Medicaid beneficiaries, and those in poor health are more likely to use the ED for non-urgent reasons (Chiou et al., 2010; Cunningham et al., 1995; McWilliams et al., 2011; Sharma et al., 2000). However, other studies merely compared the insured versus the uninsured or other categories of coverage (Medicare versus other), making it challenging to confirm the positive association between Medicaid and non-urgent ED use.

Similar to the factors contributing to general ED use, studies have found that female gender and African American race are associated with higher rates of inappropriate emergency service utilization (Chiou et al., 2010; P. J. Johnson et al., 2012; McWilliams et al., 2011; Petersen, Burstin, O'Neil, Orav, & Brennan, 1998; Sarver et al.,

2002; Sharma et al., 2000). Other predictors found to influence non-urgent ED care include low income (Cunningham et al., 1995), living in an rural area (Liu, Sayre, & Carleton, 1999; Wolinsky et al., 2008), and patient perceptions of illness severity and preferences (Lowthian et al., 2013; Northington, Brice, & Zou, 2005) and primary care access barriers (Lowthian et al., 2013; Matteson et al., 2008).

SMI and ED Utilization

Although researchers have investigated determinants of ED utilization and to an extent frequent use, there is a shortage of studies examining the role of different chronic conditions and subpopulations on inappropriate emergency service utilization (Hunt et al., 2006; Kwong, 2007; Matteson et al., 2008; Park, Linakis, Skipper, & Scott, 2012; Pines et al., 2011; Pines & Buford, 2006; Sun et al., 2003; Vinton, Capp, Rooks, Abbott, & Ginde, 2014; Zuckerman & Shen, 2004). This includes the connection between SMI and avoidable ED utilization. To date most studies are limited to their analysis of predisposing and enabling characteristics such as race, gender, and insurance status.

At the same time, it is well known that individuals with mental illness use the healthcare system differently than those without behavioral conditions. Due to their conditions, patterns of utilization and need for services for this sub-group differs from the general population. Individuals with SMI also face perceived and actual barriers to routine and preventive care (Berren et al., 1999; Deacon, Lickel, & Abramowitz, 2008; Dickerson et al., 2003; Durden et al., 2010; Salsberry et al., 2005). As noted previously, studies have linked primary care access issues to increases in ED utilization. Given this connection, we would expect individuals with SMI to have higher rates of urgent care

(Berren et al., 1999; Salsberry et al., 2005). Research supports the idea that individuals with SMI are more likely to use emergency room services. People with bipolar disorder, schizophrenia, as well as those with schizophrenia and co-occurring substance use disorders are more likely to visit the ED (Baillargeon et al., 2008; Clark, Samnaliev, & McGovern, 2007; Curran et al., 2008; Doran, Raven, & Rosenheck, 2013). Within one state's Medicaid population, 69% of beneficiaries with schizophrenia and 83% of beneficiaries diagnosed with anxiety had at least one visit to the ED (Salsberry et al., 2005). General anxiety and personality disorders as well as other mental health conditions such as obsessive-compulsive disorder, social phobias, and major depression are also linked to higher emergency service utilization (Deacon et al., 2008; Wagner, Pietrzak, & Petry, 2008). Similarly, post-traumatic stress disorder also increases the likelihood of ED utilization (Cohen et al., 2010; Dobie et al., 2006; Fogarty et al., 2008).

Based on the current state of ED care and previous knowledge surrounding utilization for individuals with SMI and/or Medicaid emergency service utilization, a study examining the impact of mental health on appropriate ED use is needed.

Chapter 3: Avoidable Emergency Department Visits Among Kansas Medicaid Aged, Blind, and Disabled Beneficiaries with Severe Mental Illness from FY2007- FY2012

Introduction

Although the Emergency Medical Treatment and Active Labor Act (EMTALA) was developed to ensure access to the emergency department (ED) for all individuals in the case of true emergencies, it has inadvertently allowed many to use the ED for non-urgent or ambulatory care sensitive (ACS) conditions (Centers for Medicare and Medicaid Services, 2012). ACS ED utilization is problematic because it crowds out appropriate ED users, ties up scarce resources, impacts quality of care, and is more expensive than outpatient or office-based care contributing to the rising cost of healthcare (Machlin, 2006; Morganti et al., 2013; Weinick et al., 2010).

Although there is no standard ACS ED measurement, there is a consensus that a sizeable portion of visits are inappropriate. A variety of methods classify 40-75% of ED visits as semi-urgent, non-urgent, or primary care treatable (Begley et al., 2006; Billings et al., 2000b; Cunningham et al., 1995; DeLia, 2006; Massachusetts Division of Healthcare Finance and Policy, 2012; McWilliams et al., 2011; Sarver et al., 2002). Factors associated with non-urgent ED utilization have not been fully vetted but there is evidence that female gender, African American race, low income, rural geography, poor health status, Medicaid coverage, and patient perception of illness and severity all contribute to inappropriate emergency service use (Chiou et al., 2010; Cunningham et al., 1995; P. J. Johnson et al., 2012; Lowthian et al., 2013; Matteson et al., 2008;

McWilliams et al., 2011; Northington et al., 2005; Sarver et al., 2002; Wolinsky et al., 2008).

Although these factors have been found to contribute to ACS utilization, few researchers have analyzed variation among these high-risk subgroups. Medicaid beneficiaries are a particularly vulnerable group because they tend to have poor overall health status, multiple chronic conditions, and frequently experience barriers to preventive and behavioral health services (Cheung et al., 2012; The Kaiser Commission on Medicaid and the Uninsured, 2013; The Kaiser Family Foundation, 2014). We would expect each of these factors to increase their likelihood of using the ED for non-urgent emergency care. This expectation has been confirmed in a number of studies that link Medicaid coverage to inappropriate ED use (Chiou et al., 2010; Cunningham et al., 1995; McWilliams et al., 2011; Sharma et al., 2000). Medicaid has been deemed a risk factor for overall ED utilization and ACS ED use, yet variation within this population is unknown. Given their high service needs, previous ED usage patterns, and barriers to routine care, there is reason to suspect that individuals with severe mental illness (SMI) within a Medicaid population may have higher ACS ED utilization than other beneficiaries without SMI. People with SMI have high morbidity and mortality, are in overall poor health, experience barriers to care, are at risk for other co-morbidities, and are less likely to receive preventive services but use high levels of outpatient care (Carney, Jones, & Woolson, 2006; Druss & Rosenheck, 1998; Felker, Yazel, & Short, 1996; Harris, 1998).

Previous multi-payer national trend studies have shown that those with Medicaid coverage are more likely to have non-urgent ED visits, and that the ED visit rate for ambulatory care sensitive conditions for Medicaid beneficiaries increased between 1999 and 2007 (Liu et al., 1999; Tang, Stein, Hsia, Maselli, & Gonzales, 2010). What is lacking from these longitudinal studies is a more in-depth evaluation within the Medicaid population over time. The next step in learning about ED utilization and ACS ED use is to build on these trend studies and determine the variation within the high-risk Medicaid population. Medicaid is not a homogeneous group when it comes to demographics and comorbidities and, consequently, healthcare utilization, so illuminating the diversity in ED patterns among this group is valuable. Within the Kansas Medicaid ABD population there exists variation in cost and users of inpatient, outpatient, and other health sources by disability group (Shireman et al., 2013). Such an analysis over multiple years yields a more comprehensive representation of the extent and context of the ACS ED utilization problem. Multiple years of data can also help illustrate changes that may have resulted from policy decisions, can signal the need for future developments, and can be used to establish baseline rates for policy change. Furthermore, by measuring ED use for the same cohort of beneficiaries each year over a specified time period, we can more accurately assess patterns of ED use without disruptions relating to Medicaid eligibility or mortality that might impact utilization patterns. An evaluation from this approach is needed in order to minimize other extraneous factors that may alter rates of ACS ED use.

Our analysis seeks to address ED utilization by persons with SMI from a historical, longitudinal standpoint by answering the following questions: (1) How does the rate of ED visits for Kansas Medicaid beneficiaries with SMI compare to that of beneficiaries without SMI over time? (2) What proportion of historical ED visits for the SMI and non-SMI populations are ACS and are these visits rising or falling?

Methods

Design

For this longitudinal analysis we used Kansas Medicaid Aged, Blind, and Disabled (ABD) Fee-for Service (FFS) claims from FY2007-FY2012. These multiple years of data were used to compare historical ED rates as well as avoidable ED visits for beneficiaries with and without serious mental illness.

Study Subjects

Our study population consisted of Kansas Medicaid ABD beneficiaries over the age of 18 who were continuously eligible for the length of the study period 2007-2012. Although this specification excluded beneficiaries who used the ED with irregular enrollment, continuous enrollment is a necessary inclusion criteria for other components of our analysis. Irregular enrollment could signal issues such as beneficiary mortality, transfer to other states' Medicaid programs, or loss of eligibility. Our analysis was focused only on beneficiaries that were enrolled for all six years continuously, thus they maintained their Medicaid coverage for the duration of the study period. Therefore our analysis contained a subsection of the ABD population. We excluded non-disabled adults or children under the age of 18.

We used ICD9 codes to segregate the cohort into SMI and non-SMI groups. We defined SMI as beneficiaries with an ICD-9 diagnosis code for schizophrenia (295.xx), bipolar and major depressive disorder (296.xx), delusional disorder (297.xx), psychosis NOS (298.xx), personality disorders (301.22, 301.83), and post-traumatic stress disorder (PTSD) (309.81). We utilized ICD-9 codes in our analysis since other measures of functional risk are not available in Kansas Medicaid claims. Beneficiaries with an ICD-9 code for a SMI condition were considered part of the SMI group for the entire study period regardless of the year in which the diagnosis code was found, e.g. we assumed these were prevalent conditions.

The non-SMI group contained all other ABD beneficiaries without one of the above-mentioned ICD-9 codes. These individuals included mostly, beneficiaries with intellectual and developmental disabilities, physical disabilities, and those who were aged and in long-term care (Shireman et al., 2013). Our non-SMI subgroup, therefore, did not contain the remainder of Kansas Medicaid, but the rest of the ABD population only because we excluded mothers and children.

Approval

This study was approved by the University of Kansas School of Medicine Human Subjects Committee IRB with HIPAA waiver. Access to the Medicaid claims was obtained through an approved data use agreement with the state of Kansas.

Outcome Variables

The primary outcome variables were the total number of ED visits, rate of ED visits per 1,000 beneficiaries, and the percentage of avoidable ED visits for each

subgroup. We identified ED visits in the physician service claims data using Healthcare Common Procedure Coding System (HCPCS) current procedural terminology (CPT) codes that indicate the setting in which care was delivered (99281, 99282, 99283, 99284, 99285).

The percent of visits that were avoidable were measured using an algorithm developed by Billings and colleagues (2000b). The algorithm is used widely to classify ED visits and has been successfully validated (Ballard et al., 2010; Gandhi & Sabik, 2014; Jones, Paxton, Hagtvedt, & Etchason, 2013). The algorithm assigns visits probabilities of being 1) non-emergent, 2) emergent-primary care treatable, 3) emergent-preventable/avoidable, and 4) emergent, or places visits into a mutually exclusive category 5) injury 6) psychiatric 7) substance abuse, or 8) unclassified. We aggregated the primary care treatable (1), preventable/avoidable (2), and non-emergent (3), groups to create an ACS group representing avoidable emergency department visits similar to others who have utilized the algorithm (Begley et al., 2006; Delia & Cantor, 2009; McWilliams et al., 2011).

We made two modifications to the algorithm. First, we created decision rules that placed each visit into a single category rather than apportioning visits by percentages as originally conducted by the algorithm. The final category for each visit was determined by the category with the highest probability. In the case of ties, we took the most conservative approach and chose the emergent category followed by primary care treatable, avoidable, and non-emergent.

Second, for individuals with multiple ED claims per day, the day's visit with the greatest probability of being emergent was chosen. If the individual had injury, psychiatric, substance abuse, or unclassified claims, we chose the category with the most claims for that day. For any ties, injury was chosen first, followed by psychiatric, substance abuse, and unclassified.

Independent Variables

Independent variables included gender, race (white, black, other), age (as of July 1, 2006), dual Medicare eligibility (FY2007), Chronic Illness and Disability Payment System (CDPS), primary care provider utilization and urban.

We included measures of disease burden and primary care visits over the course of the study period, as these factors tend to indicate the health of the population and access to preventive services. For disease burden, we used the Chronic Illness and Disability Payment System (CDPS) score computed from the prior years' claims (Kronick, Gilmer, Dreyfus, & Lee, 2000). Because the original CDPS was developed using Medicaid populations, it is sensitive to the specific characteristics of our population.

Primary care visits for each year were identified using the National Committee on Quality Assurance's (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS) CPT codes for preventive or primary care visits (National Committee for Quality Assurance, 2012). Codes for eye exams were omitted.

The urban variable was created by matching a beneficiary's county of residence in FY2007 to data from the US Census Bureau Urban and Rural Classification System

(United States Census Bureau, 2014). Counties with 2,500 people or less were considered rural, while those with more than 2,500 were classified as urban.

Data Analysis

We compared descriptive statistics for the SMI and non-SMI group using Pearson Chi-Squared tests and t-tests to show differences and similarities between the subgroups. Application of the NYU ED algorithm was performed using SAS and subsequent data analysis was performed using SPSS programs (version 22). A p-value of <0.05 was considered statistically significant throughout the analysis.

Results

Descriptives

The cohort characteristics recorded in the first year, FY2007 are shown in Table 1. The total cohort included 35,828 continuously enrolled (2007-2012) ABD beneficiaries, just over one-third 34.5% of whom met the criteria for SMI. Overall persons in the SMI group were significantly younger than those in the non-SMI group with a larger percentage of the population between 19-44 and fewer beneficiaries over the age of 65. The average age of the SMI group was 45.6 compared to 54.0 for the non-SMI population. There was no difference in gender between the SMI and non-SMI group with over 60% of each subset consisting of women. The SMI group had a significantly higher percentage of white beneficiaries (83.3%) in contrast to the non-SMI group (79.6%). In comparison to the non-SMI group, the SMI subgroup had a significantly higher proportion of dual Medicare eligible beneficiaries. Fewer SMI enrollees (45.4%) lived in rural Kansas compared to non-SMI beneficiaries (50.5%).

Both the SMI and non-SMI group's average CDPS score or disease burden increased over time with the exception of 2012 (Figure 1). The SMI subgroup consistently had a statistically significantly higher average CDPS than the non-SMI group ($p < 0.001$).

There was a statistically significant higher percentage of SMI beneficiaries who had a PCP visit each year as compared to non-SMI beneficiaries ($p < 0.001$) (Figure 2). For the non-SMI group, the percent of beneficiaries with a PCP visit peaked in FY2009 at 80.3%. This was lower than the maximum for the SMI group (88.6% in FY2010). By FY2012, 75.5% of the non-SMI group and 86.1% of the SMI group had at least one primary care visit (Figure 2).

ED Visit Utilization Trends

In 2007 the SMI subgroup had 20,319 visits to the ED or 1642.3 visits/1,000 individuals (Table 2). The visit rate for beneficiaries with SMI continued to increase each year until 2011 when it peaked at 1932.5 visits/1,000 individuals. The group visit rate for both subgroups increased from 2007 to 2011 before a slight decline to 1828.6 in 2012. Final 2012 ED visit rate for the SMI group, however, was still higher than the initial 2007 rate. The ED visit rate among beneficiaries with SMI was nearly 2x that of beneficiaries without SMI each year. The visit rate among people without SMI followed a similar growth pattern between 2007-2012 but was half of that compared to the SMI group. The ED visit rate among beneficiaries without SMI was 831.4/1,000 individuals in 2007. It rose to 940.4 by 2007 and then decreased in 2012 to 849.1.

ED visit rates for SMI beneficiaries were higher than for non-SMI beneficiaries regardless of baseline characteristics (Table 3). When segregated by demographics, the highest ED visit rates within the SMI group were for females, blacks, PCP users and individuals living in urban environments. Within the Non-SMI group, high rates of ED use were found for the same types of beneficiaries, in addition to those between the ages of 45-64. For both the SMI and non-SMI groups, the lowest ED visit rates each year were for those who did not have a PCP visit.

NYU ED Algorithm Utilization Trends

Figure 4 depicts the rate of avoidable or ACS ED visits from 2007 through 2012 for people with SMI as compared to Medicaid ABD enrollees without SMI. The rate of ACS visits for the non-SMI group was 47.4% and the rate for the SMI group 46.0%. Over the length of the analysis, the percentage of ACS visits fell for the SMI group and the non-SMI group. By 2012 avoidable visits decreased to 41.2% for the total cohort, 40.8% for SMI, and 41.5% for non-SMI. Across each group there was nearly a 6% decline in ACS ED visits from 2007 to 2012.

As ACS ED visits as a percentage of all ED visits declined, other types of visits during the study period increased. Emergent visits for each group trended slightly upward as is presented in figure 4. For the SMI population, emergent visits gradually increased nearly 2.0% from 10.4% in 2007 to 12.3% in 2012. The non-SMI group's portion of emergent visits rose as well, but only by about 1.0% over the study period.

The SMI group had higher psychiatric ED visits each year when compared to the non-SMI group each year during the course of the study period (figure 5). Psychiatric

visits fell from 9.0% in 2007 to 7.4% in 2012 for the SMI group while they rose from 1.7% to 2.2% for the non-SMI group. Unclassified visits gradually increased for both the non-SMI and SMI groups each year. For the total cohort, unclassified ED visits increased from 15.1% in 2007 to 20.6% in 2012. The non-SMI group's ED visits were consistently comprised of more unclassified visits when compared to the SMI group.

Given the substantial portion of unclassified visits for both population groups and their increasing percentage of total visits over time, we classified ED visits a second time without these trips to the ED. Once we eliminated unclassified visits from the analysis, the distribution of visits in the other categories was even more stable than the original analysis.

ACS visits for the non-SMI group fell from 56.8% of all visits in 2007 to 53.6% in 2012 compared to 53.2% in 2007 and 50.3% in 2012 for the SMI group. Emergent visits increased during the analysis period from 15.5% to 18.8% of visits for the non-SMI group and 12.1% to 14.5% of visits for the SMI group. Without the inclusion of unclassified trips to the ED, a larger percentage of visits were deemed as psychiatric for the SMI group. These psychiatric visits declined from 10.4% of visits in 2007 to 9.7% in 2012 for the SMI group. Psychiatric visits for the non-SMI group were lower, falling from 2.0% in 2007 to 1.4% in 2012 (Table 6).

Discussion

The purpose of our study was to determine if Medicaid beneficiaries with SMI had more ED visits compared to disabled individuals without SMI over a six-year period. Another objective was to determine which subgroup had more ACS visits during

between FY2007-FY2012 and evaluate the patterns of avoidable ED use during this time. Persons with SMI had nearly twice the rate of ED visits as Medicaid ABD enrollees without SMI each year. Regardless of SMI status, the highest ED visit rates were for females, blacks, individuals with at least one PCP visit, and those living in urban environments. ACS ED visit rates between SMI and non-SMI beneficiaries were similar, however, the percentage of total visits that were classified as ACS for both subgroups was substantial, approximating half of all visits. Despite different population parameters, our findings are in line with other studies that use the NYU algorithm that estimate ACS visits near 49-54% (Begley et al., 2006; DeLia, 2006; Massachusetts Division of Healthcare Finance and Policy, 2012). Our analysis adds to this body of research by examining utilization within an already established group of high ACS ED users, and segregating use by severe mental health status. Although avoidable ED visits do not seem to be increasing over time or varied by SMI, they are consistently high enough to warrant further research and policy attention (Delia & Cantor, 2009; Morganti et al., 2013; Weinick et al., 2010).

The rate of ED visits per 1,000 beneficiaries was two times higher for SMI beneficiaries than for the non-SMI group but contrary to what we anticipated, a higher proportion of SMI visits were not ACS in comparison to the non-SMI group. The majority of our findings in relation to ED utilization rate by beneficiary demographics fall in line with established literature. For example, regardless of SMI status, females, blacks, and those living in urban environments had the highest rates of emergency service use (Chiou et al., 2010; Hunt et al., 2006; Kwong, 2007; Merrick et al., 2010; Pines et al.,

2011; Sharma et al., 2000; Zuckerman & Shen, 2004). Most ED theory suggests that there is an inverse relationship between the use of primary care and ED services (Ludwick et al., 2009; Matteson et al., 2008). Our results, however, show that beneficiaries who had a primary care visit also had high ED utilization rates. Some ED literature suggests that frequent ED visitors may also be high users of all health care, including primary care (Kwong, 2007; Pines & Buford, 2006; Sun et al., 2003). This finding would help explain our results as would the positive relationship between primary care referral and emergency service use. An analysis that further stratifies the distribution and frequency of ED visits and PCP use would allow for additional useful research in this area that would help explain the nature of these results.

Also worth noting is the high rate of ED utilization for both subgroups compared to the 2012 national average of 424/1,000 individuals (American Hospital Association, 2012). Both the SMI and non-SMI groups in our study utilized the ED well above this rate in FY2012 (1829/1,000 and 849/1,000 respectively). The difference between the non-SMI and SMI rates further strengthens the notion that individuals with SMI are more likely to use emergency services (Baillargeon et al., 2008; Clark et al., 2007; Cohen et al., 2010; Deacon et al., 2008; Doran et al., 2013; Salsberry et al., 2005). Furthermore, the high ED visit rate among the SMI subgroup in comparison to the average Medicaid ED visit rate of 820/1,000 emphasizes the difference in ED utilization among different groups within the Kansas ABD population and builds on literature evaluating utilization within Medicaid (Rasch, Gulley, & Chan, 2013; Shireman et al., 2013). The non-SMI group, consisting of beneficiaries with other disabilities, still had an ED visit rate similar

to the Medicaid average whereas the rate for enrollees with severe mental illness was more than twice the national Medicaid average.

Although we anticipated elevated ED utilization by the SMI group, recent research has shown that individuals with disabilities account for a disproportionately high proportion of trips to emergency rooms each year (Rasch, Gulley, & Chan, 2013). The non-SMI group (those with other disabilities) in our study, however, still had much lower ED utilization rates than SMI beneficiaries. In regard to ACS utilization, our findings fall in line with an estimate by the CDC, but are lower than other studies that estimate avoidable visits to be closer to 54-60% (Centers for Disease Control and Prevention, 2013). These studies evaluated ED visits in safety-net hospitals only or analyzed visits across multiple payers and are therefore not directly comparable (Begley et al., 2006; DeLia, 2006; McWilliams et al., 2011).

Our study is not without limitations. One drawback includes the use of certain ICD9 codes as inclusion criteria for the SMI group. Altering this criterion could possibly change the results by broadening the SMI group or making it more exclusive. Doing so may result in different ED and ACS ED rates between the SMI and non-SMI groups. Furthermore, our analysis was restricted to the use of HCPCS codes for ED visit identification. Although revenue codes may also be used to identify emergency care in health services research, they are not available in Kansas Medicaid claims and were not a source of ED measurement in our analysis.

Some may interpret continuous Medicaid enrollment as a study limitation. However, irregular enrollment could signal issues such as beneficiary mortality, transfer

to other state Medicaid programs, or loss of eligibility criteria which could complicate the accurate measurement of ED utilization from year to year for a cohort. Finally, our results cannot be completely compared against other state programs or groups given the unique characteristics and elements of Kansas Medicaid. However, our findings in relation to the SMI population are more generalizable since individuals with severe mental illness tend to be Medicaid beneficiaries regardless of state (The Kaiser Commission on Medicaid and the Uninsured, 2011).

The primary strength of our study is that it is the first to use a validated and established algorithm over multiple years to evaluate the ED utilization among the SMI population within an already high emergency service use group of Medicaid beneficiaries (Ballard et al., 2010; Gandhi, Grant, & Sabik, 2014; Tang et al., 2010). Another strength of our study is that it is the first to disaggregate ED and ACS ED utilization among beneficiaries with and without severe mental illness.

Policies and strategies moving forward would be highly dependent on the goal of specific Medicaid programs. Whereas reducing ACS utilization would not require specification by SMI status, it would be beneficial to target the SMI population for objectives relating to lowering ED use. Shifting some non-urgent ED visits to primary care or other alternative sites is one solution to the problem. It has been estimated that 13.7%-27.1% of ED visits could take place at urgent care or retail care clinics, or freestanding hospital-based urgent care clinics (New England Healthcare Institute, 2010; Weinick et al., 2010). Another successful model that could help curb ED or ACS ED utilization includes Wisconsin's Program of Assertive Community Treatment (PACT) that

provides mental health and social services to a select group of SMI beneficiaries with higher than optimal utilization (Wisconsin Department of Health Services, 2015). Other strategies include effective chronic disease management programs for beneficiaries with a high disease burden and subsequent high ED utilization (New England Healthcare Institute, 2010; New York State Office of Mental Health, 2015). Given that our analysis indicated that primary care access was not an obstacle for our study population, this enhanced chronic disease management service could be provided through area community mental health centers, or through community health workers (CHW) trained to connect beneficiaries with support services (Enard & Ganelin, 2013; New England Healthcare Institute, 2010). The use of CHWs has been shown to successfully reduce the odds of returning to the ED for ACS ED utilization in the 12 months following the intervention for both uninsured and Medicaid covered individuals (Enard & Ganelin, 2013).

Conclusion

As ACS ED visits hover at current levels, and the ED remains a setting where services are required to be provided for all, costs, demand, and quality will continue to be a source of tension in the emergency services setting. Reliance on the ED for more routine care as is evident through high ACS visits and high ED visit rates among the SMI population raises concerns for the healthcare system overall. Future research must build on these findings and uncover differences in ACS visits by type, diagnosis, and frequency in order to accurately target policies that prevent ED visits or, divert patients to more appropriate settings.

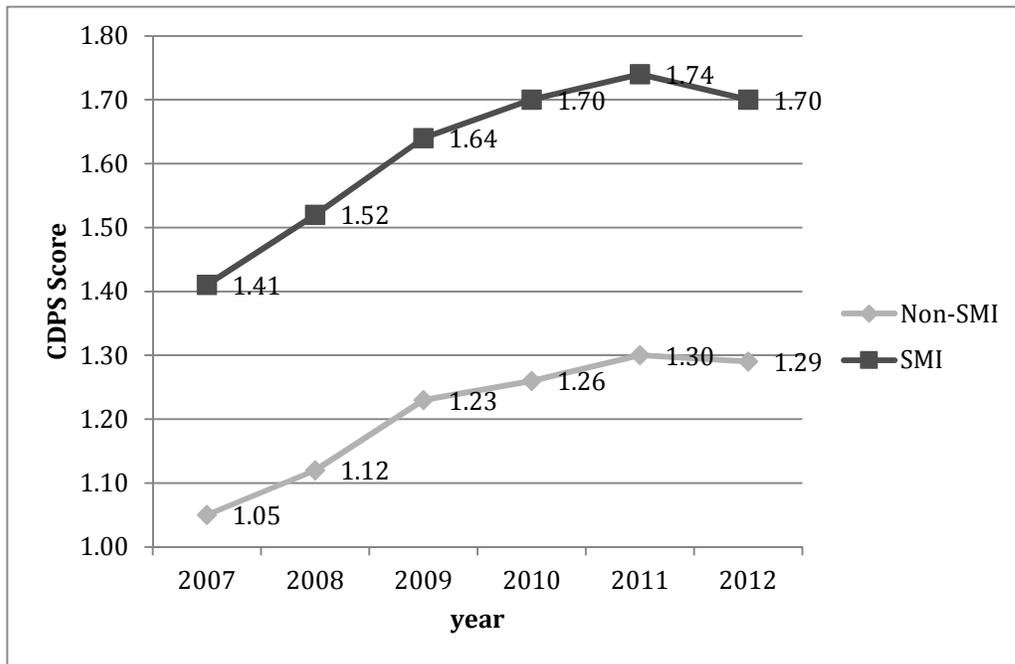
Table 1: Baseline Descriptives FY2007 Kansas Medicaid ABD Beneficiaries by SMI Status

		Non-SMI	SMI	P-value
N	35,828	23,456	12,372	
Age				<0.001
	<i>19-44</i>	30.8%	36.2%	
	<i>45-64</i>	37.4%	39.8%	
	<i>65+</i>	31.8%	24.0%	
Mean Age		54.0	45.6	
Gender				0.096
	<i>Female</i>	60.9%	61.8%	
Race				<0.001
	<i>White</i>	79.6%	83.3%	
	<i>Black</i>	14.2%	13.6%	
	<i>Other</i>	6.2%	3.1%	
Dual Medicare				<0.001
		39.9%	42.9%	
Geography				<0.001
	<i>Urban</i>	49.5%	54.6%	

ABD: Aged, Blind, and Disabled

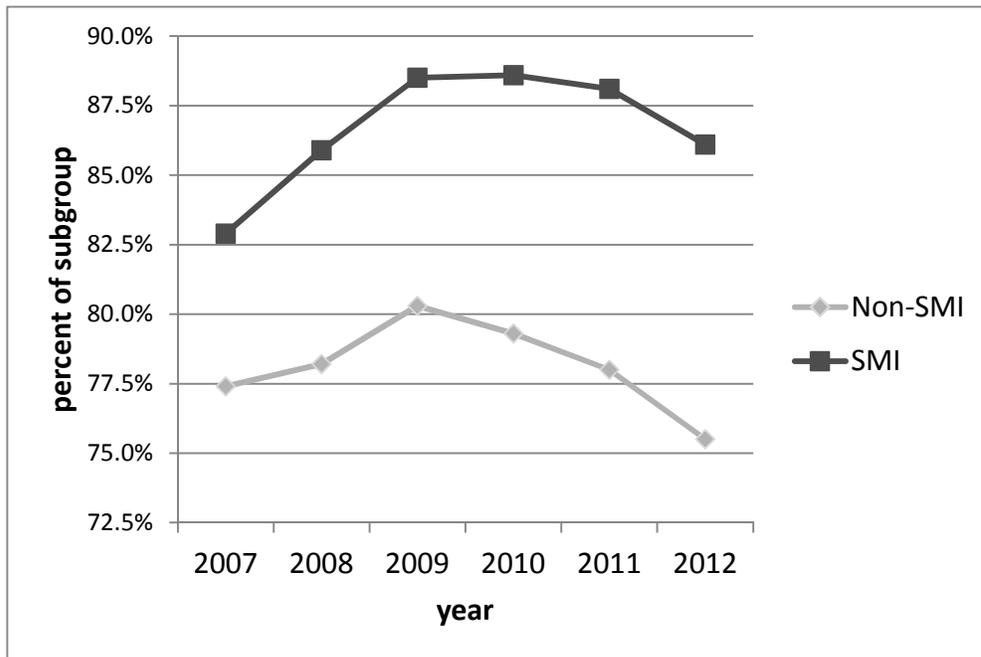
SMI: Severe Mental Illness

Figure 1: Average CDPS Disease Burden for Kansas Medicaid ABD Beneficiaries by SMI Status FY2007-FY2012



*SMI versus non-SMI significant each year
CDPS: Chronic Illness and Disability Payment System
ABD: Aged, Blind, and Disabled
SMI: Severe Mental Illness

Figure 2: Percentage of Kansas Medicaid ABD Beneficiaries with ≥ 1 PCP visit FY2007-FY2012



*SMI versus non-SMI significant each year

ABD: Aged, Blind, and Disabled

PCP: primary care provider

SMI: severe mental illness

Table 2: Total Annual ED Visits and ED Visit Rate for Kansas Medicaid ABD Beneficiaries by SMI status FY2007-FY2012

	Non-SMI visits	SMI visits	visits/1000 non-SMI	visits/1000 SMI
FY 2007	19502	20319	831.4	1642.3
FY 2008	21927	21926	934.7	1772.2
FY 2009	22086	23113	941.5	1868.2
FY 2010	22099	23872	942.1	1929.5
FY 2011	22059	23909	940.4	1932.5
FY 2012	19919	22623	849.1	1828.6

ABD: aged, blind, and disabled
 SMI: severe mental illness

Table 3: ED Visit Rate per 1,000 Kansas Medicaid ABD Beneficiaries by Baseline Characteristics for SMI and non-SMI Subgroups during FY2007-FY2012

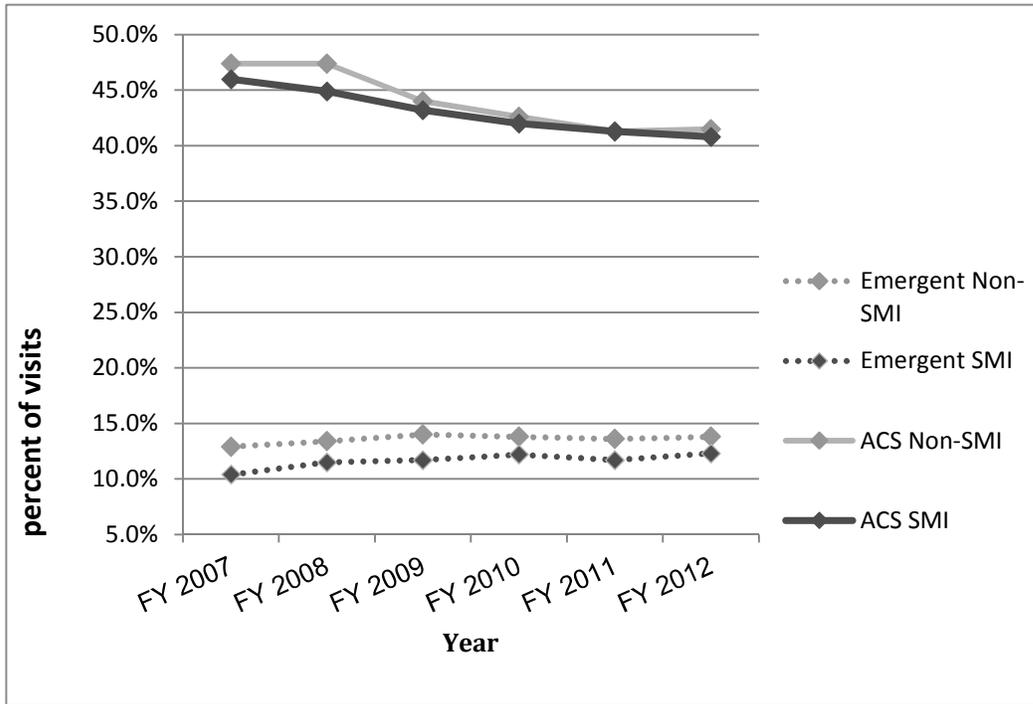
	2007		2008		2009		2010		2011		2012	
	Non-SMI	SMI										
<i>Female</i>	914.7	1774.2	994.7	1938.9	1030.4	2018.4	1086.4	2023.8	1069.7	2034.3	1010.5	1834.9
<i>Male</i>	790.8	1256.2	841.4	1369.6	926.2	1407.9	910.8	1401.9	529.2	1376.6	892.8	1246.2
<i>White</i>	873.5	1594.1	941.5	1732.8	1005.4	1792.2	1021.2	1767.3	1020.2	1768.7	972.6	1592.4
<i>Black</i>	996.4	1593.0	1081.8	1776.7	1110.4	1863.2	1213.6	2006.5	1237.1	184.2	1122.7	1777.3
<i>Other</i>	475.2	1021.0	512.4	1168.0	511.0	1249.3	508.9	1320.2	509.6	1378.0	513.8	1343.8
<i>19-44</i>	969.4	1678.3	985.5	1749.8	979.1	1796.3	990.5	1525.2	866.3	1560.6	732.1	1341.9
<i>45-64</i>	989.2	1584.5	1084.9	1799.5	1164.5	1874.4	1183.9	1941.6	1210.4	2026.8	1158.1	1862.9
<i>65+</i>	548.0	1023.7	608.0	1202.5	700.1	1299.7	748.3	1435.6	828.6	1728.3	848.2	1741.5
<i>no PCP</i>	268.2	538.3	257.5	456.5	223.3	410.6	234.1	404.9	252.5	395.9	260.3	422.4
<i>PCP>1</i>	1040.9	1790.2	1099.5	1982.1	1213.5	2068.4	1246.6	2070.9	1243.3	2068.8	1170.2	1854.7
<i>Dual</i>	392.9	429.0	406.0	438.3	406.7	465.8	415.0	477.8	444.3	497.2	408.1	477.1
<i>Rural</i>	806.8	1488.7	859.4	1650.1	956.7	1647.8	933.8	1547.3	896.8	1562.7	852.4	1381.2
<i>Urban</i>	926.8	1649.2	959.9	1780.7	1069.1	1899.5	1103.3	1985.0	1144.1	1966.2	1078.7	1800.4

ABD: aged, blind, and disabled

SMI: severe mental illness

PCP: primary care provider

Figure 4: ACS and Emergent ED Visits by for Kansas Medicaid ABD Beneficiaries by SMI Status FY2007-FY2012



ACS: ambulatory care sensitive
 ABD: aged, blind, and disabled,
 SMI: severe mental illness

Table 5: Distribution of Kansas Medicaid ABD ED Visits by SMI Status FY2007-FY2012

	Year	Non-SMI	SMI
ACS			
	2007	47.4%	46.0%
	2008	47.4%	44.9%
	2009	44.0%	43.2%
	2010	42.6%	42.0%
	2011	41.3%	41.3%
	2012	41.5%	40.8%
Emergent			
	2007	12.9%	10.4%
	2008	13.4%	11.5%
	2009	14.0%	11.7%
	2010	13.8%	12.2%
	2011	13.6%	11.7%
	2012	13.8%	12.3%
Injury			
	2007	20.9%	20.0%
	2008	20.1%	18.9%
	2009	21.0%	19.8%
	2010	20.3%	20.2%
	2011	20.6%	19.9%
	2012	20.2%	19.3%
Psychiatric			
	2007	1.7%	9.0%
	2008	1.7%	8.5%
	2009	1.6%	7.9%
	2010	1.6%	7.5%
	2011	1.8%	7.7%
	2012	2.2%	7.4%
Substance Abuse			
	2007	0.4%	1.0%
	2008	0.5%	1.0%
	2009	0.4%	0.8%
	2010	0.4%	1.0%
	2011	0.4%	1.1%
	2012	0.5%	1.0%
Unclassified			
	2007	16.7%	13.5%
	2008	17.0%	15.2%
	2009	18.9%	16.6%
	2010	21.3%	17.2%
	2011	22.3%	18.3%
	2012	21.8%	19.1%

ABD: aged, blind, disabled, SMI: severe mental illness

ACS: ambulatory care sensitive

Table 6: Distribution of Kansas Medicaid ABD ED Visits by SMI Status FY2007-FY2012 (Excluding Unclassified Visits)

	Year	Non-SMI	SMI
ACS			
	2007	56.8%	53.2%
	2008	57.7%	51.4%
	2009	54.9%	51.4%
	2010	54.9%	50.2%
	2011	53.5%	50.3%
	2012	53.6%	50.3%
Emergent			
	2007	15.5%	12.1%
	2008	16.3%	12.8%
	2009	17.6%	13.2%
	2010	18.1%	14.1%
	2011	18.7%	13.5%
	2012	18.8%	14.5%
Injury			
	2007	25.1%	23.1%
	2008	24.1%	22.0%
	2009	25.6%	24.1%
	2010	25.5%	24.7%
	2011	26.0%	25.0%
	2012	25.6%	24.4%
Psychiatric			
	2007	2.0%	10.4%
	2008	1.3%	12.5%
	2009	1.4%	10.5%
	2010	1.2%	9.9%
	2011	1.4%	9.8%
	2012	1.4%	9.7%
Substance Abuse			
	2007	0.5%	1.2%
	2008	0.6%	1.3%
	2009	0.6%	1.0%
	2010	0.6%	1.2%
	2011	0.5%	1.4%
	2012	0.6%	1.2%

ABD: aged, blind, disabled, SMI: severe mental illness

ACS: ambulatory care sensitive

Chapter 4: Avoidable Emergency Department Visits Among Kansas Medicaid Aged, Blind, and Disabled Beneficiaries with Severe Mental Illness

Introduction

There is rising concern surrounding the improper use of the emergency department (ED) and the consequences non-urgent utilization has on the healthcare system. Non-urgent or ambulatory care sensitive (ACS) ED utilization can contribute to overcrowding and higher healthcare costs and can negatively impact quality of care (Morganti et al., 2013; New England Healthcare Institute, 2010). Many ACS visits can be prevented with appropriate and routine primary care, or they can be treated in a less expensive setting with better-coordinated, more comprehensive care.

There is no standard measurement of ACS ED visits but most estimates of its prevalence range from 40-75% of visits (Begley et al., 2006; Billings et al., 2000b; Centers for Disease Control and Prevention, 2013; DeLia, 2006; McWilliams et al., 2011). ACS ED visits have been evaluated across multiple payer types using discharge data and have been segregated by basic predisposing and enabling characteristics. Studies have found that after accounting for ACS use, approximately 11-13% of visits are emergent, 18-20% are related to injury, 1% substance abuse, 1-2% psych, and 7-13% are unclassified (Begley et al., 2006; Massachusetts Division of Healthcare Finance and Policy, 2012; McWilliams et al., 2011).

ACS ED visits have been evaluated across multiple payer types using discharge data and have been segregated by basic characteristics. Predictors of ACS ED utilization

are not completely understood but higher rates of avoidable visits have been noted among females, African Americans, and those with primary care access barriers (Cunningham et al., 1995; Liu et al., 1999; Lowthian et al., 2013; Matteson et al., 2008). Medicaid coverage has also been found to be associated with ACS ED use (Delia & Cantor, 2009; McWilliams et al., 2011). Researchers have not yet disaggregated ACS ED visits within this group, however, and analyzed avoidable ED visits among different types of Medicaid beneficiaries.

There is reason to believe that variation among ACS ED utilization exists within the Medicaid subpopulation. For example, individuals with severe mental illness (SMI) are a high-risk group that we would expect to have different patterns of ACS ED utilization than other Medicaid beneficiaries. It has been shown that persons with SMI have different utilization, disease burden, and demographics compared to beneficiaries with other eligibility requirements within a Medicaid population (Shireman et al., 2013). Furthermore, individuals with SMI have high rates of co-occurring chronic conditions and are twice as likely to experience barriers to care such as cost or access (Dickerson et al., 2003; Druss & Rosenheck, 1998; J. Sokal, Messias, E., Dickerson, FB.,, 2004). As a consequence, those with SMI are high users of overall healthcare services when compared to the general population (Hackman et al., 2006; Nossel et al., 2010). SMI also contributes to an increased risk of non-psychiatric hospitalizations, ED utilization, and a longer than average ED length of stay (Fogarty et al., 2008; Little et al., 2011). Medicaid beneficiaries with SMI have been found to have high levels of outpatient services including the ED (Berren et al., 1999; Salsberry et al., 2005). In summary, people with

SMI experience PCP barriers, but tend to use more healthcare and in particular more outpatient care, in comparison to those without SMI. Thus, we hypothesized that patterns of ED utilization and ACS use within a high-risk Medicaid population would likely differ among beneficiaries on the basis of SMI status.

To more fully understand the role of SMI in ED utilization and ACS ED utilization, we applied an ED classification algorithm to a statewide Aged, Blind, and Disabled (ABD) Medicaid program. We sought to determine the following in our analysis of a high-risk Medicaid population: 1) the rate of ED visits and ACS visits per 1,000 beneficiaries (SMI versus non-SMI), 2) the distribution of ED visits (SMI versus non-SMI), 3) if the presence of SMI impacted the likelihood of any ED visit, and 4) if the presence of SMI impacted the likelihood of an ACS visit. We expected a higher rate of ED use and ACS use among the SMI group due to SMI service use patterns and primary care access barriers. For the same reasons, we expected SMI to increase the chances of an ED visit and an ACS visit as well. We also anticipated that both non-SMI and SMI groups would have lower emergent, injury, substance abuse, and unclassified visits in comparison to the literature simply because our population was a high-risk group of Medicaid beneficiaries who we expected to have higher than normal ACS utilization. This would result in fewer other types of visits.

Methods

Study Design

We conducted a retrospective, cross-sectional analysis of FY2012 fee-for-service claims provided by the Kansas Department of Health and Environment, Division of Health Care Finance (KDHE).

Study Subjects

The study population included Medicaid aged, blind, and disabled (ABD) beneficiaries over the age of 18, with continuous eligibility during FY2012. The study cohort was divided into individuals with SMI and without SMI using ICD9 diagnosis codes. Our SMI group included beneficiaries with an ICD-9 diagnosis for schizophrenia (295.XX), bipolar and major depressive disorders (296.xx), delusional disorders (297.xx), psychosis NOS (298.xx), personality disorders (301.22, 301.83), or post-traumatic stress disorder (PTSD) (309.81), which was consistent with the state's SMI statutory classification as well as definitions in the literature (Becker, 2012; Buck, 2004; Daumit, 2002; Fujii, 2004; Kansas Department of Health and Environment, 2012; Salsberry et al., 2005; Slayter, 2010). The non-SMI group consisted of individuals without one of the above-mentioned ICD-9 diagnoses codes but who met the other selection criteria. This group consisted of non-SMI ABD enrollees with physical disabilities, intellectual disabilities, older adults, and unclassified beneficiaries (Shireman et al., 2013).

Approval

The study was approved by the University of Kansas School of Medicine Human Subjects Committee IRB with a HIPAA waiver. We obtained access to claims through an approved data use agreement with the state of Kansas.

Outcome Variables

We measured a total of four outcome variables. Our first outcome measure was the annual rate of ED visits per 1,000 beneficiaries for both the SMI and non-SMI group. ED visits were identified from physician service claims on the basis of HCPCS codes (99281, 99282, 99283, 99284, 99285) (Research Data Assistance Center, 2012).

The second outcome variable we measured was the distribution of ED visit types for the SMI and non-SMI subgroups. We used the NYU ED algorithm to characterize visits as non-emergent, primary care treatable, avoidable, emergent, injury, substance abuse, psychiatric, or unclassified (Billings et al., 2000b). The algorithm considers primary diagnosis codes to assign probabilities to each ED visit for each subcategory. We combined the non-emergent, primary care treatable, and the avoidable categories to create the ACS ED visit group. This method of collapsing these categories is consistent with other studies that utilize the NYU algorithm to measure avoidable ED use (Begley et al., 2006; Delia & Cantor, 2009; McWilliams et al., 2011).

Our application of the algorithm involved decision rules that placed each visit into a single category rather than apportioning visits by percentages as originally conducted by the algorithm. The final category for each visit was determined by the

category with the highest probability. In the case of ties, we took the most conservative approach and chose the emergent category followed by primary care treatable, avoidable, and non-emergent.

For individuals with multiple ED claims per day, the same approach was used and the day's visit with the greatest probability of being emergent was chosen. If the individual had injury, psych, substance abuse, or unclassified claims, we chose the category with the most claims for that day. In the case of ties, visits were assigned to injury first, followed by psychiatric, substance abuse, and unclassified.

The third outcome was the probability of any type of ED visit. To measure the fourth outcome, the probability of an ACS ED visit conditional on having an ED visit, we combined the NYU ED ambulatory care categories of non-emergent, emergent-primary care treatable and emergent-preventable/avoidable. This aggregated ACS ED visit variable became the outcome measure for the logistic regression model.

Covariates

Aside from SMI status, independent variables included gender, race (white, black, other), age (as of July 1, 2011) categories (19-44, 45-64, 65+ years), dual Medicare eligibility (FY2012), Chronic Illness and Disability Payment System (CDPS) (FY2011), FY2011 primary care provider (PCP) utilization and urban residence.

We used CDPS to measure the disease burden of each beneficiary (Kronick et al., 2000). PCP utilization was defined as having at least one PCP visit during FY2011. PCP visits were identified using NCQA's Healthcare Effectiveness Data and Information Set

CPT codes for preventive or primary care visits, excluding eye exams (Agency for Healthcare Research and Quality, 2004).

The urban variable was created by matching a beneficiary's county to data from the US Census Bureau Urban and Rural Classification System (United States Census Bureau, 2014). Counties with 2,500 people or less were considered rural, while those with more than 2,500 were classified as urban.

Data Analysis

We compared the baseline descriptives between the SMI and non-SMI group using t-tests and Pearson Chi-Squared tests. Multiple logistic regression was used to determine adjusted odds ratios (OR) with 95% confidence intervals (CI) to examine the effect of risk factors (SMI, age, gender, race, PCP FY2011, CDPS 2011, Urban, Medicare dual eligibility) on the probability of having 1) an ED visit and 2) an ACS ED visit conditional given an ED visit. All analyses were performed using SPSS programs (version 22). A p-value of <0.05 was considered statistically significant for the analysis.

Results

Descriptive Data

Baseline characteristics for the study population are shown in table 1. Of the 64,575 ABD FY2012 enrollees with continuous Medicaid eligibility, 16,357 (25.3%) individuals had at least one SMI condition. The mean age of the SMI subgroup was 46.5 years compared to 57.7 years for the non-SMI subgroup. Nearly 90% of the SMI group was under the age of 64, while the non-SMI group was more evenly distributed among the three age categories. Females comprised approximately 60% of both the SMI and

non-SMI group. The SMI group consisted of more whites but fewer individuals of other race. There were more dual eligible beneficiaries in the non-SMI group while more SMI individuals lived in urban Kansas. More SMI beneficiaries visited a PCP at least once during FY2011 (86.2%) compared to those without SMI (73.3%). The CDPS disease burden score for the SMI group was higher than the non-SMI group (1.71 versus 1.25) and was statistically significant.

Outcomes

More than half (52.3%) of all SMI beneficiaries had at least one ED visit during FY 2012 while only 31.9% of non-SMI users visited the ED (figure 1). SMI beneficiaries were 1.64 times more likely to use the ED. Both the ED visit rate and ACS ED visit rate were higher for the SMI subgroup (Table 2). The ED visit rate for the SMI group was 1,924/1,000 beneficiaries while it was 806/1,000 for the non-SMI group. The ACS ED visit rate was 576.0 for the SMI subgroup and 294.6/1,000 for the non-SMI group.

Results from the NYU ED algorithm show little variation in the distribution of most visit categories and ED utilization between the SMI and non-SMI groups (figure 2). Both the SMI and non-SMI groups had similar rates of avoidable (4.2%, 6.2%), primary care treatable (14.0%, 15.1%), and non-emergent (21.7%, 19.6%) ED visits. A larger portion of the non-SMI group's ED visits were emergent (15.7%) compared to the SMI group (11.0%). Injury and substance abuse related visits were comparable between the two groups. However based on the algorithm, 10.4% of SMI ED visit days were psychiatric related compared to 1.4% for the non-SMI group. This disparity represents the higher proportion of psychiatric visits by SMI beneficiaries but it also reflects the

SMI cohort definition as well. ED visits for unclassified visits were higher for the non-SMI group (23.6%) than the SMI group (17.5%). Examples of ICD9 codes categorized by the algorithm as unclassified include fever, constipation, and chronic pain. Nearly 40% of all ED visits for the entire cohort were avoidable. Approximately 39.9% of the SMI group's FY 2012 ED visits were avoidable, comparable to 40.9% for those without SMI (figure 2).

In logistic regression analysis (Table 3), the presence of a serious mental illness was found to increase the likelihood of an ED visit (odds ratio [OR] 1.64; 95% confidence interval [CI] 1.58, 1.71; $P < 0.001$). Females also had a higher chance of visiting the ED (OR 1.28, CI 1.23- 1.32; $P < 0.001$) as did age 45-64 (OR 1.89, CI 1.78-1.96; $P < 0.001$) and age over the age of 65 (OR 1.52, CI 1.45-1.58; $P < 0.001$) compared to 18-44 year olds. When compared to whites, blacks had a higher likelihood of an ED visit while beneficiaries of other races were less likely to visit the ED. Visiting a primary care doctor during FY2011 was also found to increase the likelihood of ED utilization (OR 2.22, CI 2.11-2.33; $P < 0.001$) as was a higher CDPS disease burden (OR 1.50, CI 1.48-1.53; $P < 0.001$). Medicare dual eligibility status significantly decreased the chances of an ED visit among Kansas Medicaid beneficiaries (OR 0.91, CI 0.88-0.94; $P < 0.001$).

Table 4 shows the odds ratios for an ACS ED visit. This regression is contingent upon having an ED visit and consists of a different sample size than the first regression. Urban location significantly decreased the likelihood of an ACS ED visit (OR 0.93, CI 0.88-0.98; $P < 0.006$). Factors associated with an increased likelihood of an ACS ED visit included female gender (OR 1.14, CI 1.08-1.20; $P < 0.001$), black (OR 1.16, CI 1.08-1.25;

P<0.001), FY2011 PCP visit (OR 1.13, CI 1.04-1.24; P=<0.006), and CDPS (OR 1.10, CI 1.08-1.12; P<0.001).

Discussion

The purpose of our study was to compare rates of ED use, distribution of types of ED visits, and likelihood of ED and ACS ED visits among Kansas Medicaid beneficiaries with and without SMI. Through our analysis we found that beneficiaries with SMI use the ED at a much higher rate than individuals without SMI. Results also showed that nearly 40% of visits for both groups were considered ACS, while only 15.7% of non-SMI and 11.0% of SMI visits were true emergencies. Finally, we discovered that SMI significantly increased the likelihood of an ED visit but not an ACS ED visit.

The SMI group utilized the ED at a rate of 1,929/1,000 beneficiaries while the rate for non-SMI beneficiaries was 806/1,000 beneficiaries. Based on these findings, both subgroups used the ED at a higher rate than the 2012 national average of 424/1,000 (American Hospital Association, 2012). The non-SMI group used the ED less than the overall Medicaid average of 820/1,000, while the SMI subgroup ED visit rate was double that of the national Medicaid ED average (Delia & Cantor, 2009). Not only do our findings illustrate the high ED rate by Medicaid beneficiaries, they also support the literature's previous findings that individuals with severe mental illness use the ED more than individuals without such conditions (Cohen et al., 2010; Deacon et al., 2008; Salsberry et al., 2005; Wagner et al., 2008). Our analysis furthers this research by showing that this difference in ED utilization holds true between SMI beneficiaries and those with other disabilities as well. Our results also add to the discussion of ED

utilization in this area by highlighting the difference in ACS ED rates between the SMI (576.0/1,000) and non-SMI (294.6/1,000) subgroups as well, which is not studied in the aforementioned analyses.

Based on the findings from the NYU ED algorithm, 40% of ABD ED visits in FY 2012 were avoidable. In comparison to our findings, prior studies using the NYU algorithm found a larger proportion (49-54%) of ED visits to be avoidable (Begley et al., 2006; Delia & Cantor, 2009; Massachusetts Division of Healthcare Finance and Policy, 2012; McWilliams et al., 2011). These analyses however, were based off different study populations such as multiple payers, children and adults, and safety net EDs only. Our rate of emergent use (11.0%-15.7%), on the other hand, was comparable to these study estimates.

Although our intention was to focus on mental health as a predictor of ED utilization, PCP use also generated interesting findings. The literature relating PCP access and ED use is mixed. On the one hand individuals who live farther from PCP care and experience access issues are more likely to use the ED (Ludwick et al., 2009; Matteson et al., 2008). At the same time, use of ambulatory care has also been found to be associated with frequent ED users (Hunt et al., 2006; Pines & Buford, 2006; Sun et al., 2003). This may reflect the notion that some individuals are high users of all types of healthcare. We expected that the presence of a PCP visit would reduce the odds of ED utilization since access issues tend to cause the ED to act a substitute for primary care. Instead, PCP visits increased the likelihood of both overall ED visits and avoidable ED visits. Our analysis dichotomized PCP visit as a binary variable using one visit as a cutoff

point in order to measure PCP in terms of access. It would be valuable for future research to evaluate the frequency and type of PCP visits in relation to ACS ED utilization to determine if the connection between PCP utilization, ED use, and ACS ED use is driven by high overall healthcare users, provider referrals, or quality of care. Measuring the PCP visits categorically rather than as a binary variable would evaluate primary care utilization not from an access perspective, but rather from the viewpoint of high overall healthcare users and their patterns of utilization across the system.

An additional explanation for our findings include the issue of care satisfaction and access. Individuals are more likely to experience an ACS ED visit if they believe their primary care provider is not meeting their needs or delivering high quality care (Sarver et al., 2002). Other access barriers and social issues that have been found to play a role in an individual's decision to visit the ED for ACS conditions include difficulty obtaining an appointment, long wait times, difficulty talking with provider, limited clinical hours, distance to the nearest ED and lack of transportation (Cheung, Wiler, Lowe, & Ginde, 2012a; Ludwick et al., 2009; Rust et al., 2008; Sarver et al., 2002). Although 73.3% of non-SMI beneficiaries and 86.2% of SMI beneficiaries had a PCP visit in FY2012, this does not necessarily mean these individuals were able to access their providers when they needed medical care. Other factors in our logistic regression including urban location and Medicare dual eligibility are akin to other studies in the ED utilization field (Sharma et al., 2000; Wolfson et al., 2012).

Strengths of this study include the use of an established and accepted algorithm to categorize ED visits and the analysis of ED utilization for a subpopulation. The

(McCusker, Karp, Cardin, Durand, & Morin, 2003) algorithm has been used in multiple other studies to quantify the extent of avoidable ED use and is accepted by health services researchers as a valid tool used to measure appropriate ED utilization. Furthermore, unlike other studies, this analysis compared ED use for Kansas Medicaid beneficiaries with and without SMI. By investigating utilization for a vulnerable population within a high-risk subgroup, this investigation provides additional insight into what type of patients are using the ED inappropriately and contributing to the high cost of healthcare and excessive utilization. Although SMI beneficiaries are using the ED at a higher rate than those without severe mental illness, the presence of SMI does not increase the likelihood of an avoidable visit. Therefore, strategies aimed at reducing ED utilization would differ in terms of their target population in comparison to those directed at lowering ACS ED use.

Despite its strengths, there are also weaknesses to this study design that may impact our findings. It should be noted that the results of the study are specific to Kansas Medicaid and may not be entirely applicable to other state Medicaid programs or individuals covered by Medicare or private insurance. The high prevalence of SMI among other state Medicaid programs however, expands the relevance of our findings to a broader audience (The Kaiser Commission on Medicaid and the Uninsured, 2011). The use of administrative claims data and ICD-9 codes can be problematic as their accuracy is subject to human error. The identification of the SMI cohort is tied to primary ICD-9 code only and could be slightly higher or lower than indicated. As mentioned, we identified ED visits using HCPCS codes only. It is possible that some ED

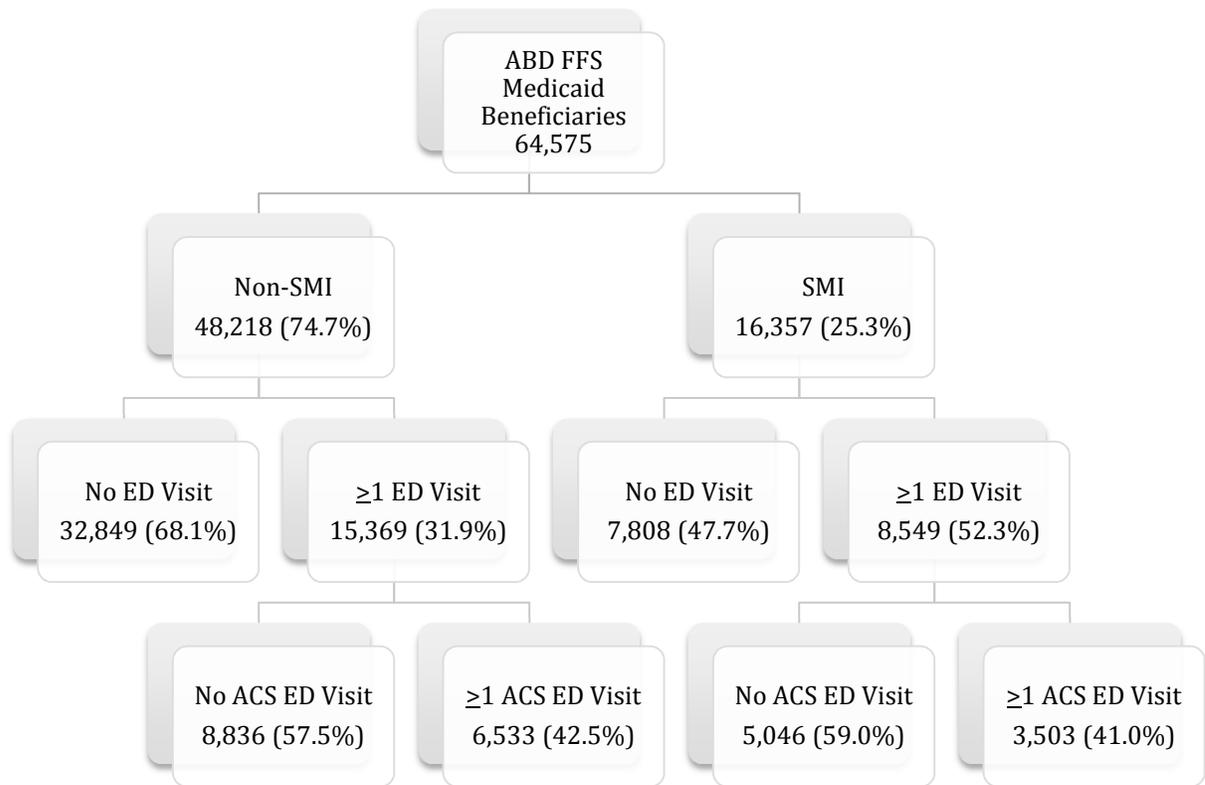
visits were not included in the cohort since revenue codes were unavailable.

Furthermore, our analysis resulted in a significant finding associated with Medicare dual eligibility and a decrease in the likelihood of an ED visit. Due to process by which Kansas gathers claims data, it is possible that our evaluation did not include all cross-over Medicare ED claims, which may have altered these results. Alternatively, beneficiaries with dual Medicare/Medicaid eligibility may have better access to needed care in comparison to those with Medicaid coverage alone which may have also impacted ED utilization. The exploration of this topic is another area of future research generated by our analysis.

Conclusion

Our results show that there is variation in ED utilization and ACS utilization among the Kansas Medicaid ABD population by SMI status. Beneficiaries with SMI had higher rates of ED utilization and ACS utilization than those without severe mental health conditions. Although the presence of SMI increased the likelihood of an ED visit, it did not increase the chances of an ACS visit. Due to the quality and cost repercussions associated with ACS ED use, as well as the high ED utilization rates of Medicaid beneficiaries, there is the need for future research that builds on our findings and uncovers additional factors that increase the chances of avoidable ED visits. As researchers investigate more the determinants of ED and ACS ED utilization, policymakers and administrators will be better suited to develop strategies to curb excessive and inappropriate use.

Figure 1: FY 2012 Sample Derivation



ABD: aged, blind, disabled
 SMI: severe mental illness
 FFS: fee-for-service
 ACS: ambulatory care sensitive

Table 1: Characteristics of Non-SMI and SMI Kansas Medicaid ABD Beneficiaries FY2012

		Non-SMI	SMI	P-Value
N		48,218	16,357	
Mean Age		57.7	46.5	<0.001
Age				<0.001
	19-44	23.8%	41.0%	
	45-64	37.9%	49.1%	
	65+	38.3%	9.9%	
Gender				0.362
	Female	59.6%	60.0%	
Race				<0.001
	White	79.8%	82.3%	
	Black	14.0%	14.5%	
	Other	6.2%	3.1%	
Duals		58.8%	52.5%	<0.001
Urban		51.1%	55.8%	<0.001
CDPS FY2011		1.25	1.71	<0.001
PCP FY2011		73.3%	86.2%	<0.001

SMI: severe mental illness

ABD: aged, blind, and disabled

CDPS: chronic illness and disability payment system

PCP: primary care provider

Table 2: ED and ACS ED Visit Rates for the non-SMI and SMI Groups for Kansas Medicaid ABD Beneficiaries FY2012

	Non-SMI	SMI
Total Beneficiaries	48,218	16,357
Total ED Visits	38,852	31,559
ED Visit/1000 beneficiaries	805.8	1,929.4
Total ACS ED Visits	14,206	9,421
ACS ED Visit/1,000 beneficiaries	294.6	576.0

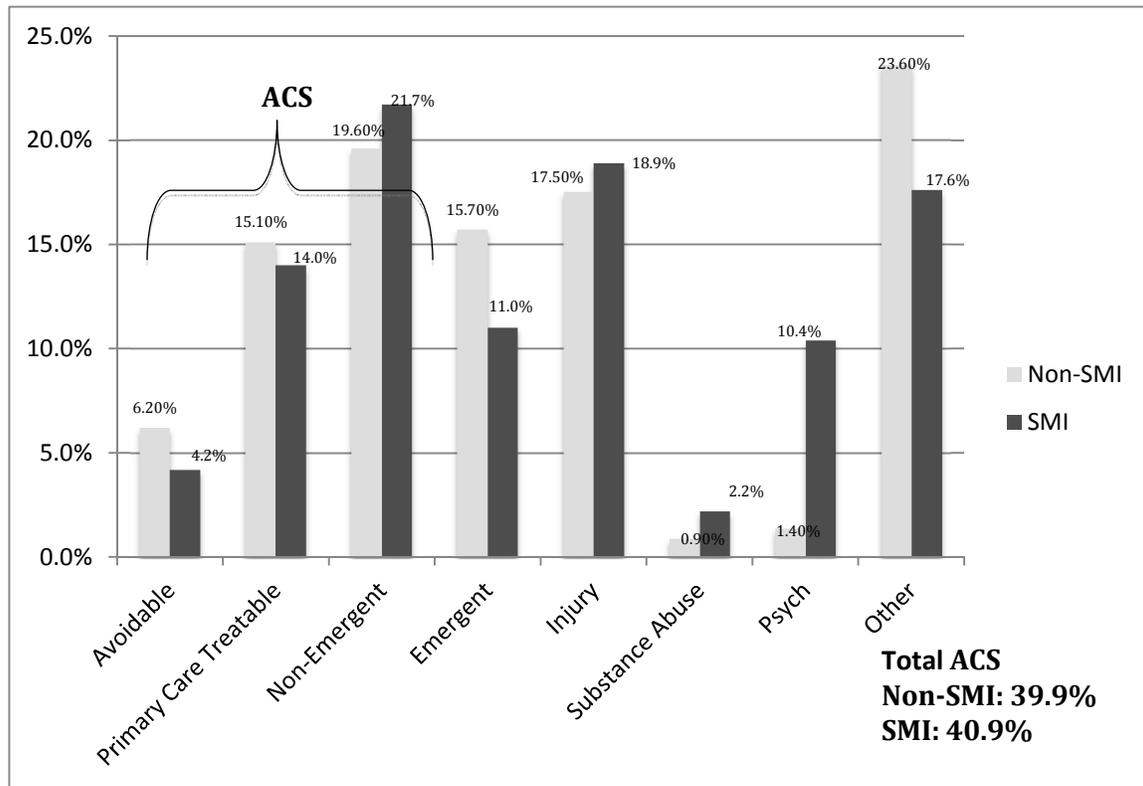
ACS: ambulatory care sensitive

SMI: severe mental illness

ABD: aged, blind, disabled

ACS: ambulatory care sensitive

Figure 2: Distribution of Kansas Medicaid ABD FY 2012 ED Visits Among SMI and non-SMI Beneficiaries Using NYU ED Algorithm



ABD: aged, blind, disabled
 SMI: severe mental illness
 ACS: ambulatory care sensitive

Table 3: Logistic Regression of Any ED Visit Among Kansas Medicaid ABD Beneficiaries in FY 2012

Variable		AOR	95% CI	p-value
SMI		1.67	1.60-1.74	<0.001
Age	45-64	1.87	1.79-1.96	<0.001
	65+	1.52	1.45-1.58	<0.001
Gender	Female	1.27	1.22-1.32	<0.001
Race	White (reference)	1.00	-----	
	Black	1.38	1.38-1.45	<0.001
	Other	0.79	0.73-0.85	<0.001
Any PCP visit (FY2011)		2.21	2.10-2.33	<0.001
CDPS (FY2011)		1.50	1.48-1.53	<0.001
Urban		1.05	1.01-1.09	0.013
Medicare Dual Eligibility		0.91	0.88-0.94	<0.001

AOR, adjusted odds ration; CI, confidence interval

*race was specified in model as black or other, with white as the reference group

ABD: aged, blind, disabled

SMI: severe mental illness

PCP: primary care provider

CDPS: chronic illness and disability payment system

Table 4: Conditional Logistic Regression of Avoidable (ACS) ED Visit FY2012

Variable		AOR	95% CI	p-value
y=ACS ED visit (0,1)				
SMI		0.94	0.89-0.99	0.390
Age	45-64	0.95	0.88-1.03	0.190
	65+	1.04	0.97-1.11	0.316
Gender, Female		1.14	1.08-1.19	<0.001
Race	White (reference)	1.00	-----	<0.001
	Black	1.16	1.09-1.24	<0.001
	Other	1.08	0.95-1.23	0.245
Any PCP (FY2011)		1.13	1.04-1.24	0.006
CDPS (FY2011)		1.10	1.08-1.12	<0.001
Urban		0.93	0.88-0.98	0.006
Medicare Dual Eligibility		0.97	0.92-1.03	0.327

Adjusted OR, odds ration; CI, confidence interval

*race was specified in model as black or other, with white as the reference group

ACS: ambulatory care sensitive

ABD: aged, blind, disabled

SMI: severe mental illness

PCP: primary care provider

CDPS: chronic illness and disability payment system

Chapter 5: Types of Ambulatory Care Sensitive Emergency Department Visits Among Kansas Medicaid Beneficiaries with and without Severe Mental Illness

Introduction

Non-urgent use of the emergency department (ED) has significant repercussions throughout the healthcare system. Individuals who utilize the ED for inappropriate services or for conditions that could have been prevented tie up limited resources and staff intended for trauma and true emergencies. Ambulatory Care Sensitive (ACS) ED visits can also contribute to overcrowding and in turn, unnecessary costs, and adverse health outcomes (Morganti et al., 2013; New England Healthcare Institute, 2010). ACS ED use may signal some type of system-wide problem related to access and use of primary care services. As reported by the 2011 National Health Interview Survey, approximately 79.9% of all adults who visited the ED did so because they did not have access to other providers (Gindi et al., 2012). Although the definitions of ACS ED utilization vary, prior research suggests that 50-75% of visits are avoidable (Billings, Parikh, & Mijanovich, 2000a; Liu et al., 1999).

These high estimates of ACS ED utilization in combination with appropriate action, highlight the potential efficiency that could be gained by analyzing patterns of ED use. Nationwide there is a strong interest in reducing unnecessary ED utilization, particularly as healthcare costs continue to rise (Center for Medicaid & CHIP Services, 2014). Although the research surrounding ACS ED use has recently expanded, the majority of studies analyze factors contributing to avoidable ED utilization or measure

the rate of ACS visits (Begley et al., 2006; DeLia, 2006; McWilliams et al., 2011; Sarver et al., 2002). Predictors of ACS ED utilization identified thus far include Medicaid beneficiaries, females, African Americans, and those with primary care access barriers (Cunningham et al., 1995; Liu et al., 1999; Lowthian et al., 2013; Matteson et al., 2008; Tang et al., 2010). These studies however, did not stratify visits by condition or diagnosis, leaving much to be learned about how to prevent or manage these individuals before they reach the ED. Within the category of ACS ED visits it is unclear if particular chronic conditions are more common than others. Researchers have not investigated ACS diagnoses as a subset of ED visits. Without knowing this information, it is difficult to strategize ways in which to eliminate or reduce these particular types of ED visits.

Along with learning more about ACS visits through diagnosis codes, there is also a need to evaluate ACS ED utilization of high-risk subpopulations such as individuals covered by Medicaid. The ACS visit rate for adults with Medicaid increased from 66.4 per 1,000 beneficiaries in 1999 to 83.9 in 2007 (Tang et al., 2010). This fact points to the growing problem of ACS visits within the Medicaid population but does not provide insight into the variation within this group of individuals. There is reason to believe that Medicaid beneficiaries with severe mental illness (SMI) would have different patterns of ACS ED use than beneficiaries without SMI. Individuals with SMI have high-rates of co-occurring chronic conditions and are twice as likely to experience barriers to primary care such as cost or access, and are high users of outpatient care, including the ED (Berren et al., 1999; Dickerson et al., 2003; Druss & Rosenheck, 1998; Salsberry et al.,

2005; J. Sokal et al., 2004). We would expect SMI individuals, therefore, to also have high ACS utilization when compared to those without SMI.

While research in the area of ACS ED utilization thus far enhances our understanding of the extent of the problem, it fall short in detailing the specific nature of ACS visits through diagnosis codes for a known, high-risk group. Knowing the clinical reason for ACS ED visits is a necessary component of reducing them as these data can direct prevention efforts and resources in the most appropriate direction. Gaining diagnosis specific information that reveals common conditions underlying ACS ED visits is one area of research needed in the field.

In a recent observational study, we found that approximately 40% of all ED visits during FY2012 for the Kansas Medicaid aged, blind, and disabled ABD population were classified as ACS. Both individuals with SMI and non-SMI beneficiaries experienced high rates of ACS ED visits. Although the presence of SMI did not increase the likelihood or the chance of an ACS ED visit, it is still important to further evaluate the clinical differences between SMI and non-SMI emergency service utilization. That is, we have yet to discover if there is variation among the types of conditions that led to ACS visits between SMI and non-SMI groups. In order to reduce ACS utilization and accurately reduce unnecessary ED visits, we must first analyze the specific reasons beneficiaries are utilizing the ED. If there are differences in the types of ACS ED visits for SMI or non-SMI beneficiaries, then policies and procedures should reflect those differences and target individuals based on these findings. The primary objective of our study addressed this issue and attempted to determine the most frequently occurring clinical reasons for ACS

ED visits by diagnosis within a Kansas Medicaid population and to determine if these visits differed among beneficiaries with and without SMI.

Methods

Study Design

The study was a retrospective, cross-sectional analysis of FY2012 fee-for-service claims provided by the Kansas Department of Health and Environment, Department of Health Care Finance (KDHE). For this analysis, we focused on the clinical reasons for ACS ED visits only. Claims associated with ED visits that were considered appropriate were not included in our evaluation.

Study Cohort

The claims we analyzed were from Kansas Medicaid ABD beneficiaries over the age of 18, with continuous eligibility during FY2012. The study cohort was divided into individuals with SMI and individuals without SMI based on the state's statutory definition of serious mental illness (Kansas Department of Health and Environment, 2012). The SMI group contained beneficiaries with at least one ICD-9 diagnosis for schizophrenia (295.XX), bipolar and major depressive disorders (296.xx), delusional disorders (297.xx), psychosis NOS (298.xx), personality disorders (301.22, 301.83), and post-traumatic stress disorder (PTSD) (309.81).

The non-SMI group contained all other ABD beneficiaries without one of the above-mentioned ICD-9 codes. These individuals included, in particular, beneficiaries with intellectual and developmental disabilities, physical disabilities, those who were aged and other unclassified individuals (Shireman et al., 2013). Our non-SMI subgroup,

therefore did not contain the remainder of Kansas Medicaid, e.g. mothers and children, but the rest of the ABD population only.

Approval

Our study was approved by the University of Kansas School of Medicine Human Subjects Committee IRB with HIPAA waiver. We obtained access to the claims through a data use agreement with the Kansas Department of Health and Environment.

Outcome Variables

The outcome variable of interest for the study was ACS ED visit diagnosis during FY2012. ED visits were identified from physician service claims with HCPCS codes for ED visits (99281, 99282, 99283, 99284, 99285) (Research Data Assistance Center, 2012).

Revenue codes are also occasionally used to identify emergency care; however, this field was not available in the Kansas Medicaid claims we had and was therefore not used in our study.

We measured ACS ED visit diagnosis using ICD9 codes and the New York University ED algorithm (Billings et al., 2000b). We first identified ACS visits using the algorithm. We selected only ED visits that fell into the algorithm categories of non-emergent, primary care treatable, and emergent avoidable as these are considered ACS. The algorithm assigns visits a probability of falling into a type of category of ED visit. Our decision rules placed ED visits into a category based on highest percentage category. For example, a visit with the following probabilities (non-emergent: 0.25, primary care treatable: 0.70, emergent avoidable: 0.05) would be classified as primary care treatable. In the case of ties, we took a conservative approach and categorized the visit into the

most emergent group possible (emergent avoidable followed by primary care treatable, followed by non-emergent).

For each of the three ACS categories (non-emergent, primary care treatable, avoidable), we then analyzed the top ten ICD9 codes for ED visits to determine the most frequent types of visits for both the SMI and non-SMI groups.

Cohort Characteristics

Cohort characteristics included in our analysis were age (as of July 1, 2011), race (white, black, other), gender, dual Medicare eligibility (FY2012), CDPS, FY2011 primary care provider (PCP) utilization, and urban.

We computed the Chronic Illness & Disability Payment System (CDPS) from FY2011 as a measure of disease burden (Kronick et al., 2000). Primary care provider utilization was defined as having at least one PCP visit during FY2011. PCP visits were identified using NCQA's Healthcare Effectiveness Data and Information Set CPT codes for preventive or primary care visits, excluding eye exams (Agency for Healthcare Research and Quality, 2004).

The urban variable was created by matching a beneficiary's county to data from the US Census Bureau Urban and Rural Classification System (United States Census Bureau, 2014). Counties with 2,500 people or less were considered rural, while those over 2,500 were classified as urban.

Data Analysis

The results are mostly descriptive in nature. Statistical analyses between subgroups were performed using Pearson Chi-Squared tests or t-tests as appropriate. All

analyses were performed using SPSS programs (version 22). A p-value of <0.05 was considered statistically significant.

Results

The characteristics of the cohort of ABD beneficiaries who had an ACS ED visits in FY2012 are shown in table 1. There were 8,549 ABD beneficiaries with SMI and 15,369 beneficiaries without SMI. The average age of beneficiaries with SMI was nearly 10 years lower than those without SMI. Over 92% of the SMI subgroup was under the age of 64 compared to 75% of the non-SMI group. A higher percentage of those with SMI were white and female compared to the non-SMI group. However, a smaller proportion of the SMI group were dual Medicare beneficiaries than the non-SMI group. Individuals with and without mental health conditions had high rates of primary care visits, during FY2011 with both groups near 91%. Beneficiaries with SMI had a slightly higher disease burden than non-SMI individuals. Finally, we found that more individuals with SMI lived in urban Kansas.

Nearly half of all ACS visits were considered non-emergent visits for both subgroups (54.7% for SMI and 49.0% for non-SMI; Figure 1). Emergent primary care treatable visits represented approximately 34.9% of ACS visits for the SMI group and 37.1% of visits for the non-SMI group. Emergent avoidable visits were the smallest category consisting of 13.9% of SMI ACS visits and 10.4% of non-SMI visits.

Figure 2 shows the top 10 ICD9 codes for both subgroups for the **emergent avoidable** category of ED visits. In total, the top 10 diagnosis codes contributed over 80% of visits for both non-SMI and SMI beneficiaries. Pneumonia was most common for

non-SMI, while convulsions (NEC) were most common for SMI. Approximately 16.9% of non-emergent visits for the SMI subgroup's non-emergent visits were related to convulsions, compared to 10.8% for the group. The SMI group had lower pneumonia related visits (15.7% versus 21.8%) but nearly twice as many ED visits with asthma ICD9 diagnosis codes. Other top types of visits in the non-emergent category for both subgroups included diabetes, chronic airway obstruction, and hyposmolality (SMI only).

Figure 3 illustrates the top 10 diagnoses for ED visits deemed **primary care treatable**. The same ten ICD9 codes were most common for both subgroups. These ICD codes contributed to 59.3% of all primary care treatable ED visits for the non-SMI subgroup and 58.8% of all primary care treatable ED visits for the SMI subgroup.

Abdominal related pain, unspecified and other specific sites, were the top two ICD9 diagnosis codes for primary care treatable ED visits for the non-SMI group (23.4% of visits) and the SMI group (25.1%). Other frequent primary treatable visits for the non-SMI and SMI subgroups were respiratory abnormalities (6.1%, 4.1%), painful respiration (5.7%, 6.6%), chest pain NEC (5.5%, 5.2%), acute bronchitis (4.2%, 3.5%), cellulitis of the leg (4.1%, 3.7%), bronchitis NOS (4.5%, 4.5%), abdominal pain epigastric (3.2%, 3.0%), and acute URI NOS (3.2%, 3.1%).

The final distribution of ACS visits, **non-emergent visits**, is shown in Figure 4. Over half of all visits in the emergent avoidable category for both subgroups were attributed to these 10 diagnoses codes. Headache and migraine related ICD9 diagnoses contributed to 16.2% of the emergent avoidable category visits for non-SMI beneficiaries compared to 23.1% of the emergent avoidable category visits for SMI

beneficiaries. Other diagnoses that were prevalent in the emergent avoidable category regardless of mental health status were lumbago, dizziness and giddiness, nausea with vomiting, and cough. Urinary tract ED visits were lower for the SMI group (4.8% of avoidable category) compared to the non-SMI group (7.6%). Finally, 2.7% of emergent avoidable visits made by SMI beneficiaries were for dental disorders, which was not one of the ten most frequent diagnoses for non-SMI beneficiaries. Malaise and fatigue occurred for non-SMI but not SMI.

Discussion

The purpose of our study was to evaluate the most frequent types of ACS ED visits among Kansas Medicaid beneficiaries and determine if visits differed among SMI and non-SMI beneficiaries. ACS ED visits consisted of non-emergent, primary care treatable, and emergent-avoidable trips to the ED. The non-emergent visits were the largest category in this group, comprising over half of all ACS visits for both the SMI and non-SMI subpopulations.

Each of the three ACS categories were highly driven by the top ten ICD9 diagnosis codes (55-83%) revealing little variation among reasons for ACS ED visits, regardless of SMI status. Most top ICD9 codes for each ACS category were the same for the SMI and non-SMI group as well, indicating similar ACS ED utilization patterns among the entire cohort of Kansas ABD Medicaid beneficiaries.

Although our analysis evaluated ICD9 diagnosis codes among 3 categories of ACS visits, when we look across these categories, it becomes evident that particular conditions are widespread. When aggregated, all respiratory and asthma conditions

comprised 20.7% of SMI ACS visits and 19.5% non-SMI ACS visits. Other prevalent conditions across all three ACS categories were abdominal issues (10.4% SMI, 9.9% non-SMI), and diabetes (2.5% SMI, 2.9% non-SMI). The frequency of these conditions helps identify the ACS ED problem and target populations for future policy initiatives. Such initiatives that have proven successful in the past include public education, nurse consulting and advice lines, hospital run urgent care clinics, and ED fast tracks (Cannon & Feldman, 2011; Center for Medicaid & CHIP Services, 2014; New England Healthcare Institute, 2010; The Advisory Board Company., 2015; Wild, 2015). Although cost sharing strategies have been discussed as a strategy to reduce ACS ED utilization, research has shown that within the Medicaid population, copayments do not alter avoidable emergency usage patterns (Siddiqui, Roberts, & Pollack, 2015).

Additionally, policymakers may want to focus their attention on the SMI group and their non-emergent dental disorder visits presented in this analysis. Research indicates that individuals with SMI are more likely to experience oral health problems in comparison to individuals without severe mental illness (Kisely, Baghaie, Lalloo, Siskind, & Johnson, 2015). Our findings confirm this notion and show that Medicaid beneficiaries with SMI are ending up in the ED for avoidable dental issues. Another recommended policy implication of our work includes evaluating current dental benefits, especially those for individuals with severe mental illness, in order to prevent them from using emergency services for their oral health care needs.

Elements of studies on the efficiency of ED utilization in Massachusetts and Washington can be compared to our results (Cannon & Feldman, 2011; Massachusetts

Division of Healthcare Finance and Policy, 2012). Both studies were all payer evaluations across multiple hospitals. The Massachusetts study used clinical conditions rather than ICD9 codes to identify common ACS visits and the Washington analysis used a pre-set list of avoidable conditions to determine ACS visits. Similar to our findings frequent clinical conditions in both studies included those related to pneumonia, respiratory issues, asthma, headache, and backache. The top 10 clinical conditions for the largest ACS category comprised 63.3% of non-emergent visits in the Massachusetts analysis, compared to 82.4%-83.0% in our results. This indicates less variation in types of ACS visits within our study which could be due to more narrowly defined population parameters. Although 87% of ACS visits in the Washington study were accounted for by ten primary diagnosis codes, the analysis omitted mental health and dental conditions, making it difficult to compare findings. Our evaluation adds to this literature by demonstrating that ACS ED visits by the ABD Medicaid population do not differ substantially from that of other payer groups. Furthermore, variation within Medicaid by SMI does not appear to alter clinical reasons for ACS visits to the ED.

Strengths of our study include the use of an established and accepted algorithm to evaluate diagnosis codes among ACS ED visits for a high-risk subpopulation (Ballard et al., 2010; Gandhi & Sabik, 2014; Jones et al., 2013; Smulowitz et al., 2010). The algorithm has been used in multiple other studies to quantify the extent of avoidable ED use and is accepted by health services researchers as a valid tool used to measure appropriate ED utilization but it has seldom been used as a tool to segregate visits by diagnosis (Begley et al., 2006; DeLia, 2006). Furthermore, unlike other studies, this

analysis compared types of ACS ED use among Kansas Medicaid beneficiaries with and without SMI. By investigating utilization for a vulnerable population within a high-risk subgroup (Tang et al., 2010), this investigation provides additional insight into the reasons why patients are using the ED inappropriately and contributing to the high cost of healthcare and excessive utilization.

Despite its strengths, there are also weaknesses to this study design that may impact the findings. It should be noted that the results of the study are specific to Kansas Medicaid and may not be entirely applicable to other insurance groups. However, the high prevalence of SMI within other state Medicaid programs does make our findings relevant to a broader audience, including other state Medicaid programs (The Kaiser Commission on Medicaid and the Uninsured, 2011). The use of administrative claims data and ICD-9 codes can be problematic as their accuracy is subject to human error (O'Malley et al., 2005). The identification of the SMI cohort is tied to primary ICD-9 code only and could be slightly higher or lower than indicated. As mentioned, we identified ED visits using HCPCS codes only. It is possible that some ED visits were not included in the cohort since revenue codes were unavailable.

Conclusion

Our results show there was a substantial overlap in ACS ED diagnosis codes among SMI and non-SMI beneficiaries during FY2012. For both subgroups, the majority of visits were concentrated among the top ICD9 diagnosis codes, and particularly among respiratory conditions, asthma, and pneumonia.

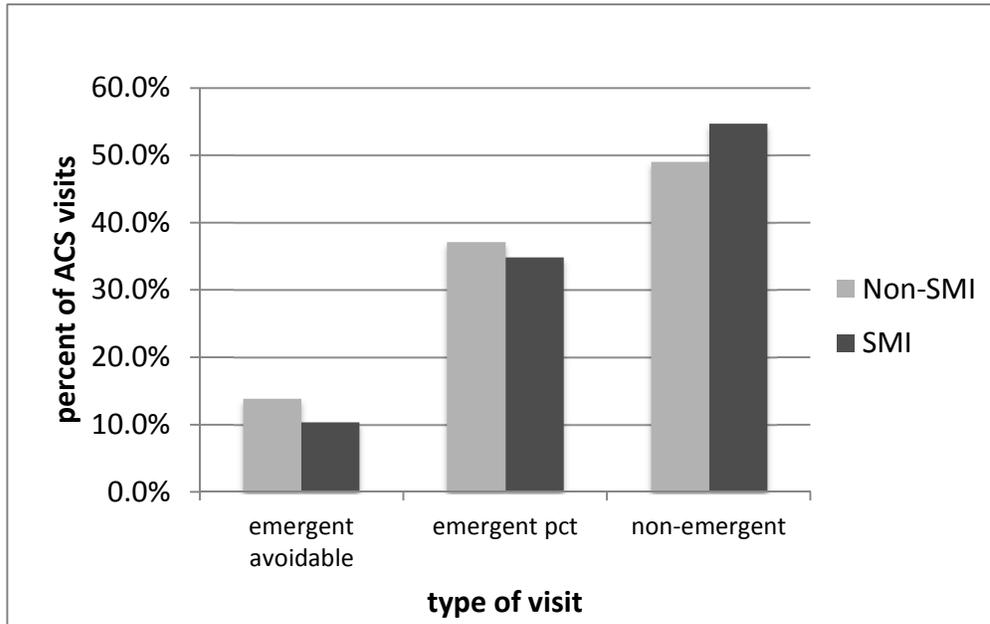
If policymakers wish to decrease ACS ED visits, it seems reasonable to target both SMI and non-SMI Medicaid beneficiaries with these conditions. Additionally, smoking prevention and other interventions that delay or properly manage the progression of these conditions would possibly result in fewer ACS ED visits as well. Since respiratory conditions, asthma, diabetes, pneumonia, and headache/migraine constitute a large percentage of ACS visits across all categories, there is considerable potential to curb unnecessary ED visits associated with these types of diagnoses by focusing on beneficiaries with these conditions or those at risk for developing them in the future.

Table 1: Characteristics of Non-SMI and SMI Medicaid ABD Beneficiaries with ED visits FY2012

		Non-SMI	SMI	p-value
<i>N Beneficiaries</i>		15,369	8,549	
<i>Age (mean)</i>		52.8	43.9	<0.001
				<0.001
<i>Age</i>	19-44	29.3%	48.4%	
	45-64	46.0%	44.6%	
	65+	24.7%	7.0%	
<i>Race</i>				
	White	74.9%	81.8%	<0.001
	Black	20.8%	15.4%	
	Other	4.3%	2.8%	
<i>Gender</i>				<0.001
	Female	61.0%	68.2%	
<i>Dual Medicare</i>		53.5%	48.1%	<0.001
<i>FY2011 PCP</i>		90.6%	91.9%	<0.001
<i>FY2011 mean CDPS</i>		2.08	2.20	<0.001
<i>Urban</i>		56.1%	61.8%	<0.001

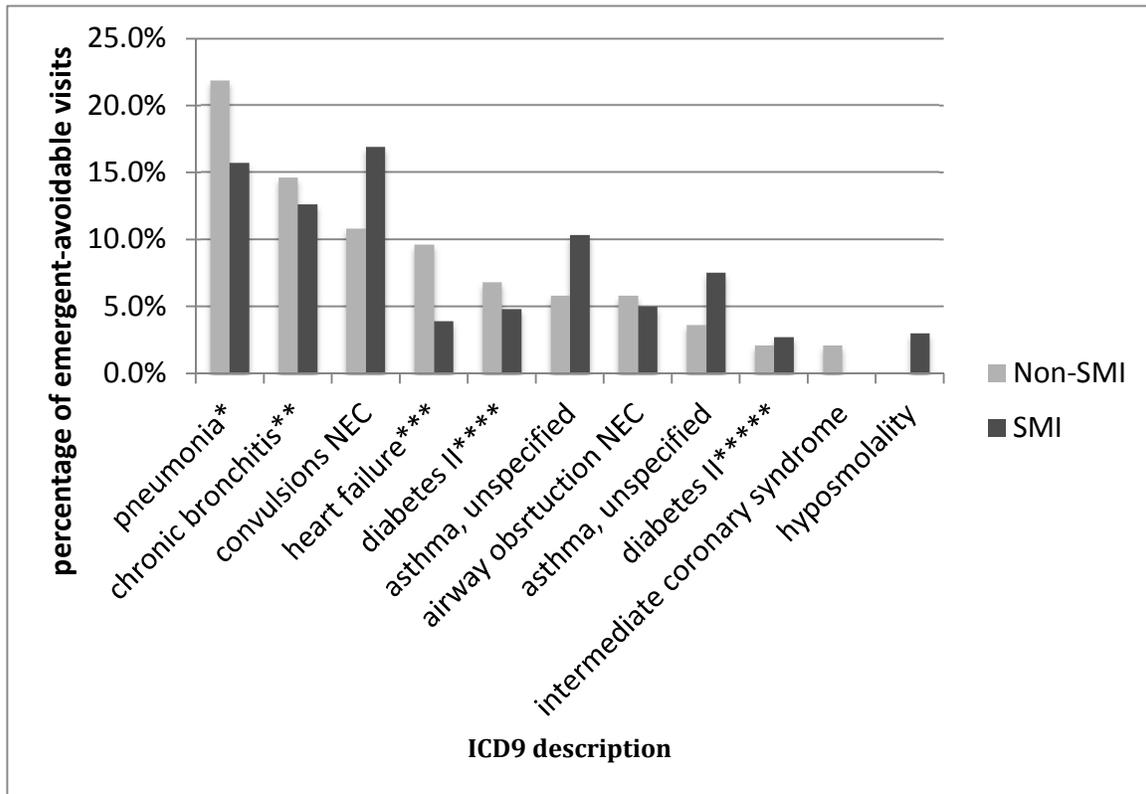
SMI: severe mental illness
 ABD: aged, blind, and disabled
 PCP: primary care provider
 CDPS: chronic illness and disability payment system

Figure 1: Distribution of Kansas Medicaid ABD FY2012 ACS ED Visits by SMI Status According to NYU ED Algorithm



ABD: aged, blind & disabled
ACS: ambulatory care sensitive
SMI: severe mental illness
PCT: primary care treatable

Figure 2: Top 10 ICD9 Codes for Emergent-Avoidable Visits FY2012



ABD: aged, blind, and disabled

SMI: severe mental illness

Pneumonia*: pneumonia, organism site not specified

Chronic bronchitis**: obstructive chronic bronchitis with acute exacerbations

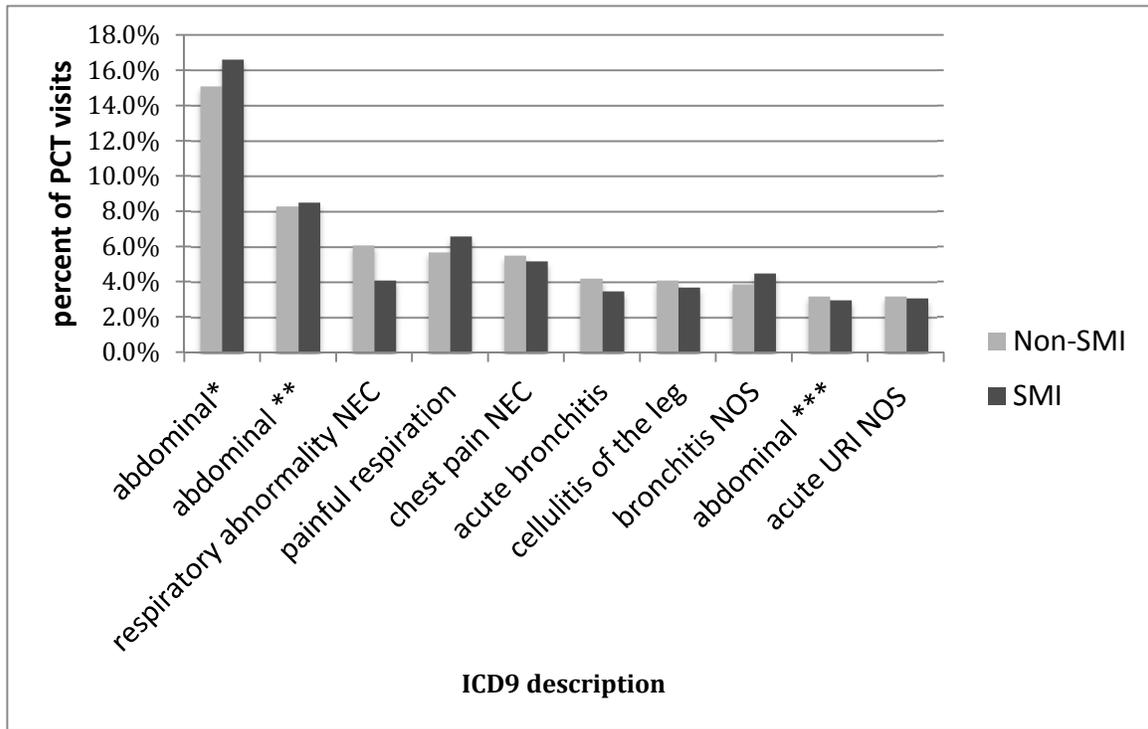
NEC: not elsewhere classifiable

Heart failure***: congestive heart failure, unspecified

Diabetes II****: diabetes II, other, not states as controlled

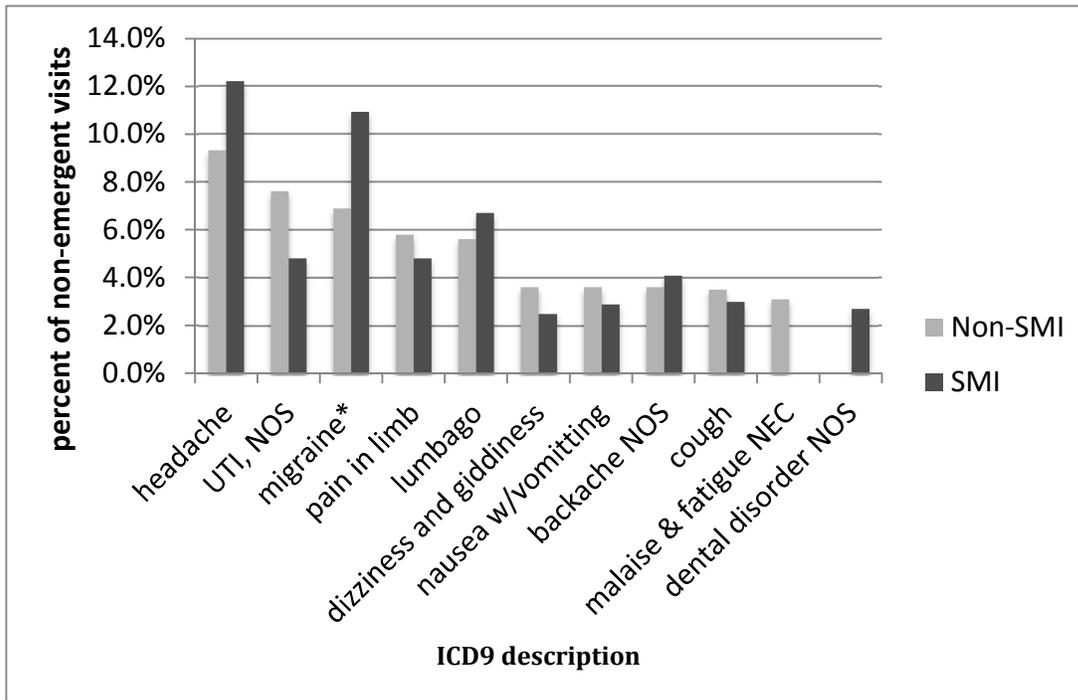
Diabetes II*****: diabetes II without complications, uncontrolled

Figure 3: Top 10 ICD9 Codes for Primary Care Treatable Visits FY2012



SMI: severe mental illness
 PCT: primary care treatable
 Abdominal*: abdominal pain unspecified site
 Abdominal**: abdominal pain other specified site
 NEC: not elsewhere classifiable
 NOS: site not specified
 Abdominal***: abdominal pain epigastric
 URI: upper respiratory infection

Figure 4: Top 10 ICD9 for Non-Emergent Visits FY2012



SMI: severe mental illness

NOS: site not specified

Migraine*: migraine unspecified, without mention of status migrainosus

NEC: not elsewhere classifiable

Chapter 6: Conclusion

Summary of Findings

This dissertation examined ACS ED utilization for Kansas Medicaid beneficiaries with severe mental illness, a nation-wide problem with quality and cost repercussions. We compared trends over the last six fiscal years for both ACS utilization and ED use between beneficiaries with SMI and without SMI to gain perspective on the extent of the problem and outline historical differences in avoidable ED utilization between these two groups. We examined SMI as a factor associated with ED and ACS utilization. And finally, we explored the diagnosis codes underlying the three categories of ACS visits for the SMI and non-SMI subgroups to determine if these populations' avoidable trips to the ED were for different types of clinical conditions. Each of our analyses was drawn from Kansas Medicaid fee-for-service aged, blind, and, and disabled claims and used the New York University ED Algorithm to classify ED visits as ACS.

In Chapter 3, we found that historical ED rates for a cohort of 35,828 ABD FFS Kansas Medicaid beneficiaries continuously enrolled from FY2007-FY2012 were twice as high for the SMI subgroup compared to the non-SMI subgroup each year. The number of visits increased gradually for each group over the study period, peaking in FY2010 for the non-SMI subgroup and in FY2011 for the SMI subgroup. The highest ED rates among the SMI group were for those beneficiaries who were female, African American, used primary care providers, and lived in urban environments. The same patterns held true for the non-SMI group in addition to high ED visit rates among beneficiaries between

the ages of 45-64. The lowest ED rates for both SMI and non-SMI groups were for those enrollees with no PCP visits. Historically, ACS ED levels did not rise, but decreased slightly, approximately 5.9% for the non-SMI group and 5.2% for the SMI group. Once unclassified visits were eliminated from our analysis the change in ACS visits was even smaller. Contrary to what we anticipated, the SMI population did not have higher ACS ED utilization in comparison to those without SMI. Although levels of ACS ED use do not appear to be increasing with the Kansas Medicaid ABD population, the overall rate is high enough to warrant concern. ACS trips to the ED ranged from 40.8% of visits to 56.8% of total trips to the ED between FY2007-FY2012 depending on the inclusion of unclassified visits and SMI status of the subgroup.

In Chapter 4 we discovered that nearly half of the SMI group (16,357 beneficiaries) had at least one ED visit in F2012 compared to one-third of the non-SMI group (48,218 beneficiaries). Rates of ED visits and ACS ED visits in Chapter 4 differed from those presented in Chapter 3 due to differences in the study population. Results from Chapter 3 were based off a cohort that was continuously eligible for a six-year period, while the Chapter 4 only required one year of continuous enrollment in a cross-sectional study design. This selection criteria resulted in an aging population, whose health was declining in Chapter 3. Thus ED and ACS ED utilization rates presented in FY2012 in Chapter 3 were different than those shown in Chapter 4.

The percentages of ACS ED visits for the SMI and non-SMI group in Chapter 4 were similar at 39.9% for the SMI group and 40.9% for the non-SMI group. Through logistic regression, we found that factors that significantly increased the likelihood of an

ED visit were SMI (OR 1.64, CI 1.58,1.71;P=<0.001), PCP use (OR 2.22, CI 2.11-2.33; P<0.001), female (OR 1.28, CI 1.23-1.32; P<0.001), black race (OR 1.38, CI 1.38-1.45; P<0.001), age 45-64 (OR 1.52, CI 1,45-1.58), age 65+ (OR 1.37, CI 1.22-1.32), relative to beneficiaries 18-44, and CDPS disease burden (OR 1.50, CI 1.48-1.53; P<0.001). Dual Medicare eligibility was associated with a decreased likelihood of an ED visit (OR 0.91, CI 0.88-0.94). Results of the second logistic regression indicated that female gender (OR 1.14, CI 1.08-1.20; P<0.001), black race (OR 1.16, CI 1.08-1.25; P<0.001), PCP use (OR 1.13, CI 1.04-1.24; P<0.006) and CDPS disease burden (OR 1.10, CI 1.08-1.12; P<0.001) were associated with an increased likelihood of an ACS ED visit conditional on having an ED visit. For this regression model, SMI did not increase the likelihood for an ACS ED visit (OR 0.94, CI 0.89-0.99; P=0.390).

In our third analysis, Chapter 5, we reviewed ICD9 codes within each of the three avoidable NYU ED Algorithm categories (emergent avoidable, primary care treatable, non-emergent) to determine top clinical reasons for ACS ED among SMI and non-SMI Kansas Medicaid ABD beneficiaries using the same cross sectional sample as Chapter 4. The emergent-avoidable category comprised 13.9% of ACS visits for the non-SMI subgroup and 10.4% of ACS visits for the SMI subgroup. The emergent primary care treatable was the second largest ACS category at 37.1% of ACS visits for the non-SMI subgroup and 34.9% of ACS visits for the SMI subgroup. For both the non-SMI and SMI groups, the non-emergent category consisted of the highest percentage of visits at 49.0% and 54.7%, respectively. Each of the three categories were highly driven by the top ten ICD9 diagnosis codes (55-83%), as were the order of diagnosis codes.

For the most part, the top ten ICD9 codes in each category overlapped between the two subgroups with the emergent-avoidable, emergent primary care treatable, and the non-emergent ACS categories. Prevalent conditions across the three ACS categories regardless of SMI status were respiratory issues, asthma, abdominal conditions, and diabetes.

Policy and Research Implications

Although our analysis was limited to Kansas Medicaid ABD beneficiaries, our findings are relevant to a more general audience. Since Medicaid eligibility requirements include individuals with significant needs such as SMI, Medicaid is the largest single payer of mental health services. Mental illness is also twice as common in Medicaid enrollees compared to the general population (The Kaiser Commission on Medicaid and the Uninsured, 2011). For these reasons, our results are important to other state Medicaid programs. ED utilization and ACS ED use among the Medicaid SMI subgroup is not exclusive to the state of Kansas but is applicable to all Medicaid programs (The Kaiser Commission on Medicaid and the Uninsured, 2011).

Our findings indicate that Kansas Medicaid ABD beneficiaries with and without SMI have ACS ED visit rates similar to insurance groups in other locations (Begley et al., 2006; Delia & Cantor, 2009; Massachusetts Division of Healthcare Finance and Policy, 2012; McWilliams et al., 2011). Although we did not find our population to have a different level of ACS ED use, it is still of concern due to the efficiency consequences and high cost associated with avoidable ED utilization (Delia & Cantor, 2009; Morganti et al., 2013; Weinick et al., 2010). This dissertation begins to explain the ACS ED crisis within

Kansas Medicaid by explaining patterns, trends, and associations of utilization between high-risk SMI and non-SMI beneficiaries.

The SMI group did not have a higher percentage of total ACS visits in comparison to the non-SMI group, nor did SMI increase the likelihood of an ACS ED visit. However, the rate of ED visits per 1,000 persons was consistently double that of the non-SMI group for seven consecutive years. In other words, beneficiaries with SMI are not using the ED more for avoidable reasons but they are using it more frequently on a person level. To build on these results, one of the next steps would be to further dissect SMI and non-SMI visits by ACS frequency. Exploring the distribution of ACS ED visits would explain if the high percentage of avoidable trips to the ED were driven by “frequent fliers” or super users or if utilization was more prevalent across the population. If the distribution of ACS visits were highly driven by a small handful of beneficiaries, policy changes and interventions would be much more targeted and specific than if utilization was more widespread. This idea is already being implemented in the state of Maine through their ED Medicaid Health Homes for super-utilizers, and in Hennepin County Medical Center’s ED onsite ambulatory clinic (America's Essential Hospitals, 2013; Center for Medicaid & CHIP Services, 2013).

Since SMI was not associated with an increase in ACS ED use, there is still a need to uncover factors that contribute to avoidable emergency department use if reducing this type of utilization continues to be a goal in the healthcare arena. Aside from Medicaid coverage, gender, and African American race, research in this area is lacking and inconclusive. Within Kansas Medicaid, factors such as home and respite care, which

is provided to some but not all ABD beneficiaries, may impact an individual's choice to visit the ED for an avoidable reason. A mixed methods study including caregiver interviews or information detailing environmental factors in combination with claims data may uncover richer data leading to a more comprehensive understanding of the decision process underlying ED utilization.

This dissertation also helped to reveal a relationship between ACS ED visits and primary care utilization for the Kansas Medicaid population. PCP use increased over the seven-year study period and it was also associated with higher ED use and ACS ED use. We expected an inverse relationship between ACS ED use and PCP utilization. Our results could be due to a number of factors including the rising disease burden of the population as shown by the CDPS. Further research is needed in this area to determine if the number, type, location, and time of PCP visits influences ACS ED visits. Looking at the distribution of PCP utilization from a categorical rather than a binary perspective, for example, may offer additional insight into some of our findings and help decipher if frequent ED and ACS ED users are driving the connection as is described in the literature (LaCalle & Rabin, 2010). This could also include more detailed analyses that evaluate area community mental health centers (CMHCs) services and resources and associated avoidable emergency department utilization.

The issue of primary care ties into another noteworthy conclusion. Our longitudinal analysis showed that over a six-year period a high percentage of ABD beneficiaries are visiting a PCP. This indicates that primary care may be a viable and appropriate way to reach beneficiaries. The prevalence of asthma and respiratory

conditions, abdominal issues, and diabetes were the leading diagnosis codes for both SMI and non-SMI beneficiary's ACS ED visits. These are the conditions that should be targeted in order to reduce avoidable ED visits. Although our analysis demonstrates that strategies focused on PCP access may not be the most appropriate avenues to improve ACS ED utilization, other proven methods such as patient education, ED fast tracks, hospital run urgent care clinics and nurse consulting lines may be efficient approaches for policymakers to pursue.

References

- Agency for Healthcare Research and Quality. (2004). AHRQ Quality Indicators: Guide to Prevention Quality Indicators. Hospital Admissions for Ambulatory Care Sensitive Conditions. from.
<http://www.ahrq.gov/downloads/pub/ahrqqi/pqiguide.pdf>
- America's Essential Hospitals. (2013). Retrieved March 15, 2015, from
<http://www.naph.org/homepage-sections/explore/innovations/2013-gage-awards/HCMC-coordinated-care-center-reduced-ED-uses-avoidable-hospitalizations.aspx>
- American Hospital Association. (2012). Annual Survey Data, 2012 Retrieved November 15, 2014
- Andersen, R., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. *Milbank Mem Fund Q Health Soc*, 51(1), 95-124.
- Baillargeon, J., Thomas, C. R., Williams, B., Begley, C. E., Sharma, S., Pollock, B. H., . . . Raimer, B. (2008). Medical emergency department utilization patterns among uninsured patients with psychiatric disorders. *Psychiatr Serv*, 59(7), 808-811. doi: 10.1176/appi.ps.59.7.808
- Ballard, D. W., Price, M., Fung, V., Brand, R., Reed, M. E., Fireman, B., . . . Hsu, J. (2010). Validation of an algorithm for categorizing the severity of hospital emergency department visits. *Med Care*, 48(1), 58-63. doi: 10.1097/MLR.0b013e3181bd49ad
- Becker, M., Boaz, T., DeMuth, A., Andel, R., . (2012). Predictors of Emergency Commitment for Nursing Home Residents: the Role of Resident and Facility Characteristics. *Int J Geriatr Psychiatry*, 27(10), 1028-1035.
- Begley, C. E., Vojvodic, R. W., Seo, M., & Burau, K. (2006). Emergency room use and access to primary care: evidence from Houston, Texas. *J Health Care Poor Underserved*, 17(3), 610-624. doi: 10.1353/hpu.2006.0098
- Berren, M. R., Santiago, J. M., Zent, M. R., & Carbone, C. P. (1999). Health care utilization by persons with severe and persistent mental illness. *Psychiatr Serv*, 50(4), 559-561.
- Billings, J., Parikh, N., & Mijanovich, T. (2000a). Emergency department use in New York City: a survey of Bronx patients. *Issue Brief (Commonw Fund)*(435), 1-5.
- Billings, J., Parikh, N., & Mijanovich, T. (2000b). Emergency department use: the New York Story. *Issue Brief (Commonw Fund)*(434), 1-12.
- Buck, J., Teich, J., Graver, L., . (2004). Utilization of Public Mental Health Services By Adults with Serious Mental Illness. *Adm Policy Ment Health*, 32(1), 3-15.
- Burt, C. W., & McCaig, L. F. (2006). Staffing, capacity, and ambulance diversion in emergency departments: United States, 2003-04. *Adv Data*(376), 1-23.
- Burt, C. W., McCaig, L. F., & Valverde, R. H. (2006). Analysis of ambulance transports and diversions among US emergency departments. *Ann Emerg Med*, 47(4), 317-326. doi: 10.1016/j.annemergmed.2005.12.001

- Cannon, J., & Feldman, J. (2011). Potentially Avoidable Emergency Room Use. Retrieved May 15, 2015, from <http://www.wsha.org/files/62/ERReport2.pdf>
- Carney, C., Jones, L., & Woolson, R. (2006). Medical Comorbidity in Women and Men with Schizophrenia: a Population-Based Controlled Study. *Journal of General Internal Medicine*, 21(1133-1137).
- Center for Medicaid & CHIP Services. (2013). Targeting Medicaid Super-Utilizers. Retrieved March 15, 2015, July 24, 3012, from <http://medicaid.gov/federal-policy-guidance/downloads/CIB-07-24-2013.pdf>
- Center for Medicaid & CHIP Services. (2014). Reducing Nonurgent Use of Emergency Departments and Improving Appropriate Care in Appropriate Settings. Retrieved March 15, 2015
- Centers for Disease Control and Prevention. (2010). National Hospital Ambulatory Medical Care Survey: 2010, .
- Centers for Disease Control and Prevention. (2013). FastStats: Emergency Department Visits. Retrieved August 28, 2013, from <http://www.cdc.gov/nchs/fastats/ervisits.htm>
- Centers for Medicare and Medicaid Services. (2012). Emergency Medical Treatment & Labor Act (EMTALA). Retrieved July 1, 2014, from <https://www.cms.gov/Regulations-and-Guidance/Legislation/EMTALA/index.html?redirect=/emtala/>
- Cheung, P. T., Wiler, J. L., Lowe, R. A., & Ginde, A. A. (2012a). National study of barriers to timely primary care and emergency department utilization among Medicaid beneficiaries. *Ann Emerg Med*, 60(1), 4-10.e12. doi: 10.1016/j.annemergmed.2012.01.035
- Cheung, P. T., Wiler, J. L., Lowe, R. A., & Ginde, A. A. (2012b). National study of barriers to timely primary care and emergency department utilization among Medicaid beneficiaries. *Ann Emerg Med*, 60(1), 4-10 e12. doi: 10.1016/j.annemergmed.2012.01.035
- Chiou, S. J., Campbell, C., Myers, L., Culbertson, R., & Horswell, R. (2010). Factors influencing inappropriate use of ED visits among type 2 diabetics in an evidence-based management programme. *J Eval Clin Pract*, 16(6), 1048-1054. doi: 10.1111/j.1365-2753.2009.01248.x
- Clark, R. E., Samnaliev, M., & McGovern, M. P. (2007). Treatment for co-occurring mental and substance use disorders in five state Medicaid programs. *Psychiatr Serv*, 58(7), 942-948. doi: 10.1176/appi.ps.58.7.942
- Cohen, B. E., Gima, K., Bertenthal, D., Kim, S., Marmar, C. R., & Seal, K. H. (2010). Mental health diagnoses and utilization of VA non-mental health medical services among returning Iraq and Afghanistan veterans. *J Gen Intern Med*, 25(1), 18-24. doi: 10.1007/s11606-009-1117-3
- Cunningham, P. J., Clancy, C. M., Cohen, J. W., & Wilets, M. (1995). The use of hospital emergency departments for nonurgent health problems: a national perspective. *Med Care Res Rev*, 52(4), 453-474.
- Curran, G. M., Sullivan, G., Williams, K., Han, X., Allee, E., & Kotrla, K. J. (2008). The association of psychiatric comorbidity and use of the emergency department

- among persons with substance use disorders: an observational cohort study. *BMC Emerg Med*, 8, 17. doi: 10.1186/1471-227x-8-17
- D'Avolio, D. A., Strumpf, N. E., Feldman, J., Mitchell, P., & Rebholz, C. M. (2013). Barriers to primary care: perceptions of older adults utilizing the ED for nonurgent visits. *Clin Nurs Res*, 22(4), 416-431. doi: 10.1177/1054773813485597
- Daumit, G., PRatt, L., Crum, R.,. (2002). Characteristics of Primary Care Visits for Individuals with Severe Mental Illness in a national Sample. *Gen Hosp Psychiatry*, 24(6), 391-395.
- Deacon, B., Lickel, J., & Abramowitz, J. S. (2008). Medical utilization across the anxiety disorders. *J Anxiety Disord*, 22(2), 344-350. doi: 10.1016/j.janxdis.2007.03.004
- DeLia, D. (2006). Potentially Avoidable Use of Hospital Emergency Departments in New Jersey (R. C. f. S. H. Policy, Trans.): Rutgers.
- Delia, D., & Cantor, J. (2009). Emergency Department Utilization and Capacity: Research Synthesis Report no17. from <http://www.rwjf.org/content/dam/farm/reports/reports/2009/rwjf43565>
- Dickerson, F. B., McNary, S. W., Brown, C. H., Kreyenbuhl, J., Goldberg, R. W., & Dixon, L. B. (2003). Somatic healthcare utilization among adults with serious mental illness who are receiving community psychiatric services. *Med Care*, 41(4), 560-570. doi: 10.1097/01.mlr.0000053440.18761.f0
- Dobie, D. J., Maynard, C., Kivlahan, D. R., Johnson, K. M., Simpson, T., David, A. C., & Bradley, K. (2006). Posttraumatic stress disorder screening status is associated with increased VA medical and surgical utilization in women. *J Gen Intern Med*, 21 Suppl 3, S58-64. doi: 10.1111/j.1525-1497.2006.00376.x
- Doran, K. M., Raven, M. C., & Rosenheck, R. A. (2013). What drives frequent emergency department use in an integrated health system? National data from the Veterans Health Administration. *Ann Emerg Med*, 62(2), 151-159. doi: 10.1016/j.annemergmed.2013.02.016
- Druss, B. G., & Rosenheck, R. A. (1998). Mental disorders and access to medical care in the United States. *Am J Psychiatry*, 155(12), 1775-1777.
- Durden, E., Bagalman, E., Muser, E., Choi, J. C., Crivera, C., Dirani, R., . . . Haskins, J. T. (2010). Characteristics, healthcare utilization and costs of bipolar disorder type I patients with and without frequent psychiatric intervention in a Medicaid population. *J Med Econ*, 13(4), 698-704. doi: 10.3111/13696998.2010.531828
- Enard, K., & Ganelin, D. (2013). Reducing Preventable Emergency Department Utilization and Costs by Using Community Health Workers as Patient Navigators. *J Healthc Manag*, 58(6), 412-428.
- Felker, B., Yazel, J. J., & Short, D. (1996). Mortality and medical comorbidity among psychiatric patients: a review. *Psychiatr Serv*, 47(12), 1356-1363.
- Fogarty, C. T., Sharma, S., Chetty, V. K., & Culpepper, L. (2008). Mental health conditions are associated with increased health care utilization among urban family medicine patients. *J Am Board Fam Med*, 21(5), 398-407. doi: 10.3122/jabfm.2008.05.070082

- Fujii, D., Wyle, A., Nathan, J. . (2004). Neurocognition and Long-Term Prediction of Quality of Life in Outpatients with Severe and Persistent Mental Illness. . *Schizophr Res*, 69(1), 391-395.
- Gandhi, S. O., Grant, L. P., & Sabik, L. M. (2014). Trends in Nonemergent Use of Emergency Departments by Health Insurance Status. *Med Care Res Rev*. doi: 10.1177/1077558714541481
- Gandhi, S. O., & Sabik, L. (2014). Emergency department visit classification using the NYU algorithm. *Am J Manag Care*, 20(4), 315-320.
- Garcia, T., Bernsetin, A., Bush, M. (2010). Emergency Department Visitors and Visits: Who Used the Emergency Room in 2007? No. 38. Retrieved August 15, 2014, from <http://www.cdc.gov/nchs/data/databriefs/db38.pdf>
- Gill, J. M., & Riley, A. W. (1996). Nonurgent use of hospital emergency departments: urgency from the patient's perspective. *J Fam Pract*, 42(5), 491-496.
- Gindi, R., Cohen, R., & Kirzinger, W. (2012). Emergency Room Use Among Adults Aged 18-64: Early Release of Estimates From the National Health Interview Survey, January-June 2011. Retrieved December 15, 2013
- Hackman, A. L., Goldberg, R. W., Brown, C. H., Fang, L. J., Dickerson, F. B., Wohlheiter, K., . . . Dixon, L. (2006). Use of emergency department services for somatic reasons by people with serious mental illness. *Psychiatr Serv*, 57(4), 563-566. doi: 10.1176/appi.ps.57.4.563
- Harris, E., Barraclough, B.,. (1998). Excessive Mortality of Mental Disorder. *British Journal of Psychiatry*, 173, 11-53.
- Hefner, J. L., Wexler, R., & McAlearney, A. S. (2014). Primary Care Access Barriers as Reported by Nonurgent Emergency Department Users: Implications for the US Primary Care Infrastructure. *Am J Med Qual*. doi: 10.1177/1062860614521278
- Hsia, R. Y., Kellerman, AL., Shen, YC.,. (2011). Factors Associated with Closures of Emergency Departments in the United States. *JAMA*, 305(19), 1978-1985. doi: doi: 10.1001/jama.2011.620.
- Hunt, K. A., Weber, E. J., Showstack, J. A., Colby, D. C., & Callahan, M. L. (2006). Characteristics of frequent users of emergency departments. *Ann Emerg Med*, 48(1), 1-8. doi: 10.1016/j.annemergmed.2005.12.030
- Johnson, P. J., Ghildayal, N., Ward, A. C., Westgard, B. C., Boland, L. L., & Hokanson, J. S. (2012). Disparities in potentially avoidable emergency department (ED) care: ED visits for ambulatory care sensitive conditions. *Med Care*, 50(12), 1020-1028. doi: 10.1097/MLR.0b013e318270bad4
- Johnson, W. G., & Rimsza, M. E. (2004). The effects of access to pediatric care and insurance coverage on emergency department utilization. *Pediatrics*, 113(3 Pt 1), 483-487.
- Jones, K., Paxton, H., Hagtvedt, R., & Etchason, J. (2013). An analysis of the New York University Emergency Department Algorithm's suitability for use in gauging changes in ED usage patterns. *Med Care*, 51(7), e41-50. doi: 10.1097/MLR.0b013e318242315b
- Kansas Department of Health and Environment. (2012). Kansas Health Solutions Provider Manual.

- Kaskie, B., Obrizan, M., Cook, E. A., Jones, M. P., Liu, L., Bentler, S., . . . Wolinsky, F. D. (2010). Defining emergency department episodes by severity and intensity: A 15-year study of Medicare beneficiaries. *BMC Health Serv Res*, *10*, 173. doi: 10.1186/1472-6963-10-173
- Kisely, S., Baghaie, H., Lalloo, R., Siskind, D., & Johnson, N. (2015). A Systematic Review and Meta-Analysis of the Association Between Poor Oral Health and Severe Mental Illness. *Psychosom Med*, *77*(1), 83-92.
- Kronick, R., Gilmer, T., Dreyfus, T., & Lee, L. (2000). Improving health-based payment for Medicaid beneficiaries: CDPS. *Health Care Financ Rev*, *21*(3), 29-64.
- Kwong, W. J. (2007). Determinants of migraine emergency department utilization in the georgia medicaid population. *Headache*, *47*(9), 1326-1333. doi: 10.1111/j.1526-4610.2007.00851.x
- LaCalle, E., & Rabin, E. (2010). Frequent users of emergency departments: the myths, the data, and the policy implications. *Ann Emerg Med*, *56*(1), 42-48. doi: 10.1016/j.annemergmed.2010.01.032
- Little, D. R., Clasen, M. E., Hendricks, J. L., & Walker, I. A. (2011). Impact of closure of mental health center: emergency department utilization and length of stay among patients with severe mental illness. *J Health Care Poor Underserved*, *22*(2), 469-472. doi: 10.1353/hpu.2011.0057
- Liu, T., Sayre, M. R., & Carleton, S. C. (1999). Emergency medical care: types, trends, and factors related to nonurgent visits. *Acad Emerg Med*, *6*(11), 1147-1152.
- Lowe, R. A., McConnell, K. J., Vogt, M. E., & Smith, J. A. (2008). Impact of Medicaid cutbacks on emergency department use: the Oregon experience. *Ann Emerg Med*, *52*(6), 626-634. doi: 10.1016/j.annemergmed.2008.01.335
- Lowe, R. A., & Schull, M. (2011). On easy solutions. *Ann Emerg Med*, *58*(3), 235-238. doi: 10.1016/j.annemergmed.2011.03.054
- Lowthian, J. A., Smith, C., Stoelwinder, J. U., Smit, D. V., McNeil, J. J., & Cameron, P. A. (2013). Why older patients of lower clinical urgency choose to attend the emergency department. *Intern Med J*, *43*(1), 59-65. doi: 10.1111/j.1445-5994.2012.02842.x
- Ludwick, A., Fu, R., Warden, C., & Lowe, R. A. (2009). Distances to emergency department and to primary care provider's office affect emergency department use in children. *Acad Emerg Med*, *16*(5), 411-417. doi: 10.1111/j.1553-2712.2009.00395.x
- Machlin, S. (2006). Expenses for a Hospital Emergency Room Visit, 2003. *Statistical Brief #111*. from http://meps.ahrq.gov/mepsweb/data_files/publications/st111/stat111.pdf
- Massachusetts Division of Healthcare Finance and Policy. (2012). Massachusetts Health Care Cost Trends: Efficiency of Emergency Department Utilization in Massachusetts.
- Matteson, K. A., Weitzen, S. H., Lafontaine, D., & Phipps, M. G. (2008). Accessing care: use of a specialized women's emergency care facility for nonemergent problems. *J Womens Health (Larchmt)*, *17*(2), 269-277. doi: 10.1089/jwh.2006.0292

- McCusker, J., Karp, I., Cardin, S., Durand, P., & Morin, J. (2003). Determinants of emergency department visits by older adults: a systematic review. *Acad Emerg Med*, *10*(12), 1362-1370.
- McWilliams, A., Tapp, H., Barker, J., & Dulin, M. (2011). Cost analysis of the use of emergency departments for primary care services in Charlotte, North Carolina. *N C Med J*, *72*(4), 265-271.
- Merrick, E. L., Perloff, J., & Tompkins, C. P. (2010). Emergency department utilization patterns for Medicare beneficiaries with serious mental disorders. *Psychiatr Serv*, *61*(6), 628-631. doi: 10.1176/appi.ps.61.6.628
- Morganti, K., Bouhoff, S., & Blanchard, J. (2013). The Evolving Role of Emergency Departments in the US. Retrieved November 06, 2013, from http://www.rand.org/content/dam/rand/pubs/research_reports/RR200/R280/RAND_RR280.sum.pdf
- National Center for Health Statistics. (2013). Health, United States, 2012 with Special Feature on Emergency Care. from <http://www.cdc.gov/nchs/data/hus/hus12.pdf#listfigures>
- National Committee for Quality Assurance. (2012). 2012 NCQA HEDIS summary table of measures, product lines and changes Retrieved January 11, 2015 from <http://www.ncqa.org/HEDISQualityMeasurement/HEDISMeasures/HEDIS2012.aspx>
- New England Healthcare Institute. (2010). A Matter of Urgency: Reducing Emergency Department Overuse.
- New York State Office of Mental Health. (2015). Assertive Community Treatment. Retrieved May 2, 2015, 2015, from <http://bi.omh.ny.gov/act/index?p=goals-features>
- Northington, W. E., Brice, J. H., & Zou, B. (2005). Use of an emergency department by nonurgent patients. *Am J Emerg Med*, *23*(2), 131-137.
- Nossel, I. R., Calmes, C. A., Brown, C. H., Kreyenbuhl, J., Goldberg, R. W., Fang, L., & Dixon, L. B. (2010). Patterns of emergency department use for medical conditions among persons with serious mental illness. *Psychiatr Serv*, *61*(12), 1251-1254. doi: 10.1176/appi.ps.61.12.1251
- O'Malley, K., Cook, K., Price, M., Wildes, K., Hurdle, J., & Ashton, C. (2005). Measuring Diagnoses: ICD Code Accuracy. *Health Serv Res*, *40*(5), 1620-1639.
- Park, J. H., Linakis, J. G., Skipper, B. J., & Scott, S. M. (2012). Factors that predict frequency of emergency department utilization in children with diabetes-related complaints. *Pediatr Emerg Care*, *28*(7), 614-619. doi: 10.1097/PEC.0b013e31825cf7a2
- Petersen, L. A., Burstin, H. R., O'Neil, A. C., Orav, E. J., & Brennan, T. A. (1998). Nonurgent emergency department visits: the effect of having a regular doctor. *Med Care*, *36*(8), 1249-1255.
- Pham, J. C., Patel, R., Millin, M. G., Kirsch, T. D., & Chanmugam, A. (2006). The effects of ambulance diversion: a comprehensive review. *Acad Emerg Med*, *13*(11), 1220-1227. doi: 10.1197/j.aem.2006.05.024
- Pines, J. M., Asplin, B. R., Kaji, A. H., Lowe, R. A., Magid, D. J., Raven, M., . . . Yealy, D. M. (2011). Frequent users of emergency department services: gaps in

- knowledge and a proposed research agenda. *Acad Emerg Med*, 18(6), e64-69. doi: 10.1111/j.1553-2712.2011.01086.x
- Pines, J. M., & Buford, K. (2006). Predictors of frequent emergency department utilization in Southeastern Pennsylvania. *J Asthma*, 43(3), 219-223. doi: 10.1080/02770900600567015
- Rasch, E. K., Gulley, S. P., & Chan, L. (2013). Use of emergency departments among working age adults with disabilities: a problem of access and service needs. *Health Serv Res*, 48(4), 1334-1358. doi: 10.1111/1475-6773.12025
- Redstone, P., Vancura, J. L., Barry, D., & Kutner, J. S. (2008). Nonurgent use of the emergency department. *J Ambul Care Manage*, 31(4), 370-376. doi: 10.1097/01.JAC.0000336555.54460.fe
- Research Data Assistance Center. (2012, 7/01/12). How to Identify Emergency Room Services in the Medicare claims Data, Technical Publication TN-003. Retrieved February 18, 2014, from <http://www.resdac.org/resconnect/articles/144>
- Rust, G., Ye, J., Baltrus, P., Daniels, E., Adesunloye, B., & Fryer, G. E. (2008). Practical barriers to timely primary care access: impact on adult use of emergency department services. *Arch Intern Med*, 168(15), 1705-1710. doi: 10.1001/archinte.168.15.1705
- Salsberry, P. J., Chipps, E., & Kennedy, C. (2005). Use of general medical services among Medicaid patients with severe and persistent mental illness. *Psychiatr Serv*, 56(4), 458-462. doi: 10.1176/appi.ps.56.4.458
- Sarver, J. H., Cydulka, R. K., & Baker, D. W. (2002). Usual source of care and nonurgent emergency department use. *Acad Emerg Med*, 9(9), 916-923.
- Sharma, V., Simon, S. D., Bakewell, J. M., Ellerbeck, E. F., Fox, M. H., & Wallace, D. D. (2000). Factors influencing infant visits to emergency departments. *Pediatrics*, 106(5), 1031-1039.
- Shireman, T., Reichard, A., & Hunt, S. (2013). Learning you ABDs: Variation in health care utilization across Kansas Medicaid disability groups. *Disability and Health Journal*, 6, 220-226.
- siddiqui, M., roberts, E., & Pollack, C. (2015). The Effect of Emergency Department Copayments for Medicaid Beneficiaries Following the Deficit Reduction Act of 2005. *JAMA Intern Med*, 175(3), 393-398.
- Siegel, B. (2004). The emergency department: rethinking the safety net for the safety net. *Health Aff (Millwood)*, Suppl Web Exclusives, W4-146-148. doi: 10.1377/hlthaff.w4.146
- Slyter, E. (2010). Disparities in Access to Substance Abuse Treatment Among People with Intellectual Disabilities and Serious Mental Illness. *Health Soc Work*, 25(1), 45-59.
- Smulowitz, P., Lipton, R., Wgaranm, F., Adelman, L., Weiner, S., Burke, L., . . . Landon, B. E. (2010). Emergency Department Utilization After the Implementation of Massachusetts Health Reform *Ann Emerg Med*, 58(3), 225-234.
- Sokal, J., Messias, E., Dickerson, F. B., Kreyenbuhl, J., Brown, C. H., Goldberg, R. W., & Dixon, L. B. (2004). Comorbidity of medical illnesses among adults with serious mental illness who are receiving community psychiatric services. *J Nerv Ment Dis*, 192(6), 421-427.

- Sokal, J., Messias, E., Dickerson, FB., (2004). Comorbidity of Medical Illnesses Among Adults with Serious Mental Illness who are Receiving Community Psychiatric Services. *Journal of Nervous and Mental Disease*, 192, 421-427.
- Sun, B. C., Burstin, H. R., & Brennan, T. A. (2003). Predictors and outcomes of frequent emergency department users. *Acad Emerg Med*, 10(4), 320-328.
- Suruda, A., Burns, T. J., Knight, S., & Dean, J. M. (2005). Health insurance, neighborhood income, and emergency department usage by Utah children 1996-1998. *BMC Health Serv Res*, 5(1), 29. doi: 10.1186/1472-6963-5-29
- Tang, N., Stein, J., Hsia, R. Y., Maselli, J. H., & Gonzales, R. (2010). Trends and characteristics of US emergency department visits, 1997-2007. *JAMA*, 304(6), 664-670. doi: 10.1001/jama.2010.1112
- The Advisory Board Company. (2015). Zeke Emanuel: Four simple steps to reduce patients' ED use. *The Daily Briefing: News for Healthcare Executives*. Retrieved May 18, 2015
- The Institute of Medicine. (2006). The Future of Emergency Care in the United States Health System.
- The Kaiser Commission on Medicaid and the Uninsured. (2011). Mental Health Financing in the United States: A Primer.
- The Kaiser Commission on Medicaid and the Uninsured. (2013). Medicaid A Primer. from <http://kaiserfamilyfoundation.files.wordpress.com/2010/06/7334-05.pdf>
- The Kaiser Family Foundation. (2014). Medicaid Moving Forward. Retrieved September 2, 2014, from <http://kff.org/medicaid/fact-sheet/the-medicaid-program-at-a-glance-update/>
- United States Census Bureau. (2014). Urban and Rural Classification. Retrieved August 15, 2014, from <http://www.census.gov/geo/reference/urban-rural.html>
- Vinton, D. T., Capp, R., Rooks, S. P., Abbott, J. T., & Ginde, A. A. (2014). Frequent users of US emergency departments: characteristics and opportunities for intervention. *Emerg Med J*. doi: 10.1136/emmermed-2013-202407
- Wagner, J. A., Pietrzak, R. H., & Petry, N. M. (2008). Psychiatric disorders are associated with hospital care utilization in persons with hypertension: results from the National Epidemiologic Survey on alcohol and related conditions. *Soc Psychiatry Psychiatr Epidemiol*, 43(11), 878-888. doi: 10.1007/s00127-008-0377-2
- Weinick, R. M., Burns, R. M., & Mehrotra, A. (2010). Many emergency department visits could be managed at urgent care centers and retail clinics. *Health Aff (Millwood)*, 29(9), 1630-1636. doi: 10.1377/hlthaff.2009.0748
- Wild, C. (2015). How to prevent an avoidable ED visit-with just one phone call. *Care Transformation Center Blog*. Retrieved May 18, 2015, 2015
- Wisconsin Department of Health Services. (2015). Mendota Mental Health Institute - Program of Assertive Community Treatment (PACT). Retrieved April 28, 2015, 2015, from <https://www.dhs.wisconsin.gov/mendota/programs/pact.htm>
- Wolfson, J. A., Schrage, S. M., Khanna, R., Coates, T. D., & Kipke, M. D. (2012). Sickle cell disease in California: sociodemographic predictors of emergency

- department utilization. *Pediatr Blood Cancer*, 58(1), 66-73. doi:
10.1002/pbc.22979
- Wolinsky, F. D., Liu, L., Miller, T. R., An, H., Geweke, J. F., Kaskie, B., . . . Wallace, R. B. (2008). Emergency department utilization patterns among older adults. *J Gerontol A Biol Sci Med Sci*, 63(2), 204-209.
- Zuckerman, S., & Shen, Y. C. (2004). Characteristics of occasional and frequent emergency department users: do insurance coverage and access to care matter? *Med Care*, 42(2), 176-182. doi:
10.1097/01.mlr.0000108747.51198.41