Socioeconomic and Job-Related Determinants of Emergency Department Use

by

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ABSTRACT

The current study examined the relationship between job status as well as socioeconomic factors and use of an emergency department (ED) over other sources of care. The study also sought to identify any other confounding variables in this choice of care location such as age, gender, insurance status, or reason for not working.

Methods: A secondary analysis of the National Health Interview Survey (NHIS) data was conducted for years 2010-2012 to determine the relationship between job or socioeconomic status and the use of an ED. Binary logistic regression models were performed and many potentially confounding factors were included to determine whether or not the relationship remains despite these other variables.

Results: Definite changes in the use of EDs over other sources of care exist between those of differing job status or socioeconomic status. Those making below 150% of the federal poverty level (FPL) are more likely to use an ED ($B = 2.85$, $p < 0.001$) compared to those who earn over 500% of the FPL, and the likelihood of using an ED decreases steadily as the ratio of income to the FPL increases. This change is also seen in education, where the less educated are more likely to use an ED than the more educated. Lastly, those who are working are less likely to use an ED than those who claim to be currently looking for work ($B = 0.00$ vs 1.62, $p < 0.001$) when compared to those who are not working or looking for work. The findings may be used to better identify the despaired population and reduce the burden currently felt on EDs.

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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

Chapter I outlines the background of the research study. It addresses the issue of emergency department use over other sources of care, which adds to the emergency department overcrowding phenomenon across the nation. The study even pays respect to this as an international problem shared by many industrialized nations. Sources vary in content as well as origin, and all sources are deemed the most pertinent ones discovered on the subject matter. Principle components of this chapter include the introduction, statement of the problem, purpose of the study, statement of the research questions, and the discussion of this document's limitations. Chapter II consists of the literature review and is followed by Chapter III, which describes the methodology of the study. Chapter IV reports the results and findings of the study. Chapter V contains the summary, conclusions, and implications for future research followed by the references, appendices, and tables.

Introduction

One of the most debated and sensitive topics of the twenty first century has been that of health care delivery, and in particular health care delivery that is both affordable as well as available to universal populations, regardless of socioeconomic status. It is a well-known fact, based not only on provider expertise but also on evidentiary research,

that the emergency medical services are consistently operating at or above capacity on a daily basis in the United States. This poses several important questions that are necessary for the overall wellbeing of the public health system:

Is the U.S. spending too much money on emergency healthcare, and not enough on prevention?

Is the general population relying too heavily on the emergency system and not heavily enough on primary care services?

Is the emergency system adequately prepared for a major disaster, due to the chronically overfilled emergency departments?

This document will address several of these important public health concerns in the literature review of Chapter II, and both Chapter II as well as the proposed research will provide an insight into the population that seeks medical care at an emergency department over other sources of care. The study will look at data available from the Centers for Disease Control and Prevention's National Health Interview Survey which spans multiple years and multiple patient populations in regard to commonly asked questions in the field of public health.

Statement of the Problem

The constant overcapacity of emergency departments is effectively destroying the "safety net" attribute to this emergency system, leaving the population at risk for several imminent health disasters. Researchers in recent years have spent much time and effort attempting to explain and solve this problem before a catastrophic event brings the

system to its knees. Currently as it stands, hospitals report that they are functioning at-or-above-capacity during 80% of operating hours (Derlet & Richards, 2002). This means the odds are very high that a major catastrophe could occur during the time in which the medical "safety net" is no longer effective in serving its primary goal: emergency life-saving medical care to the local population it represents. Provider expertise as well as documented evidence points to a problem regarding general socioeconomic status, the inability to identify an emergency, and a drastic need for faster access to primary care as some of the factors leading the population to emergency departments over more appropriate sources of medical evaluation and treatment. Even more concerning are recent studies identifying personality traits as a leading contributor to emergency department use, and this study will reflect the apathy (or lack thereof) related to job status and its correlation to emergency department use for primary care. This study will be dedicated to enlightening future care providers to more of the factors behind the use of emergency departments as a source of primary care, which is a leading contributor to the overcrowding phenomenon. In the next section a thorough review of the literature is performed and discussed as the pertinent studies and their results to date are brought to light for the audience. This will include studies that prove this phenomenon to be a real-life threat, studies that prove the dangers society faces with an overcrowded emergency system, research that points to factors which have been identified as contributors to the overcrowding phenomenon in the past, as well as previously attempted solutions to the overcrowding problem by other health care providers and authors of other overcrowding articles. This thesis concludes with suggested areas of future research into this health care "Sword of Damocles."

Purpose of the Study

The purpose of this study is to discover socioeconomic and job-related factors that lead patients to the emergency department for primary care, and therefore the loss of the general effectiveness of the 'emergency' system which has been ultimately sacrificed to provide primary care services to those of lower socioeconomic status or other theoretical factors. Several questions that have been raised previously must be answered in order to offer effective solutions to the problem. The study questions pertinent to the solution include, but are not limited to:

What major factor(s) leads people to the emergency system rather than other sources of primary care?

Are there any consistencies between populations in regard to the sought source of primary care?

Could attributes that are interpreted as 'apathetic' correlate with the use of emergency departments over other sources of primary care?

As stated previously the overwhelmed emergency services in the United States pose both local and national dangers to the public health system and should be addressed immediately if the health care "safety net" is to be maintained and effective. The bottom line is that patients should seek care at the appropriate source for the conditions they experience, and not use emergency departments as their personal physician or personal primary source of care. This leads to unnecessarily filled beds for those patients with more serious conditions. This study will focus on a limited scope of socioeconomic

demographics to include income, education, and job status. It is this study's hope to add one more piece to a greater puzzle in solving this phenomenon, but it is acknowledged that much more research on the subject is needed to provide a macroscopic benefit to the public health system.

To better represent the purpose of the study, refer to the following two formulas that will be explained with the data set:

$$\text{logit } P(X_{1i}) = a + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i}$$

$$\text{logit } P(X_{2i}) = a + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i}$$

In this equation, the dependent variable logit $P(X_{1i})$ is "patient's usual place for care" for observation i and the dependent variable logit $P(X_{2i})$ is "…you receive most of your care at the emergency room (yes or no)" for observation i. The logit model indicates the Y variable as a probability of X, abbreviated $P(X)$. The independent variable X_{1i} is the observation of "Current working status" where X_{2i} and X_{3i} remain constant. The independent variable X_{2i} is the observation of the variable "Total combined family income" where X_{1i} and X_{3i} remain constant. The independent variable X_{3i} is "Highest level of school completed" where X_{1i} and X_{3i} remain constant. In the formula, the constants "b_1" through "b_3" represent the slope of the line observed in regard to the coefficient of the respective variables. The constant "a" represents the y-intercept, which is also observed in the evaluation of the data.

Hypotheses of the Study

The statement of the hypothesis is an effort to describe attributes of patients who use the emergency department over other sources of care, exacerbating the overcrowding phenomenon that has swept the United States public health system. The relationships examined in the document identify the factors that lead to emergency department use so that future care providers are better equipped to solve the overcrowding problem.

The following two hypotheses attempt to explain the relationship between the socioeconomic factors of income and education and the usual place for care. The goal of the present research is to accept the alternate hypothesis "$H_1(1)$" and reject the null hypothesis "$H_0(1)$".

$H_0(1)$: Socioeconomic factors have no impact on the use of emergency departments as a chosen source of medical care.

$H_1(1)$: Patients of lower education and income are more likely to seek medical care at an emergency department over other chosen sources of care.

The next two hypotheses attempt to explain the relationship between job status and the choice of location for primary care. The goal of the present research is again to accept the alternate hypothesis "$H_1(2)$" and reject the null hypothesis "$H_0(2)$".

$H_0(2)$: Patients who are not employed and not currently seeking employment have no impact on the use of emergency departments as the chosen source of medical care.

$H_1(2)$: Patients who are not employed and not currently seeking employment are more likely to seek medical care at an emergency department over other chosen sources of care.

Several sub-hypotheses have been added in attempt to further support the research results obtained. These sub-hypotheses include:

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Sub-Hypothesis 1: Patients of higher education are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 2: Patients of higher income level are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 3: Patients who are currently employed are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 4: Patients who are currently looking for work are less likely to seek medical care at an emergency department over other sources of care.

Limitations of the Present Study

The present study is limited by the sample size and questions gathered by the National Health Interview Survey. Only those patients who were chosen for the study as well as participated in the survey process are included in the study. There are also variations between years of the study, for example, changes in the number of participants, changes in the socioeconomic status of those who responded, changes in some of the supplemental questions asked as well as answer choices provided, and changes of the U.S. region of respondents. The study is limited to the years represented by each National Health Interview Survey listed in the methods section, Chapter III.

Another, perhaps more prevalent, limitation to the study is the persistent problem of distinguishing an emergency from a nonemergency. There are several studies mentioned in the literature review that refer to health literacy and the inability of patients to adequately define an emergency or the reasons for seeking care at an emergency

department, but there are also known issues with health care providers defining a true emergency as well. This is in part due to the unwillingness of physicians to accept the responsibility of discouraging certain populations from seeking emergency care for both malpractice reasons as well as job-security reasons.

There are many factors which have been proven to effect the use of emergency departments over other sources of primary care, and these factors from previous studies are almost too numerous to count. The literature review will account for many of these previously theorized factors which were obtained using direct observation of sample populations, attempted interventions in the name of public health, or past reviews of the literature. Given the very complex nature of the relationship between socioeconomic status and other factors which lead patients to the emergency department over more appropriate forms of primary care, it is beyond the scope of this project to determine an exact cause and offer a precise solution to the problem.

Summary

The study identifies factors which may predict whether a patient seeks care at an emergency department or another, more appropriate, source of health care. Chapter II is a review of the current literature and provides a theoretical basis for the study, justifying the study's scope and continuation of the subject matter for further researchers. This is followed by Chapter III, which provides an explanation of the research methodology used to prove or disprove the hypotheses listed in Chapter I. Chapter IV provides a listing of the results of the study, as determined by analysis of the National Health Interview

Survey responses. Furthermore, the conclusions, discussion of results, and suggestions

for further research studies are presented in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

Purpose

This study attempts to explain the relationship between different levels of

socioeconomic status and the use of emergency departments over other sources of health

care, such as clinics, urgent care centers, or doctor's offices. The review of the literature

in this chapter presents background information and provides a theoretical base for the

study, allowing the reader to understand the problem at hand prior to reviewing the

study's results and discussion. This review contains a comprehensive report of many

attributes related to the subject of this study, including the evidence that emergency

departments are overcrowded, the dangers associated with emergency department

overcrowding, and factors that have been previously identified as predictors of

emergency department use for primary care.

Operational Definitions

The following terms are defined as used in this study:

Ambulance - refers to a vehicle equipped for transporting the injured or sick

(Ambulance, n.d.). In the United States, ambulances are typically staffed with any

combination of Emergency Medical Technicians, Paramedics, and in select cases a nurse or physician may be present.

Apathy - is the lack of interest or concern, synonymous with indifference (Apathy, n.d.). This term will be used to describe the population which does not work nor perform an equivalent role, a lifestyle that portrays apathetic attributes. Equivalent roles are retirees, stay at home parents, off-season contractual workers, those on maternity leave, and students.

Consolidated Omnibus Reconciliation Act of 1986 - is a law passed by the U.S. Congress and signed by President Reagan that, among other things, mandates an insurance program to give some employees the ability to continue health insurance coverage after leaving employment (US Law, 2014). This law has implications across many health care fields, and has been recognized, albeit infamously, as a massive governmental health care spending cut that passed the financial burden from the federal government to state and local agencies.

Disparity – is the state of being different or dissimilar (Disparity, n.d.). In health care, the term 'disparity' often referred to services that are offered or available to one socioeconomic demographic and not necessarily accessible to the other.

Emergency Department - sometimes used synonymously with 'emergency room,' refers to a hospital room or area staffed and equipped for the reception and treatment of persons with conditions (as illness or trauma) requiring immediate medical care (Emergency Department, n.d.). According to the American College of Emergency Physicians, these services may include but are not limited to: the coordination of out-of-hospital emergency medical response, out-of-hospital medical control system

authorization and oversight, participating in community disaster preparedness, oversight

and direction of emergency department patient disposition, and coordination of

emergency department care among multiple providers and health care facilities

(American College of Emergency Physicians, 2007).

Emergency Department Overcrowding - is a situation in which the demand for

emergency services exceeds the ability of physicians and nurses to provide quality care

within a reasonable time (Sinclair, 2007).

Emergency Medical Condition - is a condition manifesting itself by acute

symptoms of sufficient severity (including severe pain) such that the absence of

immediate medical attention could reasonably be expected to result in placing the

individual's health [or the health of an unborn child] in serious jeopardy, serious

impairment to bodily functions, or serious dysfunction of bodily organs (Emergency

Medical Treatment and Active Labor Act, 2014).

Emergency Medical Services - is a system that provides emergency medical care.

It is activated by a call for help, after an incident of serious illness or injury. The focus of

EMS is emergency medical care of the patient(s). EMS is most easily recognized when

emergency vehicles or helicopters are seen responding to emergency incidents, but EMS

is much more than a ride to the hospital. It is a system of coordinated response and

emergency medical care, involving multiple people and agencies. A comprehensive EMS

system is ready every day for every kind of emergency (National Registry of Emergency

Medical Technicians, 2014).

Emergency Treatment and Active Labor Act - is a statute passed as part of the

Consolidated Omnibus Reconciliation Act of 1986 which governs when and how a

patient may be (1) refused treatment or (2) transferred from one hospital to another when he is in an unstable medical condition (Emergency Medical Treatment and Active Labor Act, 2014). The law essentially states that a hospital must provide emergency medical or active labor services to those in need regardless of ability to reimburse for the services provided, monetarily or otherwise. Not only does the law require treatment despite reimbursement ability, it also requires treatment despite legal status or citizenship (Trzeciak & Rivers, 2003).

Primary Care - is the health care provided by a medical professional (such as a general practitioner, pediatrician, or nurse) with whom a patient has initial contact and by whom the patient may be referred to a specialist (Primary Care, n.d.). This term is often used attributively, such as "primary care physician."

Scope of Practice - is defined as the activities that an individual health care provider performs in the delivery of patient care. Scope of practice reflects the types of patients for whom the provider can care; what procedures/activities the provider can perform; and influences the ability of the provider to seek reimbursement for services provided (Texas Board of Nursing, 2014).

Socioeconomic Status - is the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation (American Psychological Association, 2014).

Urgent Care Center - refers to a facility that is able to provide immediate medical service offering outpatient care for the treatment of acute and chronic illness and injury (American Academy of Urgent Care Medicine, 2014). The AAUCM (2014) also states

that urgent care does not replace the primary care physician, and is simply a convenient option when one's regular physician is unable to offer a timely appointment.

Theoretical Base

In 1985, as part of the Consolidated Omnibus Budget Reconciliation Act (COBRA) destined to provide massive governmental spending cuts while still desperately attempting to preserve the quality of medical care, Congress passed the Emergency Medical Treatment and Active Labor Act (EMTALA). This provision of COBRA ensured public access to emergency services regardless of the ability to pay, legal status, or citizenship (Trzeciak & Rivers, 2003). Since the passing of COBRA and EMTALA, the emergency medical services in the United States have seen an exponential growth in the number of patients seen in the emergency setting. These acts essentially created a medical "safety net," a term coined by many authors publishing emergency treatment-related articles as a visual representation of the benefits EMTALA serves to the then-underserved community who "fall through the cracks" of other ancillary medical services. This was one major beginning to a trend of legislation designed to implement a further abundance of higher quality health care services to those with a low socioeconomic status (SES). The passing of these two pieces of legislation, and other legislative successes or attempts related to health care and SES, may have been considered a victory in the essence of public health services because medical care is deemed by many as one of the highest priorities shared by those of multiple different SES (Danis, et al., 2010).

Not everyone considers these pieces of legislation a victory, however, and the effects may have detrimental consequences over a long period of time and a negative impact on certain medical services involved in this "safety net." Over the last 10 years ED utilization has steadily risen and in more recent years has led to approximately 120 million annual visits to each of the 4800 EDs in existence (US Government Accountability Office, 2009). This is exhausting to the emergency medical services both physically and financially, not only in the in-hospital setting but also in the prehospital services, and many care providers are quick to blame those of low SES for this "overburdened" safety net originally designed to benefit those experiencing a medical emergency. Along with the number of functioning EDs, it should be noted that there are currently 9300 functioning urgent care centers in the United States (American Academy of Urgent Care Medicine, 2014), and the American Academy of Urgent Care Medicine (2014) stresses that urgent care centers should become the source of care for minor illnesses or injury outside of normal physician office hours. Of the ED visits annually, more than 40% of them are paid for by federally funded programs (US Government Accountability Office, 2009). 85% of these ED visits are located in metropolitan areas (US Government Accountability Office, 2009). Adding to these concerning numbers, one-quarter of all ER visits are by children under 18, in which 97.1% of those child ED visits result in discharge rather than admission, and this rate is 86.1% higher in lower-income communities than in higher income communities (Herman & Jackson, 2010). Recent studies have also proven that the expansion of government aid programs such as Medicaid have increased the use of emergency departments (Taubman, Allen, Wright, Baicker, & Finkelstein, 2014), which was the opposite effect that was expected with the

implementation of the Affordable Care Act whose focus is on proper primary care sources, preventive services, and cutting health care spending while improving outcomes (U.S. Centers for Medicare & Medicaid Services, 2014).

Many questions are raised in regard to this safety net burden as well as the populations at risk. These questions can include:

Who (exactly) is causing this burden?

What services are 'overburdened'?

To what extent are these services overburdened?

How does one define an 'emergency'?

Where do people go if they are not experiencing this defined 'emergency'?

A very reasonable yet grandiose concern is that these patients rely too heavily on the emergency services "safety net" and not enough on the less expensive and more appropriate preventive resources such as primary care physicians, urgent care centers, or clinics. It should also be noted that the Emergency Medical Treatment and Active Labor Act (1986) defines an emergency as "a condition manifesting itself by acute symptoms of sufficient severity (including severe pain) such that the absence of immediate medical attention could reasonably be expected to result in placing the individual's health [or the health of an unborn child] in serious jeopardy, serious impairment to bodily functions, or serious dysfunction of bodily organs."

The problem with a strategic plan implementation to correct the behavior, surprisingly, is a significant lack of data to support any one specific cause or any one specific burden, as well as a lack of data to identify which services are the most overwhelmed. Many authors describe this lack of data similarly in statements within their

research articles, such as the passage "…more research is needed to determine how to best redirect vulnerable populations to primary care" (Wilkin, Cohen, & Tannebaum, 2012). Authors have only recently begun to thoroughly attempt a diagnosis of the problem, only to continue finding more problems as they proceed. This intricate web of problems and suggested solutions could lead to increased confusion on the subject, and it is up to further researchers to make sense of the uncovered mess before the society's "safety net" snaps under financial and exhaustive pressure.

Though many health care providers working in emergency settings have complaints of being overworked or overcrowded, the evidence of overcrowding still needs to be presented for the viability of argument. Though it is an older resource, the Trzeciak & Rivers study (2003) makes a few main points shared by many researchers in recent years. The authors drew four conclusions regarding emergency department (ED) overcrowding:

> "(1) The ED is a vital component of America's health care "safety net". (2) Overcrowding in ED treatment areas threatens public health by compromising patient safety and jeopardizing the reliability of the entire US emergency care system. (3) Although the causes of ED overcrowding are complex, the main cause is inadequate patient capacity for a patient population with an increasing severity of illness. (4) Potential solutions for ED overcrowding will require multidisciplinary system-wide support."

Trzeciak & Rivers (2003) present a very logical and simplified point of view for such a complicated topic, but questions still remain to be answered.

It is important to emphasize that the burden felt on EDs across the nation is not a recent phenomenon; researchers Grumbach, Keane, and Bindman (1993) identified that "the emergency department has become part primary care and part social worker to many Americans." Adding to this, several studies like Grumbach et. al (1993) cite a percentage of patients who are clinically inappropriate for ED services because of barriers to primary care. In a comprehensive Report to the Chairman conducted for the U.S. Government Accountability Office (2009), the authors describe three phenomena that indicate emergency department overcrowding: (1) ambulance diversion, (2) wait times in the emergency department, and (3) patient boarding, defined by the American College of Emergency Physicians (ACEP) as patients staying in the ED for the duration of their treatment (American College of Emergency Physicians, 2011). These factors have since then been used to identify signs of emergency department overcrowding in system reviews nationwide.

Dangers Associated with Overcrowding

One of the most significant impacts felt throughout the country in regard to ED overcrowding has been the cost of providing care in that setting. The US Governmental Accountability Office issued its 2009 report on the status of the ED safety net to the Senate, and in it was a number that has been highly scrutinized by subsequent researchers. The US GAO (2009) report states that ED crowding does not have a significant financial burden on the health care system because it only accounts for approximately 2% of all health care spending. When private researchers looked into the

matter they discovered that the government's report did not include emergency care provided to patients in the ED who were then admitted to the hospital for further care, meaning that the 2% statistic only accounts for patients who are treated and released from the ED. When including the cost of ED treatment which then leads to a patient admission, the number is as high as 10% of health care expenditures (Lee, Schuur, & Zink, 2013). This is a significantly higher cost estimate compared to those admitted to by the government.

Another of the biggest threats to public health as a whole is that of the inability to prevent disease spread from overcapacitated EDs, where patients may be in close proximity for long periods of time, allowing for facilitated disease transmission from person to person (Trzeciak & Rivers, 2003). This may not be quite as dire of a public health threat if it were not for a range of hospitals across the United States reporting overcrowded states during over 80% of their operating time (Derlet & Richards, 2002). In the Derlet & Richards (2002) study, several further concerns that were raised included the fact that 80% of hospital EDs report every bed in the ED is filled greater than 6 hours out of the day, patients are on gurneys in hallways greater than 6 hours per day, and 75% of physicians state that they spend greater than 6 hours per day in such a hurry their chance for medical errors is extremely high. Shen & Hsia (2011) conclude that the survival rate of patients cared for in overcrowded EDs is much lower than those in EDs that are not operating at maximum capacity. Corresponding with this data, a later article confirms that 90% of hospital EDs report operating at or over capacity on a regular basis (Trzeciak & Rivers, 2003).

Aside from the critical dangers to public health are the individual issues and dangers which everyday patients may be subject to when the ED is overcrowded. Among these individual problems is the inability to provide for appropriate patient dignity in this setting. Dignity is defined as "the state of being worthy of honour and respect" (Mah, 2009). Mah recognizes the threats to dignity as being:

"(1) Being ignored or insufficiently acknowledged; (2) Being seen, but only as a member of a group; (3) Having one's personal space transgressed involuntarily; and (4) Humiliation."

Two qualitative studies, one by Coughlan and Corry (2007) and the other by Wellstood, Wilson, and Eyles (2005), support Mah's editorial with direct evidence of patient dissatisfaction in emergency room visits as well as the loss of preserved dignity. Continuing into the subject of dissatisfaction, Derlet and Richards (2000) find that the dissatisfaction goes both ways, with overcrowded EDs containing physicians who become less productive, frustrations between medical staff, and in some cases violence.

The topic of physician dissatisfaction isn't difficult to understand from the perspective of a busy work environment, but there are other factors involved which exponentially increase the rate of physician "burn out" as well as create patient safety issues. The first of these is a lack of autonomy and general control over the context of the environment in which they practice medicine. The physicians are crippled under the effects of increased public as well as patient expectations of care in the ED on top of administrative and regulatory constraints (Rondeau & Francescutti, 2005). This study also reports that an overcrowded ED leads to physicians practicing "out-of-scope" activities, or activities which are not in the emergency physician's scope of practice, such

as patient scheduling, resource negotiation, patient placement, and discharge. Practicing out of scope is not only dangerous for the patient but it is extremely stressful for the provider, because the chance for medical error is much higher when performing tasks that are not typically performed by that level of care.

In addition to an overworked medical staff and difficulty in maintaining nurse-to-patient ratios (Weichenthal & Hendey, 2011) is the overwhelmed janitorial service within the hospital. Because of the need to provide for a continuous inflow and outflow of patients these janitorial services produce a "quantity over quality" degree of disinfection, where the bed is wiped and clean sheets are placed upon the bed, but all pieces of monitoring equipment are still contaminated when placed onto a new patient.

Another of the recognized potential dangers in ED overcrowding is one of the very factors used to measure whether or not an ED is overcrowded: ambulance diversion. When hospitals begin boarding patients they have a decision to make: continue accepting patients, or turn patients away whenever possible. Since hospitals cannot deny someone who has entered the premises care in the emergency room, hospitals have to reduce the influx of patients by another means: turning ambulances away when they are en route to the facility. This leads to a number of other problems, to include a lack of patient autonomy, frustrated personnel, and an increased risk of poor outcomes (Olshaker & Rathlev, 2006).

Another problem that arises in relation to ambulances and patient boarding is the inability of ambulances to transfer care to an overwhelmed ED, leaving the ambulances stranded and unable to return to service (Olshaker & Rathlev, 2006). When these ambulances are sent on an emergency, providers must ensure that return to service is met

in a timely fashion to prevent delayed response to another emergency (Bledsoe, Porter, &

Cherry, 2012). The amount of time spent on diversion in an urban setting is reportedly

20-50% of total operating time (Trzeciak & Rivers, 2003). The previous study also

recognizes that EDs are ill prepared for a major disaster, because if staff and resources

are stretched thin on a daily basis no room is left for increased volumes in a crisis.

According to Michtalik, et al. (2013), 22% of ED physicians report that they order

potentially unnecessary tests or procedures due to the inability to perform an adequate

patient assessment. Approximately 20% admit that their workload worsened patient

satisfaction, 14% attribute readmission rates to the lack of time to assess patients, and

20% of respondents either failed to adequately hand off care to another practitioner or

failed to act on critical lab findings.

Causes of ED Overcrowding

As stated previously, there are many different theories of attributing factors to the

ED overcrowding problem, some of which are very clearly related and others which the

relationships are not as easily drawn.

One commonly shared opinion in research articles related to ED overcrowding

factors is that of the patient's knowledge of medicine and what deems the incident an

'emergency'. According to the National Assessment of Adult Literacy in 2003, over 90

million Americans lack the necessary health literacy skills to effectively use the health

care system (Kutner, Greenberg, Jin, & Paulsen, 2006). Herman and Jackson (2010)

discovered that empowering patients with the necessary health literacy skills to use the

healthcare system decreased pediatric emergency room visits by an average of 58%.

When patients are given sufficient information about the importance of primary care over

ED care, nonurgent ED visits can be decreased by 14.5% (Grossman, Rich, & Johnson,

1998). Similarly, one study compared ED use in children with special needs compared to

children from lower income, lower education households. The reason for this study's

emphasis on children with special needs was due to the perceived increase in ED use

from that demographic, but taking into account the fact that parents of special needs

children tend to have a much higher health literacy skill level. Subsequently, the families

of children with special needs were far less likely to use a hospital ED than those of the

low income, low education group (Kroner, Hoffmann, & Brousseau, 2010). Taking a

slightly different approach, Lischko & Burgess (2010) found that patients who are made

aware of the cost associated with emergency department care versus primary care settings

were less likely to use the ED as a primary source of care following the informational

session.

Many resources have been focused on proving whether or not socioeconomic

status plays an important role in ED utilization or overutilization. One of the more

thorough studies identifies that race and ethnicity are not predictors of routine ED use,

but acknowledges that routine ED use is due to the confounding effects of SES (Hong,

Baumann, & Boudreaux, 2007). Other studies, such as Wetta-Hall, et al. (2005)

specifically name patients on low income as a major factor in ED overcrowding while

others, such as Cunningham (2011), argue that patients of low socioeconomic status are

not the cause. A study in Texas by Begley, et. al (2010), supports Cunningham's

argument that those of low SES don't increase the volume of ED visits, however the

Begley article found emergency room use to be higher for black/non-hispanics than other ethnic groups. One study focused on the homeless, discovering that the homeless population is much more likely to use an ED than other populations (D'Amore, Hung, Chiang, & Goldfrank, 2001). Johnson, et. al (2012), identifies disparities in the following groups when it comes to ED use: race/ethnicity, insurance status, and age.

To coincide with SES, many look to the uninsured population for an explanation of ED overuse. Though Cunningham (2011) states that SES and the uninsured play a smaller role than what was originally thought, that report does point to Medicare recipients as one of the major contributors to ED overcrowding. Despite claims in the Cunningham report, it cannot be overlooked that the uninsured or temporarily uninsured are far less likely to use preventive and early-detection services, leading to the potential for increased use of EDs and perhaps further increases as these patients age (Broyles, Narine, & Brandt, 2002). Other studies (Sen, et al., 2012) have attempted to identify changes based on required copayments, to find that a copayment will indeed change the patient's source of primary care but requiring insurers to pay for emergency services has no impact on ED utilization (Hsia, Chan, & Baker, 2006). Ginde et. al (2012) provides unique insight and concludes that it is not simply the presence or absence of insurance that leads to corresponding ED visits, but rather the change in insurance status having a stronger correlation to ED use.

Seemingly one of the factors most thoroughly studied in regard to use or overuse of EDs is that of primary care barriers. Chan & Ovens (2002) conclude that frequent users of EDs also frequent primary care physicians (PCPs), whereas McCusker, et. al (2012), finds that patients who visit a PCP more than 25 times in one year are far less

likely to use the ED for care, however, the greatest drop in ED use was for those patients who were adequately referred to specialists. Sox, et. al (1998), compared ED use to two factors: regular presence of and contact with a family physician and insurance status to determine which group was using the ED more frequently, to discover that interaction with a family physician has a much stronger influence, and those patients are less likely to use the ED. The last of the strongly correlating factors to ED use related to primary care access is that of simple convenience (Han, Ospina, Blitz, Strome, & Rowe, 2007). Patients report a variety of problems, from unable to reach the physician to problems with hours of operation or transportation (Rust, et al., 2008). Sarver, Cydulka, and Baker (2002) have also revealed that patients who are dissatisfied with their usual source of care are also prone to use the ED for nonurgent reasons.

Other contributing factors to ED overcrowding that have been investigated by researchers are substance abuse and psychological conditions (Doupe, et al., 2012), a reducing quantity of EDs coupled with increasing overpopulation (Hsia, Kellerman, & Yu-Chu, 2011), personality traits (Chapman, et al., 2009), an increase in chronic medical conditions (Begley, Behan, & Seo, 2010), and geographic location (Zielinski, Borgquist, & Halling, 2013).

Despite the many studies mentioned above, there is a large disconnect between results as well as probable solutions. Many of the studies have opened up doors to future studies or identified areas of weakness, yet none of the studies have been able to clearly identify the complex problem causing the detrimental overcrowding of the U.S. healthcare system "safety net." This is an indication that more research over a broader

scope is required to pinpoint a solution to one of the major problems affecting the US

healthcare system today.

CHAPTER III

METHODS

Introduction

This study addresses the relationship between socioeconomic status and use of an emergency department over other sources of care, which may lead to the overcrowding of emergency departments. Based on the previous research discussed in the literature review of Chapter II, socioeconomic status should be a fair indicator of emergency department use. Chapter III provides an explanation of the methodologies and statistical analysis of the data used to determine the relationship between socioeconomic factors and sources of health care as observed in the Centers for Disease Control and Prevention's National Health Interview Survey, years 2010-2012. The setting, participants, variables, and methods for data analysis will be discussed in this chapter.

The National Health Interview Survey

The National Health Interview Survey (NHIS) is conducted annually since 1957 by the National Center for Health Statistics, a division of the U.S. Census Bureau, and statistics are reported by the Centers for Disease Control and Prevention. The survey results have provided data to track health status, health care access, and progress toward achieving national health objectives (U.S. Department of Health and Human Services,

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2014). An important note added by the U.S. Department of Health and Human Services (2014) is that the NHIS consists of a core set of questions that remain basically unchanged year to year but does contain supplemental questions that relate to the core set, yet reflect current issues of national importance. It should also be noted that private nonprofit organizations may sponsor these supplemental questions.

Setting

According to the U.S. Department of Health and Human Services (2014) the setting of the study consists of the representative sample's household. These households are determined to be representative of the civilian noninstitutionalized population. Specially trained representatives of the U.S. Census Bureau travel to selected households and conduct a thorough interview with the core and supplemental questions mentioned earlier. These agents present proper identification, including government identification cards and badges. Confidentiality as well as other human rights are guaranteed by law to be upheld. Even if the particular household that is approached has been selected for participation in the study, voluntary consent is always gained prior to beginning the interview process.

Participants

The NHIS is a cross-sectional household interview survey (U.S. Department of Health and Human Services, 2014). The U.S. Department of Health and Human Services

(2014) reports that 35,000-40,000 households are visited annually to conduct this interview, and within these tens of thousands of households data is collected on 75,000-100,000 individuals. Participants are 18 years of age and older, and if any member of the household is a child (under 18) or not present, an 18+ year old family representative may answer for that person. No substitutions are made, which means that if a particular household that was chosen in the sampling process is unable or unwilling to participate the interviewer may not choose a different household to conduct the interview.

The sampling process used by the NHIS is a multistage process with the overall goal of accurate U.S. population representation. The first stage consists of a cluster sample, using 428 primary sampling units (PSU's) that are drawn from geographically defined areas and mainly consist of counties, small groups of contiguous counties, or metropolitan statistical areas, all of which are preexisting units used for other samples. The second stage is a stratified random sample in which the population is divided into homogenous subgroups from which a random sample can be drawn. This process involves "screening" of the PSUs for demographic information deemed suitable for a representative sample such as ethnicity, as an example. Once the total NHIS sample has been selected, it is subdivided into four separate panels determined by the U.S. Census Bureau so that each panel can be a representative of the general U.S. population.

Variables

As stated previously, the questionnaire consists of a consistent set of core questions that do not change from year to year as well as supplemental questions which

reflect current health care related issues. There are four major components to the questionnaire: Household, Family, Sample Adult, and Sample Child. This study only refers to the Sample Adult and Family components because the Family variables will reflect socioeconomic status and the Sample Adult variables will reflect decision-making tendencies and job status.

The following two hypotheses will explain the relationship between the socioeconomic factors of income and education and the choice of location for primary care. The goal of the present research is to accept the alternate hypothesis "$H_1(1)$" and reject the null hypothesis "$H_0(1)$".

$H_0(1)$: Socioeconomic factors have no impact on the use of emergency departments as a chosen source of medical care.

$H_1(1)$: Patients of lower education and income are more likely to seek medical care at an emergency department over other chosen sources of care.

The next two hypotheses attempt to explain the relationship between job status and the choice of location for primary care. The goal of the present research is again to accept the alternate hypothesis "$H_1(2)$" and reject the null hypothesis "$H_0(2)$".

$H_0(2)$: Patients who are not employed and not currently seeking employment have no impact on the use of emergency departments as the chosen source of medical care.

$H_1(2)$: Patients who are not employed and not currently seeking employment are more likely to seek medical care at an emergency department over other chosen sources of care.

Several sub-hypotheses were added to further support the research results obtained. These sub-hypotheses include:

Sub-Hypothesis 1: Patients of higher education are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 2: Patients of higher income level are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 3: Patients who are currently employed are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 4: Patients who are currently looking for work are less likely to seek medical care at an emergency department over other sources of care.

With respect to these hypotheses, a variety of statistics were used in this study. Statistical significance is defined as a p value of 0.05 or lower. The usual place for care and the emergency room as the usual place for care are the dependent variables of the study. The independent variables examined within the study are average family income, highest education level achieved, and current working status. Each independent variable is examined individually for correlation using regression models, and a multiple regression model is used to examine their collective effects (or lack thereof) once the individual examination is complete.

Dependent Variables

The dependent variables in the study are (1) the patient's usual place for care and (2) the emergency room as the usual place for care. Within the variable "patient's usual place for care" are several options from which the respondent can choose, but the study focuses on the following recoded variables: (1) Emergency Department or (2) Other (clinic, doctor's office/HMO, hospital outpatient department). The latter dependent

variable, "emergency room as the usual source for care," simply asks the patient to answer with (1) Yes; or (2) No; to the statement "…you get most of your care at the emergency room."

Independent Variables

The independent variables addressed in the study include the following: *Current employment status.* Possible answers related to current employment status include (1) Working for pay at a job or business; (2) With a job or business but not at work; (3) Looking for work; (4) Working, but not for pay, at a family-owned job or business; (5) Not working at a job or business and not looking for work.

Ratio of income to the federal poverty level. This variable was chosen to represent the ratio of family income to the federal poverty level, because this particular variable accounts for income regarding family size. This question includes many categories to choose from, but they are recoded into the following: (1) Below 1.5; (2) 1.5 to 2.99; (3) 3.0 to 4.99; (4) Above 5.0, indicating that the household income is below 150%, between 150% and 299%, between 300% and 499%, and above 500% of the federal poverty level. They were separated into these categories for the purpose of observing those who are eligible for governmental aid programs such as Medicaid, where the threshold is 133% or lower of the federal poverty level (Centers for Medicaid & Medicare Services, 2014), and also for observing the middle class, whose income ranges from 200% of the federal FPL to the upper middle class and wealthy making 500% of the FPL or greater (United States Census Bureau, 2014). It should be noted that above 500% is the statistical limitation of

the NHIS results, and does not imply that everyone making over 500% of the FPL is wealthy. It should also be noted that below 1.5 was used instead of 1.25 due to the intent of including all of those eligible for Medicaid services, despite the fact that there may be outliers.

Highest level of school completed. There are many subcategories that fall under the highest level of school completed, but this study only addresses the following recoded variables: (1) 12th grade, no diploma; (2) GED or High School Graduate; (3) Some college, no degree; (4) Associate Degree (technical or academic); (5) Bachelor's Degree; (6) Terminal Degree (Master, Doctorate, Professional).

Data Analysis

The data in this study are analyzed with the SPSS statistical package using bivariate and multivariate analyses. Before any analyses could be performed, it was necessary to recode the variables for both ease of reference and to provide for a binary dependent variable from the categorical variable "Place you seek care (most often)." The first stage of statistical analysis consists of descriptive statistics, such as frequencies and percentages, to describe the population and choices made by the population. Next, logistic regression models are entered into SPSS and the results are used to explain the relationships between the dependent and independent variables. Beta coefficients were compared among the variables in question to determine any correlation between the phenomena. The last variable in each category served as the reference variable for the

rest of the beta coefficients. Statistical significance is identified as a p value of less than 0.05 and respects are paid to those relationships which, though they have a higher p value, remain consistent despite correcting for potentially confounding factors. Logistic regression models are chosen as the appropriate level of analysis because the variables in question are categorical.

Bivariate logistic regression models were constructed to determine if any relationship can be established between each independent variable to each dependent variable, then beta coefficients are compared with Wald Chi-square and standard error analyses to determine goodness of fit of the present models.

Among the logistic regression models analyzed were a series of multivariate analyses on potentially confounding variables as well as weighted models. The data available was weighted, then compared to the nonweighted models to account for any changes that may occur. One ambiguous variable which could affect results of the analysis involves the working status "not working and not looking for work." Because this category has the potential to include the stay at home parent or retiree, those in school, on disability, or layoff, there could be a significant variation in choice of care noted in the regression models. Insurance status was analyzed to determine if a relationship exists between emergency department use and the presence or absence of insurance, or if insurance reflects job status. Other potentially confounding variables include age, sex, and ethnicity.

The presented multivariate regression analyses were corrected versions to include the influence of confounding variables. These were used determine if there was a factor influencing the dependent variables other than those used in the bivariate analyses. Once

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these potentially confounding variables and their significance to the results were identified, results of years 2010, 2011, and 2012 were thoroughly evaluated in regard to the beta coefficient, standard error, Wald Chi-square value, and exponentiated beta to determine correlation and statistical significance between each variable in question.

To ensure evaluation of the insured population, crosstabulation was also performed to identify consistencies or inconsistencies between presence or absence of insurance and the reason for emergency department use. These reasons consist of options such as: (1) the patient didn't have another place to go, (2) the doctor's office was not open, (3) the patient was advised by another health care provider to go, (4) the problem is too serious for a doctor's office or clinic, (5) only the hospital could help, (6) the ER is the closest provider, and (7) the ER is the usual place for care.

It is important to note that due to a differing number of respondents to each question, the variables in question and the descriptive or regression analyses performed have presented with varying sample frequencies. This is due to the fact that not everyone has gone to the emergency department or not everyone has answered every question within the sample questionnaire.

Summary

This chapter describes the setting, participants, variables, and methods for data analysis in the study. The methods are designed to address the listed hypotheses in regard to factors which lead patients to the emergency department as a primary source of care. Chapter IV will present the analyses of the technical data. Chapter V will conclude the

study and discuss the findings, as well as offer suggestions for future research on the

subject matter.

CHAPTER IV

RESULTS

Chapter IV describes the results of the current study which are used to identify

relationships between socioeconomic status, job status, and the usual place to receive

medical care. Demographic and care location characteristics will be used to examine the

sample studied, then the results from a variety of logistic regression models will be

presented to identify whether or not a relationship exists between choice of care location

and job or socioeconomic status. Chapter V concludes the study and provides for

discussion.

Study Hypotheses

The following two hypotheses will explain the relationship between the

socioeconomic factors of income and education and the choice of location for primary

care. The goal of the research is to accept the alternate hypothesis "$H_1(1)$" and reject the

null hypothesis "$H_0(1)$".

$H_0(1)$: Socioeconomic factors have no impact on the use of emergency

departments as a chosen source of medical care.

$H_1(1)$: Patients of lower education and income are more likely to seek medical

care at an emergency department over other chosen sources of care.

The following two hypotheses attempt to explain the relationship between job status and the choice of location for primary care. The goal of the research is to accept the alternate hypothesis "$H_1(2)$" and reject the null hypothesis "$H_0(2)$".

$H_0(2)$: Patients who are not employed and not currently seeking employment have no impact on the use of emergency departments as the chosen source of medical care.

$H_1(2)$: Patients who are not employed and not currently seeking employment are more likely to seek medical care at an emergency department over other chosen sources of care.

Several sub-hypotheses were added to the study in attempt support the research results from the logistic regression models. These sub-hypotheses include:

Sub-Hypothesis 1: Patients of higher education are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 2: Patients of higher income level are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 3: Patients who are currently employed are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 4: Patients who are currently looking for work are less likely to seek medical care at an emergency department over other sources of care.

Review of Methodology

The statistical data from the 2010, 2011, and 2012 National Health Interview Survey results were analyzed using the SPSS statistical package. Prior to analyzing any

statistical models, the variables needed to be recoded for this study, both for ease of

reference as well as compatibility with the binomial logistic regression model intended.

Ratio of family income to the federal poverty level was recoded into 5 categories: (1)

Below 1.5; (2) 1.5 to 2.99; (3) 3.0 to 4.99; and (5) Above 5.0.

The education levels of Associate (technical) and Associate (scholarly) were

combined into one Associate degree category, while the terminal degrees (Master,

Professional, Doctoral) were combined into one category. Age was recoded into (1) 18-

54, (2) above 55 for the purpose of evaluating differences in those eligible for retirement.

The final recoding involved the creation of a binary dependent variable from the

multivariate "Place you seek care (most often)." This left two options: (1) Emergency

department and (2) Other sources (clinic, doctor's office/HMO, hospital outpatient

department).

After the variables were recoded as needed for the present study, descriptive

statistics were first used to identify the demographics of the population as well as the

most common choices of medical care location. The data was then analyzed using the

logistic regression function of the SPSS software, with the usual place for care as the

dependent variable and the income, job status, and education level serving as the

independent variables. The assumed logistic regression formulae which explain the

relationship between the dependent and independent variables are shown below.

$$\text{logit P}(X_{1i}) = a + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i}$$

$$\text{logit P}(X_{2i}) = a + b_1 X_{1i} + b_2 X_{2i} + b_3 X_{3i}$$

In these equations, the dependent variable logit $P(X_{1i})$ is "patient's usual place for care"

for observation i where the dependent variable logit $P(X_{2i})$ is "…you receive most of your

care at the emergency room (yes or no)" for observation i. The logit model indicates the Y variable as a probability of X, abbreviated P(X). The independent variable X_{1i} is the observation of "Current working status" where X_{2i} and X_{3i} remain constant. The independent variable X_{2i} is the observation of the variable "Total combined family income" where X_{1i} and X_{3i} remain constant. The independent variable X_{3i} is "Highest level of school completed" where X_{1i} and X_{3i} remain constant. In the formula, the constants "b_1" through "b_3" represent the slope of the line. The constant "a" represents the y-intercept of the model.

<div align="center">Descriptive Statistics of the Sample</div>

Demographic Data

The pertinent demographic data for the 2010-2012 National Health Interview Survey is reported in Table 1 and reflects the study-related demographic data collected from the NHIS sample. Of this sample, the majority (54.6%) are working at a job for pay, 2.2% are with a job but not currently at work, 6.5% are looking for work, 0.9% of respondents work but not for pay at a family owned business, and 35.8% are "not working and not looking for work."

The next pertinent demographic data for the 2010-2012 National Health Interview Survey, also reported in Table 1, is the ratio of income to the federal poverty level (FPL). Within this sample, the majority (29.9%) make less than 1.5 times the FPL. 26.1% of respondents make between 1.5 and 2.99 times the FPL. 21.7% of the respondents make

between 3.0 and 4.99 times the FPL, and finally 22.4% of the study's participants make more than 5 times the FPL.

The third set of pertinent demographic data for the 2010-2012 National Health Interview Survey reported in Table 1 is the household adult with the highest level of schooling. Of this sample, 16.5% have not graduated from high school, 26.1% have graduated from high school or achieved their GED, 19.7% have completed some college without earning a degree, 10.7% have earned an associate's degree, 17.3% have earned a bachelor's degree, and 9.7% have earned a master's, professional, or doctoral degree.

One of the potentially confounding variables related to the demographic data is the reported gender of the respondent, reported in Table 1. Within the sample, 55.6% of respondents were female and 44.4% of them were male. Along with gender influencing results could also be the respondent's age. For the purpose of identifying the retired population, the study looked at those aged 18-54 (62.8%) and those older than 55 (37.2%) because of the U.S. national average age of retirement, which is currently 61 (Brown, 2013).

Ethnicity is considered a potentially confounding variable and is listed in Table 1, and the majority (59.3%) of respondents were Non-Hispanic White, 17.8% reported being Hispanic, 15.6% reported being Non-Hispanic Black, and 6.3% reported being Non-Hispanic Asian. Only 0.9% were reported being Non-Hispanic, all other races.

Insurance status was considered in the list of potentially confounding variables and among the demographic information listed in Table 1 it is noted that 90.5% of respondents claim to possess insurance while 9.5% claim they do not. Crosstabulation data in Table 2 illustrates the relationship between job status and insurance status, where

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it is discovered that the majority of respondents within each job category do possess

insurance, with the lowest number possessing insurance (75.2%) in the "looking for

work" category.

Among the demographic data of the sample the confounding variable "reason for

not working last week" is added to the descriptive analysis for reference. As shown in

Table 3, the choice "taking care of house/family" accounts for 14.9% and represents the

stay at home parent. The majority (47.8%) report being retired, and another small

majority (18.6%) report not working because of a disability. Others report going to

school (7.1%), being on vacation (2.5%), on maternity leave (0.5%), health reasons

(2.4%), being off-season for contractual work (1.3%), and currently on layoff (1.7%).

Another 3.1% chose another answer not assigned to a particular category.

Job Status Representation

It must be made abundantly clear which reason for not working falls under the

corresponding job status choice, whether it is "With a job or business but not at work" or

"Not with a job or business and not looking for work." According to the crosstabulation

data in Table 4, the work status "with a job or business but not at work" represents those

who are on vacation (85.6%) or those who are off-season and contractual (69.8%), and

there is some representation of those on maternity leave (52.3%), but based on the

percentages it is clear the respondents on maternity leave were not sure which category

they should choose.

Again referring to the crosstabulation data in Table 4 it is clear the work status

"not with a job or business and not looking for work" represents stay at home parents

(98.8%), those still going to school (98.1%), those who are retired (99.8%), respondents

on layoff (84.6%), and those who are disabled (99.2%). 47.7% of those respondents on

maternity leave also chose this answer.

Another crosstabulation that was considered is the reason for using an emergency

room with presence or absence of insurance status. As Table 5 demonstrates, those with

insurance typically use the emergency room because they believe only the hospital could

help (64.8%), the problem was too serious for a doctor's office (54.1%), or the doctor's

office was closed (46.8%). Those without insurance use the emergency room for different

reasons, but share the reason "only the hospital could help" in common with those who

have insurance (64.6%). Those without insurance also report not having anywhere else to

go (58.2%) or they perceived the problem too severe for a doctor's office or clinic

(45.9%). Another large percentage of this group reports using the emergency department

as their main source of care (37.7%).

Choice of Care Location

The first set of descriptive statistics for the dependent variables are reported in

Table 6 and reflect the responses from the 2010-2012 National Health Interview survey

regarding the place patients go to receive most of their care. As Table 6 illustrates, the

majority (98.5%) seek care at a clinic, doctor's office, Health Maintenance Organization

(HMO), or a hospital outpatient department. The remaining 1.5% identify the emergency

department as their usual place for care. Table 6 also shows that the majority (85.4%) still

state that it is not their usual place for care, but 14.6% of respondents admit that they use

an emergency room for most of their care.

Table 7 represents the information to be described with the previous data describing the emergency room as the patient's usual place for care. As Table 7 illustrates, the majority (22.7%) believe only the hospital could help, while another small majority (18.8%) believe that the problem was too serious for a doctor's office or clinic. Other larger frequencies included patients who needed help when a doctor's office or clinic was not open (16.1%), patients who did not have another place to go (15.0%), patients who use the emergency room because it is the closest place for care (13.9%), patients who were advised by another healthcare provider to go to the emergency room (8.4%), and patients who state that the emergency department is their usual place for care (5.1%).

Logistic Regression

Bivariate Analyses

Due to the order of the listed hypotheses, the data regarding socioeconomic status will be presented first. In the 2010-2012 regression statistics listed in Table 8 it is illustrated that as the ratio of income to the federal poverty level rises the likelihood of seeking care at an emergency department over other sources decreases. Those making below 150% of the federal poverty level are more likely to seek care first at an emergency department ($B = 2.85$, $p < 0.001$) when compared to the reference variable of those making above 500% of the federal poverty level. The beta coefficient steadily decreases as ratio of income to the federal poverty level increases, indicating a negative relationship between income and use of an emergency department over other sources of

care. Using the exponentiated beta coefficient, it is estimated that those making below

150% of the federal poverty level are at least twice as likely to seek care at an emergency

department over other sources of care ($\text{Exp}B = 17.19$) than those making above 150% of

the federal poverty level ($\text{Exp}B \leq 7.30$).

The next socioeconomic independent variable is the highest education level in the

household. The regression statistics listed in Table 9 demonstrate that as education level

rises, likelihood of using an emergency department over other sources of care decreases.

Those participants who did not graduate from high school ($B = 2.59$, $p < 0.001$),

graduated high school or obtained a GED ($B = 2.13$, $p < 0.001$) are more likely to use an

emergency department over other sources of care compared to the reference variable,

those who have received a terminal degree.

The next independent variable of question represented in Table 10 is that of

employment status, in which the use of an emergency department over other sources of

care is lower among those working or earning an income ($B = 0.00$, $p > 0.05$) than those

who claim they are looking for work ($B = 1.62$, $p < 0.001$) when compared to the

reference variable "not working, not looking for work."

The next set of bivariate regression data refers to Table 11 which shows the

relationship between the dependent variable "you get most of your care at the emergency

room" and the independent variable of ratio of income to the FPL. It is still clear that

those making less than 150% of the federal poverty level are seeking emergency

departments over other sources of care ($B = 1.26$, $p < 0.001$) when compared to the

reference variable of those making above 500% of the FPL.

Staying true to the previous set of regression analyses, Table 12 shows that

patients who did not graduate high school are more likely to use an emergency room as

their main source of care ($B = 1.45$, $p < 0.001$), as well as high school graduates and GED

recipients ($B = 1.14$, $p < 0.001$) and the relationship continues to descend as education

level increases, when compared to the reference variable of those who have earned a

terminal degree.

Table 13 clearly identifies the similar relationship witnessed in previous

regression models in regard to job status and use of an emergency department as the main

source of care. Those who are currently "working for pay" are less likely to use an

emergency department for most of their care ($B = 0.29$, $p < 0.001$) than someone who

claims to be "looking for work" ($B = 0.97$, $p < 0.001$) when compared to the reference

variable of "not working, not looking for work."

Multivariate Analyses

The previous bivariate regression analyses represented the relationships between

the dependent variables with each independent variable. The following analyses included

multivariate models to determine confounding factors that lead patients to the emergency

department over other sources of care.

Table 14 represents the multivariate logistic regression analysis establishing

likelihood of seeking care at an emergency department over other sources of care while

correcting for the confounding variables of insurance status, age, sex, and ethnicity.

Those respondents earning below 150% of the federal poverty level (FPL) are still more

likely to use an emergency department over other sources of care ($B = 2.06$, $p < 0.001$)

when compared to the reference variable of those making above 500% of the FPL. This relationship becomes more negative as income increases.

Also represented in Table 14 is the corrected analysis of education and use of an emergency department over other sources of care. It is again noted that as education level rises, use of an emergency department over other sources of care decreases. Those who have not graduated from high school are more likely to use an emergency department than those who have obtained higher levels of education ($B = 1.45$, $p < 0.001$) when compared to the reference variable of those who have obtained a terminal degree.

The final independent variable represented by Table 14 is the corrected analysis of job status and the use of an emergency department over other sources of care. Once correcting for the potentially confounding variables this category loses much of its statistical significance, with the only statistically significant finding is that those who claim to be "looking for work" are likely to use an emergency department over other sources of care ($B = 0.67$, $p < 0.001$) compared to the reference variable "not working, not looking for work."

Table 15 represents a similar analysis corrected for the potentially confounding variables but compares the independent variables to the dependent variable "you receive most of your care at the ER (yes or no)." The patients earning less than 150% of the federal poverty level (FPL) still show an increased likelihood of using an emergency department ($B = 0.93$, $p < 0.001$) when compared to the reference variable of those making above 500% of the FPL. Education also still plays a role in the corrected results, with those who have not graduated from high school being more likely to use an emergency department for most of their care ($B = 0.74$, $p < 0.05$) compared to the

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reference variable of those who have earned a terminal degree. The relationship between employment status and use of an emergency department for the main source of care is similar to previously reported relationships, in which Table 15 illustrates statistical significance in those who claim to be "looking for work" being more likely to use an emergency department as the main source of care ($B = 0.38$, $p < 0.05$) than those of the reference variable "not working and not looking for work."

The previous models were also weighted to the population in attempt to identify other major changes to the statistical data, but even with the weighted sample despite the major mathematical changes from the larger population size, the relationships between the variables remain the same.

Summary

This chapter presents the technical analysis of the data, reported purely in numerical format as it is discovered in the SPSS statistical package. The chapter also provided a brief synopsis of the logistic regression formula used to describe the data analysis as well as the hypotheses of the study in relation to the regression tables. Chapter V will conclude the study and discuss the findings, as well as offer suggestions for future research on the subject matter.

CHAPTER V

SUMMARY AND CONCLUSIONS

This is the final chapter of the study. The summary includes an overview of the

problem studied, the hypotheses, and the methods used to conduct the present study. This

summary is followed by a thorough discussion of the results and implications for future

research.

Purpose

The purpose of the present study is to identify relationships between job or

socioeconomic status and the use of an emergency department over other sources of

health care. The study also attempts to identify whether or not there are any potentially

confounding variables that change the results when logistic regression models are

reviewed between the dependent and independent variables in question. This data may

help to identify the despaired population when it comes to choice of health care location

and reduce the burden felt on the emergency healthcare system.

Summary of Procedures

The present study referred to data collected by the United States Census Bureau

and reported by the Centers for Disease Control and Prevention in the National Health

Interview Survey (NHIS) from years 2010-2012. The sampling process used by the U.S.

Census Bureau for the NHIS is a complex and multilevel one which includes cluster

sampling as well as a stratified random sample that is screened, ultimately providing for a

more accurate representation of the entire U.S. population. The sample consists of

participants over the age of 18 from 35,000 to 40,000 households, where the annual

individual participant number is 75,000 to 100,000.

The dependent variables in the study were (1) the patient's usual place for care,

with the choices of emergency department or other (clinic, doctor's office, hospital

outpatient department) and (2) the emergency room as the usual place for care, with the

choice of "yes" or "no." The independent variables were current employment status, ratio

of income to the federal poverty level, and highest level of school completed.

The study hypotheses are listed below and the goal of the present research is to

accept the alternate hypothesis "$H_1(1)$" and reject the null hypothesis "$H_0(1)$".

$H_0(1)$: Socioeconomic factors have no impact on the use of emergency

departments as a chosen source of medical care.

$H_1(1)$: Patients of lower education and income are more likely to seek medical

care at an emergency department over other chosen sources of care.

The next two hypotheses attempt to explain the relationship between job status

and the choice of location for primary care. The goal of the present research is again to

accept the alternate hypothesis "$H_1(2)$" and reject the null hypothesis "$H_0(2)$".

$H_0(2)$: Patients who are not employed and not currently seeking employment have

no impact on the use of emergency departments as the chosen source of medical care.

H_1(2): Patients who are not employed and not currently seeking employment are more likely to seek medical care at an emergency department over other chosen sources of care.

Several sub-hypotheses were added in attempt to support the research results obtained. These sub-hypotheses include:

Sub-Hypothesis 1: Patients of higher education are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 2: Patients of higher income level are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 3: Patients who are currently employed are less likely to seek medical care at an emergency department over other sources of care.

Sub-Hypothesis 4: Patients who are currently looking for work are less likely to seek medical care at an emergency department over other sources of care.

With the use of the statistical analyses described above, statistical significance was defined as any relationship with a p value of less than 0.05. The beta coefficient was examined to compare relationships between one another, and an exponentiated beta coefficient was used to further identify the degree of change between each job or socioeconomic status.

Discussion

The initial data illustrated by the results is that of the pertinent demographics of the sample studied. The majority of respondents report "working at a job for pay," while the second majority of the respondents are "not working and not looking for work." Regarding the other categories "with a job but not at work," "looking for work," and "working but not for pay at a family owned business," it is noticed that there are very small percentages of the sample reporting these job statuses.

The next data set described the participant's ratio of income to the federal poverty level (FPL), where every category was nearly evenly divided between less than 1.5 times, 1.5-2.99 times, 3-4.99 times, and greater than 5 times the FPL. A slight majority (29.9%) of respondents fell below 1.5 times the FPL, which is slightly higher than the reported national average in 2010 of 18.7% (U.S. Census Bureau, 2014), however the US Census Bureau reports the national average of those making below 1.25 times the FPL, whereas the present study focused on those making less than 1.5 times the FPL.

Within the socioeconomic variables also lies the highest level of school completed. Of this sample, the majority of respondents have graduated from high school or completed a GED (26.1%), while an alarming number of respondents have not completed high school (16.5%). This number is fairly equivalent to those who have attended college but do not have a degree and those who have earned a bachelor's degree. The smaller percentages have earned an associate degree or terminal degree, such as a master, professional, or doctoral degree. In regard to national averages, the data reported by the U.S. Census Bureau is nearly identical to the data reported in the NHIS results, with 31.2% being the national average college graduation or GED attainment rate and 12.9% not graduating high school (U.S. Census Bureau, 2014). The frequencies of those

who have attended college without receiving a degree, received an associate, bachelor, or advanced (terminal) degree are also very similar to those reported in the present study.

Potentially confounding variables within the population include gender, age, insurance, ethnicity, and reason for not working. The majority of respondents were female (55.6%) and less than half were male (44.4%). The majority of respondents are also aged 18-54 (62.8%) while the population that represents the retired persons older than 55 is 37.2%. The insurance crosstabulation suggests that the majority of each job status are insured, with the lowest majority (75.2%) being those who claim to be "looking for work." 89.2% of those who are "working for pay" are insured, 92.3% of those "with a business but not at work" are insured, and 95.3% of those "not looking, or not working" are insured. In regard to the reason for not working the majority of respondents (47.8%) state that they are retired, while smaller majorities are not working because of a disability or they are a stay at home parent. The other categories represent much smaller divisions of the sample and include going to school, being on vacation, maternity leave, off-season and contractual, and on layoff. It should be noted that those who chose the job status "With a job or business but not at work" were typically on vacation or perform contractual work, as well as those on maternity leave. Those who chose "not with a job or business and not looking for work" were stay at home parents, those going to school, retirees, disabled, or on layoff.

It is readily apparent that there is a difference in the reason for ER use between those who possess insurance and those who do not. Those who possess insurance tend to use the emergency department because they perceive their problem to be too serious for a doctor's office or clinic, or because they believe only the hospital is capable of handling

their particular problem. While these are shared by the uninsured group, those without insurance also use ERs because they do not have anywhere else to go, because it is the closest location for care, or because they use the ER as their usual source of care. It is possible that those without insurance also do not possess a vehicle, which could explain the proximity of the ER as a reason to seek that location for care. It is also possible that those with a lower income or who may be on Medicaid would have difficulty finding a primary care physician who accepts alternative payment types, therefore they feel as if they do not have anywhere else to go since the ER cannot turn them away after the implementation of EMTALA, discussed in Chapter II.

When reviewing the descriptive statistics of the sample, it is abundantly clear that the emergency department is not used as a first choice for a large percentage of the respondents, but that small percentage is enough to cause the overwhelming of the emergency system discussed in Chapter II and must be studied. The majority of respondents seek care at a clinic, doctor's office, HMO, or hospital outpatient department over an emergency department. However, when the question is restated later in the survey, those who went to the emergency department because it is their main source of care include 14.6% of the respondents, much higher than the 1.5% reported when respondents are given the option of other care locations.

In the bivariate logistic regression models when reviewing the beta coefficients produced it is readily noticed that there is a difference in the rate of emergency department use over other sources of care for those on low income or lower education status. When referring to the exponentiated beta, those making less than 150% of the federal poverty level are at least twice as likely to seek care at the emergency department

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versus other sources, or use it as their main source of health care. A similar, but not as strong, relationship exists between those with lower educational backgrounds are more likely to use an emergency department versus those who possess a terminal degree.

The next bivariate logistic regression model illustrates the relationship between job status and use of the emergency department over other health care sources, or use of an emergency department as the main source of care. Those who are working are less likely to use the emergency department over those who claim to be looking for work, with all other work statuses including "not working and not looking for work" showing unlikelihood of seeking care at an emergency department. This category is also lacking statistical significance compared to the other regression models possibly due to the ambiguity of the categories, where there is such diversity in those who chose the respective categories that it doesn't make a good predictive model. There were also fewer respondents for the "with a job but not working" and "working but not for pay at a family business" categories.

When correcting for the variables of age, ethnicity, gender, and insurance status in multivariate analyses, these are discovered to have a small impact on beta coefficient numbers by insignificant amounts but never changing the relationship between the dependent and independent variables. It is worth noting, however, that despite relationships between beta coefficients remain the same, correcting for potentially confounding variables including ethnicity, age, sex, and insurance status reduced the statistical significance of some of the data represented in each of the tables. This could be due to the limited number of respondents who answered all questions, or the fact that there were so many questions with multiple answer choices it is more difficult to

determine a trend while reviewing it on a grandiose scale. This phenomenon is noticed very profoundly in the Table 15 data representing those who receive most of their care at the emergency room, where the smallest sample size of the tables is represented. Due to so many choices in the questionnaire for the limited number of respondents, statistical significance was difficult to achieve and therefore many of the statistics reviewed using that dependent variable are not statistically significant enough to include in the conclusions.

Conclusions

The conclusions of the present research will be guided by the study hypotheses:

H_0(1): Socioeconomic factors have no impact on the use of emergency departments as a chosen source of medical care.

H_1(1): Patients of lower education and income are more likely to seek medical care at an emergency department over other chosen sources of care.

While correcting for potentially confounding variables, it is readily apparent that there is clear association between the socioeconomic factors of income and education level and the use of an emergency department over other sources of care. Therefore, according to the data presented by the NHIS from years 2010 to 2012, the alternate hypothesis is accepted and the null hypothesis is rejected.

H_0(2): Patients who are not employed and not currently seeking employment have no impact on the use of emergency departments as the chosen source of medical care.

H_1(2): Patients who are not employed and not currently seeking employment are more likely to seek medical care at an emergency department over other chosen sources of care.

When correcting for the potentially confounding variables, there is a clear difference in emergency department use between those who are working and those who claim to be "looking for work." However, those who are "not working and not looking for work" are not necessarily patients who are living an apathetic lifestyle because the category includes retirees, stay at home parents, students, and contractual workers, all of which are considered equal to the working population. The results show no correlation between this particular job status and use of an emergency department over other sources of care. Therefore, the alternate hypothesis is rejected and the null hypothesis is accepted.

Sub-Hypothesis 1: Patients of higher education are less likely to seek medical care at an emergency department over other sources of care.

Based on the illustrated relationships with statistical significance, there is a clearly negative relationship between education level and use of an emergency department over other sources of care. Therefore, this sub-hypothesis is accepted.

Sub-Hypothesis 2: Patients of higher income level are less likely to seek medical care at an emergency department over other sources of care.

Since the relationship between income and use of an emergency department is clearly negative with statistical significance, this sub-hypothesis is accepted.

Sub-Hypothesis 3: Patients who are currently employed are less likely to seek medical care at an emergency department over other sources of care.

The data does not reveal a strongly positive relationship nor a strongly negative relationship, indicating that respondents who are working may have mixed answers when it comes to the care location. The sub-hypothesis, however, compares the relationship between other groups, and those who are "working for pay" were one of the less likely groups to use an emergency department over other sources of health care. Therefore, this sub-hypothesis is accepted.

Sub-Hypothesis 4: Patients who are currently looking for work are less likely to seek medical care at an emergency department over other sources of care.

In the statistical analysis of the data, it is clear that there is a strongly positive relationship between patients who are looking for work and use of an emergency department over other sources of care. Therefore, this sub-hypothesis is rejected.

In summation of the conclusions, it is clear that those who are working are less likely to choose an emergency department over those who claim to be looking for work, however, those who are "not working and not looking" fall into an ambiguous category with too many different factors which leads to a loss of relationship between the dependent variables as well as lack of statistical significance. However, the relationships between the socioeconomic variables of education and income and the dependent variables are clearly negative, indicating that as socioeconomic status decreases, likelihood of the use of emergency departments over other sources of care increases while the relationship becomes even stronger when accounting for the respondent's insurance status. It should be noted that these conclusions are based upon available data in the NHIS from years 2010-2012.

Limitations

One of the first references to the limitations of the study will be to its internal validity. The study has made a thorough attempt to account for any potentially confounding variables, trying to ensure that the independent variables are indeed the ones with the greatest effect on the dependent variables. Due to this thoroughness in the statistical analysis, internal validity of the study can be ensured but respect will be paid to those opinions that not every potentially confounding variable was included.

The next study limitation discussed is that of external validity. This study uses data available from the National Health Interview Survey from years 2010-2012, conducted annually by the United States Census Bureau and published by the Centers for Disease Control and Prevention, who have both ensured that the complex sampling process is representative of the United States population. With that in mind, one of the limiting factors of the NHIS is that regions are only divided into four sections, essentially north, south, east, and west. Therefore, more specific regions cannot be studied which may show a difference in the results between certain impoverished areas or flourishing areas of the country. In fair confidence, despite the lack of specific regions to study, because of the overall sampling process and many decades of error correction in the survey process it is safe to assume external validity is ensured for the present research.

Another arguable limitation to the study is that it only covers years 2010 to 2012, and there will be variances between years because of economic fluctuation as well as the changes not to be overlooked among the health care system with implementation of the Affordable Care Act. This is coupled with the inability of the present data to distinguish

between types of insurance. Many people in the United States interpret Medicare and Medicaid as a type of health care insurance, which could lead to a misinterpretation of the survey as well as a misinterpretation of the results of the survey.

The final limitation discussed is that of the ambiguous independent variable of work status. While some of the categories within this variable are clear, others such as the presently studied "not working and not looking for work" have too many confounding factors to accurately study, leading to the statistical insignificance of the conclusion and inability to adequately study that variable. It is considered, however, that those who are "working for pay" may be less likely than other job statuses to use an emergency department over other sources of health care, even when accounting for age, gender, reason for not working, insurance status as contributing factors.

Contributions of the Study

The results and conclusions of the present study provide another piece to a very large puzzle regarding the overuse of emergency departments. The study has further solidified evidence that there are disparities among those of differing socioeconomic status when it comes to seeking a main source of care, and the study has provided an overview of how job status may potentially be an indicator of emergency department use and other behavioral factors shown by the reasons for not working. The ultimate goal is to ease the burden on emergency departments and provide for a more effective public health system; and while the present research will not directly lead to change it will certainly add to the science that can.

An important addition to the discussion of contributions is a speculation on possible solutions to the problems identified in the predictive model of the present study. Since the socioeconomic factors of income and education level were identified by the present study as contributors to emergency department use, it may benefit both the population as well as the emergency department overcrowding problem at hand to alter the Patient Protection and Affordable Care Act (PPACA) to address the patient's choice of location for health care. While there are provisions within the PPACA that promote preventive care services over treatment and cost-effectiveness issues, it may be beneficial to offer more financial incentives to patients for seeking these preventive services and also for using a primary care physician on a regular basis to discourage problems that could lead to an emergency department visit. More incentives could also be given to primary care physicians to give them a reason to accept Medicaid or other government assistance programs as a viable form of payment.

Since education is also identified as a contributor to the problem, the preventive provisions addressed in the PPACA could focus on health literacy levels among the despaired population, helping the less educated population understand what a medical emergency is and where to go for certain types of treatment. It would also benefit this population to receive repeated exposure to good health habits and proper hygiene, to avoid the chronic buildup of health problems over many years from simple problems that can be fixed quickly and cheaply, such as proper diet, proper tooth care, and other general health tips.

Addressing the relationship discovered between job status and emergency department use (and in particular the job status "looking for work" and emergency

department use) a series of economic changes to promote job creation are necessary to altering this statistic. Once more jobs are available, those who are truly "looking for work" will be able to find a job, have a greater chance of purchasing insurance, and therefore use the emergency department less frequently. However, the only way to stimulate job growth is to deregulate business; and the principal health care law, the PPACA, is essentially a comprehensive regulation on businesses.

To account for the possibility of patients who are perpetually "looking for work" just to receive government aid, there could be legislation that alters Medicaid and other assistance programs to offer both incentives for getting off of these programs as well as disincentives for remaining on these programs, such as brief time limits or lifetime maximums for government aid. These government assistance programs could be briefly lived and unsatisfactory in quality but provide for the bare minimum of life sustainment, just to help those in an emergency who are truly in need of the assistance. This maintains the "charitable" aspect of Medicaid while avoiding massive expenditures at the cost of others. Respect should be paid to those deserving of the aid, such as the working poor and those who have shown initiative and promise in the work place only to have a life altering disability which prevents them from obtaining work due to health reasons. There are several options to determine whether or not one falls in the "deserving" category, to include comprehensive review of past records, both employment and criminal, and review physicians such as those utilized by insurance companies, to ensure that the people receiving aid are those who need it, and to determine whether those on the programs still need aid, or whether they can be released.

Regular mandatory training could also be required for those who are receiving the government benefits, and attendance of these trainings could be enforced on a no tolerance policy to ensure that these patients are knowledgeable about their condition and the program to which they belong. Each of these suggested changes essentially account for both the job status problem as well as the education problem.

Recommendations for Future Research

Based on previous comments, the present study is not without its limitations. Therefore, recommendations for future research include accounting for the limitations of the present study. These limitations were defined as the inability of the data set to specify particular localities, the limitations in studying years prior to full implementation of all clauses of the Affordable Care Act, the ambiguity of the job status "not working and not looking for work," as well as the potential for those on government assistance programs to answer "looking for work" just to continue receiving benefits without the intent of working. Future research may look into correcting the ambiguity of these job status choices as well as identifying relationships between these job statuses and behavioral characteristics.

The last mention of future study recommendations includes studies that ask questions regarding income, education, and job status as patients enter the emergency department, with more direct questioning, or a less obscure way of asking, about each patient's job status. This could be coupled with the addition of information regarding the reason they are in the emergency department today, and if they had considered taking this

problem to their family physician or a clinic prior to seeking care at an emergency

department. Questioning in this atmosphere may be conducive to more direct answers

and would allow for stronger evaluation of relationships between the dependent and

independent variables.

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APPENDIX A

Institutional Review Board Approval

May 17, 2013

Dr. Salvatore Sanders, Principal Investigator
Mr. Matthew Ozanich, Co-investigator
Mr. Joseph Mistovich, Co-investigator
Dr. Richard Rogers, Co-investigator
Department of Health Professions
UNIVERSITY

RE: HSRC Protocol Number: 180-2013
       Title: Emergency Department Overcrowding: Identifying Patient-sided Factors

Dear Dr. Sanders, et. al.:

The Institutional Review Board has reviewed the abovementioned protocol and determined that
it is exempt from full committee review based on a DHHS Category 5 exemption.

Any changes in your research activity should be promptly reported to the Institutional Review
Board and may not be initiated without IRB approval except where necessary to eliminate hazard
to human subjects. Any unanticipated problems involving risks to subjects should also be
promptly reported to the IRB.

The IRB would like to extend its best wishes to you in the conduct of this study.

Sincerely,

Cathy Bieber Parrott, Chair
YSU Institutional Review Board

c: Mr. Joseph Mistovich, Chair
       Department of Health Professions

March 21, 2014

Dr. Joseph Lyons, Principal Investigator
Mr. Matthew Ozanich, Co-investigator
Mr. Joseph Mistovich, Co-investigator
Dr. Richard Rogers, Co-investigator
Department of Health Professions
UNIVERSITY

RE: HSRC PROTOCOL NUMBER: 180-2013
       TITLE: Socio-economic and Job Related Determinants of Emergency Department
                     Use

Dear Dr. Lyons, et. al.:

The Human Subjects Research Committee has reviewed the modifications you have made to the above-mentioned protocol including a change in Principal Investigator, change in title, and review of additional two years data, and finds that your project continues to meet the condition of minimal risk review of pre-existing data. Therefore, the modifications are approved.

Any other changes in your research activity should be promptly reported to the Human Subjects Research Committee and may not be initiated without HSRC approval except where necessary to eliminate hazard to human subjects. Any unanticipated problems involving risks to subjects should also be promptly reported to the Human Subjects Research Committee.

The HSRC would like to extend its best wishes to you in the conduct of this study.

Sincerely,

Dr. Scott Martin
Interim Associate Dean for Research
Authorized Institutional Official

SCM:ee

c: Mr. Joseph Mistovich, Chair
       Department of Health Professions

APPENDIX B

Tables

Table 1

Demographic information from the 2010-2012 National Health Interview Survey

Variable	*n*	%
Corrected employment status		
Working at a job for pay	51,708	54.6
With a job but not at work	2,097	2.2
Looking for work	6,107	6.5
Working, not for pay, family	831	0.9
Not working, not looking	33,884	35.8
Ratio of income to federal poverty level		
Below 1.5	23,328	29.9
1.5 to 2.99	20,381	26.1
3.0 to 4.99	16,947	21.7
Above 5.0	17,483	22.4
Highest household education		
12th grade, no diploma	15,576	16.5
HS Graduate/GED recipient	24,596	26.1
Some college, no degree	18,611	19.7
Associate degree	10,067	10.7
Bachelor's degree	16,271	17.3
Terminal Degree	9,118	9.7
Race/Ethnicity		
Hispanic	16,884	17.8
Non-Hispanic White	56,145	59.3
Non-Hispanic Black	14,811	15.6
Non-Hispanic Asian	5,981	6.3
Non-Hispanic All other races	875	0.9

Table 1 (continued)

Variable	*n*	%
Gender		
Male	42,070	44.4
Female	52,626	55.6
Age		
18-54	59,473	62.8
55 and older	35,223	37.2
Insurance status		
Has insurance	61,029	90.5
Does not have insurance	6,403	9.5

Note. The job status "Not working, not looking" includes retirees, stay at home parents, contract workers off-season, students, and the disabled.

Table 2

Crosstabulation showing the relationship between work status and the presence of insurance

	Insured	Not Insured	
	%	%	χ^2
Job Status			1,909.0
Working for pay	89.2	10.8	
With a business, not at work	92.3	7.7	
Looking for work	75.2	24.8	
Working, no pay, family business	83.7	16.3	
Not working, not looking	95.3	4.7	
Other	34.4	75.6	

Note. $n = 67,383$. From the 2010-2012 National Health Interview Survey. $p < 0.001$.

Table 3

Reasons people do not work

Variable	*n*	%
Reason for not working last week		
Taking care of house/family	5,369	14.9
Going to school	2,536	7.1
Retired	17,199	47.8
On vacation	908	2.5
On maternity leave	195	0.5
Health reasons	864	2.4
Off-season/contractual	473	1.3
Layoff	597	1.7
Disabled	6,703	18.6
Other	1,126	3.1

Note. n = 35,970. From the 2010-2012 National Health Interview Survey.

Table 4

Crosstabulation showing the relationship between work status and the reason for it

	With a job or business but not at work	Not with a job or business and not looking for work	
	%	%	χ^2
Reason for not working last week			18,851.7
Taking care of house/family	1.2	98.8	
Going to school	1.9	98.1	
Retired	0.2	99.8	
On vacation	85.6	14.4	
On maternity leave	52.3	47.7	
Health reasons	38.1	61.9	
Off-season/contractual	69.8	30.2	
Layoff	15.4	84.6	
Disabled	0.8	99.2	
Other	34.4	75.6	

Note. $n = 35,970$. Crosstabulation data gave no explanation for the job status "Looking for work." It is inferred from the crosstabulation data that those on maternity leave were not sure which category to choose. From the 2010-2012 National Health Interview Survey. $p < 0.001$.

Table 5

Crosstabulation showing the relationship between insurance status and the reason for ER use

	Insured	Not Insured	
	%	%	χ^2
Reason for ER use			232.8
Didn't have another place to go	41.2	58.2	
Doctor's office was not open	46.8	35.7	
Advised by doctor to go	24.8	11.8	
Problem is too serious for a doctor's office or clinic	54.1	45.9	
Only the hospital could help	64.8	64.6	
ER is the closest provider	38.6	51.6	
ER is the usual place for care	12.6	37.7	

Note. n = 15,449. ER = emergency room. From the 2010-2012 National Health Interview Survey. $p < 0.001$.

Table 6

Choice of care location

Variable	n	%
Place you seek care (most often)		
Clinic, doctor's office, HMO, or hospital outpatient department	75,828	98.5
Emergency department	1,192	1.5
ER is the usual place for care		
Yes	793	14.6
No	4,645	85.4

Note. n = 77,020 for the variable "place you seek care (most often)." *n* = 5,438 for the variable "ER is the usual place for care." HMO = Health Maintenance Organization. ER = Emergency Room. From the 2010-2012 National Health Interview Survey.

Table 7

Reasons people use the emergency room

Variable	*n*	%
Reason for using the ER		
Didn't have another place to go	2316	15.0
Doctor's office or clinic was not open	2492	16.1
Advised by healthcare provider to do so	1295	8.4
Problem is too serious for doctor's office or clinic	2899	18.8
Only the hospital could help	3510	22.7
The ER is the closest place of care	2150	13.9
The ER is the usual place for care	793	5.1

Note. *n* = 15,455. ER = emergency room. From the 2010-2012 National Health Interview Survey.

Table 8

Bivariate logistic regression model representing ratio of income to the federal poverty level and likelihood of seeking care at an emergency department over other sources of care

Variable	*B*	SE	χ^2	Exp(*B*)
Ratio of income to federal poverty level				
Below 1.5	2.85**	0.17	267.23	17.19
1.5 to 2.99	1.99**	0.18	121.38	7.30
3.0 to 4.99	1.06**	0.20	28.68	2.90
Above 5.0	0.00[a]			1.00[b]
Constant	-6.11**	0.17	1,301.52	0.00

Note. n = 63,375. People who earn a ratio less than 1.33 of the federal poverty level are eligible to apply for Medicaid assistance (U.S. Centers for Medicare & Medicaid Services, 2014). From the 2010-2012 National Health Interview Survey. [a]Reference variable, other values are compared to this variable. [b]Reference variable exponentiated *B* reported as 1.00.
*p < .05. **p < .001

Table 9

Bivariate logistic regression model representing education level and likelihood of seeking care at an emergency department over other sources of care

Variable	B	SE	χ^2	Exp(B)
Highest household education				
12th grade, no diploma	2.59**	0.23	127.35	13.38
HS Grad/GED recipient	2.13**	0.23	85.94	8.39
Some college, no degree	1.73**	0.23	54.35	5.63
Associate degree	1.64**	0.24	45.26	5.17
Bachelor's degree	0.59*	0.26	5.31	1.81
Terminal Degree	0.00[a]			1.00[b]
Constant	-5.99**	0.22	716.31	0.00

Note. $n = 76{,}682$. HS = high school. GED = general education degree. From the 2010-2012 National Health Interview Survey.
[a]Reference variable, other values are compared to this variable. [b]Reference variable exponentiated B reported as 1.00.
*p < .05. **p < .001

Table 10

Bivariate logistic regression model representing job status and likelihood of seeking care at an emergency department over other sources of care

Variable	*B*	SE	χ^2	Exp(*B*)
Employment status				
Working for pay	0.00	0.07	0.00	1.00
With a job, not at work	0.01	0.22	0.00	1.01
Looking for work	1.62**	0.08	378.16	5.03
Working, not for pay, family	-0.74	0.50	2.17	0.48
Not working, not looking	0.00[a]			1.00[b]
Constant	-4.33**	0.05	7,217.93	0.01

Note. n = 76,969. From the 2010-2012 National Health Interview Survey.
[a]Reference variable, other values are compared to this variable. [b]Reference variable exponentiated *B* reported as 1.00.
*p < .05. **p < .001

Table 11

Bivariate logistic regression model representing ratio of income to the federal poverty level and those who get most of their care from the emergency room

Variable	B	SE	χ^2	Exp(B)
Ratio of income to federal poverty level				
Below 1.5	1.26**	0.16	60.36	3.54
1.5 to 2.99	0.67**	0.18	14.82	1.96
3.0 to 4.99	0.06	0.21	0.09	1.06
Above 5.0	0.00[a]			1.00[b]
Constant	-2.59**	0.15	286.97	0.08

Note. n = 4,598. People who earn a ratio less than 1.33 of the federal poverty level are eligible to apply for Medicaid assistance (U.S. Centers for Medicare & Medicaid Services, 2014). From the 2010-2012 National Health Interview Survey.
[a]Reference variable, other values are compared to this variable. [b]Reference variable exponentiated *B* reported as 1.00.
*p < .05. **p < .001

Table 12

Bivariate logistic regression model representing education level and those who get most of their care from the emergency room

Variable	B	SE	χ^2	Exp(B)
Highest household education				
12th grade, no diploma	1.45**	0.24	35.69	4.25
HS Grad/GED recipient	1.14**	0.24	22.60	3.14
Some college, no degree	0.96**	0.25	15.40	2.62
Associate degree	0.80*	0.26	9.31	2.23
Bachelor's degree	0.42	0.27	2.45	1.53
Terminal Degree	0.00[a]			1.00[b]
Constant	-2.79**	0.23	146.81	0.06

Note. n = 5,420. HS = high school. GED = general education degree. From the 2010-2012 National Health Interview Survey.
[a]Reference variable, other values are compared to this variable. [b]Reference variable exponentiated *B* reported as 1.00.
*p < .05. **p < .001

Table 13

Bivariate logistic regression model representing job status and those who get most of their care from the emergency room

Variable	*B*	SE	χ^2	Exp(*B*)
Employment status				
Working for pay	0.29**	0.08	11.75	1.33
With a job, not at work	0.17	0.24	0.49	1.19
Looking for work	0.97**	0.61	56.18	2.64
Working, not for pay, family	-0.28	0.61	0.22	0.75
Not working, not looking	0.00[a]			1.00[b]
Constant	-1.99**	0.06	1,074.74	0.14

Note. n = 5,437. From the 2010-2012 National Health Interview Survey.
[a]Reference variable, other values are compared to this variable. [b]Reference variable exponentiated *B* reported as 1.00.
*p < .05. **p < .001

Table 14

Multivariate logistic regression model representing likelihood of seeking care at an emergency department over other sources of care

Variable	B	SE	χ^2	Exp(B)
Employment status				
Working for pay	0.12	0.10	1.57	1.13
With a job, not at work	0.23	0.28	0.68	1.26
Looking for work	0.67**	0.12	30.85	1.95
Working, not for pay	-0.53	0.59	0.79	0.59
Not working, not looking	0.00[a]			1.00[b]
Ratio of income to federal poverty level				
Below 1.5	2.06**	0.22	88.26	7.82
1.5 to 2.99	1.42**	0.22	41.67	4.15
3.0 to 4.99	0.74*	0.24	9.72	2.10
Above 5.0	0.00[a]			1.00[b]
Highest household education				
12th grade, no diploma	1.45**	0.32	20.45	4.25
HS Grad/GED recipient	1.21**	0.32	14.51	3.34
Some college, no degree	0.95*	0.32	8.82	2.59
Associate degree	1.07**	0.33	10.47	2.91
Bachelor's degree	0.47	0.34	1.88	1.78
Terminal Degree	0.00[a]			1.00[b]
Race/Ethnicity				
Hispanic	-0.14	0.32	0.18	0.87
Non-Hispanic White	-0.23	0.32	0.54	0.79
Non-Hispanic Black	0.90*	0.32	8.07	2.47
Non-Hispanic Asian	-0.86	0.42	4.21	0.42
Non-Hispanic All other	0.00[a]			1.00[b]

(continued)

Table 14 (continued)

Variable	B	SE	χ^2	Exp(B)
Age (<55 or >55)	-0.74**	0.10	53.66	2.09
Sex (Male or Female)	-0.58**	0.08	55.15	0.56
Insurance Status (Yes or No)	1.23**	0.09	177.23	3.43
Constant	-3.89**	0.512	57.76	0.02

Note. $n = 45,523$. HS = high school. GED = general education degree. People who earn a ratio less than 1.33 of the federal poverty level are eligible to apply for Medicaid assistance (U.S. Centers for Medicare & Medicaid Services, 2014). From the 2010-2012 National Health Interview Survey.

[a]Reference variable, other values are compared to this variable. [b]Reference variable exponentiated B reported as 1.00.

*p < .05. **p < .001

Table 15

Multivariate logistic regression model representing those who get most of their care from the emergency room

Variable	B	SE	χ^2	Exp(B)
Employment status				
Working for pay	0.21	0.11	3.43	1.23
With a job, not at work	0.10	0.29	0.13	1.11
Looking for work	0.38*	0.16	5.81	1.46
Working, not for pay	-0.38	0.76	0.25	0.68
Not working, not looking	0.00[a]			1.00[b]
Ratio of income to federal poverty level				
Below 1.5	0.93**	0.18	25.66	2.53
1.5 to 2.99	0.36	0.19	3.65	1.43
3.0 to 4.99	-0.10	0.21	0.20	0.91
Above 5.0	0.00[a]			1.00[b]
Highest household education				
12th grade, no diploma	0.74*	0.28	7.09	2.10
HS Grad/GED recipient	0.49	0.27	3.25	1.63
Some college, no degree	0.29	0.28	1.12	1.34
Associate degree	0.25	0.29	0.74	1.28
Bachelor's degree	0.24	0.29	0.65	1.27
Terminal Degree	0.00[a]			1.00[b]
Race/Ethnicity				
Hispanic	0.10	0.39	0.06	1.10
Non-Hispanic White	-0.15	0.39	0.16	0.86
Non-Hispanic Black	0.36	0.39	0.87	1.44
Non-Hispanic Asian	0.19	0.46	0.18	1.21
Non-Hispanic All other	0.00[a]			1.00[b]

(continued)

Table 15 (continued)

Variable	B	SE	χ^2	Exp(B)
Age (<55 or >55)	-0.61**	0.11	29.21	0.54
Sex (Male or Female)	-0.40**	0.09	19.45	0.67
Insurance Status (Yes or No)	1.14**	0.13	81.91	0.32
Constant	-0.46**	0.53	0.73	0.63

Note. $n = 4,589$. HS = high school. GED = general education degree. People who earn a ratio less than 1.33 of the federal poverty level are eligible to apply for Medicaid assistance (U.S. Centers for Medicare & Medicaid Services, 2014). From the 2010-2012 National Health Interview Survey.

[a]Reference variable, other values are compared to this variable. [b]Reference variable exponentiated B reported as 1.00.

*p < .05. **p < .001