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Predictors of Emergency Department Utilization by Homeless Persons: A National
Study

by

Clarilee Hauser

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Nursing

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

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Dedication

This dissertation is dedicated to my husband, Frederic Carr and to my son Kelley Hauser and my daughter, Stephanie Hauser. You have always supported me and believed in me. What is truly amazing is that you have never once doubted that I could do anything I decided to do. Thank you keeping me company on the wild ride that is my life. I love you.

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Abstract

Predictors of Emergency Department Utilization by Homeless Persons: A National Study

By

Clarilee Hauser

Purpose.

To determine the extent to which homeless persons in the United States use the emergency department (ED), the extent to which they use it for non-urgent care and the factors that are predictive of ED use for non-urgent care.

Background.

The homeless population has a higher morbidity and mortality than the U.S. population in general. Use of the ED for non-urgent care results in poor health outcomes and in ED overcrowding. Delay in emergency care due to overcrowding results in increased morbidity and mortality and contributes to the increasing cost of health care.

Methods.

Secondary analysis of the National Hospital Ambulatory Medical Care Survey 2005 examines variables from the perspective of predisposing, enabling and need factors that predict non-urgent use of the ED.

Results.

Chi-square confirmed that homeless people have a significantly higher likelihood of visiting the ED than not homeless ($p = 0.007$). However, in reference to the extent to which they use the ED for non-urgent visits, Pearson's chi-square test did not indicate a rejection of the null hypothesis ($p = 0.763$). This finding does not provide support for the hypothesis that urgency of the ED visit is dependent on the housing status of the patient.

Multiple logistic regression revealed gender ($p = 0.120$), race/ethnicity ($p = 0.003$), season ($p = 0.030$), health insurance ($p < 0.000$), physician diagnosis ($p < 0.000$) and age ($p < 0.000$) as predictors of ED use for non-urgent care.

Discussion.

This is the first known study to examine use of the ED by homeless persons in the United States at the national level using empirically derived ED data. Two very important findings emerged from this study: 1) homeless people use the ED in significantly greater proportion than not homeless people, however, they do not use it for non-urgent care in greater magnitude and 2) lack of health insurance significantly increases the likelihood of making a non-urgent visit to the ED.

Table of Contents

Copyright	ii
Dedication	iii
Acknowledgements	iv
Abstract	v
Table of Contents	vii
Tables and Figures	ix
Chapter 1: Introduction to The Problem and Study Purpose	1
Background	1
Problem Statement	3
Purpose.....	3
Significance.....	4
Chapter 2: Theoretical Perspectives and Literature Review	8
Theoretical Perspectives	8
The Behavioral Model	8
The Theory of Marginalization	13
Conceptual Framework	17
Critical Review of the Literature	19
Predisposing Factors	21
<i>Age, Gender, Race/Ethnicity</i>	21
<i>Health Beliefs and Behaviors</i>	24
<i>Housing Status</i>	26
Enabling Factors	29
<i>Health Insurance</i>	29
<i>Regular Source of Care</i>	32
<i>Social Support/Competing Needs</i>	34
<i>Characteristics of Health Services</i>	35
Need Factors	37
Summary and critique	40
Chapter 3: Methodology	45
Research Questions and Aims	45
Assumptions.....	46
Research Design.....	47
Definition of Variable and Terms	49
Dependent Variables	49
Independent Variables-Predisposing Factors.....	50
Independent Variables- Enabling Factors	53
Independent Variables- Need Factors	54
Terms	57
Sample Selection, Size and Setting.....	58

Data Collection Methods	61
Instruments and Techniques	62
Considerations.....	62
Dummy Coding.....	62
Power and Missing Data	63
Estimation Procedures	64
Weighted Data	65
Complex Sampling Surveys.....	65
Assumption of Independence.....	67
Data Analysis and Procedures	67
Descriptive Statistics.....	68
Univariate Analysis-Chi-Square	69
Multivariate Logistic Regression.....	73
Protection of Human Subjects	73
Chapter 4: Study Results	74
Study Question 1	74
Study Question 2.....	78
Additional Comparisons	83
Study Question 3.....	84
Summary	89
Chapter 5: Discussion.....	91
Meaning of Findings.....	91
Study Question 1.....	91
Study Question 2.....	92
Study Question 3.....	93
Limitations	98
Indications for Future Study	100
Significance.....	102
References.....	104
Appendix A	111
Appendix B	113
Publishing Agreement	118

List of Figures and Tables

Figures

Figure 1: The Behavioral Model of Health Care Utilization	9
Figure 2: The Behavioral Model For Vulnerable Populations 2000.....	11
Figure 3: Model of ED Utilization by Homeless Persons in the United States	19
Figure 4: Hierarchy of NHAMCS 2005 Survey Design.....	59

Tables

Table 1: Definitional Inconsistencies.....	43
Table 2: Triage Definitions	50
Table 3: Housing Status Definitions	51
Table 4: Health Insurance Status Definitions	53
Table 5: CCS Codes/ ICD-9 Codes/Physician Diagnosis.....	57
Table 6: Definition of Terms	58
Table 7: Summary of Variables Used in Descriptive Analysis	68
Table 8: Summary of Variables Used in Chi-Square Analysis.....	71
Table 9: Residence.....	74
Table 10: Urgency.....	75
Table 11: Gender.....	76
Table 12: Race/Ethnicity.....	76
Table 13: Geographic Location	76
Table 14: Expected Source of Payment	77
Table 15: Hospital Ownership	77
Table 16: Month of Visit.....	77
Table 17: Day of Visit.....	78
Table 18: Presenting Level of Pain.....	78
Table 19: Housing Status by Urgency	79
Table 20: Gender by Urgency	79
Table 21: Race/Ethnicity by Urgency.....	80
Table 22: Geographic Location by Urgency.....	80
Table 23: Season by Urgency	80
Table 24: ED Visit Day of Week by Urgency	80
Table 25: Time of Arrival to ED by Urgency.....	80
Table 26: Insurance Status by Urgency	80
Table 27: Hospital Ownership by Urgency	81
Table 28: Degree of Pain by Urgency.....	81
Table 29: Results of Chi-Square Tests between Each Variable and Urgency	81
Table 30: Residence by Insurance	83
Table 31: Residence by Hospital Ownership.....	83
Table 32: Residence by Admission to Hospital.....	83
Table 33: Residence by Drug Use	83
Table 34: Residence by Alcohol Use.....	83

Table 35: Residence by Intentionality of Injury	84
Table 36: Summary of Chi-Square Tests on Housing Status	84
Table 37: Overall Tests for Likelihood of a Non-Urgent Visit	85
Table 38: Logistic Regression Predicting Non-Urgent Visits	85
Table 39: CCS Codes/Physician Diagnosis/Likelihood of a Non-Urgent Visit.	89

Chapter 1: Introduction to The Problem and Study Purpose

Background

Homelessness is a social and public health crisis in the United States (Cunningham & Henry, 2007; Plumb, 1997). While the exact number of homeless persons, today, is unknown, it has been estimated that 840,000 Americans are homeless at any given time. Furthermore, of the estimated 2.5 to 3.5 million who are homeless over a given year, 1.35 million are children (National Law Center on Homelessness and Poverty, 2004). Of the total number of homeless persons, 40% are estimated to be female, and the annual prevalence of homeless adolescents is estimated between 650,000 and two million (Aron & Sharkey, 2002; United States Department of Health and Human Service, 1993). For adolescents in the United States, that figure represents 7.6% of the general population (Robertson & Toro, 1999). The causes of homelessness are varied and complex and include poverty, lack of social support, violence, substance abuse, physical abuse and neglect (Cunningham & Henry, 2007; Plumb, 1997). Health outcomes of the homeless population are much poorer than those of the general public, as they suffer from higher rates of morbidity and mortality resulting from chronic and acute physical and mental illness, substance abuse, traumatic injury, sexual assault and violence (Bassuk, Weinreb, Buckner, Browne, Saloman, & Bassuk, 1996; Gelberg, Andersen, & Leake, 2000; Klein, Woods, Wilson, Prospero, Greene, & Ringwalt, 2000; Cunningham & Henry, 2007).

Emergency Department (ED) overcrowding is also a social and public health crisis in the United States (Padgett, Struening, Andrews, & Pittman, 1995; Derlet, Richards, & Kravitz, 2001). ED overcrowding has resulted in financially overburdened

public services (Padgett et al., 1995). It has also resulted in the delay of emergency care to others who need it and in the practice of ambulance diversion, which is the refusal to allow an ambulance to discharge its patient because there is no room in the ED (Burt, McCaig, & Valverde, 2006). One reason for ED overcrowding is thought to be the use of the ED as a regular source of care by some patients (D'Amore, Hung, Chiang, & Goldfrank, 2001). A study of ED patients published in 2002 revealed the extent of this problem as, at one point, seven million people, or 0.9% of the population of the United States reported using the ED during the past year as their regular source of health care (Walls, Rhodes, & Kennedy, 2002).

The homeless constitute a portion of the population that is believed to use the ED as a regular source of health care, however, the extent to which this is done is not known. A study published in 1998 on service use patterns of 627 homeless and low-income housed children found that 33% of the homeless reported ED use as opposed to 20% of the housed (Weinreb, Goldberg, Bassuk, & Perloff, 1998). Factors associated with ED utilization by 2578 homeless and marginally housed persons in San Francisco were explored in a study published in 2002 (Kushel, Perry, Bangsberg, Clark, & Moss, 2002). Of the respondents, 40.4% had been seen in the ED within the past year. Eight percent had been seen more than 3 times, which accounted for 54.4% of all ED visits; 18% used the ED exclusively for health care.

The cost in terms of dollars spent for ED utilization by homeless persons is largely speculative because data evaluating the economic impact of homelessness are few. A 1998 report in the *New England Journal of Medicine* estimated the hospitalization costs associated with homelessness in New York City (Salit, Kuhn, Hartz, Vu, & Mosso,

1998). The homeless patient's average hospital stay was 4.1 days longer than stays by other patients, with an increased cost of \$2,414 to \$4,094 per patient depending upon diagnosis. The cost to homeless people themselves and to society, in terms of "human capital", has not been calculated.

Problem Statement

It has been shown that homelessness has a singularly negative effect on health and that the homeless population has a higher morbidity and mortality than the population in general (Ringwalt, Greene, Robertson, & McPheters, 1998). Additionally, the use of the ED as a regular source of health care results in poor health outcomes and in ED overcrowding. (Klein, et al., 2000). Delay in emergency care because of overcrowding also results in increased morbidity and mortality and contributes to a system that is financially overburdened (Padget et al., 1995). The use of the ED as a regular source of care by homeless persons brings together the dual crises of homelessness and ED overcrowding that now threatens the public health of the United States.

Purpose

The purpose of this study is to determine the extent to which homeless persons in the United States use the ED as a regular source of health care (non-emergency care) and to determine the factors that are predictive of ED use for non-emergency care by the homeless. The study questions are approached using a secondary analysis of cross sectional data from the National Hospital Ambulatory Medical Care Survey (NHAMCS 2005). Sponsored by the National Center for Health Statistics of the National Institutes of Health, the data, from a nationally representative sample of hospital emergency departments, have been collected for the years 1992 through 2006 (National Center for

Health Statistics, 2007). The last year to be published, 2005, provides the data necessary for a retrospective cross sectional study of the homeless population with respect to ED utilization, because it is the first time that the survey included a determination of housing status (National Center for Health Statistics, 2007).

Significance

An understanding of the significance of the problem of ED use for non-emergency health care by homeless persons in the United States is hampered by a lack of uniformity in the existing literature. Because there is no specific body of literature on the phenomenon, it is necessary to draw from both the literature on homelessness and the literature on ED utilization to comprehend the scope of the problem.

There is no universal definition of the term “homeless person” in the literature. It has been defined as a person: 1) who has spent any of the past 30 days in a shelter or on the streets, 2) who lacks a fixed, regular, adequate housing situation, 3) who has spent at least one night in a shelter or on the streets, and 4) who currently resides in temporary quarters (Barkin, Balkrishnan, Manuel, Andersen, & Gelberg, 2003; Ensign & Santelli; 1997, Klein et al., 2000; Rew, 2003).

Researchers dispute the importance of the various causes of homelessness. There are studies that determine the most important factors to be “individual” attributes such as alcoholism and mental illness (Main, 1998; Cherpitel, 1999). There are also studies that determine the most important factors to be “structural”, such as the high cost of housing and public health policies (Main, 1996; McChesney, 1990).

Just as there are conflicting definitions of “homelessness”, there are differing opinions of what constitutes “appropriate” use of the ED. There is disagreement over

what constitutes emergency and non-emergency use of the ED and there exists a lack of consensus about the role of the ED in the public health arena. A recently published review of the emergency department utilization literature over the past 20 years illustrates the developing pattern of concern over the rising cost of health care, “inappropriate” use of the ED, and ED overcrowding with the resulting adverse impact upon emergency care (Richardson & Hwang, 2001).

Stemming from a growing concern over the accelerating cost of health care, studies from the 1980s and 1990s began placing an emphasis on appropriate use of the ED and the use of ED triage as a means to limit non-emergency care. While many definitions for appropriate ED use were offered, none were widely accepted and the lack of an operational definition for the term “appropriate” exists today (Richardson & Hwang, 2001).

During the late 1990s, the health consequences of delayed emergency care were established. Studies on the costs of ED care and those on the costs of delaying or denying emergency care were inconclusive, and the scientific community turned to studies asserting the importance of the ED as a “safety net” provider for the uninsured, underinsured and critically ill or injured (Richardson & Hwang, 2001). By the end of the decade, the restrictions on delaying or denying ED care that had been imposed in 1986 by the Emergency Medical Treatment and Labor Act (EMTALA), led to a renewed interest in studies “...focusing on the scope and severity of ED overcrowding” (Richardson & Hwang, 2001, p. 1035).

To date there exists no known study of emergency department use by homeless persons employing ED data at the national level. Therefore, it is not known if homeless

persons use the ED for non-emergency health care and thereby contribute to ED overcrowding. Studies using ED data have been done at the regional or local level, usually in large metropolitan areas (D'Amore et al., 2001; Kushel et al., 2002; Mandelberg, Kuhn, & Kohn, 2000). Because they are geographically restricted, the results cannot be generalized to rural or suburban populations. Additionally, these studies were done in Los Angeles, San Francisco, New York and other areas known for the quantity of social services offered. The findings from these studies are likely to be different from studies done in areas that do not offer extensive social services. A few studies on homelessness have been done at the national level, but have not used data specifically from the ED (Klein et al., 2000; Kushel, Vittinghoff, & Haas, 2001; Lam, & Rosenheck, 1998; Padgett et al., 1995; Ringwalt et al., 1998). Data for these studies have come from shelters, soup kitchens and clinics. Aside from relying upon recall by the participants with no empirical verification, these studies have missed the portion of the homeless population that does not use social services and is likely to use the ED for lack of any other option.

While the extent to which homeless persons utilize the ED for non-emergency care on a national level is unknown, it is an important phenomenon to explore because the outcome has a profound effect upon the health of homeless persons and also upon the accelerating cost of health care, which is thought to be due, in part, to over utilization of the ED. This study contributes to the body of knowledge because it is the first known study to use ED data at the national level to explore the question of ED utilization by homeless persons. It contributes to the body of nursing knowledge by providing an understanding of the elements that underlie the use of the ED by homeless persons and

how these variables interact and relate. An understanding of the relationships of the factors that predict ED utilization by homeless persons may provide nurses with the tools to create interventions and services that provide for better health care for the homeless population. Nurses have recognized the health issues of vulnerable populations to be a priority. “The future of nursing depends on the ability of the discipline to reach out to diverse communities and to meet the health needs of those most vulnerable” (Hall, Stevens, & Meleis, 1994, p. 23). Homeless people are some of the most vulnerable.

Chapter 2: Theoretical Perspectives and Literature Review

Theoretical Perspectives

Theory has been defined as "...a broad attempt to organize and explain phenomena occurring in the world" (Sidani & Braden, 1998, p. 43). For this study, a synthesis of two theories will aid in organizing and understanding the phenomenon of ED utilization by homeless persons. The Behavioral Model of Health Care Utilization (Behavioral Model) was designed specifically to discern patterns of health care utilization and uncover the underlying factors that influence it (Andersen, 1995). The theory of Marginalization gives focus to the barriers created by the process that peripheralizes groups within a society, which are different from the norm (Hall et al., 1994).

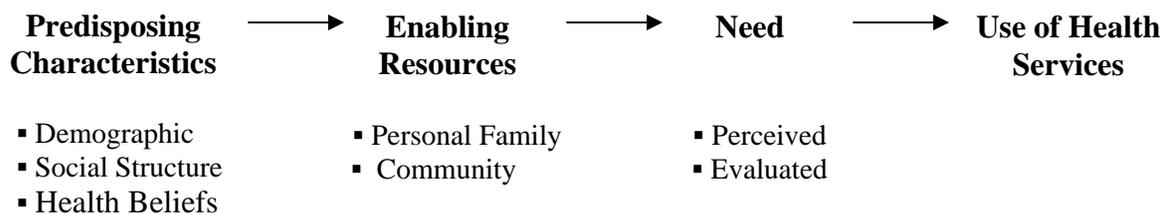
The Behavioral Model.

Andersen conceived the Behavioral Model in 1963 when he became interested in why some Americans had adequate access to medical care and some did not (Andersen, 1995). The model integrates environmental, individual and provider variables that determine health care utilization, using a systems perspective (Phillips, Morrison, Andersen & Aday, 1998). Since its inception it has become a standard for use in measuring utilization. The Behavioral Model has been tested extensively and modified several times to account for differences in various populations (Swanson, Andersen, & Gelberg, 2003; Kushel et al., 2002).

The original model explores the phenomenon (use of health care services) from the perspective of three concepts: 1) predisposition, 2) factors that enable or impede access, and 3) need for health care (Figure 1). Each of the concepts is further explicated by defining attributes. Predisposition is defined by demographics, social structure and

health beliefs. Person, family and community resources make up the enabling factor, and need is described as perceived or evaluated need. In turn, each of the attributes is subsequently operationalized in measurable terms. Demographics are assessed traditionally by age, gender and other demographic measures. Measures of social structure include occupation, ethnicity and education. Attitudes, values and knowledge about health and illness define health beliefs. The numbers of existing facilities and personnel, as well as the availability of public transportation determine community resources. Health insurance, income and regular source of provider are included in measures of personal and family resources. Perceived need is revealed by how a person assesses his own health and health care needs, and evaluated need is measured by professional opinions of need (Andersen, 1995).

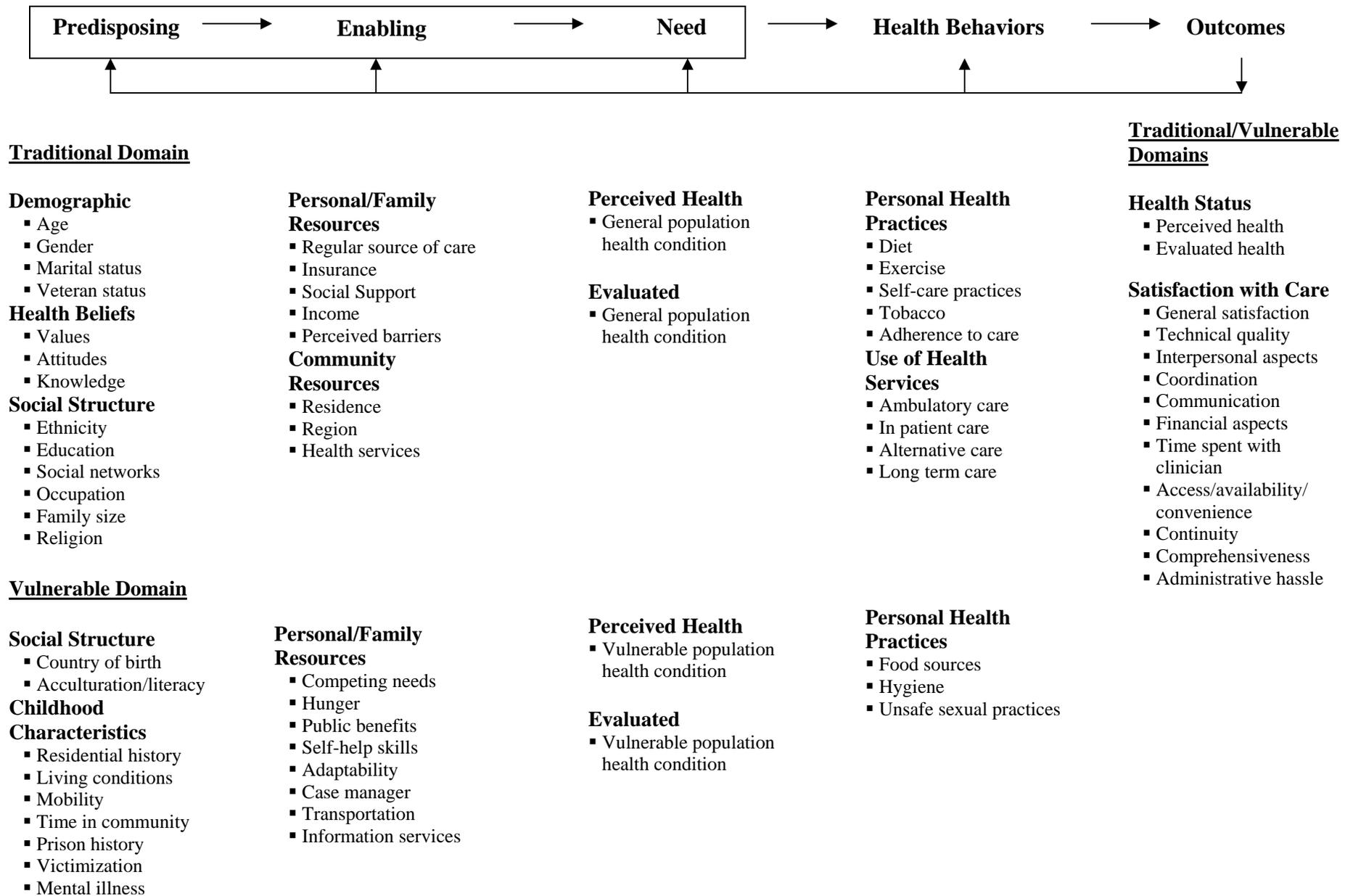
Figure 1- *The Behavioral Model of Health Care Utilization* (Andersen, 1995)



The Behavioral Model for Vulnerable Populations was an attempt by Gelberg and colleagues (2000) to modify the model for use with the homeless population by including the factors specific to homelessness that could possibly affect health and use of health care services. They began with the phenomenon of utilization consisting of the original predisposing, enabling and need factors. Two domains subsequently defined each of these factors. The traditional domain included those factors that had been used in earlier models. Additionally, they added a vulnerable domain to each of the traditional domains

that included factors associated with residential history, substance abuse, competing needs, victimization and mental health (Gelberg et al., 2000) (Figure 2).

To test this new model, Gelberg and colleagues (2000) followed a probability sample of 363 homeless persons with one of four study conditions, high blood pressure, skin/leg/foot problems, visual impairment or a positive TB test, longitudinally for up to eight months. Particular emphasis was placed upon conditions of homelessness that affect the dependent variable, health care utilization, including competing needs, substance use, victimization, residential history and mental health (Gelberg et al., 2000). The focus of the study was to determine predictors of utilization. One of the strengths of the study was its ability to examine the effect of utilization upon health status. They concluded that health status is both an outcome and a determinant of health care utilization along with compliance and patient satisfaction (Gelberg et al., 2000). While their results were mixed relevant to their stated hypotheses, it is the area of compliance and patient satisfaction that is troubling. With homeless populations, satisfaction with care may not be an important predictor of future utilization. One cannot assume that homeless patients will be able to return to a site where they experienced satisfactory health care. Due to residential instability they simply may not be in the same location when they again need health care.

Figure 2 - *The Behavioral Model for Vulnerable Populations 2000* (Gelberg et al., 2000)

Another limitation of this model is that it may not be valid to use a measure of compliance as a predictor of continued or future utilization. With the homeless population the concept of competing needs is key. Finding a place to sleep or food to eat may take priority, at the moment, over compliance with the routine prescribed by health care professionals (Schlossstein, St. Clair, & Connell, 1991; Milligan, Wingrove, Richards, Rodan, Monroe-Lord, Jackson, Hatcher, Harris, Henderson, & Johnson, 2002; Ensign & Panke, 2002). It may be that competing needs are far stronger in affecting utilization than the combined effect of predisposing and need factors.

Lack of transportation and fragmented services provide barriers to access in that they become, quite literally, inaccessible (Bloom, Bednarzyk, Devitt, Renault, Teaman, & Looock, 2004). The stigma attached to homelessness and lack of respect by health care professionals has been shown to be one of the most important deterrents to utilization for the homeless population (Hatton, Kleffel, Bennett, & Gaffrey, 2001; Schlossstein et al., 1991; Yee, Andersen, Leake, Cunningham, & Gelberg, 2002; Milligan et al., 2002; Swanson et al., 2003; Ensign & Panke, 2002). In short, some of the characteristics that create homelessness, along with some of the problems created by homelessness, may affect health care utilization as hypothesized by Gelberg and colleagues (2000). Additionally, there may exist more important predictors of utilization than either satisfaction or compliance.

One of the great strengths of the Behavioral Model may paradoxically be one of its greatest weaknesses. A strength of the model is that the variables have remained intentionally flexible so that each investigator can tailor the variables to the study population. However, it is possible to omit a confounding variable that has a profound

effect upon the results, as can be seen in a 1995 study that used the Behavioral Model to assess ED use by homeless adults in New York City (Padgett, et al., 1995). This study omitted the enabling factor “competing needs” completely as a predictor of utilization. Additionally, there is inconsistency in the inclusion of poor mental and physical health, substance abuse and a history of childhood abuse. These variables have been included as preexisting factors and alternatively as need factors.

Another problem with the model is the temptation to include a large number of variables, as shown by the Behavioral Model For Vulnerable Populations (Gelberg et al., 2000). The use of a large number of variables creates a burden for the study subject due to the use of multiple survey tools. Finally, one area that is not addressed by the Behavioral Model is a measure of whether a visit to the ED is for emergency or non-emergency care.

The Theory of Marginalization

The concept of marginalization is rooted in Marxist theory that examines the unequal distribution of power based upon the economic inequality inherent in a capitalistic society. Feminist theory extends this concept from a “class struggle” to one based upon gender. Feminism explores the oppression of women from the perspective of the gender specific difference in power that exists within a society and how that power difference results in the marginalization of women (McAfee, 2005).

As a theory useful to nursing, marginalization was developed in 1994 at the University of California, San Francisco, by Meleis and two postdoctoral fellows, Hall and Stevens (Hall et al., 1994). The purpose of the theory was to present marginalization as a “...guiding concept for the development of nursing knowledge that values diversity”

(Hall et al., 1994, pg. 23). As such, the Theory of Marginalization is a guide to building a framework through which to view and understand persons and groups who have been devalued by society. It arose from the desire to give nursing research the conceptual tools for overcoming the barriers in understanding groups who are hidden from society and mistrustful of research (Hall et al., 1994). This need for nursing research to understand vulnerable populations arose, not just from the philosophical imperative of the nursing profession to care for all persons including the vulnerable, but also from federal mandates to include these populations in research (Hall et al., 1994).

The theory, as explained by the authors, was derived from an examination of the meaning of margins (Hall et al., 1994). Margins can be defined as the outside limit of something, an edge, and an extreme limit beyond which something becomes impossible or is no longer desirable (Merriam -Webster Dictionary, 2006). Hall and colleagues (1994) added that margins also are boundary-determining characteristics of social networks, communities and people. Margins are established to separate the “us” from the “other” and create a sense of “differentness” from the societal norm. In this manner, persons or groups who are considered different are relegated to the periphery, or margin, of society by the identification of their “differentness” through appearance or other easily recognizable attributes. The authors next defined the phenomenon of marginalization by contrasting it with other similar processes, such as oppression, alienation, stigmatization and segregation. These are all aspects of marginalization, but are not inclusive of the “...unique perspective marginalization offers as a lens through which to view the nursing phenomenon” (Hall et al., 1994, pg. 25).

The main concepts describing the phenomenon of marginalization are presented as properties by Hall and colleagues (1994). They are 1) intermediacy, 2) differentiation, 3) power, 4) secrecy, 5) reflectiveness, 6) voice and 7) liminality.

Intermediacy is the primary property of the Theory of Marginalization, and is defined as the propensity of the human boundary to act as both a connector and a barrier. It is the quality of the space that lies between the human entity and others that can protect, but also can act to extend the self.

Differentiation is the development and safeguarding of distinct identities. Mainstream society is located at the center, while those who have been marginalized live at the periphery. Because they are not restricted by the homogeneity of the center, those at the periphery develop distinctly different identities, which can have the potential for stigmatization.

Power is exerted not only from the center outward, but also from the periphery inward. While authority and power come from the center, resistance and innovation come from the periphery. It must be noted that those on the periphery have a great deal of knowledge about those in the center, while the reverse is not true. The center exists with awareness of those who are peripheralized, but the need for knowledge does not exist because all power resides with those at the center.

Secrecy is described as the "...confining [of] information to establish interpersonal bonds, maintain trust, and avoid betrayal" (Hall et al., 1994, p. 28). Secrecy acts as both a means for protecting those on the periphery and as a contributing factor to marginalization and the stigma it can create.

Reflectiveness refers to the need for constant introspection necessary for those who are marginalized to reconcile their knowledge of self to the stigma reflected back onto them from those at the center. This creates a constant crisis in self worth requiring significant amounts of time and energy on the part of the marginalized.

Voice refers to the unique ways of communicating developed by those at the periphery. While they are silenced within the dominant culture, they develop their own languages and ways of expressing their experiences. These styles are devalued by mainstream society even as they are co-opted. An example of this is the use of the word “girlfriend”. The popular use of the word as a form of address between African American women has become fashionable for use between Caucasian women.

Liminality is defined by Hall and colleagues as “...altered and intensified perceptions of time, worldview, and self-image that characterize and result from marginalizing experiences” (Hall et al., 1994, p. 33). The shared reality of marginalized people is shaped by how they experience marginalization. This creates a reality that can be very different than the reality of those who do not live at the periphery of society.

The authors offered no visual model to aid in understanding the concepts. While the lack of precise operational definitions may limit the use of Marginalization as a theory because operational definitions serve to define theories (Walker & Avant, 2005), it does not limit its use as a philosophical focus. When used this way, the Theory of Marginalization can aid a researcher studying select populations in understanding the factors contributing to and resulting from the process of marginalization that impact the phenomenon under study.

Conceptual Framework

The two theories discussed are significantly different. The Behavioral Model is very specific, almost a template for the design of a study of health care utilization. While the content is specific, the design is flexible. The variables in the model can be modified to any population and the tools used to measure the variables can be changed to those appropriate to the study of the target population. While the phenomenon is theoretical, the model proposes ways of operationalizing each concept and suggests methods of measurement.

The Theory of Marginalization is a theoretical approach to understanding relationships between mainstream society and those it has peripheralized. The effect of the process of marginalization upon the health of the marginalized group is the main outcome of interest. It has been theoretically defined and can be used as a lens for focusing on the unique circumstances surrounding this phenomenon. The Theory of Marginalization gives voice to the vulnerable and places them in a position where they can be heard and potentially understood.

In exploring the predictors of health care utilization, the traditional structure of the Behavioral Model with the domains of predisposing, enabling, and need are appropriate. To tailor the Behavioral Model to health care utilization by homeless persons, it is necessary to include variables specific to the population, found in the literature, that are revealed by the Theory of Marginalization. Marginalization suggests variables resulting from the causes and consequences of homelessness that affect utilization by homeless persons. It is necessary to add measures of vulnerability that include housing status (residential instability) and health beliefs/risky behaviors to the

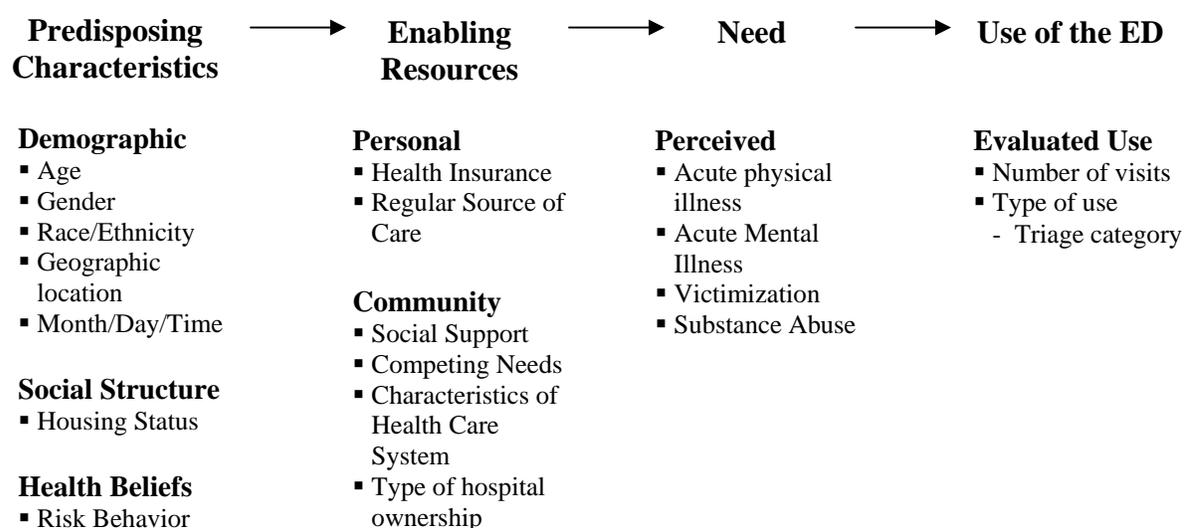
traditional domain of predisposing factors. Competing needs, social supports, and characteristics of the health care system are aspects of homelessness that impact the traditional enabling factor. The traditional measures of need should also include measures of vulnerability arising from the acute effects of mental and physical illness, victimization and the symptoms of substance abuse. Finally, to further specify health care utilization by homeless persons to the emergency department, it is necessary to include variables specific to ED utilization, including triage category, geographical location, month, day of week/time of day, and type of hospital ownership. The original Behavioral Model included “perceived” and “evaluated” as measures of the independent variable “need” (Figure 1). For a new model of ED utilization by homeless persons in the United States, evaluated need is not included as a measure of need, but rather as a measure of the outcome variable “Use of the ED” and is renamed “evaluated use”. Evaluated use is measured by the numbers of ED visits and by the type of ED use, as defined by the triage category assigned to the patient visit. These variables are contained in the NHAMCS and

will be described in the next section. A Model of ED Utilization by Homeless Persons in the United States is shown in Figure 3. It was designed specifically for this study.

Critical Review of the Literature

The following literature review includes studies resulting from a search of the reference databases Pub Med, CINAHL and Soc Abstracts using combinations of the

Figure 3-Model of ED Utilization by Homeless Persons in the United States



search terms “homeless persons”, “health care”, “utilization”, “emergency department utilization”, and “barriers to care”. The search was restricted to studies published after 1980 because it has been estimated that the homeless population tripled in size between 1981 and 1989 due to “...a declining supply of inexpensive housing, increased use of crack cocaine, the deinstitutionalization of the mentally ill and declining welfare payments” (Kreider & Nicholson, 1997, p. 31). Particular attention was paid to studies published since 1996 because they are more reflective of conditions existing today and because August 22, 1996 marks the passage of HR 3734, the Federal Welfare Reform Act. This act created an increase in homelessness as new rules disqualified former

recipients from aid, thereby resulting in a decrease in the resources necessary for people to maintain employment and housing. These measures also resulted in both a sharp decline in those who are eligible to receive Food Stamps and in those eligible to receive Medicaid (Pati, Romero, & Chavkin, 2002).

Included in the literature review are studies that examine ED utilization by the general population of the United States and those that specifically address ED use by homeless persons. Also included are studies exploring health care utilization that incorporate use of the ED and articles that focus on barriers to care that result in use of the ED. Studies are included that pertain to the homeless population in general and to homeless women and homeless adolescents in particular.

The following literature review is based on the Model of ED Utilization by Homeless Persons in the United States that was developed for this study. Predisposing factors include age, gender, race/ethnicity, health beliefs and behaviors, housing status (residential instability), geographic location, and month/day/time of ED visit. Possession of health insurance, a regular source of health care, competing needs, social supports, characteristics of the health care system, and type of hospital ownership define the enabling factor. Acute physical and mental illness, the effects of violence and the symptoms of substance abuse measure perceived need. The outcome variable, ED utilization, is measured by evaluated use. Evaluated use is measured by numbers of visits and type of visit, as designated by ED triage category. It should be noted that the preexisting conditions of chronic physical and mental illnesses and a history of physical or substance abuse are often considered to be predisposing factors. However, for this review they are included in the need factor because it is the exacerbation of acute

physical and mental illness and the acute symptoms of substance and physical abuse that are more likely to result in seeking ED care than are the chronic conditions (D'Amore et al., 2001; Mandelberg et al., 2000).

Predisposing Factors

Age, Gender, Race/Ethnicity. There were 90 million total visits to emergency departments in the United States in 1992. By 1999 that number had increased to 103 million (Walls et al., 2002). The relationship between age, gender, ethnicity/race and ED utilization in the general public was shown in a secondary analysis of the 1998 National Health Interview Survey (NHIS) (Walls et al., 2002). This study revealed that 54.6 million Americans or 20.3% used the ED at least once in the 12 months preceding the survey. Among those patients who reported having a regular source of healthcare, 1.7 million or 0.9% of the population of the United States used the ED as their regular source of care. Predictors of ED utilization as a regular source of care from the NHIS data were age 22-44 years, male, African American, less than a college education, lack of health insurance, rural residence and disability (Walls et al., 2002). While the NHIS collects data from a nationally representative sample of EDs, it does not differentiate between homeless and housed patients and, therefore, cannot predict use by homeless persons.

Likewise, a secondary analysis of the National Hospital Ambulatory Medical Care Survey (NHAMCS) indicates that adolescents in the general population use the ED at rates higher than both pediatric and adult patients (Ziv, Boulet, & Slap, 1998).

However the study again did not differentiate between homeless and housed adolescents. Additionally, no attempt was made to determine if the ED visit was for emergency care or a regular source of care.

Studies have shown that homeless adolescents use the ED as a regular source of care more than do housed adolescents. In 1999 a study determined that only 5% of a national sample of adolescents who were not homeless used the ED for primary care (Klein, Wilson, McNulty, Kapphahn, & Scott, 1999). The following year, comparing homeless sheltered and unsheltered youth (street), Klein and colleagues (2000) found that the homeless sheltered youth in their study used the ED less than the unsheltered. In fact, only 12% of the 640 sheltered youth used the ED, while 25% of the 600 street youth reported high usage for alcohol and drug emergencies (Klein et al., 2000). This study agreed with that of Weinreb and associates (1998) who found that 33% of the homeless children in their study reported ED use as opposed to 20% of the housed (Weinreb et al., 1998). While these studies show that homeless adolescents use the ED as a regular source of health care more often than housed adolescents, they do not compare homeless adolescents to homeless adults and they do not differentiate between age groups within the category of “adolescent”.

To compare utilization between older and younger homeless women, Barkin and associates (2003) studied a probability sample of 433 homeless women in Los Angeles. While 70% of those studied reported having had serious health problems in the past year, younger women, those 15 to 24 years old, had significantly greater use of outpatient facilities than did older women, those 25 to 35 years old. Seventy percent of the variance in number of outpatient visits was explained by age and possession of health insurance. However, 71% of the younger women had health insurance, while only 53% of the older women had health insurance. Therefore higher utilization could be attributable to the insurance variable rather than to age alone (Barkin et al., 2003).

Age and gender were found to be two of the predictors of frequent ED use by the homeless and marginally housed (those living in single occupancy residences or SROs) in San Francisco. Although not highly correlated, younger age and female gender were predictive of frequent ED use (Kushel et al., 2002). Gender was also highlighted in a study using data from a 1987 survey of 1260 homeless adults in New York City (Padgett et al., 1995). Women were significantly more likely to use the ED than men and to use it more often. These studies did not differentiate between women with children and those without, and leave in question whether increased utilization was due to gender or to the presence of children.

Race was determined to be a factor in ED utilization in a study of frequent ED users in San Francisco. While African Americans represented 27% of the total population of ED visits, they accounted for 50% of the frequent visits (Mandelberg et al., 2000). DeRosa and colleagues (1999) found that race was associated with shelter use and shelter use was associated with greater use of medical services including use of the ED. African Americans and Hispanics were more likely to use shelters and therefore the ED than Caucasians (DeRosa, Montgomery, Kipke, Iverson, Ma, & Unger, 1999). This study took place in an area of Los Angeles highly populated by Hispanics and African Americans.

From the above studies, it is apparent that the correlation of age, gender and race/ethnicity to ED utilization by the homeless population is known for some subgroups and unknown for others. Studies generally include the demographic characteristics of age, gender and race/ethnicity of the study population. However, demographics are often provided only as a description of the population and are not studied in the outcome. Furthermore, the demographic characteristics of a sample population sometimes reflect

those of the larger population. For instance, the sample for a study on utilization by chronic alcoholics was 60% Native American (Thornquist, Biros, Olander, & Sterner, 2002), however, the study was conducted in a county that contained a large Native American population. The conclusions from this study cannot be generalized to a different population.

Health Beliefs and Behaviors. Health beliefs are formed from lived experiences. For the homeless, the experience of life on the streets is difficult and dangerous, where "...coping skills are used to endure violence, abuse, isolation and a sense of mistrust in authority figures" (Ensign & Panke, 2002, p. 167). Life on the streets also results in increased risk taking in the form of alcohol and drug abuse and in health compromising behaviors such as "survival sex", which is the practice of exchanging sex for sustenance (Klein et al., 2000).

An assessment of the risk taking behaviors of homeless adolescents reveals the impact that risk taking has upon physical and mental health. Ensign and Santelli (1998) compared 109 adolescents aged 12 –17 from emergency shelters to 1010 adolescents from school-based clinics. Compared to the non-homeless youth, the homeless began having sex at an earlier age and were less likely to use birth control or any kind of protection. They had higher rates of depression, and substance abuse problems. The homeless youth were twice as likely to have visited an ED in the past year than the school-based adolescent. Homeless adolescents were also more likely to have used the ED for non-emergency care. This study clearly reveals a correlation between the increased risk taking behavior of homeless adolescents and increased use of the ED.

Two qualitative studies attempted to understand health-seeking behaviors and self care attitudes amongst adolescents. Ensign and Panke (2002) interviewed 20 adolescent women regarding their reproductive health seeking behaviors and barriers to care. They found that homeless adolescent women access clinics only when self help measures fail. Before seeking advice from medical professionals, they seek it from family members and friends. Rew (2003) explored self-care attitudes of 15 homeless adolescents and concurred with Ensign and Panke's (2002) findings that homeless adolescents develop a process for taking care for themselves in a hostile and dangerous environment. The process includes becoming aware of whom one is, optimal use of limited resources, and being responsible for one's personal mental and physical health. Barriers to care in both studies included confusion by the clinics over consent for this age group, lack of insurance, problems with transportation, lack of respect for their own self-knowledge by judgmental providers (Ensign & Panke, 2002; Rew, 2003).

All three of the above studies highlighted the increased risk-taking activities of homeless adolescents, but they also revealed strengths born from hardships suffered by these youths. These studies are limited because they likely missed the portion of the homeless population that does not access clinics. Because they took place in major metropolitan areas, the level of sophistication of the subjects may not reflect that of adolescents in urban and rural areas.

A much larger study was conducted to determine if education can change learned behavior and if those changes can be maintained over time (Nyamathi, Kington, Flaskerud, Lewis, Leake, & Gelberg, 1999). Nyamathi and colleagues (1999) followed a cohort of 410 homeless, drug addicted, HIV positive, African American women for two

years. Half of the group received the standard AIDS education program and the other half received the standard education program and a specialized program of risk reduction and self-esteem enhancing skills. The unsafe sex practices and injection drug use of both groups was similar at baseline. The women were assessed at one year and at two years post treatment. Both groups showed a marked increase in AIDS related knowledge, a significant reduction in both injection and noninjection drug use, and a reduction in sex with multiple partners. The results were even more pronounced for the women in the specialized group. In this study, education seemed to result in a long-term (2 year) change in risky behavior. This study revealed that behavioral change can be sustained over time, however the extent to which the two groups interacted with each other is not known, which poses a question of contamination bias.

Housing Status. Housing status, residential instability and homelessness are used interchangeably. Instability in housing is reflected in shelter use and mobility and it is common amongst poor people. In 1994, it was estimated that 33% of those on public assistance and 27% of those considered poor (annual income < \$20,000) had been homeless. The definition of homelessness also included temporarily staying with families or friends. By contrast, only 8% of those who had never been on public assistance and 10% of those not considered poor had ever experienced homelessness (Link, Susser, Stueve, Phelan, Moore, & Struening, 1994). Poverty is an important determinant of homelessness.

Homelessness is also strongly associated with poor health, including higher rates of physician diagnosed disease, higher prevalence of chronic illness, higher incidence of affective disorders, and lesser ability to perform the activities of daily living (Mead,

Witkowski, Gault & Hartman, 2001). Just how significant the effect of some form of housing is upon health was shown in a major study in Los Angeles in 2000. Nyamathi and colleagues (2000) subdivided 1,051 homeless women into those who had some form of shelter and those who lived on the streets (Nyamathi, Leake, & Gelberg, 2000). Health outcomes for homeless women were far worse in all areas when compared with the general population. Additionally, unsheltered homeless women had significantly worse health outcomes than sheltered homeless women. The study showed a marked difference in the overall health of homeless women based on shelter status (Nyamathi et al., 2000).

The correlation between homelessness and frequent use of the ED was established in a cross sectional and retrospective cohort study of all of the 348, 858 ED visits at San Francisco General Hospital for the years 1993-1998. Utilization characteristics of ED “frequent users” was compared with those of “non frequent users” (Mandleberg et al., 2000). A frequent user was defined as one who visited the ED five times or more in one year. While only 3.9% of the ED users were defined as frequent, they constituted 20.5% all ED visits. The condition of being homeless was significantly associated with ED utilization, representing 12% of the total yearly ED population with 38% attributable to the frequent user population. In agreement, Kushel and associates (2002) studied factors associated with ED utilization by 2578 homeless persons and those who were marginally housed, in San Francisco. A major finding was that 40.4% of the respondents had been seen in the ED within the past year, and that 7.9% had been seen more than 3 times, accounting for 54.4% of all ED visits. Additionally, 18% of those surveyed used the ED exclusively for health care. The effects of residential instability, such as chronic medical

problems, substance abuse and violence were the most significant predictors of ED use by the homeless population (Kushel et al., 2002).

The objective of a study by Yee and associates (2002) was to examine access to a regular source of health care by homeless women as a function of their residential status, sheltered or unsheltered. The results indicate that all homeless women have limited access to a regular source of health care, while those living on the streets have the most limited access along with the highest need for health care. Access was significantly linked to shelter status (Yee et al., 2002).

The importance of residential stability to health and access to a regular source of health care were highlighted in a study of 220 homeless and 216 low-income mothers who had never been homeless. While both groups received welfare, 46% of the homeless women experienced greater residential instability, with an average of 3.8 moves in the prior 2 years versus 1.8 moves for the housed women (Bassuk et al., 1996).

The conclusion of these studies was that poverty is correlated with homelessness and homelessness is a significant predictor of poor health and lack of a regular source of health care, resulting in use of the ED. The studies used large sample sizes, however, none was a national sample. Only one used ED data (Mandleberg et al., 2000) in the form of charts, while the others relied upon participant recall.

Among American adolescents, two seminal studies established the prevalence of homelessness and the fact that homelessness is, in itself, an independent predictor of poor health outcomes and high service use. Ringwalt and associates (1998) surveyed 6496 children between the ages of 12 and 17 who were randomly selected from the 1992 Youth Behavior Survey that was part of the National Health Interview Survey sponsored

by the Centers for Disease Control and Prevention. In this cross sectional secondary analysis, 7.6% of the surveyed children reported at least one episode of homelessness in the past 12 months. Of that number, 3.3% reported the use of an adult shelter, 2.2% a public place, 0.4% underground, 1.0% an abandoned building, 2.2% outside and 1.1% reported spending at least one night with a stranger (Ringwalt et al., 1998). This study exposed the prevalence of homelessness among American adolescents, but did not explore health care issues.

Weinreb and colleagues (1998) determined the correlation between homelessness, health and health services utilization in a case control study comparing 293 homeless children between ages 3 and 17 with 334 low-income children from August 1992 until July 1995. The Worcester Family Research Project surveyed homeless families recruited from shelters and welfare hotels, and families who had never been homeless were recruited from the Worcester Department of Public Welfare office. After controlling for possible confounding variables, they found that homeless children were 2.83 times more likely to report poor or fair health than housed children and to report the lack of a regular source of healthcare resulting in ED use (Weinreb et al., 1998).

Enabling Factors

Health Insurance. In the general population, the possession of health insurance has been found to increase the use of discretionary health care (regular source of care) and to decrease reliance on the ED as shown in a 1999 study of a nationally representative sample of 6748 adolescents who were not homeless (Klein et al., 1999). Of the total population, 85% reported having good health. While 92% reported having a regular source of health care, 5% used the ED as their usual source of care. Access was

positively related to health insurance, which was significantly associated with a regular source of care and receiving needed health care. The uninsured were more likely to miss needed care or rely upon the ED as a regular source of health care (Klein et al., 1999).

The effect of health insurance upon ED use in the homeless population compared to the poor, but housed, was shown by O'Toole and colleagues (1999). In a survey study of 388 homeless and housed poor who used 24 community based assistance sites in Pennsylvania, 90.2% of the respondents reported having a regular source of care, while only 51.3% reported using preventive health care sites and 28.9% reported using the ED. The perceptions of need and health status were no different in those who used preventive healthcare sites and those who used the ED as a regular source of care. The only significant predictors of ED utilization were lack of health insurance and lack of health care in the previous six months (O'Toole, Gibbon, Hanusa, & Fine, 1999).

Accordingly, Han and colleagues (2003) conducted a study of 941 homeless persons to compare use of the services provided by the Health Care for the Homeless Program (HCHP) to use of other health care services for the Department of Health and Human Services. They concluded that, second to the need for dental care, health insurance played the most significant role in the utilization of HCHP and other health care services with a corresponding decrease in use of the ED. The number of ED visits was inversely associated with use of services other than the HCHP services, indicating that case management, as offered by HCHP, reduced ED use (Han, Wells, & Taylor, 2003).

To examine the importance of health insurance on access to a regular source of care in homeless adolescents, Ensign (2001) reviewed the health passports of 89 shelter-

based, homeless adolescents in Baltimore. Of the 89 health records reviewed, 11 had not experienced delay in needed health care in the past year. Delay in care, resulting in use of the ED, was attributed to lack of health insurance (Ensign, 2001).

The direct association between health insurance and ED use was questioned in a secondary analysis of the National Survey of Homeless Assistance Programs and Clients (Kushel et al., 2001). The authors examined the self-reported use of the ED, other ambulatory services, and inability to receive needed care by 2974 homeless adults. Of the 62.8% who had received ambulatory care, 32.2% had used the ED and 23.3% had been hospitalized, while 24.6% reported having been unable to receive needed care. While health insurance was positively associated with increased ambulatory care, it was not associated with use of the ED. The authors concluded that providing health insurance might indirectly reduce reliance upon the ED because it would encourage the use of other ambulatory care settings for preventive health care (Kushel et al., 2001).

Kreider and Nicholson (1997) explored the association between health insurance and health care utilization by the homeless in Alameda, California. This cross sectional survey of 564 homeless adults occurred in three waves over 18 months. Their findings indicate that health insurance is positively associated with reduced barriers to both discretionary (regular source of care) and non-discretionary (ED) health care services. However, the reduction of barriers to care, while it does increase access, does not necessarily result in increased utilization. Non-financial barriers, such as difficulty navigating the system, competing needs and lack of trust in the health care system, also contribute significantly to lack of utilization by the homeless. (Kreider & Nicholson, 1997). The author then ignored those findings by predicting that hospitalization can be

expected to increase 38% with institution of a universal type of health care coverage in which health care is provided to all, with the greatest effect predicted to be on admission for alcohol and substance abuse, and mental health.

These studies illustrate the important distinction between “access” and “utilization”. “Access” is defined as a means of entry, the right to enter and the opportunity to enter (Merriam-Webster, 2006) “Utilization” is defined as making use of or making practical use of (Merriam-Webster, 2006). Access to health care includes the existence of services, and a lack of barriers that obstruct the ability of one to obtain health care. Utilization of health care indicates the actual use of health care services. While lack of health insurance is one of the major barriers to access, it is not the only factor in underutilization of health care services by the homeless, as is indicated by Kreider and Nicholson (1997). While only two of the studies use national data (Han et al., 2003; Kushel et al, 2001), the consensus was that health insurance reduces barriers to care thereby increasing access. However, increased access does not necessarily equate with increased utilization. Access is only one determinant of utilization.

Regular Source of Care. A regular source of health care is an important determinant of good health and access to health care. Individuals with a regular source of care are more likely to seek preventive care, while those without are more likely to use the ED when care is needed (Gallagher, Andersen, Koegel, & Gellberg, 1997).

Lewis and colleagues (2003) disputed the primary importance of health insurance and concluded that having a regular source of care was the more significant factor in utilization. In their cross sectional study evaluating the perceived unmet health care needs of 974 homeless women in Los Angeles, they found that having a regular source of health

care was positively associated with having fewer perceived unmet medical needs, while having health insurance was not (Lewis, Andersen & Gelberg (2003). However, the majority of their sample had state sponsored health insurance.

Adolescents, as a group, have less access to medical care than adults (Millstein, Petersen, Nightengale, 1993). Klein and colleagues established the correlation between a regular source of health care, missed needed care and use of the ED in the housed population (Klein et al., 1999). Adolescents without a regular source of care were more likely to miss needed care and to use the ED. In the homeless adolescent population the situation is worse. In 2000, Klein and colleagues compared 640 sheltered homeless and 600 adolescents who lived on the streets. Fifty percent of the street youth and 36% of the sheltered youth did not have a regular source of health care, while 36% of the street youth and 29% of the sheltered youth had used the ED in the past year. Sheltered youth with a regular source of healthcare were less likely to use the ED (Klein et al., 2000).

Accordingly, The Worcester Family Research Project also found that 33% of the homeless children surveyed reported an ED visit within the past 12 months as compared to 20% of the low income housed children. Although possession of health insurance was similar in both groups, the homeless children were significantly less likely to report a regular source of health care (Weinreb et al., 1998).

While all three of the above studies had large sample sizes, only one was drawn from a nationally representative sample, which did not use ED data (Klein et al., 2000). While Klein and colleagues (2000) and Weinreb and colleagues (1998) compared those who were homeless with those who were not, all of the studies were based on recall data with no empirical validation.

Social Support/Competing Needs. The basic necessities of life that are required by all people, but are difficult for the homeless person to acquire, like safety, shelter and sustenance are known as “competing needs”. Because the homeless must devote a disproportionate amount of time and energy to acquire these necessities, they compete with and take priority over health care (Gelberg, Gallagher, Andersen, & Koegel, 1997). Additionally, social support networks are few for the homeless. Bassuk and colleagues (1996) describe the homeless woman as half as likely to have graduated from high school, and if employed, earns little. She is also less likely to benefit from AFDC, child support, housing subsidies or food stamps (Bassuk et al., 1996).

In their 2001 study, D’Amore and colleagues compared 252 homeless persons with 88 non-homeless controls to explore the social, psychiatric and medical factors that contribute to homelessness and use of an inner city ED (D’Amore et al., 2001). The homeless accounted for 20-30% of all ED patients over the eight-week period for a 20,000 to 30,000 year total. Homelessness was associated with high rates of social isolation. High rates of ED utilization and hospitalization were attributed to the lack of integration into a primary care system (D’Amore et al., 2001).

Even when financial barriers are overcome, homeless women access services only when it becomes necessary for them to do so. The barriers to health care resulting from competing needs were highlighted in a study of 169 homeless and poor women (Milligan et al., 2002). The need to find shelter and food in the hostile environment of homelessness took much of the time and energy of these homeless women especially those who had children. A further problem was lack of transportation to healthcare facilities and adequate child care (Milligan et al., 2002) This study supports the findings

of a study in 1991, that finding child care, employment and housing and keeping welfare appointments were all barriers to keeping medical referral appointments by homeless women (Schlossstein et al., 1991).

Qualitative studies have uncovered the circuitous route that homeless women must take to access the managed care system. The homeless woman must first gain access to shelter services that provide social support and guidance through the many obstacles presented by the system, including long wait times for appointments, services provided in diverse locations, confusion and lengthy paperwork (Hatton, 2001).

Hatton and colleagues (2001) also explored how shelter staff members attempt to assist residents in obtaining health care. What they discovered is the paradox that shelter staff attempt to obtain health care services from a system that was designed to deny those services. This study identified problems with geographically scattered services, difficulties with comprehension due to language differences and the overall adversarial nature of the system (Hatton, Kleffel, Bennett, & Gaffney, 2001).

Although none of the reviewed studies was based on national data, D'Amore and colleagues (2001) did use ED data. When taken together, the cited studies give ample evidence to support the statement that the homeless are patients who "...exist in our cities wandering from ED to ED and hospital to hospital without social, medical, or psychiatric contact" (D'Amore et al., 2001. p.1054).

Characteristics of Health Services. The healthcare system is difficult to access for the homeless. Language is a barrier in itself since sociocultural conditions preclude access to some when they are denied services due to an inability to speak English (Hatton et al., 2001). Difficulty accessing services also results from geographically scattered

services that demand homeless persons travel from site to site to obtain needed care (Hatton et al., 2001). A recent approach is to include the homeless in managed care systems, but this inclusion involves complicated systems of referral and endless paperwork (Hatton et al., 2001). Additionally, an increasing emphasis on reducing welfare fraud has created a hostile, even adversarial system that effectively keeps out those for whom it was designed to serve (Hatton et al., 2001).

Site related factors such as waiting room time, distance to be traveled, lack of transportation, lack of child care and wait time for appointments were all factors cited as significant barriers in a study by Bloom and colleagues (2004). Over half of their sample of 47 pregnant women had no prenatal care even though prenatal care is theoretically available to all women in Northeast Florida (Bloom et al., 2004).

Lack of an understanding of the needs of the homeless by the health care system has been cited as a significant obstacle to utilization (Bassuk, Dawson, Peloff, & Weinreb, 2001). There is little knowledge of access barriers caused by childhood trauma, despite the fact that the experience of childhood trauma is prevalent in this population (Bassuk, et al., 2001). Similarly, a life of substance abuse impacts the daily reality for homeless persons. Because of the prevalence of substance abuse in the homeless population, the consequences of the lifestyle are greatly underestimated. Therefore, inappropriate care is provided to these people because it is not understood or accepted that health care must include substance abuse treatment and violence prevention (Milligan et al., 2002).

Homeless women cite lack of respect as the most significant factor in the inadequate use of health care services (Hatton et al., 2001; Schlosstein et al., 1991; Yee

et al., 2002; Milligan et al., 2002; Swanson et al., 2003). Stigmatization of homeless women creates a “blame-the-victim” environment. Unless the health care facility is designed specifically for the homeless, providers may treat the women as less than equal or somehow morally inferior to themselves and other patients (Hatton et al., 2001). The most powerful motivating force for referral keeping by homeless women comes from respectful treatment by the health care provider and the communication of the importance of the needed care (Schlossstein et al., 1991). Finally, in a study by Ugarriza and Fallon (1994), the attitude of the health care provider was the most significant factor in whether homeless people did or did not use health care services.

Contrary to the above studies are the findings of a cross sectional study by Geber (1997) of 89 runaway youth served by two community agencies in Minneapolis. Only 8% of the adolescents reported not having health care in the past year. In this study, 57% had received services in the past month, 21% in the past six months and 14% in the past year. Satisfaction with care was reported by 88% of those who had received health care. However, the high service rate and high level of satisfaction were attributed to the high degree of contact with community services (Geber, 1997).

In summary, while community services claim to be designed for the poor and homeless, they present many obstacles to use. All of the studies included in the “enabling” section speak to barriers to care that result in underutilization of existing services by the homeless.

Need Factors

Acute physical and mental illness, the effects of violence and the symptoms of substance abuse measure perceived need. These factors are so interdependent and

influential in the lives of the homeless that they are usually considered together. Every article reviewed reported the high level of need associated with the homeless population. Compared to the general population, homeless persons suffer poorer physical and mental health. They are at increased risk for infectious and sexually transmitted diseases, substance abuse, mental illnesses, depression and violence (Ringwalt et al, 1998; Ensign, 2004).

Need was determined to be the most significant factor in predicting ED utilization in a study of 1260 homeless adults in New York (Padgett et al., 1995). Physical health problems and injuries had the strongest correlation with ED use. The homeless population had a victimization rate 30 times higher than the national average.

The effect of victimization upon clinical outcomes was also explored by Lam and Rosenheck in their 1998 study of 1,839 mentally ill clients. This cohort study used interviews at intake, 3 months and 12 months at community treatment centers participating in the Access to Community Care and Effectiveness Services and Supports. They found that 44% of the clients were victims of at least one crime in the preceding two months and women were significantly more likely to be victims of crime than men. The gender difference was attributed to sexual assault (Lam & Rosenheck, 1998).

Victimization is also highlighted in a study of ED use among the homeless and marginally housed or those who live in SROs (Kushel, et al., 2002). Acute injury associated with victimization was an important predictor of ED utilization. Victimization was also highly associated with exclusive ED use, any ED use, and repeated ED use.

The effect of acute exacerbations of chronic health problems was revealed in a study of frequent ED users in San Francisco (Mandelberg et al., 2000). While this study

included all patients seen in the ED, frequent users accounted for 20.5% of all visits and were likely to be homeless. Frequent users were most often seen for acute symptoms of chronic diseases and for alcohol related problems such as withdrawal, seizures and intoxication. It is of interest to note that in this study, frequent ED users were less likely to use the ED for trauma and more likely to use the ED for acute episodes resulting from all forms of chronic illness.

Previous life experiences are crucial in the determination of future homeless status and homeless women are more likely to have suffered physical assault as a child or as an adult. Over 40% have been sexually assaulted. Consequently, there is a larger prevalence of Post Traumatic Stress Disorder (PTSD), drug and alcohol abuse, major depressive disorders and attempted suicide (Bassuk et al., 2001). A secondary analysis of a case control longitudinal study of 436 homeless women was done to explore the role PTSD as a barrier to health care (Bassuk et al., 2001). Because of PTSD, these women report more bodily pain, more chronic health problems, less satisfaction with health care and more barriers to care than women without PTSD when other factors were controlled. Additionally, even though they reported a regular source of health care, they had a high ED utilization rate (Bassuk et al., 2001).

The homeless are at high risk for alcohol and drug abuse and mental illness (Wenzel, Koegel, Morton, Miu, Jinnett, Greer, 2001). D'Amore and colleagues (2001) studied the homeless population of an urban ED. Homelessness was associated with extremely high rates of alcoholism, substance use and mental illness. Of the 20 to 30 thousand yearly visits to the ED, 20-30% were by homeless persons (D'Amore et al., 2001).

These attributes; alcohol, substance abuse, mental illness, and violence are interwoven, as seen in a study contrasting 860 sheltered homeless women and 191 nonsheltered homeless women in Los Angeles (Nyamathi et al., 2000). While the rates were higher for the unsheltered homeless, both groups had extremely high rates of mental illness, alcohol and substance abuse. The unsheltered also reported a higher incidence of violence and a history of victimization.

Yee and associates (2002) conducted a cross sectional study using a purposive sample of 974 homeless women in Los Angeles County. For homeless women in their study, life on the streets created a great demand for health care services as shown by the fact that homeless women were hospitalized at a rate 5 times that of the national average and 89% of the study sample had an outpatient or ED visit during the 9 month study period (Yee et al., 2002).

Summary and critique. The reviewed studies reveal the complex relationships between the predisposing, enabling and need factors and ED utilization and support the conclusion that the homeless population does use the ED to a greater extent than the general public. However, because the emergency department data are drawn from local populations, it is not known if this is a national trend. Moreover, left unanswered is the crucial question of whether the homeless use the ED for non-emergency care or if their increased morbidity and injury rate result in ED use that is warranted.

When using the Behavioral Model of Health Care Utilization, it has been concluded that most of the variance in utilization is explained by the need factor (Andersen, 1995; Kushel et al., 2002; Lewis et al., 2003; Padgett et al., 1995; Swanson et al., 2003; Phillips et al., 1998; Gelberg et al., 2000). It appears, from this literature

review, that need is the primary determinate of ED utilization. However, a closer look at the studies reveals that need is, in itself, directly related to homelessness. Homelessness results in poor health, which in turn creates need (Bassuk et al., 1996; Gelberg, et al., 2000; Klein et al., 2000; Ringwalt et al, 1998; Ensign, 2004). Homelessness is a consequence of and results in substance abuse, again resulting in need (Nyamathi et al., 2000; Wenzel et al., 2001; D'Amore et al., 2001). Violence and traumatic injury constitute need that is directly attributable to homelessness (Lam & Rosenheck, 1998; Kushel, et al., 2002). Additionally, homelessness results in social isolation and the lack of social support, which, in turn results in need (Gelberg et al., 1997; Bassuk et al., 1996; D'Amore et al., 2001). While need appears to be the principal factor in ED utilization, need itself is a function of the predisposing factor, housing status. When examined in this light, homelessness can be seen as a major determinant of need.

There are limitations to the existing literature. There is little literature and much of what exists is outdated. For example, the number of homeless adolescents in the United States is cited in several of the reviewed articles as estimated at 1.3 million. That estimate was first cited in 1992 (Sherman, 1992). However, 1.3 million was still the estimate that was cited in an article that was published in 2000 (Klein et al., 2000). It is unlikely that the homeless adolescent population did not grow during that time frame.

Much of the existing literature lacks external validity. Most of the studies take place in major urban areas and because the samples were not randomly selected, they cannot be generalized to suburban or rural areas (Barkin et al., 2003; D'Amore et al., 2001; Kushel et al., 2002; Lewis et al., 2003; Mandelberg et al., 2000). Additionally, these studies were conducted in the "service rich" communities of Los Angeles, Seattle,

Baltimore and San Francisco and the results cannot be generalized to areas that do not provide comparable services. Results from communities that offer services may underestimate the severity of the situation in communities that do not offer similar services.

Studies conducted in clinics and shelters miss the homeless who live in cars, abandoned buildings or under freeway overpasses. Because this portion of the population may not use community services, or may use them differently, they likely have a great need for health care and are underrepresented in current research (Barkin et al., 2003; Bloom et al., 2004; De Rosa et al., 1999; Ensign, 2004; Geber, 1997; Yee et al., 2004; Rew, 2003). Additionally only two of the reviewed studies used data actually collected from emergency departments (D'Amore et al., 2001; Mandelberg et al., 2000). Studies using data collected at shelter sites and clinics are likely to under represent the homeless who use only the ED for health care. More rigor is required in sample selection so that the entire homeless population can be represented and estimated.

The majority of studies are cross-sectional or qualitative. The qualitative studies provide in depth understanding of the barriers faced by the homeless, as they come from the perspective of the homeless themselves. While the cross-sectional studies adequately establish prevalence, they do not establish causation, which must be established by randomized trial studies. Also, they are not as conclusive as cohort or longitudinal studies. Most of the studies employ surveys that are self-report without validation by chart review or any other form of empirical evidence and the validity of the surveys are not well established.

The homeless population is difficult to find precisely because the people have a deep mistrust of authority (Ensign & Panke, 2002). Studies of ED utilization and barriers to access are flawed by inconsistent definitions that make it difficult to compare the findings of various studies. An example of this can be seen in the adolescent studies using many definitions of “homeless” and “adolescent”. Studies defining homelessness as one night in a non-home setting produce different results than studies of homelessness that is more chronic in nature. (Table 1) The adolescent studies also lack a dependable definition of “adolescent”. It is difficult to compare studies when adolescence is defined as everything from 11 to 23 years of age. Some definitional inconsistencies from the adolescent studies are shown in Table 1.

Table 1 *Definitional Inconsistencies*

Authors	Sample Size	Age Range	Definitions
Barkin et al., 2003	N = 142	15-24 years	Any of the past 30 days in a shelter or on the streets
De Rosa et al., 1999	N = 296	13-23 years	Not defined
Ensign, 2004	N = 47	12-23 years	Not defined
Ensign, & Panke, 2002	N = 20	14-23 years	Self designated
Ensign & Santelli, 1997	N = 109	12- 17 years	Lacking a fixed, regular, adequate housing situation (federal definition)
Geber, 1997	N = 89	Not given Mean = 17.5 years	Not defined
Klein et al., 1999	N = 6,748	5th through 12 th grade	In school, both housed and homeless with no definition
Klein et al., 2000	N = 600 street N = 640 sheltered	12-21 years	At least one night in a shelter or on the streets
Ringwalt et al., 1998	N = 6496	12-17 years	One night in previous 12 months
Rew, 2003	N = 15	16-20 years	Living in temporary quarters
Rew et al., 2002	N = 22	16-20 years	Not defined
Weinreb, et al., 1998	N = 627	3 months- 17 years	Not defined

It is difficult to understand utilization of the ED when few of the existing studies separate the ED from other outpatient services, like clinics. Among the studies that do differentiate ED use from other outpatient services, none determine whether the presenting complaint was, in fact, an emergency or could be more appropriately handled in a clinic.

Finally, the literature is inconsistent about the extent to which homeless persons use existing discretionary health care facilities. More significantly, left unexplored is whether a presenting complaint that was treated in the ED had become an emergency because it was not treated in a timely fashion. Studies have shown that the homeless use the ED significantly more often than the housed, however, it has also been shown that they suffer from higher rates of trauma and serious illness, due, in part, to life on the streets. It is therefore possible that their increased use of the ED is warranted.

Chapter 3: Methodology

This study is designed as a cross sectional, secondary analysis of an existing database. The beginning of any research study is the recognition of the phenomenon of interest and the identification of the research question. The formulation of the research question will then determine the method to be used in completing the research study (Hulley, Cummings, Browner, Grady, Hearst, & Newman, 2001).

Research Questions

The purpose of this study is to determine the extent to which homeless persons use the ED as a regular source of health care (non-urgent visits) and to determine the factors that are predictive of non-urgent ED use.

- Aim 1: To describe the differences between persons who are homeless and those who are not homeless, living in the community, who use the ED in terms of their predisposing, enabling and need factors.

Question 1: What is the relationship between housing status and ED use?

- Aim 2: To describe the differences in the number and type (urgent versus non-urgent) of ED visits between persons who are homeless and those who are not homeless, living in the community.

Question 2: What is the relationship between housing status and urgent versus non-urgent use of the ED?

- Aim 3: To examine the predisposing, enabling and need factors that predict the number and type of ED visits for persons who are homeless and those who are not homeless, living in the community.

Question 3: What are the predictors of ED utilization for non-urgent visits?

Because the intent of this study is to determine if homeless persons in the United States use the ED for non-emergency (non-urgent) health care and to discover those factors that are predictive of ED use for non-urgent visits, the focus of the study is on the amount and type of ED use and the factors associated with the use of the ED by homeless persons. This study of ED utilization by homeless persons asks several questions. The first concern is the amount of ED use by homeless persons, the proportion of the population that uses the ED and the type of use, whether urgent or non-urgent care. Secondly, it attempts to determine if there are any factors associated with the use of the ED by homeless persons for non-urgent health care and if there are any relationships among the factors.

Assumptions

1. Homelessness has a singularly negative effect on health. The homeless population has a higher morbidity and mortality than the population in general.
2. The use of the ED as a regular source of health care results in poor health outcomes.
3. ED overcrowding contributes to a delay in emergency care that results in increased morbidity and mortality for ED patients.
4. ED overcrowding contributes to the increasing cost of health care in the United States.
5. Homeless persons contribute to ED overcrowding.

Research Design

A cross-sectional analysis of an existing database is an appropriate method for this study. The National Hospital Ambulatory Medical Care Survey (NHAMCS) is a

national probability sample of patient visits to hospital emergency departments, excluding Federal, military and Veteran's hospitals in the 50 states and the District of Columbia for the years 1992 through 2007. This public-use database is available for research through the National Center for Health Statistics of the National Institutes of Health. The NHAMCS focuses upon demographic characteristics of the patient population, the urgency of the presenting problems and resulting diagnoses and hospital characteristics. Explicitly included in the Patient Record Form (Appendix A) are age, gender, presenting complaint, urgency of presenting complaint, diagnosis and final disposition. In 2005, housing status was added to the Patient Record Form for the first time (National Center for Health Statistics, 2007).

A cross-sectional design is appropriate for this study and is defined as an observational study in which data are collected while no intervention is attempted (Polit & Beck, 2004). Cross-sectional studies are designed to look at data retrospectively. Data from a sample are drawn from a selected population and collected at one point in time (Hulley et al., 2001). The data are then examined to determine if there is any connection between the outcome (dependent variables) that exists in the present and any conditions (independent variables) that preceded it (Polit & Beck, 2004). Cross-sectional studies are used primarily to describe the variables of interest along with their patterns of distribution and to define the clinical and demographic characteristics of a group (Polit & Beck, 2004; Hulley et al., 2001).

Cross-sectional studies establish prevalence, which is the number of subjects exhibiting the variable of interest that exists within a given population at a particular point in time (Doordan, 1998). In the case of this study of ED utilization, prevalence is

the proportion of the population of homeless persons who use the ED for non-urgent health care.

Cross-sectional studies can also describe relationships at one point in time, as relationships can be inferred from the associations among the variables (Polit & Beck, 2004). Because associations between the variables can be established, outcomes can be estimated. However, while association between variables can be shown by cross-sectional studies, causal relationships cannot be demonstrated. Association is necessary, but not sufficient to establish causation (Shott, 1990). To ascertain causation, it is necessary to show that potential causative factors always preceded a measured outcome (Hulley et al., 2001). This necessitates an experimental design study in which possible confounding variables are controlled, while independent variables are manipulated. The effect of each independent variable upon the dependent variable can then be estimated (Munro, 2005).

Care must be exercised in examining relationships between outcome and predictor variables. Independent or predictor variables can be affected by other (confounding) independent variables, thereby altering the effect of the predictor variable of interest upon the outcome variable. Therefore, to establish a relationship, it is important to determine whether and in what way any of the independent variables affect the predictor variable of interest within the model (Polit & Beck, 2004).

Secondary analysis is a "...form of research in which a set of existing data is analyzed by another researcher to test the same or new research hypotheses..." (Doordan, 1998, p.113). A secondary analysis of an existing database can be used to 1) re-examine dependent and independent variables, 2) answer research questions from data gathered for other purposes, 3) focus on a particular sub group that was included in a larger study,

and, 4) look at a different unit of analysis than was used in the original study (Polit & Beck, 2004).

A secondary analysis of the NHAMCS 2005 is the most cost effective way for a single investigator to look at utilization of the ED by homeless persons in the United States. The database includes the largest sample of the target population that is available. It includes data relevant to the prevalence of ED utilization by homeless persons nationally and includes variables that can be used to predict the use of the ED for non-urgent health care. Because the sample is representative of the entire population of the United States that used the ED in 2005, it will produce results that are relevant.

Definition of Variables and Terms

There are several important variables indicated in the literature. However, a limitation of this study, and secondary analysis in general, is that the variables that can be used are those that were included in the primary data collection. The following definitions are from the NHAMCS 2005 Micro-Data File Documentation and from the NHAMCS 2005 Survey Instrument (National Center for Health Statistics, 2007)

Dependent Variables

Use of the ED, expressed on the NHAMCS 2005 as number of patient visits, is calculated as the proportion of the homeless population in the United States that used the ED in 2005. The possibility that one patient may account for more than one patient visit will be discussed in a later section.

Type of ED visit (urgent or non-urgent) is determined by triage category. Triage category is defined in the NHAMCS as the clinical judgment of the ED professional as to

the immediacy with which the patient needed to be evaluated and/or treated, that was made at the time of arrival in the ED. Triage categories are defined in Table 2.

Table 2 *Triage Definitions.*

Category	Definition
1. Immediate	Emergent serious illness or injury where delay would result in death.
2. 1-14 minutes	Emergent serious illness or injury where delay would result in deterioration of condition.
3. 15-60 minutes	Urgent illness or injury.
4. > 1 hour – 2 hours	Semi urgent illness or injury.
5. > 2 hours – 24 hours	Non-urgent illness or injury where delay of up to 24 hours would make no difference in outcome. Patient may be referred to appropriate specialty.
6. No triage	Patient dead on arrival or hospital does not perform triage.
7. Unknown	Immediacy is unknown

For this analysis, triage categories are coded and dichotomized as Urgent or Non-Urgent. The Urgent category includes (1), (2), (3), and (4) from above. They are grouped together because they entail illness or injury that must be addressed in the least amount of time possible. Non-urgent includes category (5). Categories (6) and (7) are treated as missing data. Management of missing data will be discussed in a later section.

Independent Variables-Predisposing Factors

Housing status is determined by the answer to question 1e: Patient residence, which is categorized and defined in Table 3.

Table 3 *Housing Status Definitions.*

Residence	Definition
1. Private residence	Residence is a private home or apartment
2. Nursing home	Residence is a nursing home
3. Other institution	Residence is any institution other than a nursing home
4. Other residences	Residence is a hotel, college dorm or assisted living
5. Homeless	Residence is a shelter or no defined home
6. Unknown	Residence is unable to be determined

For this analysis, the residence variable is dichotomized into homeless and not homeless. Housing status is the independent variable of interest for this study. The aim of the study is to compare homeless persons with not homeless persons who are living in the community, because living in the community presents similar choice of options for and barriers to health care. Persons residing in nursing homes and institutions have limited options for health care. Therefore, not homeless includes categories (1), and (4) from above. Homeless includes category (5). Categories (2), (3), and (6), are treated as missing data.

Age is determined in the NHAMCS by subtracting the date of birth from the date of visit. It is expressed in years. It is then recoded as: under 15 years, 15-24 years, 45-64 years, 65-74 years, 65-74 years and 75 years and over. For this analysis it is used in the original form as continuous data and is not recoded.

Gender is defined as either male or female.

Race/Ethnicity are handled separately by NHAMCS. Ethnicity is defined as Hispanic or Latino or not Hispanic or Latino. Race is defined as White, Black/African American, Asian, Native Hawaiian/Other Pacific Islander, American Indian/Alaskan

Native, and More than one race reported. Race and ethnicity are then combined and recoded as:

1 = White Only, Non-Hispanic

2 = Black Only, Non-Hispanic

3 = Hispanic

4 = Asian Only

5 = Native Hawaiian, Other Pacific Islander Only

6 = American Indian/Alaska Native

7 = Multiple Races

For this analysis, race/ethnicity is dummy coded White, Black, Asian, Hispanic and Other. Categories 5, 6, and 7 are combined as “Other” due to their small numbers. The process of dummy coding will be explained in the analysis section that follows.

Geographic location is defined in the NHAMCS Micro-Data File Documentation as the actual location of the hospital: Northeast, Midwest, South and West. Geographic location is dummy coded for analysis to account for any regional differences.

Month of visit is recorded on the patient Record Form and is collapsed into season of visit; winter, spring, summer and fall and then dummy coded to account for any seasonal differences.

Day of the week is recorded on the Data Record Form and is dichotomized for analysis into weekday or weekend. This categorization indicates if there is any difference in ED use when clinics and private physician offices are open and when they are closed.

Time of visit is recorded on the Patient Record Form and is dichotomized for analysis into day (6am to 6pm) or night (6pm to 6am). This categorization reveals any

differences in use of the ED when clinics and private physician offices are open and when they are closed.

Independent Variables- Enabling Factors

Health Insurance status is determined by the answer to question 1j: Expected source(s) of payment for this visit, which is defined in Table 4.

Table 4 *Health Insurance Status Definitions.*

Status	Definition
1= Private insurance	Charges paid entirely or partially by private insurance
2= Medicare	Charges paid entirely or partially by Medicare, including payments directly to the hospital and payments reimbursed to the patient
3= Medicaid/SCHIP	Charges paid entirely or partially by Medicaid or SCHIP, including payments directly to the hospital and payments reimbursed to the patient
4= Worker's Comp	Charges paid entirely or partially by any program designed to provide financial compensation to a worker injured on the job regardless of fault
5= Self-pay	Charges that are expected to be paid entirely by the patient or the patient's family
6= No charge/Charity	No charges are assessed for the visit
7= Other forms	Any form of payment not included in the above definitions
8= Unknown	Primary source is unknown

For this analysis, insurance status is dichotomized into insurance and no insurance. Insurance includes (1), (2), (3), and (4) from above. No insurance includes (5), (6), and (7). Unknown (8) is treated as missing data.

Type of hospital ownership is based upon the Verispan Hospital Database determination of primary type of hospital ownership. It is designated in the NHAMCS Micro-Data File Documentation as:

1. Voluntary non-profit, defined as church based or non-profit ownership.
2. Government-non-Federal, defined as operated by city, county, state or hospital authority district.
3. Proprietary, defined as privately owned or held by for profit corporations.

For this analysis, type of hospital ownership is dichotomized as non-profit and for-profit. For-profit includes category (3) from above. Non-profit includes categories (1) and (2). Church based or non-profit hospitals and government-operated facilities are grouped together because they provide the majority of charity based and “safety net” services.

Independent Variables- Need Factors

“Need” is defined for the Model of ED Utilization by Homeless Persons in the United States that was designed specifically for this study, as acute physical and mental illness, victimization and substance use/abuse. The literature review reveals that the homeless population suffers a high level of need compared to the general population. Homelessness contributes to poor physical and mental health due to the stresses of the lifestyle that exacerbate chronic physical illness and mental illness. In addition, the homeless are at increased risk of sexually transmitted diseases and substance abuse along with the results of violence, physical abuse and sexual abuse.

Need is not well defined in the NHAMCS 2005. Due to the complexity of the survey, it is difficult to determine how to measure need. Discussed below are variables associated with need and a rationale for the way in which each was used in this analysis.

Reason for visit is first recorded verbatim as a string variable, as it was stated by the patient and written on the Patient Record Form. It is then recoded into a Reason for Visit Classification with 26 categories. In this analysis it is used to describe the most frequent reason for visit given by patients to the triage nurse in the ED. However, it is unsuitable for this analysis or for use in logistic regression without significant manipulation.

Drug and alcohol use/abuse are recorded in the data by physician diagnoses expressed as ICD-9-CM codes. ICD-9-CM codes are explained in a later section. In this analysis they are used to compare the homeless and not homeless population for substance abuse.

Injury, poisoning, and adverse effects are recorded on the Patient Record Form in answer to question 5a, “Is this visit related to an injury, poisoning, or adverse effect of medical treatment?” If answered, “Yes”, 5b asks, “Is this injury/poisoning intentional?”

0= Blank

1= Yes, self inflicted

2= Yes, assault

3= No, unintentional

4= Unknown

8= Not applicable, not an injury visit

This variable is used in an attempt to identify the magnitude of victimization and compare the homeless and not homeless populations.

Admit to hospital is answered either yes or no on the Patient Record Form. This variable is used to compare the homeless and not homeless populations.

Presenting level of pain is based upon the Clinical Practice Guidelines published by the Agency for Healthcare Research and Quality (AHRQ) that provides a numerical hierarchical rating for pain from 0= no pain to 10= severe pain. This variable is also used to compare ED visits by homeless and not homeless persons. Presenting level of pain is defined as follows:

0= None

1= Mild - numerical rating 1-3

2= Moderate – numerical rating 4-6

3= Severe – numerical rating 7-10

The need variables discussed above are included to create a better understanding of the need factor and its impact upon utilization of the ED. None of them is a complete measure of need. “Reason for visit” is the patient’s perception of need, which resulted in an ED visit. A patient presenting to the ED believes a need for an ED visit exists. Drug and alcohol use/abuse contributes to ED visits; however, substance abuse is only one contributing factor, as are injury, poisoning and presenting level of pain. Whether a patient is admitted to the hospital is one measure of need but excludes conditions warranting a visit to the ED that do not result in hospital admission, such as asthma, seizure and fractures.

Physician diagnosis is first recorded verbatim as a string variable, as the ED physician wrote it on the Patient Record Form. It is then recoded in the NHAMCS 2005, into International Classification of Diseases, 9th Revision, Clinical Modification Codes (ICD-9-CM codes), of which there are over 13,000. In this analysis, physician diagnosis is first used as a string variable to describe the most frequent diagnosis given by

physicians in the ED. It is then collapsed into 17 categories using The Clinical Classifications Software (CCS) for ICD-9-CM codes created by the AHRQ. The CCS is a coding system that can be used to analyze data on diagnoses by collapsing the ICD-9-CM codes into a smaller number of clinically meaningful codes, which can be used in a logistic regression. For this analysis the variable “need” is measured by CCS, which represents physician diagnosis as described in Table 5, that were then dummy coded for use in the logistic regression. It was chosen as the most objective measure of need available in the NHAMCS 2005 data.

Table 5 *CCS Codes/ ICD-9 Codes/Physician Diagnosis.*

CCS	ICD-9-CM	Physician Diagnosis
CCS 1	001-139	Infectious and parasitic diseases
CCS 2	140-239	Neoplasms
CCS 3	240-279	Endocrine, nutritional and metabolic diseases, and immunity disorders
CCS 4	280-289	Diseases of the blood and blood forming organs
CCS 5	290-319	Mental disorders
CCS 6	320-389	Diseases of the nervous system and sense organs
CCS 7	390-459	Diseases of the circulatory system
CCS 8	460-519	Diseases of the respiratory system
CCS 9	520-579	Diseases of the digestive system
CCS 10	580-629	Diseases of the genitourinary system
CCS 11	630-677	Complications of pregnancy, childbirth, and the puerperium
CCS 12	680-709	Diseases of the skin and subcutaneous tissue
CCS 13	710-739	Diseases of the musculoskeletal system and connective tissue
CCS 14	740-759	Congenital anomalies
CCS 15	760-779	Certain conditions originating in the perinatal period
CCS 16	780-799	Symptoms, signs, and ill defined conditions
CCS 17	800-999	Injury and poisoning.

Terms

Definitions for terms used in the NHAMCS 2005 are detailed in the NHAMCS Micro- Data File Documentation. For clarity they are included in Table 6.

Table 6 *Definition of Terms.*

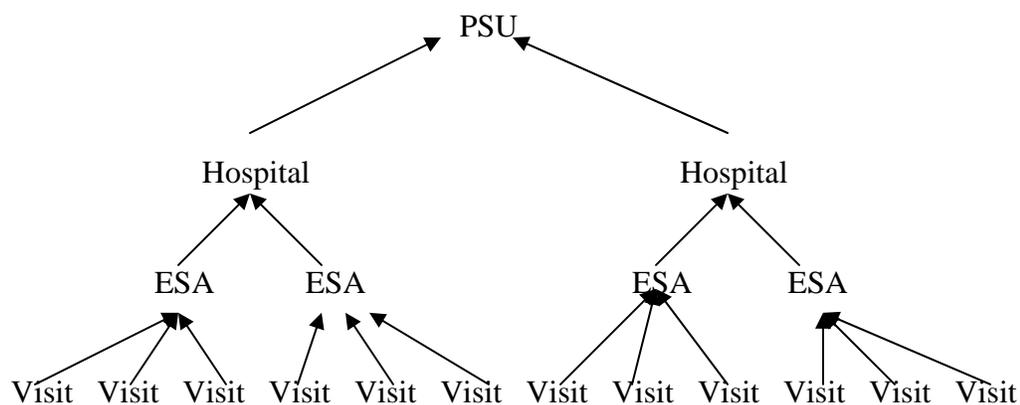
Term	Definition
Metropolitan Status Area (MSA)	Defined by the US Office of Management and Budget as involving two aspects: a city or cities with a specified population that identify the county or counties in which they are located and secondly, boundaries that are definable by economic and social relationships with contiguous areas
Primary Sampling Unit (PSU)	A county, county equivalent, group of counties, townships, towns, minor civil divisions, or MSA.
Hospital	All short term (less than 30 days), general medical/surgical, and general children's hospitals. Excluded are federal hospitals, hospitals within institutions and hospitals with fewer than 6 patient beds
Emergency Service Area (ESA)	Areas within emergency departments where emergency services are provided
Visit	A direct and personal encounter between a patient seeking care and a health care provider
Region	One of four geographic areas used by the US Bureau of the Census that includes Northeast, Midwest, South and West
Patient	An individual, not currently admitted to the hospital, seeking health care service

Sample Selection, Size and Setting

The NHAMCS uses a four-stage probability design to create a nationally representative sample of patient visits to hospital emergency departments in the United States. The multistage estimation procedure, which is detailed in the NHAMCS Micro-Data File Documentation, is designed to approximate unbiased results. Included in the stages are primary sampling units (PSUs), hospitals within PSUs, emergency service areas (ESAs) within hospital emergency departments, and patient visits within ESAs, as

shown in Figure 4. Data for the NHAMCS 2005 were collected from December 27, 2004 through December 25, 2005.

Figure 4 *Hierarchy of NHAMCS 2005 Survey Design.*



PSU.

The first stage sample of 112 PSUs was a probability sub sample selected from 1,900 geographically designated PSUs used in the 1985-94 National Health Interview Survey (NHIS). The NHAMCS 2005 included with certainty the 26 largest PSUs, along with one-half of the next 26 largest and one from each of the remaining 73 PSUs that were referred to as non-certainty. These were stratified by demographic, economic, and geographical factors, along with MSA status. Sample PSUs were selected with a probability proportional to their size.

Hospital.

Of the 6,249 hospitals that met the definitional requirements, (Table 2) 5,582 were deemed eligible for inclusion in the NHAMCS. Hospitals were selected from the original SMG database produced by the SMG Marketing Group in 1991 that is updated annually by Verispan (a health care services marketing group). The SMG database is used extensively in health care research (Sullivan, Richman, Ahn, Auerbach, Pallin,

Schafermeyer, Clark, & Camargo, 2006). Selection was made through a complicated multiple stratification process, as follows, aimed at insuring that extremely large hospitals would not be over represented.

1. All 149 hospitals in 55 non-certainty PSUs with 5 or fewer hospitals were selected.
2. One hundred sixty-one hospitals were selected from non-certainty PSUs with more than 5 hospitals. These were stratified by hospital ownership, class, and size. Five hospitals were selected from each of the designated PSUs based upon probability proportional to the number of ED visits.
3. Two hundred and forty hospitals were selected, based on probability proportional to size, from certainty PSUs that had been stratified by size, region, ownership, and class.
4. Fifty hospitals were selected from the 427 that did not have an ED.

For the NHAMCS, a panel of 600 hospitals (550 with an ED and 50 without) was chosen. This panel was divided into 16 sub sets that were equal in size and randomly assigned to 1 of the 16 four week survey periods that started December 2, 1991 and has continued across the years, ensuring that each hospital will be surveyed every 15 months.

For the NHAMCS 2005, 458 hospitals were sampled, 406 were eligible, 42 refused to participate and 376 participated with 7 participating minimally. This resulted in an unweighted hospital response rate of 89.6%.

ESA.

All ESAs within each sample hospital were included unless they totaled more than 5. In this instance, 5 ESAs were chosen with the probability that was proportional to

the expected number of visits to each of the existing ESAs within the random 4-week sampling period.

Of the 458 hospitals chosen for the NHAMCS 2005, 386 had eligible EDs and 352 chose to participate, resulting in a 91.2% unweighted ED response rate. Of the 442 ESAs selected from the eligible hospitals, 417 elected to participate submitting 33,605 Patient Record Forms. The unweighted ESA response rate was 94.3% and the overall unweighted response rate for these 2 stages (Hospitals and ESAs) was 86%.

Patient Visit.

Patient visits are the basic sampling unit of the NHAMCS. After a random start time within a randomly chosen 4 week period, visits were sampled following a systematic procedure selecting every *n*th visit designed to achieve the target number of Patient Record Forms, which is 100 for each ED. The sample for 2005 consisted of 33,605 patient visits from the participating hospitals.

Data Collection Methods

The United States Bureau of the Census coordinated the data collection for the NHAMCS 2005, as stated in the NHAMCS Micro-Data File Documentation. Bureau staff members were responsible for training the hospital personnel on the use of the Emergency Department Patient Record Form (Appendix A) and on the sampling procedures. Hospital staff members were then responsible for visit sampling and data collection. The top section of the Patient Record Form, containing identifying information, was detached before the data were collected in order to preserve confidentiality. The hospital staff maintained this portion for a period of four weeks in the event of missing or confusing data.

Instruments and Techniques

Data for the NHAMCS 2005 were collected on the Patient Record Form (Appendix A). This form is a simple survey form that has evolved since its inception in 1992 and is detailed in the NHAMCS Micro-Data File Documentation. Reliability is insured by the thoroughness with which the persons responsible for collecting and processing the data were trained. Field representatives, who checked collected data for completeness, instructed hospital staff members who were responsible for data collection. Upon arrival at central processing, the data were subject to clerical edits. The clerical staff performing this service was provided with detailed instruction manuals for reclassifying and recoding. At this point, computer edits for inconsistencies were also performed. All medical coding was subject to quality control procedures. Quality control for the medical coding operation, as well as straight-key items, involved a two-way 10-percent independent verification procedure. As an additional quality control, all Patient Record Forms with differences between coders or with illegible entries for the reason for visit, diagnostic and therapeutic procedures, diagnosis, and E-code (cause of injury) were reviewed and adjudicated at NCHS. Coding was subject to internal quality control procedures and achieved a keying error rate of .3% for nonmedical and ranged from .3% to 4.2% for medical items. Additionally, nonresponse rates were generally <5%. Adjustment for nonresponse is explained in a later section.

Considerations

Dummy Coding.

Categorical variables using nominal data are qualitative in nature, in that they describe a variable and have no mathematical value. Therefore categorical variables

cannot be directly entered into regression models and produce meaningful and interpretable results (Stockburger, 1998). Dummy coding is the process by which categorical variables with more than two levels are converted into multiple variables; each with two levels assigned a value of 0 or 1. When taken together, these new dummy variables contain the same information as the original categorical variable and can be entered into regression models, because they have mathematical properties. Dummy coding changes a categorical variable with k levels into $k-1$ variables with two levels each (Stockburger, 1998). For instance, the categorical variable “hair color” with 6 levels can be transformed into five dichotomous variables, each with two levels coded with the value of 0 or 1. Alternatively, each category within a single variable can be assigned a unit value of 0 or 1, 0 when absent and 1 when present. The referent category is then omitted in the analysis in order to facilitate interpretation (Polit & Beck, 2004).

Power and Missing Data.

Statistical power is defined as the probability that an effect, or meaningful difference, will be found, if one exists. It is the product of the sample size, effect size and significance level (Munro, 2005). A large sample size will result in adequate power. A study that is overpowered may result in findings that are significant simply due to the large power to detect effects. The results from a study that is overpowered must be interpreted within the context of the study to determine if results that are statistically significant are also clinically significant. The NHAMCS 2005 has a sample size of 33,605 patient visits, which is ample to provide adequate power. Missing data, in this analysis, is handled by listwise deletion, which is the deletion of cases with missing data from the analysis and is the default method for the analytical software used for the

analysis (Munro, 2005). Due to the large sample size, this process does not affect the power of the analysis. However, missing data could bias the results if it is significantly different than the included data. The process used by NHAMCS 2005 to avoid bias is explained in a later section.

Estimation Procedures.

Essentially unbiased estimates from the NHAMCS 2005 are produced because the statistics are derived from a multistage estimation procedure. Comprised of three components: 1) inflation by reciprocals of the sampling selection probabilities, 2) adjustment for nonresponse, and 3) a population weighting ratio, the procedure is explained below (National Center for Health Statistics, 2007).

Inflation by reciprocals. There are 4 separate probabilities, one for each stage of sampling: selection of PSU, selection of hospital, selection of ESA and selection of visit. See Figure 4. The probability of visit selection is the sample size of the ESA divided by the number of actual visits. The total probability of selection is the product of the 4-stage probability procedure. The assigned selection weight is the inverse of the total probability factor.

Ratio adjustments, defined by hospital ownership and region, were made within each stratum. Further adjustments defined by MSA status were made in the Northeast, Midwest and South. This adjustment consists of a factor in which the numerator is the sum of annual visits to the hospital EDs within each stratum, and an estimated number of ED visits within each stratum is the denominator.

Adjustment for nonresponse. There are two types of nonresponse adjustments to the NHAMCS data: adjustments for hospitals that refused to provide ED data and

adjustments for EDs that failed to provide complete Patient Data Forms. In the first case, weights for a hospital determined to be similar to the non-response hospital were inflated to account for the missing hospital. In the second case, weights were inflated for visits to EDs that were deemed similar to those with incomplete data. Adjustments for nonresponse made by the NCHS do not include the handling of missing data for this analysis that was described earlier.

Population weighting factor. The 33,605 patient visits to the ED included in the NHAMCS data represents a sample of all of the visits made to EDs in the United States in 2005. To reach a national estimate, an inflation factor is assigned to each visit (patient visit weight). An aggregate of the patient visit weights results in 115,322,815 estimated actual visits to EDs in the United States in 2005.

Weighted Data.

An estimate is considered reliable by the NCHS if the relative standard error is no more than 30%. Additionally, any estimates based on <30 records are considered unreliable. Relative standard error accounts for sampling variability that occurs by chance and is computed by dividing the standard error of the estimate by the estimate itself and is expressed as a percent of the estimate. Analysis for this study used weighted data.

Complex Sampling Surveys.

Logistic regression is used to estimate the association between variables, specifically the relationship that independent variables have with a dichotomous dependent variable. When interpreting the results, a goodness-of-fit test should be performed to ascertain how well the data fit the model. Existing goodness-of-fit models, for example the Hosmer-Lemeshow test, are based upon the assumption that the data

come from simple random samples. The NHAMCS 2005 does not use a simple random sample, but rather, a complex multistage probability design that includes stratification, the assignment of unequal selection probabilities to the sample units, and clustering at different levels of the sampling (National Center for Health Statistics, 2007). Because of the complex survey design, the Hosmer-Lemeshow goodness-of-fit test cannot be used to evaluate the NHAMCS 2005, and, at the present time, there is no agreed upon goodness-of-fit test for studies using data from complex sample surveys (Archer, Lemeshow, & Hosmer, 2007; Graubard, B., & Korn, E. 1997).

Due to the complexity of this survey, software must be used that was designed to compute population statistics accurately from surveys containing sample points with unequal selection probabilities. Otherwise, tests of statistical significance would be invalid because the standard errors produced would underestimate the true population (Siller & Tompkins, n.d.).

The early versions of the NHAMCS used masked design variables that reflected the multi-stage sampling design to estimate variance. Masked design variables cannot be used on software that uses only first stage stratum and first stage cluster identification to estimate variance, without major recoding. Therefore, the NHAMCS was revised so that standard errors can be calculated on software other than SUDAAN, for which it was originally designed. In 2002, two new variables, CSTRATM and CPSUM were added to allow software that uses an ultimate cluster model, STATA, SPSS and SAS, to compute accurate standard errors (National Center for Health Statistics, 2007). The data in the NHAMCS 2005 are clustered within EDs. However, the variables CSTRATM and CPSUM allow the software used in this analysis to compute accurate population statistics

from the survey sample. These variables are necessary because the sample is not random and certain subpopulations have been over sampled. The variables CSTRATM and CPSUM adjust for the fact that the sample is not random and that observations have different weights.

Assumption of Independence.

Independence is achieved when knowledge of one variable has no bearing on a second variable or when a measurement of one variable has no bearing on a second measurement of the same variable (Schott, 1990). Most statistical analyses are based upon the assumption of independence and the violation of the assumption can result in erroneous findings (Schott, 1990). Independence of visits within each ED can be assumed in this study because of the use of the variables CSTRATM and CPSUM that were designed specifically for that purpose.

For the NHAMCS 2005, data were collected from each designated ED for a randomly assigned four-week period, only once during the year. Data collection at each ED began with a random start time and data were collected at every *n*th visit. The value of *n* was based upon the expected number of visits to the specific ED during the four-week period and the target number of Patient Record Forms from each ED, which was one hundred (National Center for Health Statistics, 2007). Because of this sampling strategy, and the complex survey design, the probability that data were collected from the same patient more than once during the four-week period is very small.

Data Analysis and Procedures

The analysis for this study was conducted using STATA SE 10. The following methods were used to address the research questions:

Descriptive Statistics.

Descriptive statistics describe the population of the United States that accessed the ED in 2005, including, means, median, mode, range, proportions, frequencies, standard errors and, standard deviations, where appropriate. For descriptive purposes, all of the variables were used in their original form as described in the section on definition of variables (Table 7).

Table 7 Summary of Variables Used in Descriptive Analysis.

Variable	Name	Categories
Dependent	Use of ED	Number of Patient Visits
	Type of ED Visit	Triage Category
Variable	Name	Categories
Independent	Housing status	Private Residence
		Nursing Home
		Other Institution
		Other Residences
		Homeless
		Unknown
	Age	Age in Years
		Blank
	Gender	Male
		Female
	Race/Ethnicity	White Only, Non-Hispanic
Black Only, Non-Hispanic		
Hispanic		
Asian Only		
Native Hawaiian, Other Pacific Islander Only		
American Indian/Alaska Native		
Geographic location	Multiple Races	
	Northeast	
	Midwest	
	South	
Month	Month of Visit	
	Day	
Day	Day of the Week of Visit	
	Time	
Time	Time of the Day of Visit	
	Health Insurance	Blank

Variable	Name	Categories
		Private insurance
		Medicare
		Medicaid/SCHIP
		Worker's Comp
		Self-pay
		No charge/Charity
		Other forms
		Unknown
	Type of hospital ownership	Voluntary, Non-profit
		Government-non-Federal
		Proprietary
	Reason for visit	Verbatim Patient Statement
	Drug /Alcohol Use/Abuse	Yes
		No
	Injury/Poisoning Intentional	Blank
		Yes, Self Inflicted
		Yes, Assault
		No, Unintentional
		Unknown
		Not Applicable, Not an Injury Visit
	Admit to Hospital	Yes
		No
	Presenting Level of Pain	None
		Mild
		Moderate
		Severe
	Physician Diagnosis	Verbatim Physician Statement

Univariate Analysis-Chi-Square.

The first question, “*What is the relationship between housing status and ED use?*” was addressed as follows:

1. The percentage of homeless and housed population in the sample that used the ED was first calculated.
2. A chi-square test was used to compare the proportion of the housed population with the proportion of the homeless population that used the ED in 2005, because a chi-square is the appropriate statistical test to use when comparing the difference in

proportions between two groups (Munro, 2005). A total population estimate of 291,155,919 for the United States in 2005 was supplied by the United States Bureau of the Census and an estimated homeless population of 744,313 was supplied by the National Alliance to End Homelessness. A report prepared by The Homeless Research Institute of The National Alliance to End Homelessness tabulated 463 Continuum of Care (CoC) point-in-time count reports to arrive at an estimated 744,313 homeless persons in the United States as of January 2005. Continuum of Care regions were created by the United States Department of Housing and Urban Development (HUD) at the local or regional level to coordinate funding and services for the homeless. It was noted that point-in-time studies underestimate the number of homeless because they miss those who move into and out of homelessness during any given year. However, this study represents the first time since 1996 that an attempt was made to count the homeless population in order to establish a baseline (Cunningham & Henry, 2007).

The second question, “*What is the relationship between housing status and urgent versus non-urgent use of the ED?*” was addressed with chi-square analysis. Chi-square is an appropriate statistical test for the difference in proportion between two groups when the dependent variable and the independent variable use nominal data (Glanz & Slinker, 2001). For Chi-Square analysis, the variables were used in their altered form, as described in the section on definition of variables that is summarized in Table 8.

Table 8 *Summary of Variables Used in Chi-Square Analysis.*

Variable	Name	Categories	Correlation Statistic
Dependent	Type of ED use	Urgent Not urgent	
Independent	Housing status	Homeless Not homeless	Phi
	Gender	Male Female	Phi
	Day of visit	Weekday Weekend	Phi
	Time of visit	Day Night	Phi
	Insurance Status	Insurance No insurance	Phi
	Type of hospital ownership	For profit Not for profit	Phi
	Race	White Black Hispanic Asian Other	Cramer's V
	Geographic location	Northeast Midwest South West	Cramer's V
	Season	Winter Spring Summer Autumn	Cramer's V
	Age	Age as Recorded in Years	Point biserial

The independent variable, “housing status”, is the variable of interest for this study. It was dichotomized as homeless and not homeless. Type of ED use is the dependent variable. It was measured by the triage categories that were collapsed into urgent and non-urgent. These dichotomous variables were entered into a contingency table and the chi-square statistic was calculated. The relationship between housing status

and type of ED use is expressed by the Phi statistic, which is calculated in a manner similar to the Pearson correlation coefficient and is appropriate for use when both dependent and independent variables are dichotomous (Munro, 2005).

The third question is “*What are the predictors of ED utilization for non-urgent visits?*” The objective of univariate analysis is to determine which of the independent variables correlate significantly with the dependent variable, which is type of ED use, either urgent or non-urgent. Those variables are then placed into multivariate logistic regression models as explained below. The strength of the relationship between each independent variable and the dependent variable is expressed by the correlation coefficient that is produced by chi-square.

With chi-square, the relationship between the dichotomous dependent variable (urgent or non-urgent) and the dichotomous independent variables; gender, day of visit, time of visit, health insurance, and type of hospital ownership, is expressed by the Phi statistic. The relationship between the dichotomous dependent variable and the nominal independent variables with more than two categories; race, geographic location, and season of visit is expressed by the Cramer’s V statistic, which is appropriate for this analysis. Cramer’s V is used to express the strength of the relationship between one nominal variable and either an ordinal or another nominal variable, both of which can have more than 2 categories (Munro, 2005). The point biserial statistic is appropriate for use with a nominal dependent variable and a continuous independent variable and is used to express the relationship of the continuous variable, age, with the dependent variable (Munro, 2005).

Statistical significance for each of the independent variables is determined by a two-tailed alpha of $p < .05$. All independent variables were then entered into multiple logistic regression models.

Multivariate Logistic Regression.

Logistic regression is the proper statistical test for the relationship between a dichotomous dependent variable, which is type of ED use as expressed by urgent or non-urgent triage category, and multiple nominal variables that are dichotomous or have been dummy coded or are interval independent variables. It is used to predict the probability of an event given the predictor variables and produces an estimate of relative risk expressed as adjusted odds ratios (OR) as produced by STATA (Munro, 2005). Logistic regression modeling was conducted at type I error of 0.05 to evaluate the independent effect of each variable with simultaneous adjustment for other potential confounding factors. Odds ratios with 95% confidence intervals (CIs) for each dependent variable were also estimated through logistic regression modeling. For this logistic regression, the categorical independent variables are either dichotomous or have been dummy coded. The continuous variable is used in its original form.

Protection of Human Subjects

This NHAMCS 2005 database contains no personal identifiers. The original data were collected for the National Center for Health Statistics of the National Institutes of Health. The Committee on Human Research of the University of California, San Francisco, approved the study. (Appendix B).

Chapter 4: Study Results

This study of ED utilization by homeless persons in the United States addresses three main questions. The results of the statistical analysis are presented below in order of the questions asked.

Question 1: What is the Relationship Between Housing Status and ED Use?

The following table shows the estimated frequencies and their respective 95% confidence intervals for the reported patient's residence:

Table 9 *Residence.*

	Estimate	95% CI	
		Lower	Upper
Private residence	91.25%	89.36%	92.83%
Nursing home	1.90%	1.64%	2.21%
Other institution	0.96%	0.80%	1.14%
Other residence	0.53%	0.38%	0.74%
Homeless	0.41%	0.30%	0.56%
Unknown	3.10%	1.87%	5.11%
Blank	1.85%	1.43%	2.38%

As shown in the above table, most of the patients who visited the ED in 2005 lived in a Private Residence, with an estimated 91.25% of the population (95% confidence interval [89.36%, 92.83%]). The estimated proportion of *homeless* patients in the population was 0.41% (95% CI [0.30%, 0.56%]). A chi-square test was carried out to assess whether the proportion of homeless persons that visited the ED was equal to the overall proportion of homeless among the US population. Using the 2005 estimates from the methods chapter supplied by the United States Bureau of the Census (291,155,915 US population) and the National Alliance to End Homelessness, (744,313 homeless US population), the proportion of homeless subjects among the US population in 2005 would be 0.25%. The chi-square test confirmed that the estimated 0.41% of homeless among the

population of patients that visited the ED was significantly higher than 0.25% ($p = 0.007$). Therefore, this finding provides evidence that *homeless people have a significantly higher likelihood of visiting the ED than not homeless*. This finding addresses question 1; “What is the relationship between housing status and ED use?”

It must be noted that 0.41% of the total sample is quite small; however, it accurately reflects the total population of homeless persons who visited the ED in 2005. As was explained in the methods section, the multiple weighting procedure of the four-stage sampling survey design insures reliable statistics from the data. STATA applies the patient visit weight that is a compilation of the weighting from the 4 stages and "approximates" random selection. The NCHS considers estimates to be reliable as long as there are >30 cases and the relative standard error is no greater than 30%. In this analysis, all relative standard errors were below 30% and there were more than 30 cases in each category. The standard error for the proportion of the sample population that was homeless was 0.06%, while the estimate was 0.41%; therefore the relative standard error was approximately 15%. Of the actual estimated 115, 322, 815 patient visits to EDs in the United States in 2005, homeless persons accounted for an estimated 473, 823 visits.

The following table shows the frequency distribution for triage categories:

Table 10 *Urgency*.

	Estimate	95% CI	
		Lower	Upper
Immediate	5.54%	4.26%	7.17%
1 - 14 min	9.81%	8.55%	11.24%
15 - 60 min	33.33%	29.96%	36.88%
> 1hr - 2hrs	20.70%	18.30%	23.32%
>2 hrs - 24hrs	13.93%	11.47%	16.82%
No triage	2.08%	1.18%	3.63%
Unknown	14.62%	11.39%	18.57%

As indicated by this table, most of the patients that visited the ED were considered to be in the “15-60 min” category (estimated 33.33% of the population), followed by “>1 hr – 2 hr” (estimated 20.70% of the population) and then “>2 hrs – 24 hrs” (estimated 13.93% of the population).

The following tables show the frequency distribution for the other categorical variables that were considered for this study:

Table 11 *Gender*.

	Estimate	95% CI	
		Lower	Upper
Female	53.86%	53.14%	54.57%
Male	46.14%	45.43%	46.86%

Table 12 *Race/Ethnicity*.

	Estimate	95% CI	
		Lower	Upper
White	62.22%	58.67%	65.64%
Black	20.25%	17.64%	23.14%
Hispanic	14.10%	11.42%	17.30%
Asian	1.88%	1.31%	2.70%
Other	1.54%	1.06%	2.24%

Table 13 *Geographic Location*.

	Estimate	95% CI	
		Lower	Upper
Northeast	19.29%	16.21%	22.79%
Midwest	24.95%	20.25%	30.33%
South	38.04%	32.88%	43.49%
West	17.72%	14.41%	21.60%

Table 14 *Expected Source of Payment.*

	Estimate	95% CI	
		Lower	Upper
All sources of payment are blank	1.27%	0.91%	1.77%
Private insurance	34.31%	32.28%	36.39%
Medicare	13.91%	12.79%	15.11%
Medicaid/SCHIP	24.85%	22.73%	27.10%
Workers compensation	1.68%	1.42%	2.00%
Self-pay	16.11%	14.65%	17.69%
No charge/ charity	0.77%	0.45%	1.30%
Other	1.89%	1.47%	2.43%
Unknown	5.20%	3.47%	7.72%

Table 15 *Hospital Ownership.*

	Estimate	95% CI	
		Lower	Upper
Voluntary non-profit	72.22%	65.17%	78.32%
Government, non-Federal	16.97%	12.58%	22.51%
Proprietary	10.80%	6.98%	16.34%

Table 16 *Month of Visit.*

	Estimate	95% CI	
		Lower	Upper
January	8.45%	5.99%	11.81%
February	7.92%	5.61%	11.06%
March	7.54%	5.24%	10.74%
April	8.60%	6.25%	11.70%
May	8.88%	6.45%	12.09%
June	7.68%	5.41%	10.80%
July	7.43%	5.53%	9.92%
August	9.56%	6.46%	13.92%
September	10.34%	7.23%	14.58%
October	6.96%	4.77%	10.05%
November	8.34%	5.58%	12.29%
December	8.31%	5.91%	11.55%

Table 17 *Day of Visit.*

	Estimate	95% CI	
		Lower	Upper
Sunday	15.12%	14.89%	15.36%
Monday	15.21%	14.97%	15.45%
Tuesday	14.06%	13.86%	14.27%
Wednesday	14.12%	13.90%	14.35%
Thursday	13.45%	13.18%	13.72%
Friday	13.64%	13.41%	13.88%
Saturday	14.39%	14.14%	14.64%

Table 18 *Presenting Level of Pain.*

	Estimate	95% CI	
		Lower	Upper
Blank	3.31%	2.64%	4.14%
None	19.09%	17.51%	20.77%
Mild	14.07%	12.96%	15.26%
Moderate	23.22%	21.69%	24.81%
Severe	19.46%	17.92%	21.09%
Unknown	20.86%	18.11%	23.90%

As indicated in these tables, 53.86% of the patients that visited the ED were female and 46.14% were male. Furthermore, most of them were White (62.22%) or Black (20.25%). Most of the patients that visited the ED were from the South region of the US (38.04%), followed by the Midwest (24.95%). While 69% of the visits were triaged as urgent, 14% were triaged as non-urgent. Additionally, the majority (75%) had some form of health insurance and 89% were seen in non-profit hospitals.

Question 2: What is the Relationship Between Housing Status and Urgent Versus Non-Urgent Use of the ED?

In order to assess the relationship between urgency of ED visit and the other variables considered in this study, multiple chi-square tests were carried out. This test was used in order to assess whether there was a significant association between the

urgency of the ED visit (which was recoded as a dichotomous variable) and any other categorical variable that was analyzed (such as housing status, gender, race/ethnicity, region, etc.). The following table is a contingency table; displayed as row percentages, between housing status (which can be either homeless or not homeless) and urgency of ED visit (which can be urgent or non-urgent):

Table 19 *Housing Status by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
Not Homeless	16.89%	83.11%	100%
Homeless	18.92%	81.08%	100%
Total	16.90%	83.10%	100%

As shown in this table, 81.08% of homeless subjects had “urgent” ED visits. This proportion was lower than that of not homeless subjects that had urgent ED visits (83.11%). However, Pearson’s chi-square test did not indicate a rejection of the null hypothesis that these two variables are not associated ($p = 0.763$). Therefore, *this finding does not provide support for the hypothesis that urgency of the ED visit is dependent on the housing status of the patient.* This finding addresses question 2, “What is the relationship between housing status and urgent versus non-urgent use of the ED?”

A similar analysis was carried out for each of the other variables. Contingency tables, presented as row percentages, as well as a summary table reporting the results of the chi-square tests, are presented below:

Table 20 *Gender by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
Female	16.80%	83.20%	100%
Male	16.63%	83.37%	100%
Total	16.73%	83.27%	100%

Table 21 *Race/Ethnicity by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
White	16.79%	83.21%	100%
Black	15.71%	84.29%	100%
Hispanic	20.11%	79.89%	100%
Asian	9.75%	90.25%	100%
Other	6.29%	93.71%	100%
Total	16.73%	83.27%	100%

Table 22 *Geographic Location by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
Northeast	17.86%	82.14%	100%
Midwest	15.56%	84.44%	100%
South	18.69%	81.31%	100%
West	12.11%	87.89%	100%
Total	16.73%	83.27%	100%

Table 23 *Season by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
Winter	10.94%	89.06%	100%
Spring	18.78%	81.22%	100%
Summer	18.45%	81.55%	100%
Autumn	18.39%	81.61%	100%
Total	16.73%	83.27%	100%

Table 24 *ED Visit Day of Week by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
Weekend	17.79%	82.21%	100%
Weekday	16.28%	83.72%	100%
Total	16.73%	83.27%	100%

Table 25 *Time of Arrival to ED by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
Night	16.36%	83.64%	100%
Day	17.02%	82.98%	100%
Total	16.74%	83.26%	100%

Table 26 *Insurance Status by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
No Insurance	21.79%	78.21%	100%
Insurance	15.79%	84.21%	100%
Total	16.99%	83.01%	100%

Table 27 *Hospital Ownership by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
Not for Profit	16.06%	83.94%	100%
For Profit	22.17%	77.83%	100%
Total	16.73%	83.27%	100%

Table 28 *Degree of Pain by Urgency.*

<i>N</i> =24,311	Non-Urgent	Urgent	Total
None	17.84%	82.16%	100%
Mild	19.98%	80.02%	100%
Moderate	17.16%	82.84%	100%
Severe	14.91%	85.09%	100%
Total	17.29%	82.71%	100%

Table 29 *Results of Chi-Square Tests Between Each Variable and Urgency*

<i>N</i> =24,311	Chi-square <i>p</i> value
Gender	0.763
Race/Ethnicity	*0.036
Geographic Location	0.570
Season	0.149
Day of Week	*0.021
Time of Arrival	0.290
Insurance Status	***<0.001
Hospital Ownership	0.191
Degree of Pain	*0.035

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

The results of Chi-Square tests between each variable and urgency show that only 4 of the considered variables are significantly associated with urgency at the 0.05 significance level. These are *Race/Ethnicity* (*p* = 0.036), *Day of Week* (*p* = 0.021), *Insurance Status* (*p* < 0.001) and *Degree of Pain* (*p* = 0.035)

From the contingency tables, it appears that subjects with “Other” race were the least likely to make non-urgent visits to the ED (6.29% of subjects in this race group had non-urgent visits). On the other hand, the race group that was most likely to make non-

urgent visits was Hispanic (20.11%). Pairwise comparisons for Hispanic versus the other categories revealed the following:

1. Hispanic vs. White = no significance difference ($p = 0.15$)
2. Hispanic vs. Black = no significant difference ($p = 0.08$)
3. Hispanic vs. Asian = Hispanic significantly more likely to make non-urgent visits ($p = 0.001$)
4. Hispanic vs. Other = Hispanic significantly more likely to make non-urgent visits ($p = 0.001$)

Similarly, arrivals to the ED on weekends had a higher likelihood of being non-urgent (17.79%) than arrivals on weekdays (16.28%). Additionally, individuals who were uninsured were more likely to make a non-urgent visit to the ED (21.79%) than those who had health insurance (15.79%). Finally, individuals experiencing “Mild” pain were the most likely (19.98%) to make a non-urgent visit to the ED, while patients experiencing “Severe” pain were the least likely (14.91%).

In order to assess whether there was a significant relationship between age of the patient and urgency of visit, the point biserial correlation between these two variables was computed. Results show a correlation coefficient of 0.074, which is significantly different from zero ($p < 0.001$). Therefore, this finding suggests that younger subjects had a higher likelihood of making a non-urgent ED visit than the older subjects. The mean age of patients making non-urgent visits was 31.01 and the mean age of patients making urgent visits was 36.6. A t test of the difference was significance ($p < 0.001$).

Additional Comparisons

The following tables present contingency analyses showing the percentage for each variable within each residence type displayed as column percentages. For example, Table 30 shows that, 19.99% of not homeless had no insurance, while 80.01% had insurance. On the other hand, 62.15% of homeless had no insurance, while 37.85% had insurance.

Table 30 *Residence by Insurance.*

<i>N</i> =24,311	Not Homeless	Homeless	Total
No Insurance	19.99%	62.15%	20.16%
Insurance	80.01%	37.85%	79.84%
Total	100.00%	100.00%	100%

Table 31 *Residence by Hospital Ownership.*

<i>N</i> =24,311	Not Homeless	Homeless	Total
Not for Profit	88.93%	91.65%	88.95%
For Profit	11.07%	8.35%	11.05%
Total	100.00%	100.00%	100%

Table 32 *Residence by Admission to Hospital.*

<i>N</i> =24,311	Not Homeless	Homeless	Total
Not Admitted	88.88%	91.67%	88.89%
Admitted	11.12%	8.33%	11.11%
Total	100.00%	100.00%	100%

Table 33 *Residence by Drug Use.*

<i>N</i> =24,311	Not Homeless	Homeless	Total
No Drug Use	99.41%	95.28%	99.39%
Drug Use	0.59%	4.72%	0.61%
Total	100.00%	100.00%	100%

Table 34 *Residence by Alcohol Use.*

<i>N</i> =24,311	Not Homeless	Homeless	Total
No Alcohol Use	99.15%	84.42%	99.08%
Alcohol Use	0.85%	15.58%	0.92%
Total	100.00%	100.00%	100%

Table 35 *Residence by Intentionality of Injury.*

<i>N</i> =24,311	Not Homeless	Homeless	Total
Self-Inflicted	38.43%	69.40%	39.12%
Assault	61.57%	30.60%	60.88%
Total	100.00%	100.00%	100%

Table 36 *Summary of Chi-Square Tests on Housing Status.*

<i>N</i> =24,311	Chi-square <i>p</i> value
Insurance Status	***<0.001
Hospital Ownership	0.439
Admission to Hospital	0.352
Drug Use/Abuse	***<0.001
Alcohol Use/Abuse	***<0.001
Intentionality	**0.002

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

The above table shows that there are significant differences between homeless and not homeless patients in terms of insurance status, drug and alcohol use/abuse and intentionality of injury. Of particular interest is the finding that homeless patients were significantly less likely than not homeless to have insurance (80.01% of not homeless had insurance, while only 37.85% of homeless had insurance). Similarly, homeless patients were significantly more likely than not homeless patients to admit to alcohol and drug use/abuse. Finally, homeless patients were more likely than not homeless patients to have self-inflicted injuries (69.4% of homeless versus 38.43% of not homeless).

Question 3: What Are the Predictors of ED Utilization for Non-Urgent Visits?

A logistic regression was carried out in order to assess the impact of each of the independent variables on the likelihood of having a non-urgent ED visit, after controlling for the effects of the other variables. The logistic regression expresses the likelihood of a non-urgent visit by the Adjusted Odds Ratio (OR) and the likelihood of an urgent visit by the reciprocal of the OR.

Results are presented in the following tables. Table 37 shows the results of overall tests for the likelihood of a non-urgent visit (overall test). Table 38 displays the results of the logistic regression and addresses question 3; “What are the predictors of ED utilization for non-urgent visits?” Referent variables are shown at the bottom of the table.

Table 37 Overall Tests for Likelihood of Non-Urgent Visit.

<i>N</i> = 24,311				
Source	df1	df2	Wald F	Sig.
(Corrected Model)	34.000	151.000	13.338	.000
(Intercept)	1.000	184.000	43.323	.000
Residence	1.000	184.000	.731	.394
Gender	1.000	184.000	6.473	*.012
Race/Ethnicity	4.000	181.000	4.203	**0.003
Region	3.000	182.000	.459	.711
Season	3.000	182.000	3.061	*.030
Day of Week	1.000	184.000	3.841	.052
Time of Day	1.000	184.000	3.253	.073
Insurance	1.000	184.000	16.850	***.000
Ownership	1.000	184.000	1.210	.273
CCS	17.000	168.000	14.183	***.000
Age	1.000	184.000	13.361	***.000

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

Table 38 Logistic Regression Predicting Non-Urgent Visits.

<i>N</i> = 24, 311							
Parameter	Beta	Std Error	t	<i>p</i> value	Adjusted Odds Ratio	CI Lower 95%	CI Upper 95%
(Intercept)	-4.222	1.017	-4.172	0.001	0.014	0.002	0.107
Residence = Not Homeless	-0.295	0.345	-0.855	0.394	0.744	0.377	1.471
Gender = Male	0.132	0.052	2.544	*0.012	1.141	1.030	1.263
Race = White	-0.106	0.138	-0.768	0.443	0.900	0.685	1.180
Race = Black	-0.303	0.161	-1.886	0.061	0.739	0.538	1.014
Race = Asian	-0.589	0.243	-2.422	*0.016	0.555	0.343	0.897
Race = Other	-10206	0.349	-3.453	***0.001	0.300	0.150	0.596

Parameter	Beta	Std Error	t	p value	Adjusted Odds Ratio	CI Lower 95%	CI Upper 95%
Region = Northeast	0.535	0.501	1.067	0.287	1.707	0.635	4.587
Region = Midwest	0.293	0.505	0.580	0.562	1.340	0.495	3.630
Region = South	0.388	0.471	0.824	0.411	1.474	0.582	3.733
Season = Spring	0.704	0.266	2.649	**0.009	2.023	1.197	3.418
Season = Summer	0.598	0.280	2.131	*0.034	1.818	1.045	3.160
Season = Autumn	0.570	0.308	1.849	0.066	1.769	0.963	3.251
Day = Weekend	0.091	0.046	1.960	0.052	1.095	1.000	1.200
Time = Night	-0.084	0.046	-1.804	0.073	0.920	0.839	1.008
Insurance = No Insurance	0.345	0.084	4.105	***0.000	1.412	1.196	1.667
Ownership = Not for Profit	-0.407	0.370	-1.100	0.273	0.666	0.321	1.381
CCS = 1	2.740	0.921	2.975	**0.003	15.483	2.516	95.267
CCS = 2	0.473	1.436	0.330	0.742	1.605	0.094	27.280
CCS = 3	2.178	1.011	2.155	*0.032	8.829	1.202	64.865
CCS = 4	1.531	1.138	1.345	0.180	4.622	0.489	43.673
CCS = 5	2.181	0.981	2.223	*0.027	8.852	1.278	61.290
CCS = 6	2.830	0.952	2.974	**0.003	16.950	2.592	110.819
CCS = 7	1.399	0.979	1.428	0.155	4.050	0.587	27.959
CCS = 8	2.522	0.947	2.663	**0.008	12.452	1.922	80.687
CCS = 9	2.679	0.945	2.833	**0.005	14.570	2.256	94.098
CCS = 10	2.485	0.961	2.586	**0.010	12.002	1.802	79.916
CCS = 11	1.964	1.013	1.938	0.054	7.126	0.965	52.604
CCS = 12	3.373	0.918	3.676	***0.000	29.180	4.772	178.393
CCS = 13	3.118	0.947	3.292	***0.001	22.593	3.488	146.358
CCS = 14	1.695	0.531	3.191	0.002	5.445	1.909	15.527
CCS = 16	2.813	0.948	2.967	**0.003	16.654	2.567	108.055
CCS = 17	2.425	0.939	2.582	*0.011	11.303	1.772	72.082
Age	-0.005	0.001	-3.655	***0.000	0.995	0.992	0.997

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

Reference groups for logistic regression; Homeless, Female, Hispanic, West, Winter, Weekday, Day, Insurance, For Profit, CCS 15 (Certain conditions originating in the perinatal period)

As shown in the logistic regression, Gender was significant at the 0.05 level. In a logistic regression, the OR can be used to assess the difference between each group and the reference group within the variable. Since the reference group for gender was female, this implies that the category male is 1.14 times more likely to have a non-urgent visit to the ED than female ($p = 0.012$). This is supported by the overall test showing the variable Gender to be significant ($p = 0.012$).

The overall test (Table 37) shows the independent variable Race/Ethnicity as significant in predicting non-urgent visits to the ED ($p = 0.003$). For the logistic regression, Hispanic was chosen as the referent category because the original chi-square for Race/Ethnicity (Table 21) showed the Hispanic category to have the largest percentage (20.11%) of non-urgent visits. Additionally, pairwise comparisons of Hispanic versus all other categories showed that, while there was no significant difference between Hispanic and White or Hispanic and Black, there was a significant difference between Hispanic and Asian, with Hispanic significantly more likely to make non-urgent visits ($p = 0.001$) and Hispanic and Other, with Hispanic significantly more likely to make non-urgent visits ($p = 0.001$). This was confirmed in the logistic regression. Negative coefficients observed for the variables Other and Asian would imply that these race groups were *less likely* than Hispanic to have a non-urgent visit to the ED. Non-urgent visits to the ED were 0.555 times *less likely* in the Asian category and 0.300 times *less likely* in the Other category than in the Hispanic category. Alternatively, this can be interpreted by the reciprocal in the following way: The Hispanic category was 1.8 times *more likely* than the Asian category and 3.3 times *more likely* that the Other category to make a non-urgent ED visit.

The overall test (Table 37) shows the independent variable Season as significant in predicting non-urgent visits to the ED ($p = 0.030$). Because the reference category was Winter, the logistic regression shows that ED visits in the Spring and Summer were 2.0 and 1.8 times respectively more likely to be non-urgent than ED visits in the Winter.

The independent variable No Insurance was significant in the logistic regression at the 0.05 level ($p < 0.001$). Because the reference group was Insurance, this finding would suggest that individuals with no insurance were more likely to make a non-urgent visit than those with health insurance and less likely to make an urgent visit. Patients without health insurance were 1.41 times more likely to make a non-urgent ED visit than those with health insurance, confirming the chi-square test of insurance status by urgency (Table 26) showing that individuals who were uninsured were more likely to make a non-urgent visit to the ED (21.79%) than those who had health insurance (15.79%).

The overall test (Table 37) also shows the independent variable CCS as significant in predicting non-urgent visits to the ED ($p < 0.000$). CCS 15 corresponds to certain conditions originating in the perinatal period. It was chosen as a referent category for this variable because it represents the diagnosis with the smallest percentage of non-urgent visits to the ED. Many CCS categories for diagnoses were found to be significant in the regression. This suggests that subjects with these diagnoses were more likely to have non-urgent visits and less likely to have urgent visits to the ED than the referent category CCS 15. The likelihood of a non-urgent visit for these diagnoses when compared to CCS 15, along with the corresponding physician diagnosis are presented in Table 39.

Table 39 CCS Codes/Physician Diagnosis/Likelihood of a Non-Urgent Visit.

CCS	Physician Diagnosis	Times more likely
CCS 1	Infectious and parasitic diseases	15.483
CCS 3	Endocrine, nutritional and metabolic diseases, and immunity disorders	8.829
CCS 5	Mental disorders	8.852
CCS 6	Diseases of the nervous system and sense organs	16.950
CCS 8	Diseases of the respiratory system	12.452
CCS 9	Diseases of the digestive system	14.570
CCS 10	Diseases of the genitourinary system	12.002
CCS 12	Diseases of the skin and subcutaneous tissue	29.180
CCS 13	Diseases of the musculoskeletal system and connective tissue	22.593
CCS 14	Congenital anomalies	5.445
CCS 16	Symptoms, signs, and ill defined conditions	16.654
CCS 17	Injury and poisoning.	11.303

Finally, the independent variable Age of the subject was negative and significant at the 0.05 level ($p < 0.001$). This would suggest that older individuals were less likely than younger individuals to make non-urgent visits to the ED. In the case of continuous variables (such as age), the OR is interpreted as the factor by which the likelihood of having a non-urgent ED visit decreases for each additional year in a subject's age. So, for example, a 40-year old patient was 0.995 times less likely than a 39-year old patient to make a non-urgent ED visit. This finding confirms the earlier point biserial correlation between these two variables showing a correlation coefficient of 0.074, which is significantly different from zero ($p < 0.001$).

Summary.

In summary, characteristics of the general population of the United States that visited the ED in 2005 are described as mostly White (62%), female (54%), having possession of private health insurance (34%), and living in private residences (91%) in the South (38%). The majority of ED visits were for complaints that were triaged by ED

personnel as urgent (33%) or semi-urgent (21%). Additionally, the most common patient complaint was abdominal pain (4.9%) and the most frequent physician diagnosis was “sprains and strains” (5.4%).

When comparing ED visits by triaged determination of urgency of visit, this study found that non-urgent visits were more often by Hispanics (20%), uninsured persons (19%), occurred on weekends (18%) and were associated with mild pain (20%).

In comparing patient visits by residential status, it was shown that a greater proportion of the homeless population than the not homeless population used the ED in 2005 ($p = 0.007$), although there was no statistically significant difference in non-urgent use ($p = 0.763$). Also, homeless persons had proportionately less health insurance (20% vs. 80%) and reported proportionately more drug (5% vs. 0.6%) and alcohol (16% vs. 0.9%) use and self inflicted injuries (69% vs. 38%).

A logistic regression of patient visits by likelihood of a non-urgent urgent visit reveals that non-urgent visits were more likely made by males than females (1.1 times) and Hispanic than Asian (1.8 times) or Other (3.3 times). Also, non-urgent visits were more likely to occur in the spring (2.0 times) or summer (1.8 times) than in the winter, and were more likely made by persons without health insurance than by those with health insurance (1.4 times). More likely to make non-urgent visits than patients with physician diagnoses codes representative of conditions originating in the perinatal period were: infectious and parasitic diseases (15.5 times), endocrine, nutritional and metabolic diseases, and immunity disorders (8.8 times), mental disorders (8.9 times), diseases of the nervous system and sense organs (16.9 times), diseases of the respiratory system (12.4 times), diseases of the digestive system (14.6 times), diseases of the genitourinary system

(12.0 times), diseases of the skin and subcutaneous tissue (29.2 times), diseases of the musculoskeletal system and connective tissue (22.6 times), congenital anomalies (5.4 times), symptoms, signs, and ill defined conditions (16.7 times), and Injury and poisoning (11.3 times). Finally, the likelihood of a non-urgent visit decreased by 0.995 times for each year of increasing age. The significance and possible meanings for these findings is discussed in the next section.

Chapter 5: Discussion

This study is significant for its findings as well as for the questions it raises. This is the first known study to examine use of the ED by homeless persons in the United States at the national level using empirically derived ED data. Two very important conclusions are supported by this analysis: 1) while homeless people use the ED in significantly greater proportion than not homeless people, they do not use it for non-urgent care in greater magnitude and 2) lack of health insurance significantly increases the likelihood of making a non-urgent visit to the ED. The meanings of the results of the study are discussed below in the order in which the research questions were asked.

Meaning

What is the Relationship Between Housing Status and ED Use?

Statistical analysis of the NHAMCS 2005 supports the conclusion that homeless persons have a significantly higher likelihood of visiting the ED than not homeless persons, in response to the first research question, “What is the relationship between housing status and ED use?” Homeless persons accounted for 473, 823 visits to EDs in the United States in 2005. Using the estimated homeless population of 744,313 supplied by the National Alliance to End Homelessness, 64% of the homeless population visited the ED in 2005. This conclusion is supported by the literature review that indicates a relationship within limited geographical areas (Kushel et al., 2002; Mandleberg et al., 2000; Ringwalt et al., 1998; Weinreb et al., 1998; Yee et al., 2002).

The stated assumptions upon which this study was based include the assumption that ED overcrowding contributes to a delay in emergency care that results in increased morbidity and mortality for ED patients, and that homeless persons contribute to ED

overcrowding. While 64% is a very high proportion of the homeless population, it only contributed to 0.41% (estimated 473, 823) of the actual estimated 115, 322, 815 patient visits to EDs in the United States in 2005. It is therefore unlikely that visits made by homeless persons contribute significantly to the problem of ED overcrowding and the sequelae; delay in emergency services resulting in increased morbidity and mortality that was discussed in Chapter 1.

What is the Relationship Between Housing Status and Urgent versus Non-Urgent Use of the ED?

The second question “What is the relationship between housing status and urgent versus non-urgent use of the ED?” had, as its intent, the exploration of the difference in type of ED visit by homeless and not homeless persons. Triage category was used as a measure of whether a visit was considered urgent and therefore “appropriate” to the ED or non-urgent and could be treated elsewhere. Statistical analysis did not provide support for the hypothesis that urgency of the ED visit is dependent on the housing status of the patient. While homeless persons used the ED in much higher proportions than the not homeless population, they were not significantly more likely to have a non-urgent visit. This finding supports the study assumptions that homelessness has a singularly negative effect on health and that the homeless population has a higher morbidity and mortality than the population in general. This finding is also supported by the literature that explored the effects of homelessness on increased morbidity and mortality and the literature that examined the effect of competing needs on ED utilization by homeless persons revealing that the need to find food and shelter results in a delay in seeking medical care (Bassuk et al., 1996; Cunningham & Henry, 2007; Gelberg et al., 1997;

Gelberg et al., 2000; Klein et al., 2000). It is, therefore, likely that homeless persons are actually quite “sicker” when presenting to the ED than not homeless persons. It is also possible that the increased likelihood of an ED visit by homeless persons is due to the differences in ED visits resulting from substance use/abuse and intentionally self-inflicted injuries for homeless and not homeless persons that were revealed by this study.

What Are the Predictors of ED Utilization for Non-Urgent Visits?

Health insurance. The literature review revealed the relationship between health insurance and access to a regular source of health care, defined as clinics and medical offices. The consensus was that health insurance increases access to and utilization of these health care facilities, which reduces the need for ED services. This is due, in part, to the fact that a regular source of health care results in better overall health because of the likelihood that those with a regular source of health care will seek preventative services. Those without health insurance are more likely to miss needed preventative care, become “sicker” and then present to the ED (Ensign, 2001; Han et al., 2003; Klein et al., 1999; Kushel et al., 2001; Kreider & Nicholson, 1997; O’Toole et al., 1999).

Some form of health insurance, either private or public, covered most (75%) of the patient visits to EDs in the United States in 2005. This, by itself, does not indicate a relationship between ED use and insurance status because most of the American public (84%) possessed some form of health insurance in 2005 (US Census Bureau, 2007). When the type of ED visit, either urgent or non-urgent, is considered, there is a significant correlation with health insurance. Those without health insurance were 1.41 times more likely to make a non-urgent ED visit than those with health insurance. Those

without health insurance were more likely to make non-urgent visits to the ED, presumably because they had limited access to a regular source of care.

Of the homeless population, 38% had health insurance and 62% did not, while 80% of the not homeless population had health insurance and 20% did not. It would seem to follow that the large proportion of homeless people who do not have health insurance and the small proportion of not homeless who do not have health insurance would result in a difference in type (urgent versus non-urgent) of visit to the ED. The homeless would be expected to be more likely to make non-urgent visits. This study did not find that to be accurate. Barring an unknown mitigating factor, the fact that there was no difference in type of ED visit between homeless and not homeless persons, despite the great difference in possession of health insurance, gives further evidence to the conclusion of the literature review that the homeless are sicker than the general population, which is also due partly to decreased access to a regular source of health care. It also gives further support to the study assumptions that homelessness has a profoundly negative effect on health.

Race/Ethnicity. Persons who identified themselves as Hispanic made up only 14% of the total population of patient visits to EDs in the United States in 2005, and, of that group, 20% of the visits were triaged non-urgent. Furthermore, logistic regression indicates that the Hispanic group was 1.8 times more likely to make a non-urgent ED visit than the Asian group and 3.3 times more likely to make a non-urgent ED visit than the Other group. While this finding is statistically significant, the clinical significance is unknown. Lower socioeconomic status is likely more predictive of the likelihood of a non-urgent ED visit than “Race/Ethnicity”. Also, no attempt was made in the NHAMCS

2005 to distinguish citizenship status. Since 1997, it has been mandatory that immigrants reside in the United States for 10 years before being entitled to Medicaid (and other entitlements) and illegal immigrants are entitled only to ED services (Stanhope & Lancaster, 2006). It is reasonable that a portion of the Hispanic group who made non-urgent ED visits was comprised of recent immigrants and illegal aliens.

Gender. Females constituted 53.86% of all ED visits for 2005. However, the logistic regression indicates that males were 1.14 times more likely to have a non-urgent visit to the ED than females ($p = 0.012$). The meaning of this finding is largely speculative, considering that males are prone to greater risk taking activities, resulting in accidental injury and injury from aggression and violence. Additionally, they deny the need for medical care and delay seeking medical care, resulting in more serious health problems (Stanhope, & Lancaster, 2006). It would seem that males would have more urgent and fewer non-urgent visits to the ED. It is possible that, because of the tendency to avoid medical care, males have fewer sources of regular care and must, therefore, present to the ED for any kind of health care, including non-urgent care.

Season. Season was shown to be a significant predictor for the likelihood of a non-urgent visit to the ED ($p = 0.30$). The logistic regression indicated that a non-urgent visit was 2.0 times more likely to occur in the spring and 1.8 times more likely to occur in the summer than the winter. The meaning of this finding is unclear.

Age. Although “Age” was revealed in the logistic regression to be a statistically significant predictor of non-urgent use of the ED, the clinical significance of this finding is questionable. Older Americans were more likely to make urgent visits and less likely to make non-urgent visits. This is most probably due to the fact that older persons are more

likely to have multiple chronic health problems that have acute exacerbations resulting in hospitalization at three times the rate of the general population (Stanhope & Lancaster, 2006). Younger persons were more likely to present to the ED with non-urgent injuries and illness. While this analysis did not look at “age” by grouping, it is reasonable to conclude that the majority of “younger” persons were children brought to the ED by their parents who were concerned for their health and unsure of the urgency of the illness or injury.

Physician diagnosis. In this study, “need” was measured by physician diagnosis determined by ICD-9-CM Codes, expressed as CCS codes. While the overall concept of physician diagnosis was statistically significant ($p < 0.001$), it is difficult to determine the clinical significance. Several variables to measure need were discussed in a previous section. They were all considered to be part of an expression of need, yet incomplete. Physician Diagnosis was chosen because it was the most complete and objective variable describing “need” that was included in the NHAMCS 2005. However, the meaning of the results of the statistical analysis is questionable.

CCS codes 1, 3, 5, 6, 8, 9, 10, 12, 13, 14, 16, and 17 were shown to be more likely triaged as non-urgent than CCS 15. CCS 15 corresponds to certain conditions originating in the perinatal period (birth to 28 days) that includes complications of pregnancy and/or childbirth. CCS codes more likely to result in a non-urgent ED visit represent infectious and parasitic diseases, endocrine, nutritional and metabolic diseases, and immunity disorders, mental disorders, diseases of the nervous system and sense organs, diseases of the respiratory system, diseases of the digestive system, diseases of the genitourinary system, diseases of the skin and subcutaneous tissue, diseases of the musculoskeletal

system and connective tissue, congenital anomalies, symptoms, signs, and ill defined conditions, and injury and poisoning.

CCS codes 2, 4, 7, and 11 were less likely than CCS 15 to be triaged as non-urgent. These codes represent neoplasms, diseases of the blood and blood forming organs, diseases of the circulatory system and complications of pregnancy, childbirth and the puerperium.

The finding that “need” is a significant factor in ED utilization is supported by the conclusion of the literature review that need was the most significant factor in utilization of all health care facilities (Bassuk et al., 2001; D’Amore et al., 2001; Kushel, et al., 2002; Lam & Rosenheck, 1998; Mandelberg et al., 2000; Nyamathi et al., 2000; Padgett et al., 1995; Yee et al., 2002). It is also not surprising due to the fact that the model developed for this study was derived from the Behavioral Model of Health Care Utilization, which has been criticized because most of the variance in utilization is explained by the need factor, as was discussed in the literature review (Andersen, 1995; Kushel et al., 2002; Lewis et al., 2003; Padgett et al., 1995; Swanson et al., 2003; Phillips et al., 1998; Gelberg et al., 2000). It is possible that this criticism is unwarranted because need might actually be the most important predictor of utilization. While the CCS codes that were significantly predictive of non-urgent ED visits included urgent diagnoses, they also included the non-urgent conditions diarrhea, otitis media, dermatitis, back pain, and others that would be predictive of non-urgent visits because they represent visits for non-urgent problems. It is also possible that physician diagnosis is not an adequate measure of need and it is also possible that CCS code is not an adequate expression of physician diagnosis.

Limitations

This study has several limitations. Many of the variables of interest in predicting use of the ED for non-urgent health care by homeless persons in the United States, such as health beliefs/risky behaviors, competing needs, social supports, and characteristics of the health care system, were not included in the data collected for the NHAMCS 2005. Additionally, mental illness has been shown to be important as both a cause and as a consequence of homelessness. Due to the complexity of the survey, it is difficult to determine visits to the ED that were made for specific conditions arising from mental illness. Therefore it is probable that the model excludes important variables.

This study was designed to compare ED utilization by homeless and not homeless persons living in the community. A goal of the study was to determine predictors of ED use for non-urgent visits. "Living in the community" was chosen as inclusion criteria because persons who are institutionalized have limited choice over whether they are taken to an ED or other facility for health care, whereas persons living in the community, whether homeless or not homeless have a similar ability to choose. Therefore residents of nursing homes and other institutions were deleted from the study. Inclusion of these groups would have made it unlikely to determine predictors of ED utilization that are based upon an individual's choice of whether to use the ED or not. This does not bias the results, however, they are only generalizable to the population of the United States that lives outside of institutions. While the results are biased for the entire population of the United States in 2005, they are valid as inferences about the population that does not live in institutions.

Definitions of the term “homeless” are varied. Survey question 1e queries, “Patient residence”. The definition for the term “homeless” is given as: has no home or lives in a homeless shelter, and is answered by the patient without further clarification. Therefore, one patient might consider himself homeless if he is residing with a relative and another patient might not, and one patient might consider himself homeless if he spent one night in a shelter and another might not.

Triage has been found to be unreliable in predicting which patients presenting to the ED actually require admission. Discrepancies have also been found between the assignment of urgency designation in triage and the determination of urgency designated by physician diagnosis of the illness or injury (Brillman, Doezema, Tandberg, Sklar, Davis, Simms, & Skipper, 1996). This has been attributed to the lack of categorization methodology and standard criteria for defining urgent and non-urgent visits (Richardson & Hwang, 2001). Due to varied and subjective interpretations, a visit designated non-urgent might, in fact, be urgent. However, the NHAMCS has established guidelines for triage designations and procedures for training hospital personnel with retrospective analysis of triage designation. Additionally, triage is, to date, considered the standard for establishing the immediacy with which a patient should be seen.

The easiest way to increase power is to increase the sample size (Munro, 2005). It is possible, however, that a large sample size will result in enough power to detect an effect that has no clinical significance as one that is statistically significant. This study has a large sample size ($N = 24,311$) and therefore large power to detect effects. It is necessary to interpret the findings carefully to determine their relevance to the reality of ED use.

Contrarily, visits to the ED by homeless persons only contributed to 0.41% of the total number of the 33, 605 visits sampled. This constitutes a homeless sample of only 138 visits. Complex sampling surveys are designed to over-sample subgroups within the larger population in order to have a large enough group to insure meaningful statistical analysis. It can be speculated whether 138 visits is large enough to produce meaningful statistical analysis and if the inclusion of a larger sample of visits made by homeless persons would alter the results. However, the multistage probability design that includes stratification, clustering and the assignment of patient weighting used in the NHAMCS 2005 insures accurate population statistics from the sample when used with the variables CSTRATM and CPSUM that were designed specifically for this purpose. In addition, the analysis is based upon cases > 30 and no relative standard errors $> 30\%$, which the NCHS defines as the necessary parameters for reliable results.

Despite these limitations, findings drawn from the study population are generalizable to use of the ED for the larger homeless population because the sample is a nationally representative sample of that population. To date, findings have been varied because they were affected by the region of the country, type of hospital, and other factors specific to the particular study (D'Amore et al., 2001; Kushel et al., 2002; Mandelberg et al., 2000; Padgett et al., 1995; O'Toole et al., 1999). This study resolves those differences because they are accounted for in the model.

Indications for Future Study

The results of this study ask as many questions as they answer. Support was found for the conclusion that the proportion of homeless persons that use the ED is significantly greater than the proportion of the not homeless population, however, there is no

difference between the two groups in the use of the ED for non-urgent visits, even though lack of health insurance is a significant predictor of non-urgent ED use and homeless persons less often have health insurance than the not homeless. This conclusion is supported by the literature showing the consequences of homelessness upon health and by the studies showing the consequences of lack of a regular source of health care upon health. It also is supported by the studies indicating the effect of competing needs upon delay in seeking health care that also results in greater morbidity and mortality of homeless people. Studies are needed to determine if there are adequate health care facilities that are accessible by homeless persons for use as a regular source of health care. Studies are also needed to determine whether the homeless utilize services available to them, and, if they do not, why not.

The majority of ED visits in 2005 were triaged “urgent” (69% vs. 14% non-urgent). The decision to include the semi urgent (>1hour- 2 hours) category in the “urgent” designation was made because injuries and illnesses requiring attention within 1-2 hours are unlikely to be seen in a clinic or physician’s office due to scheduling. Patients with these kinds of problems would be referred to the ED. Given that the majority of ED visits are for injuries and illnesses for which the ED was designed to treat, it is necessary to “rethink” the problem of ED overcrowding. Perhaps ED overcrowding is less a consequence of “inappropriate” use and more a consequence of EDs that are inadequate in number, size and staffing. This is reflected in the fact that the number of EDs in the United States declined from 4, 176 to 3, 795 in the decade from 1995 to 2005 (Nawar, Niska, & Xu, 2007). Studies are needed to determine the costs and benefits of expanding EDs in size and scope and to compare expanded use of the ED with extended

use of other health care facilities. An ED is already operating 24 hours a day, seven days a week. Perhaps it would actually cost less to provide greater ED services than it would to extend services offered in other types of health care facilities.

Finally, there is the question of health insurance. The conclusion of the literature review is that possession of health insurance increases access to and utilization of a regular source of health care. This, in turn, results in improved health and less use of the ED. The use of the ED for non-urgent health care contributes to poor health outcomes and ED overcrowding, resulting in a delay in emergency care. Delay in emergency care to ED patients due to overcrowding also results in increased morbidity and mortality and contributes to increased health care costs. The findings of this study supply evidence that lack of health insurance significantly increases the likelihood of a non-urgent ED visit.

Health care expenditures are expected to reach 2.8 trillion dollars by 2011 representing 17% of the gross domestic product of the United States (Heffer, Smith, Kuhn, Clemens, Wong, & Zizza, 2003). Meanwhile the number of uninsured Americans continues to grow and is expected to increase from 5.3 to 12.8 million in the same period (Gilman & Kronick, 2001). Studies are needed to explore the relationship between increased health insurance, increased use of a regular source of health care and improved health outcomes resulting in, not only a decrease in the use of the ED for non-urgent complaints, but also in a decrease in health care expenditures.

Significance

This study contributes significantly to the body of knowledge because the findings corroborate, at the national level, those of earlier studies done at the regional level. The results of the earlier studies show that homeless persons use the ED in greater

proportion than the not homeless. The findings of this study support that conclusion and the conclusion of earlier studies that homeless persons suffer greater morbidity and mortality than not homeless persons.

This study contributes significantly to the body of knowledge because the findings provide evidence, at the national level, that homeless persons do not use the ED for non-urgent care in greater magnitude than not homeless persons, even considering the fact that they possess health insurance in much smaller proportion than not homeless persons. The analysis also shows that “inappropriate” use of the ED by homeless persons does not significantly contribute to ED overcrowding, because homeless persons do not use the ED for non-urgent care in large numbers.

This study contributes significantly to the body of knowledge because the findings validate, at the national level, those of earlier studies done at the regional level showing the relationship between health insurance and ED use. It provides persuasive evidence that lack of health insurance is an important predictor of ED use for non-urgent medical care.

Building upon earlier studies that have shown the deleterious effects of homelessness on health and studies that have shown the negative impact of lack of health insurance on health, this study provides compelling evidence of the magnitude of these effects and the need to address homelessness and lack of health insurance in the United States.

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Appendix A

Form Approved OMB No. 0920-0179 Exp. Date 06/30/2007 CDC 62.126

Form NHAMCS-100(ED) (9-11-2006)	U.S. DEPARTMENT OF COMMERCE Economic and Census Administration U.S. CENSUS BUREAU FEDERAL BUREAU OF INVESTIGATION U.S. DEPARTMENT OF JUSTICE OFFICE OF SPECIAL INQUIRY AND INSPECTION FEDERAL BUREAU OF INVESTIGATION FEDERAL BUREAU OF INVESTIGATION	PATIENT RECORD NO.: PATIENT'S NAME:
NATIONAL HOSPITAL AMBULATORY MEDICAL CARE SURVEY 2005 EMERGENCY DEPARTMENT PATIENT RECORD		
Assurance of confidentiality - All information which would permit identification of an individual, a practice, or an establishment will be held confidential, will be used only by persons engaged in and for the purpose of the survey and will not be disclosed or released to other persons or used for any other purpose without consent of the individual or the establishment in accordance with section 502(d) of the Public Health Service Act (42 USC 242m).		

NHAMCS-100(ED) (9-11-2006)

1. PATIENT INFORMATION											
a. Date of visit		b. ZIP code		c. Date of birth			d. Time of day				
Month	Day	Year									
		200									
e. Patient residence			f. Mode of arrival - Mark (X) one			g. Sex			(1) Arrival		
1 <input type="checkbox"/> Private residence 2 <input type="checkbox"/> Nursing home 3 <input type="checkbox"/> Other institution 4 <input type="checkbox"/> Other residence 5 <input type="checkbox"/> Homeless 6 <input type="checkbox"/> Unknown			1 <input type="checkbox"/> Ambulance (with board) 2 <input type="checkbox"/> Public service (concomitance, e.g., police, social services) 3 <input type="checkbox"/> Walk-in 4 <input type="checkbox"/> Unknown			1 <input type="checkbox"/> Female 2 <input type="checkbox"/> Male			<input type="checkbox"/> AM <input type="checkbox"/> Military <input type="checkbox"/> PM		
(2) Time seen by physician			(2) ED discharge			(2) ED discharge			(2) ED discharge		
<input type="checkbox"/> Not seen by physician			Mark (X) if ED discharge is more than 24 hours from arrival			<input type="checkbox"/> AM <input type="checkbox"/> Military <input type="checkbox"/> PM			<input type="checkbox"/> AM <input type="checkbox"/> Military <input type="checkbox"/> PM		
h. Ethnicity		i. Race - Mark (X) one or more			j. Reported source(s) of payment for this visit - Mark (X) all that apply.						
1 <input type="checkbox"/> Hispanic or Latino 2 <input type="checkbox"/> Not Hispanic or Latino		1 <input type="checkbox"/> White 2 <input type="checkbox"/> Black/African American 3 <input type="checkbox"/> Asian 4 <input type="checkbox"/> Native Hawaiian/Other Pacific Islander 5 <input type="checkbox"/> American Indian/Alaska Native			1 <input type="checkbox"/> Private insurance 2 <input type="checkbox"/> Medicare 3 <input type="checkbox"/> Medicaid/SCHIP 4 <input type="checkbox"/> Worker's compensation 5 <input type="checkbox"/> Self-pay 6 <input type="checkbox"/> No charge/Charity 7 <input type="checkbox"/> Other 8 <input type="checkbox"/> Unknown						
2. TRIAGE											
a. Initial vital signs		(1) Temperature		(2) Blood pressure		b. Triage category with which patient should be seen			c. Presenting level of pain		
(2) Pulse											
(4) Oriented X 3				1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No 3 <input type="checkbox"/> Unknown			1 <input type="checkbox"/> Immediate 2 <input type="checkbox"/> 1-14 minutes 3 <input type="checkbox"/> 15-60 minutes			4 <input type="checkbox"/> >1 hour-2 hours 5 <input type="checkbox"/> >2 hours-24 hours 6 <input type="checkbox"/> No triage 7 <input type="checkbox"/> Unknown	
1 <input type="checkbox"/> None 2 <input type="checkbox"/> Mild 3 <input type="checkbox"/> Moderate		4 <input type="checkbox"/> Severe 5 <input type="checkbox"/> Unknown		6 <input type="checkbox"/> Moderate		7 <input type="checkbox"/> Severe 8 <input type="checkbox"/> Unknown		9 <input type="checkbox"/> Moderate 10 <input type="checkbox"/> Severe 11 <input type="checkbox"/> Unknown			
3. PREVIOUS CARE					4. REASON FOR VISIT						
Has patient been:					a. Patient's complaint(s), symptom(s), or other reason(s) for this visit. Use patient's own words.					b. Is this visit work related?	
a. Seen in this ED within the last 72 hours?		b. Discharged from any hospital within the last 7 days?			(1) Most important:					1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No 3 <input type="checkbox"/> Unknown	
1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No 3 <input type="checkbox"/> Unknown		1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No 3 <input type="checkbox"/> Unknown			(2) Other:					1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No 3 <input type="checkbox"/> Unknown	
(3) Other:					(3) Other:					1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No 3 <input type="checkbox"/> Unknown	
5. INJURY/POISONING/ADVERSE EFFECT											
a. Is this visit related to an injury, poisoning, or adverse effect of medication?			b. Is this injury/poisoning intentional?			c. Cause of injury, poisoning, or adverse effect - Describe the place and event(s) that preceded the injury, poisoning, or adverse effect (e.g., along in parking, bus being pedestrian hit by car driven by drunk driver, spouse beaten with belt by spouse, heroin addiction, infant abuse, etc.).					
1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No - N/A or N/A to item 5.			1 <input type="checkbox"/> Yes, self-inflicted 2 <input type="checkbox"/> Yes, assault 3 <input type="checkbox"/> No, unintentional 4 <input type="checkbox"/> Unknown								

8. PHYSICIAN'S DIAGNOSIS FOR THIS VISIT																													
As specifically as possible, list diagnosis referred to this visit including chronic conditions.	(1) Primary diagnosis:																												
	(2) Other:																												
	(3) Other:																												
7. DIAGNOSTIC/SCREENING SERVICES	8. PROCEDURES	9. MEDICATIONS & IMMUNIZATIONS																											
Mark (X) all ordered or provided at this visit. <input type="checkbox"/> NONE Blood tests: 1 <input type="checkbox"/> CBC (complete blood count) 2 <input type="checkbox"/> BUN/Creatinine 3 <input type="checkbox"/> Cardiac enzymes 4 <input type="checkbox"/> Electrolytes 5 <input type="checkbox"/> Glucose 6 <input type="checkbox"/> Liver function tests 7 <input type="checkbox"/> Arterial blood gases 8 <input type="checkbox"/> BAC (blood alcohol) 9 <input type="checkbox"/> HIV serology 10 <input type="checkbox"/> Other blood test Other tests: 11 <input type="checkbox"/> EKG/ECG 12 <input type="checkbox"/> Cardiac monitor 13 <input type="checkbox"/> Pulse oximetry 14 <input type="checkbox"/> Pregnancy test 15 <input type="checkbox"/> Urinalysis (UA) 16 <input type="checkbox"/> Other test/service Imaging: 17 <input type="checkbox"/> X-ray 18 <input type="checkbox"/> Ultrasound 19 <input type="checkbox"/> MRI 20 <input type="checkbox"/> CT scan 21 <input type="checkbox"/> Other imaging	Mark (X) all provided at this visit. Exclude medications. <input type="checkbox"/> NONE 1 <input type="checkbox"/> Bladder catheter 2 <input type="checkbox"/> CPP 3 <input type="checkbox"/> Endotracheal intubation 4 <input type="checkbox"/> IV fluids 5 <input type="checkbox"/> Nebulizer therapy 6 <input type="checkbox"/> NG tube/gastro suction 7 <input type="checkbox"/> OBGYN care 8 <input type="checkbox"/> Orthopedic care 9 <input type="checkbox"/> Therapeutic therapy 10 <input type="checkbox"/> Wound care 11 <input type="checkbox"/> Other	List up to 8 drugs given at this visit or prescribed at ED discharge. Include Rx and OTC drugs, immunizations, and anesthetics. <input type="checkbox"/> NONE <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 10%; text-align: center;">Given in ED</th> <th style="width: 10%; text-align: center;">Rx at discharge</th> </tr> </thead> <tbody> <tr><td>(1) _____</td><td style="text-align: center;">1 <input type="checkbox"/></td><td style="text-align: center;">2 <input type="checkbox"/></td></tr> <tr><td>(2) _____</td><td style="text-align: center;">1 <input type="checkbox"/></td><td style="text-align: center;">2 <input type="checkbox"/></td></tr> <tr><td>(3) _____</td><td style="text-align: center;">1 <input type="checkbox"/></td><td style="text-align: center;">2 <input type="checkbox"/></td></tr> <tr><td>(4) _____</td><td style="text-align: center;">1 <input type="checkbox"/></td><td style="text-align: center;">2 <input type="checkbox"/></td></tr> <tr><td>(5) _____</td><td style="text-align: center;">1 <input type="checkbox"/></td><td style="text-align: center;">2 <input type="checkbox"/></td></tr> <tr><td>(6) _____</td><td style="text-align: center;">1 <input type="checkbox"/></td><td style="text-align: center;">2 <input type="checkbox"/></td></tr> <tr><td>(7) _____</td><td style="text-align: center;">1 <input type="checkbox"/></td><td style="text-align: center;">2 <input type="checkbox"/></td></tr> <tr><td>(8) _____</td><td style="text-align: center;">1 <input type="checkbox"/></td><td style="text-align: center;">2 <input type="checkbox"/></td></tr> </tbody> </table>		Given in ED	Rx at discharge	(1) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>	(2) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>	(3) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>	(4) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>	(5) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>	(6) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>	(7) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>	(8) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>
	Given in ED	Rx at discharge																											
(1) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>																											
(2) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>																											
(3) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>																											
(4) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>																											
(5) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>																											
(6) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>																											
(7) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>																											
(8) _____	1 <input type="checkbox"/>	2 <input type="checkbox"/>																											
10. PROVIDERS	11. VISIT DISPOSITION																												
Mark (X) all providers seen at this visit. 1 <input type="checkbox"/> ED attending physician 2 <input type="checkbox"/> ED resident/Intern 3 <input type="checkbox"/> On call attending physician/Fellow 4 <input type="checkbox"/> RN/PPN 5 <input type="checkbox"/> Nurse practitioner 6 <input type="checkbox"/> Physician assistant 7 <input type="checkbox"/> EMT 8 <input type="checkbox"/> Other	Mark (X) all that apply. 1 <input type="checkbox"/> No follow-up planned 2 <input type="checkbox"/> Return if needed, PRN appointment 3 <input type="checkbox"/> Return/Refer to physician/clinic for FU 4 <input type="checkbox"/> Refer to social services 5 <input type="checkbox"/> Left AMA 6 <input type="checkbox"/> Left without being seen 7 <input type="checkbox"/> DOA/died in ED 8 <input type="checkbox"/> Transfer to different hospital - Reason _____ 9 <input type="checkbox"/> Admit to hospital 10 <input type="checkbox"/> Admit to observation unit 11 <input type="checkbox"/> Other																												
	If "Admit to hospital" was marked, then please continue with Item 12 - HOSPITAL ADMISSION on the reverse side.																												

2005 ED

12. HOSPITAL ADMISSION								
Complete if the patient was admitted to the hospital at this visit.								
a. Admitted to: 1 <input type="checkbox"/> Critical care unit 2 <input type="checkbox"/> OR/Cath lab 3 <input type="checkbox"/> Other bed/unit 4 <input type="checkbox"/> Unknown	b. Hospital admission time ____ : ____ <input type="checkbox"/> AM <input type="checkbox"/> Military <input type="checkbox"/> PM	c. Hospital discharge date <table style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td style="border: 1px solid black;">Month</td> <td style="border: 1px solid black;">Day</td> <td style="border: 1px solid black;">Year</td> </tr> <tr> <td style="border: 1px solid black;"> </td> <td style="border: 1px solid black;"> </td> <td style="border: 1px solid black;"> </td> </tr> </table>	Month	Day	Year			
Month	Day	Year						
d. Principal hospital discharge diagnosis _____	e. Hospital discharge status 1 <input type="checkbox"/> Alive 2 <input type="checkbox"/> Dead 3 <input type="checkbox"/> Unknown							
If this information is not available at time of abstraction, then complete the Hospital Admission Log.								

Appendix B

UCSF COMMITTEE ON HUMAN RESEARCH
 REVISED EXEMPT CERTIFICATION
 (CATEGORY 4: Biological Specimens, Records Review and/or Data Analysis)

Please date form: 12/11/2006

General Instructions | Submission Requirements

Street Address:
 Committee on Human Research (CHR)
 Office of Research
 3333 California Street, Suite 315
 University of California
 San Francisco, CA 94118

Campus Mailbox:
 CHR
 Box 0962

Office Contact for questions:
 Office: (415) 476-1814
 Facsimile: (415) 502-1347
 e-mail: chr@ucsf.edu

PART 1: ADMINISTRATIVE REQUIREMENTS

- Eligibility requirements for Principal Investigator, Co-Principal Investigator and Contact Person
- Training requirements

A. Principal Investigator:		
Name and degree Jean Ann Seago, R.N., Ph.D.	University Title Associate Professor	Department Department of Community Health Systems
Campus Mailing Address (Box No.) Box 0608	Phone Number 502-6340	E-mail Address jean.ann.seago@nursing.ucsf.edu
Co-Principal Investigator		
Name and degree Claire Hauser, R.N., M.S.	University Title Doctoral Student	Department Department of Community Health Systems
Campus Mailing Address (Box No.) Box 0608	Phone Number 502-6340	E-mail Address claire.hauser@ucsf.edu
Additional Contact Person (if any):		
Name	University Title	Department
Campus Mailing Address (Box No.)	Phone Number	E-mail Address
Study Title: Emergency Department Utilization by Homeless Persons in the United States		Application Type: <input checked="" type="checkbox"/> New Category 4 <input type="checkbox"/> Modification / Update <input type="checkbox"/> Re-certification
Sites (Check all that apply):		
<input checked="" type="checkbox"/> UCSF <input type="checkbox"/> SFGH <input type="checkbox"/> VAMC <input type="checkbox"/> Fresno <input type="checkbox"/> Cancer Center <input type="checkbox"/> UC Berkeley		
<input type="checkbox"/> GCRC (Moffitt/Mt. Zion) <input type="checkbox"/> GCRC (SFGH) <input type="checkbox"/> JPCRC <input type="checkbox"/> Foreign Country		
<input type="checkbox"/> Other(s):		

B. Funding: If this study is eligible for "Just in Time" NIH review, do not submit your application to the CHR until you have received notification from the federal granting agency that your study appears to be in a fundable range. If this study is federally funded please complete section B.6.

Check all that apply:

1. Type of funding:	2. Source of funding:	3. Funds will be awarded to/through:
<input type="checkbox"/> Contract/Grant	<input type="checkbox"/> Federal Government*	Dept./CRU:
<input type="checkbox"/> Subcontract	<input type="checkbox"/> Other Gov. (e.g., State, local)	Institution <i>Enter 10-Digit Account # (PDA) No.</i>
<input type="checkbox"/> Drug/Device donation	<input type="checkbox"/> Industry**	<input type="checkbox"/> UCSF.....00000068
<input type="checkbox"/> Departmental	<input type="checkbox"/> Other Private	<input type="checkbox"/> Blood Centers of the Pacific.....00002111
<input type="checkbox"/> Gift	<input type="checkbox"/> Campus/UC-Wide program	<input type="checkbox"/> Blood Systems Research Institute.....00006454

<input checked="" type="checkbox"/> Student project <input type="checkbox"/> Other: ___ Have funds been awarded? <input type="checkbox"/> Yes <input type="checkbox"/> Pending <input checked="" type="checkbox"/> No Award No.: ___ Proposal Express number(s): ___	<input type="checkbox"/> Departmental Funds <input checked="" type="checkbox"/> Other: Specify name of source designated above: <u>Funds provided by student (Co-PI)</u>	<input type="checkbox"/> Gluck Institute 00000304 <input type="checkbox"/> Gladstone Institute 00000067 <input type="checkbox"/> Institute on Aging 00002525 <input type="checkbox"/> INCIRE 00000256 <input type="checkbox"/> S.F. Dept. of Public Health 00000162 <input type="checkbox"/> SFVAMC Research Office 00000280
4. **UCSF (or affiliate) financial contact person for IRB review recharge:		
5. Grant Title and PI (if different from above):		
6. *CHR Protocol/Federal Grant or Contract Comparison (New CHR Studies Only) If this study is federally funded, please submit one copy of one of the following documents (unless there is more than one grant or contract involved; in that case, submit one copy for each associated grant or contract). Please indicate which document you have attached: <input type="checkbox"/> The human subjects section of your NIH grant, or <input type="checkbox"/> For other federal proposals (contracts or grants), the section of the proposal describing human subjects work, or <input type="checkbox"/> The section of your progress report if it provides the most current information about your human subjects work. Note: If there are any significant discrepancies between the grant or contract and this CHR application please explain here:		
7. Secondary sponsors: If there are multiple sources of funding for this study, please describe the additional funding:		

C. Key Personnel: All key personnel including the PI and Co-PI must be listed below along with a brief statement of their qualifications. If the SF VAMC is a study site, please identify the principal VAMC investigator, unless already listed as PI or CoPI above. For questions regarding the VAMC application process, please contact the VA Clinical Research Office at 221-4810 ext.4655. Please note: All Key Personnel at UCSF or affiliated sites must complete the online UCSF Human Subject Protections Training program (<https://www.researchonline.ucsf.edu/>).

Investigator (and institution):

Principal Investigator:
 Jean Ann Seago, R.N., Ph.D.
 University of California, San Francisco

Qualifications:

Dr. Seago is an Associate Professor in the Department of Community Health Systems, School of Nursing at the University of California, San Francisco. Dr. Seago has been extensively published and has served as Principal Investigator for many research studies including those focusing on nurse workforce issues and organizational factors that impact patient outcomes and patient safety. Dr. Seago has expertise in the secondary analysis of large databases due to her focus on health services research incorporating the use of large databases to study patient and organizational outcomes.

Co-Principal Investigator:
 Clarice Hauser, R.N., M.S.

Ms. Hauser is a third year doctoral student at the University of California, San Francisco. She has served as a research assistant on faculty studies and as Clinical Coordinator for the Parkinson's Disease Research Center. Her interest in the homeless population stems from her extensive experience as an Emergency Department RN.

D. Statement of Financial Interest: Does the PI or any investigator have any financial interests related to this clinical study?

Yes No

If Yes, Attach Disclosure Of Investigators' Financial Interests Supplement

E. Principal Investigator's Certification:

- I certify that the information provided in this application is complete and correct.
- I accept ultimate responsibility for the conduct of this study, the ethical performance of the project, and the protection of the rights and welfare of the human subjects who are directly or indirectly involved in this project.
- I will comply with all UCSF policies and procedures, as well as with all applicable federal, state and local laws regarding the protection of human subjects in research.
- I will ensure that the personnel performing this study are qualified and adhere to the provisions of this CHR-certified protocol.
- I will not modify this CHR-certified protocol or any attached materials without first submitting an amendment to the previously approved protocol.



Principal Investigator's Signature

PI completed training Yes NoCoPI completed training Yes No

Date

12/11/06

PART 2: STUDY SPECIFIC INFORMATION

Complete section A and/or B below for research eligible under Exempt Category #4:

Category #4 The research involves the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

IMPORTANT NOTE: The Exempt application is not allowed for Category 4 if any of the following are true:

1. There is contact with subjects
2. The human biologic specimens are from the Pathology Department
3. The research involves derivation and use of human embryonic stem cells, human embryonic germ cells, or human adult stem cells from any source, including somatic cell nuclear transplantation.
4. Medical Records are used.

If any of the above is not applicable you must submit an application for Expedited Review.

A. Biological Specimens- complete the following if you are requesting permission to study biological specimens.

1. In non-technical language briefly describe the study purpose and activities:

2. Will there be any contact with the subjects? Yes No

If "Yes", this research does not qualify as exempt. Please fill out and submit an expedited review or full committee application.

3. Are the human biological specimens pre-existing? Yes No

Pre-existing means the specimens are collected prior to this research use for a purpose other than the proposed research. The materials must be "on the shelf" (or in the freezer at the time the protocol is initiated).

If no, this study does not qualify for Exempt. Submit an application for Expedited Review.

4. What is (are) the types of human biological specimens?

5. What is the source of the human biological specimens? Check all that apply. Identify the contact person and location of the repository/bank.

- Nationally recognized or an established UCSF Tissue Bank
 - Contact Person/Location:
 On-site (UCSF) repository/bank
 - Contact Person/Location:
 Off-site repository/bank
 - Contact Person/Location:
 Historical samples with none of the 18 Protected Health Identifiers associated with the human biological specimen.
 - Contact Person/Location:

6. Does the human biological specimen repository/bank have IRB approval to obtain, receive, possess, private information that is individually identifiable for research purposes?

- Yes
 No, please explain:

7. How will identities of the specimens be protected?

- Neither the researcher nor the human biological specimen repository/bank possess identifiers.
 The identifiers are maintained at the human biological specimen repository/bank only. There is a firewall between the source and the researcher so that the protected health identifiers are never given to the researcher.

8. In order to work with biological samples in your lab you must have or apply for Biosafety Committee (BSC) approval through the Biological Use Authorization (BUA) process. Please provide your BUA number: (Please note exempt certification cannot be given if this number is not provided.)

9. Will the human biological samples be used in animal research?

- No
 Yes, please provide the IACUC approval number:

Protected Health Identifiers:

- | | | |
|-------------------|---------------------------------|----------------------------------|
| 1) Names | 7) Social Security Numbers | 13) Device identifiers |
| 2) Dates | 8) Medical record number | 14) Web URLs |
| 3) Postal address | 9) Health plan numbers | 15) IP address numbers |
| 4) Phone numbers | 10) Account numbers | 16) Biometric identifiers |
| 5) Fax numbers | 11) License/Certificate numbers | 17) Photos and comparable images |
| 6) Email address | 12) Vehicle id numbers | 18) Any other unique identifier |

B. Records Review and/or Data Analysis- complete the following if you are requesting permission to review records or do data analysis.

1. In non-technical language briefly describe the study purpose and activities:

The purpose of this study is to determine the extent to which homeless persons in the United States use the ED as a regular source of health care and to determine the factors that are predictive of ED use. The study will be based upon a secondary analysis of cross sectional data from the National Hospital Ambulatory Medical Care Survey (NHAMCS). Sponsored by the National Center for Health Statistics of the National Institutes of Health. The data, from a nationally representative sample of hospital emergency departments, have been collected for the years 1992 through 2006. The last year to be published, 2005, provides the data necessary for a retrospective cross sectional study of the homeless population with respect to ED utilization.

2. Will there be any contact with the subjects? Yes No

If "Yes", this research does not qualify as exempt. Please fill out and submit an expedited review or full committee application.

3. **What types of records will be reviewed? (Check all that apply)**
 Aggregate data from STOR, Cancer Center, or other established data bank or repository.
 Publicly available (i.e. DMV, library, newspapers)
 NCI SEER (Surveillance Epidemiology and End Results)
 Data Sets not including any of the 18 Protected Health Identifiers
 Other:

4. **How will the identities of the records be protected?**
 Neither the researcher nor the source possesses identifiers.
 The identifiers are maintained at the source only. There is a firewall between the source and the researcher so that the protected health identifiers are never given to the researcher.

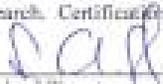
Protected Health Identifiers:

1) Names	7) Social Security Numbers	13) Device identifiers
2) Dates	8) Medical record number	14) Web URLs
3) Postal address	9) Health plan numbers	15) IP address numbers
4) Phone numbers	10) Account numbers	16) Biometric identifiers
5) Fax numbers	11) License/Certificate numbers	17) Photos and comparable images
6) Email address	12) Vehicle id numbers	18) Any other unique identifier

***** CHR Office Use Only *****

Certification of Exempt Status

On the basis of the information presented here, this research activity qualifies as exempt from review by the Committee on Human Research. Certifications are valid for three years from the date of certification.


 CHR Authorized Signature


 Certification Date


 Expiration Date

Exempt Project Number

EXEMPT PROJECT NUMBER: 06030177

Publishing Agreement

It is the policy of the University to encourage the distribution of all theses and dissertations. Copies of all UCSF theses and dissertations will be routed to the library via the Graduate Division. The library will make all theses and dissertations accessible to the public and will preserve these to the best of their abilities, in perpetuity.

I hereby grant permission to the Graduate Division of the University of California, San Francisco to release copies of my thesis or dissertation to the Campus Library to provide access and preservation, in whole or in part, in perpetuity.

Clevidu Hausw
Author Signature

12/21/07
Date