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An Examination of Factors Affecting Non-Urgent Use of Emergency Department Services by Patients with "Universal" Healthcare

Gregory Smith Feltenberger
Old Dominion University

AN EXAMINATION OF FACTORS AFFECTING NON-URGENT USE OF EMERGENCY DEPARTMENT SERVICES BY PATIENTS WITH "UNIVERSAL" HEALTHCARE

by

Gregory Smith Feltenberger
B.A. December 1998, Edinboro University of Pennsylvania
M.B.A. December 2000, Kent State University

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Approved by:

Andrew Balas (Director)

Qi (Harry) Zhang (Member)

Carolyn Rutledge (Member)

ABSTRACT

AN EXAMINATION OF FACTORS AFFECTING NON-URGENT UTILIZATION OF EMERGENCY DEPARTMENT SERVICES BY PATIENTS WITH "UNIVERSAL" HEALTHCARE

Gregory Smith Feltenberger
Old Dominion University, 2012
Director: Dr. Andrew Balas

The purpose of this research is to examine the factors affecting non-urgent utilization of emergency department (ED) services by individuals with "universal" healthcare using the Behavioral Model of Health Services Use. Since Air Force Medical Service beneficiaries have free and unlimited use of the full-range of healthcare services, they are ideally suited for this study. The findings of this research may also apply to other populations with free or low-cost access to healthcare (i.e., universal or single-payer healthcare). Using secondary data extracted from the Air Force Medical Service's electronic health record system at several military hospitals, this study will present descriptive and inferential statistics on person-based ED and primary care utilization of spouses of active duty military. This study is important because a significant proportion of patients present to the ED with medical problems that are classified as non-urgent and could safely be treated by a primary care provider. In particular, the costs associated with non-urgent use of ED services are very high; patients with non-urgent ED use impose a substantial strain on the efficiency of the ED; and increasingly, patient satisfaction has become more important since it is considered a primary indicator of quality of care. While this problem exists both in the military and civilian sectors, the non-monetary predictors of presenting to the ED with non-urgent medical problems have not been well

studied for patients with "universal" healthcare or in the context of the Air Force Medical Service. The results of this research are likely to provide hospital leadership with insights to aid them in making evidence-based decisions aimed at reducing non-urgent (unnecessary) use of ED services. Finally, the most significant predictor of non-urgent ED use is related to SES and age category. That is, spouses of enlisted military members with non-urgent ED use are 2.855 times more likely to be under 40 years of age. Therefore, the findings of this study provide a starting point and would be magnified in value once attitudinal factors of patients are incorporated.

This dissertation is dedicated to my children, Brittany, Aaron, and Taylor that anything is possible with hard work and patience. To my wife, Denise, for her support, my mother, Linda, for her strength and inspiration, and my father, Ron, for his drive and focus. And to all my friends in the Air Force Medical Service.

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In accordance with Air Force Instruction 41-210, *Patient Administration*, the use of Air Force medical records in the preparation of this material is acknowledged, but it is not to be construed as implying official Department of the Air Force approval of the conclusions presented.

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CHAPTER I

INTRODUCTION

Non-urgent (inappropriate) utilization of emergency department (ED) services by individuals with "universal" coverage is a significant strain on the healthcare system. This research explored patient factors related to non-urgent use of ED services for the purpose of reducing inappropriate use of ED services. The Behavioral Model of Health Services Use (Andersen & Davidson, 1996; Andersen, 1995; Aday & Andersen, 1974) was used as a theoretical framework for grouping patient factors in the context of the Air Force Medical Service. In particular, the primary constructs of the model were used to group variables related to utilization in military EDs and primary care clinics. The unit of observation was unique episode-based ED and primary care factors of adult female dependents of active duty military members. Since Air Force Medical Service beneficiaries have free and unlimited use of the full-range of healthcare services, they were ideally suited for this study. The findings of this research may apply to other populations with free or low-cost access to healthcare.

Non-monetary predictors of presenting to the ED have not been well studied in the context of the Air Force Medical Service. Therefore, the military environment provided an excellent setting in which to examine non-monetary predictors of ED use by non-urgent patients. Because these patients do not pay for ED or primary care services, cost is not a factor in their decision-making.

STATEMENT OF THE PROBLEM

Inappropriate utilization of ED services has become a significant problem. A large proportion of patients present to the ED with medical problems that are classified as

non-urgent and could be safely treated by a primary care provider (Ray, 1993; Bond et al., 1999). For instance, a study conducted by Bond et al. (1999) found 62.5% of ED patients were triaged as non-urgent while only 42.6% of non-urgent patients had insurance. In addition, the Centers for Disease Control (CDC, 2004) found only 1% of ED visits required immediate medical attention.

ED utilization and triage category distributions have been steadily changing over the past couple decades. In 2004, the CDC published the National Hospital Ambulatory Medical Care Survey results. Findings from this survey identified a 23% (110.2 million visits) increase in ED visits between 1992 and 2002; whereas, the number of EDs decreased by 15% (ACEP, 2004). In 2002, ED utilization was found to be 38.9 visits per 100 persons, a 9% increase over 1992 utilization (Medical Benefits, 2004). In addition, the CDC (2004) found a nationwide increase in emergent (22.3% in 2002 from 19.2% in 1992), urgent (34.2% from 31.2%), and non-urgent (10.2% from 9.1%) patient triage categories.

The costs associated with the use of ED services in the civilian healthcare setting are very high. Bamezai et al. (2005) found the cost of non-trauma ED services without the physician component averaged $295 per encounter (in 1998 dollars). According to the CDC (2003), there were 114 million patient visits to EDs in 2003. A national estimate of the total cost of ED services, calculated using the figures provided by Bamezai et al. ($295) and the CDC (114 million), exceeds $33 billion per year. Therefore, approximately $21 billion per year is spent on non-urgent ED services (calculated using 62.5% from Bond et al. in 1999).

AIR FORCE MEDICAL SERVICE

Similar to the civilian sector, ED use by patients for non-urgent care is a significant issue in the military since the majority of ED patients could be treated in a primary care setting. A preliminary analysis of ED data from 2004 at a single Air Force Medical Service hospital located in eastern Virginia found 83.1% (24,192) of patient visits were categorized as non-urgent. This rate is consistent with a previous study of military ED use by Ray (1993) who found 88.2% (4,983) of patient visits were non-urgent. Air Force Medical Service policy further compounds the problem of non-urgent ED utilization. That is, current policy supports the use of ED services based on the judgment of the patient as a 'prudent layperson'. Therefore, policy does not limit patient use of healthcare services.

The costs associated with the use of ED services in the military are very high. According to the American College of Emergency Physicians (ACEP, 2004), non-urgent patients impose increased costs on the system. A preliminary review of costs for ED services rendered at the hospital located in eastern Virginia found the total cost of ED services approached $348,437 for females and $309,461 for males in fiscal year 2004 using $34.14 per RVU based on Department of Health and Human Services, Technical Assistance Costing Tool, 2005 version. As an estimate and using the non-urgent rate previously discussed of 83.1%, the cost of non-urgent care for 2004 may have approached $289,551 for females and $257,162 for males.

ED resource utilization is also associated with a significant number of ED visits. According to Medical Benefits (2004), diagnostic/screening services and procedures were provided at 86.8 visits per 100 persons (43.2% of visits) and radiological services were

provided at 40.7% of visits. In addition, pharmaceuticals were prescribed at 75.8% of visits, referrals to another provider were given at 44.6% of visits, and 38.9% of patients were told to return or given an ED appointment (Medical Benefits, 2004).

Non-urgent patients can impose a substantial strain on ED services resulting in decreased patient satisfaction. According to the American College of Emergency Physicians (ACEP, 2004), financial and efficiency pressures continue to increase at all hospitals making patient satisfaction the primary indicator of quality of care. Further, since a significant proportion of ED patients are classified as non-urgent and only require routine medical care, this results in increased ED wait times and decreased patient satisfaction across all patient triage categories (e.g., two-thirds of ED patients wait on average 3.2 hours for treatment; ACEP, 2004).

The influence of patient satisfaction extends beyond quality of care. For instance, Bruce et al. (1998) found patient satisfaction was associated with patient compliance with medical advice. According to Mack et al. (1995), among civilian hospitals, patient satisfaction can account for nearly one-third of a hospital's profitability. Therefore, the impact of non-urgent patient use of ED services on patient satisfaction may include a decrease in overall quality of care, patient compliance with medical advice, and profitability.

KEY TERMS

There are a few ED-related key terms used in this research. That is, 'inappropriate' ED care is synonymous with the non-urgent triage category or unnecessary care seeking behavior. Whereas, 'appropriate' ED care is the same as semi-urgent, urgent, and emergent triage categories or necessary care seeking behavior.

PURPOSE OF THE STUDY

The purpose of this research was to identify factors that might be used to reduce inappropriate ED use. This research examined the factors affecting non-urgent utilization of ED services by patients with 'universal' healthcare using the Behavioral Model of Health Services Use. The subsequent objectives of this research were:

1. To support the development of policies/regulations focused on decreasing inappropriate ED usage.
2. To support methods focused on decreasing costs (fixed and variable) associated with inappropriate ED usage.
3. To improve the perceived quality of care for appropriate use of ED services as a result of policies/regulations and decreased costs.

This research could be 'valuable' to the healthcare system, both military and civilian, for several reasons. For instance, this research was the first comprehensive assessment of Air Force Medical Service ED utilization. The findings from this study could be used to (1) reduce costs and waiting times, (2) increase patient satisfaction and quality of care, and (3) support future ED policies. In addition, the results from this research might provide insights into why other groups with 'universal' healthcare (i.e., free or low-cost access to care) use the ED inappropriately. Therefore, it is likely this research can provide decision makers with information that supports policies and/or processes aimed at mitigating non-urgent utilization of ED services. Finally, this study might identify other factors associated with non-urgent ED use for future research.

POPULATION OF INTEREST

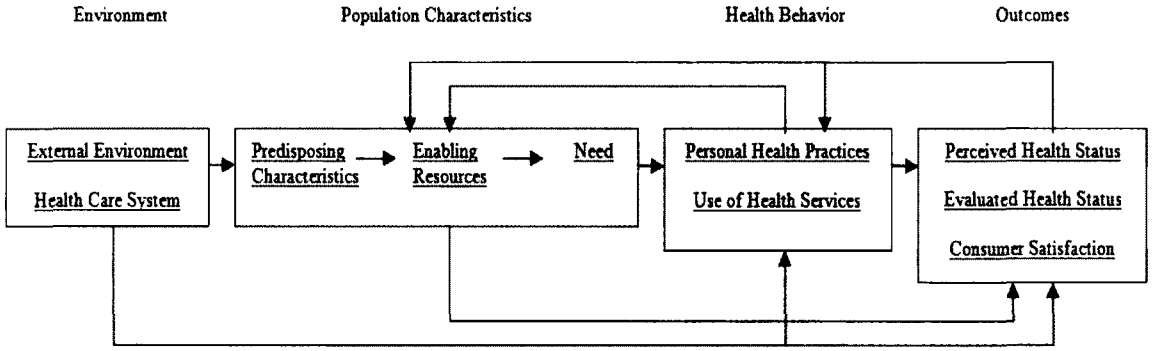
The Military Health System is one of the largest healthcare systems in the US. In 2008, the Military Health System (annual budget of $42 billion) consisted of 63 military hospitals with over 400 military clinics and countless private sector and network providers (civilian providers). In total, there were over 34 million outpatient visits at Military Health System hospitals in 2008. The Air Force Medical Service comprises approximately one-third of the Military Health System. Specifically, the population of interest in this study will be the 9.2 million Military Health System beneficiaries (i.e., active duty, retirees, survivors, and family members).

The population of interest, however, is markedly different from the general population since the personal costs associated with medical care are nominal. For instance, active duty and their family members do not pay for services, and retirees and their family members pay a flat fee of $230 for an individual or $460 for a family per year. In particular, 'personal time' (i.e., time spent making an appointment and waiting for an appointment) is the primary cost incurred by all beneficiaries. Therefore, there are little or no monetary disincentives to limit use of health services, so this population basically has no-cost, 'universal' access to healthcare.

OVERVIEW OF THE CONCEPTUAL FRAMEWORK

The Behavioral Model of Health Services Use (see Figure 1) provides a systematic framework for measuring access to healthcare (Andersen & Davidson, 1996). The initial purpose of the model was prediction and explanation of health services use; whereas, the newest iteration was designed to also capture multi-factorial influences that affect utilization (Andersen & Davidson, 1996; Andersen, 1995). Feedback loops and

Figure 1. Behavioral Model of Health Services Use



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outcomes in the 4th phase represent the dynamic and interdependent relationships inherent in health services utilization. Also, Andersen and Davidson (1996) indicate serious medical problems can be explained by demographic factors and perceived need. Care for less serious conditions can be explained using all model constructs (Andersen & Davidson, 1996). And discretionary treatments can be explained by social structure, health beliefs, and enabling resources (Andersen & Davidson, 1996).

The model consists of four primary constructs: environment, population characteristics, health behavior, and outcomes (Andersen & Davidson, 1996; Andersen, 1995; Aday & Andersen, 1974). The environmental construct explains use of health services (Andersen, 1995). Components of the environmental construct are external environment and health care system (Andersen & Davidson, 1996). External environment factors are related to influences within the community like economics, politics, violence, and societal norms (Andersen & Davidson, 1996). The health care

system is represented by policies, resources, organizational structure, and financial factors that influence accessibility, availability, and acceptability (Andersen & Davidson, 1996).

Population characteristics explain personal health practices and use of health services (Andersen, 1995). Components of the population characteristics construct are predisposing characteristics, enabling resources, and need (Andersen & Davidson, 1996). Predisposing characteristics can explain health behaviors and consist of demographic factors that drive the need for health services, social structure factors that represent status within the community and the ability to adapt to the physical environment (e.g., education, occupation, race/ethnicity), and health beliefs associated with attitudes, values, and knowledge (Andersen & Davidson, 1996). Health beliefs can explain the influence of social structure on enabling resources, perceived need, and use of health services (Andersen & Davidson, 1996).

Within enabling resources, community and personal resources are appropriate to facilitate use of healthcare services (Andersen & Davidson, 1996). According to Andersen & Davidson (1996), community resources consist of physician and bed supply and availability of healthcare professionals and facilities. Personal resources consist of "income, health insurance, a regular source of care, transportation, and acceptable travel and wait times" (Andersen & Davidson, 1996, p. 15).

Need is a dichotomous component and consists of perceived need and evaluated need. Perceived need is a personal judgment of health status by the patient and a decision to pursue or not pursue the use of health services (Andersen & Davidson, 1996). Andersen and Davidson (1996) indicate perceived need can explain the care-seeking

behavior and compliance with medical advice. Evaluated need, however, is a professional medical judgment and objective measure of health and functional status (Andersen & Davidson, 1996). Andersen and Davidson (1996, p. 16) suggest "evaluated need will be more closely related to the kind and amount of treatment that will be provided after a patient has presented to a medical care provider."

Health behavior consists of personal health practices and use of health services. According to Andersen and Davidson (1996), personal health practices consist of behaviors specific to the individual focused on maintaining or improving health. Andersen and Davidson (1996) further suggest use of health services can be predicted based on predisposing, enabling, and need factors and are directly related to the type of service. For instance, serious problems are explained by demographic factors and perceived need; care for less serious conditions are explained using all model constructs; and discretionary treatments are explained by social structure, health beliefs, and enabling resources (Andersen & Davidson, 1996).

Outcomes consist of perceived health status by the individual, evaluated health status by professional medical personnel, and consumer satisfaction (Andersen & Davidson, 1996). Perceived health status, much like perceived need, is based on personal judgment by the patient regarding their current health status (Andersen & Davidson, 1996). According to Andersen and Davidson (1996, p. 16), evaluated health status, also much like evaluated need, is derived from professional medical opinion and objective measures related to "clinical standards and state-of-the-art practices." Consumer satisfaction indicates personal feelings toward the care received.

The primary goal of the model is to measure access. Therefore, there are several classifications of access to care. For instance, potential access explains potential care seekers' use of health services and is influenced by the health care system and enabling resources (Andersen & Davidson, 1996). The purpose of policy related to this type of access should focus on increasing or decreasing use of health services (Andersen & Davidson, 1996). According to Andersen and Davidson (1996, p. 18), "realized access is the actual use of services" and policy should focus on monitoring and evaluating use of health services. Access determined by demographic factors and the constructs of need is referred to as equitable access and policy should focus on distributing health services by need (Andersen & Davidson, 1996). Inequitable access, however, can be explained by social characteristics and enabling resources and policy should attempt "to reduce the influence of social characteristics and enabling resources on health services distribution" (Andersen & Davidson, 1996, p. 19). Effective access links realized access with outcomes and identifies the benefit of health services based on improved outcomes (Andersen & Davidson, 1996). Effective access is explained by predisposing characteristics, enabling resources, and need. Therefore, health behavior and policy should focus on improving outcomes like health status and satisfaction (Andersen & Davidson, 1996). Finally, Andersen and Davidson (1996) posed that efficient access reduces the cost of health services and increases health status and/or consumer satisfaction. Efficient access policy should focus on reducing costs and improving outcomes (Andersen and Davidson, 1996).

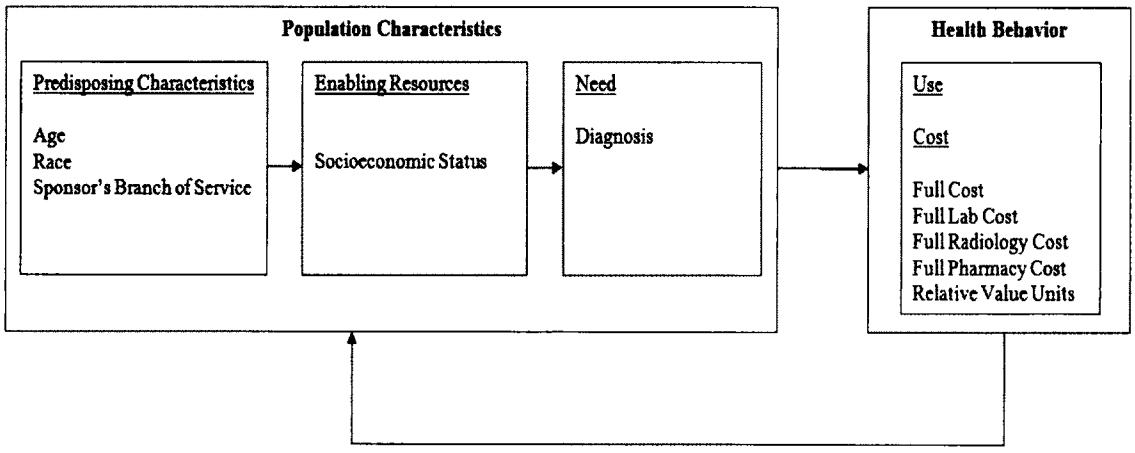
Empirical Studies Using Behavioral Model of Health Services Use

Empirical studies using the Behavioral Model of Health Services Use to explain ED utilization in the context of the Military Health System are not available. However, Jensen (1990) used the model to explain *Utilization of Outpatient Health Services by Army Retirees and Spouses*. This research validated the explanatory power of the model constructs by societal, individual, health services system, and need determinants related to discretionary use of outpatient health services.

Model Applied to Emergency Department Use

An adapted version of the Behavioral Model of Health Services Use (Andersen & Davidson, 1996; Andersen, 1995; Aday & Andersen, 1974) provided the theoretical framework (see Figure 2). Specifically, this model was used as a framework to organize

Figure 2. Behavioral Model of Health Services Use (Adapted)



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variables and identify relationships between ED and primary care factors. Using the variables associated with the different model constructs, the significance between ED and primary care utilization were examined. In particular, significance was explored based on patient age, race, sponsor's branch of services, socioeconomic status (SES), diagnosis, use, and cost between the following groups:

1. ED and primary care patients
2. Groups that used ED services appropriately and inappropriately
3. Groups that used primary care services for routine and acute care
4. Groups that used ED services appropriately and routine primary care
5. Groups that used ED services appropriately and acute primary care
6. Groups that used ED services inappropriately and routine primary care
7. Groups that used ED services inappropriately and acute primary care

RESEARCH OVERVIEW

This research examined the factors affecting non-urgent patient utilization of ED services by Air Force Medical Service beneficiaries using a post-test only with a matched, equivalent control group (observational retrospective cross-sectional study; see Figure 3, p. 80) research design. The research design is simply an (1) observation of factors and (2) how these factors are related to one another. An intervention was not performed by the researcher.

This research employed several statistical tests to explore differences between inappropriate ED users, appropriate ED users, those that use primary care routinely, and those that use primary care on an acute basis. First, descriptive analyses were performed on all factors consisting of frequency distributions and descriptive statistics. Second,

causal-comparative (differential) analyses examined differences. And third, logistic regression (predictive analyses) was performed to identify the odds-ratios between ED and primary care utilization factors.

Within this research, the primary dependent variable was ED triage category with a particular focus on the non-urgent category. Among ED triage categories, 'serious' problems consisted of emergent and urgent triage categories; while 'less serious' problems were treated as non-urgent.

Independent variables in the research were aligned with constructs from the Behavioral Model of Health Service Use constructs (see Figure 1). In particular, episode-based variables were matched to population characteristics and health behavior factors to explain, measure, compare, and predict ED usage.

Research Questions

The main research question was, "why do adult female dependents of active duty military members with 'universal' healthcare misuse ED services?" More specifically, this research answered the question, "using a subset of constructs from the Behavioral Model of Health Services Use as a framework, what are the factors affecting non-urgent (inappropriate) patient utilization of ED services within the Air Force Medical Service?" In particular, this research explored the following:

1. What are the characteristics of non-urgent ED, emergent ED, acute primary care, and routine primary care patients related to population characteristics and health behavior factors (descriptive analysis)?

2. What are the differences between non-urgent ED, emergent ED, acute primary care, and routine primary care patients related to population characteristics and health behavior factors (differential analysis)?
3. What are the odds of non-urgent ED use related to specific population characteristics and health behavior factors while controlling for other characteristics and factors (predictive analysis)?

Data Source

The data source for this research was the Air Force Medical Service electronic health record (EHR). This study used retrospective secondary data from ED and primary care patient encounters from 2008 at an Air Force Medical Service Medical Center located in San Antonio, Texas with a fully operational (24/7/365) ED.

The Air Force Medical Service's EHR is called AHLTA (Armed Forces Health Longitudinal Technology Application). It was formerly referred to as the Composite Health Care System or CHCS. AHLTA is an enterprise-wide medical information system that provides secure access to longitudinal health records. AHLTA collects patient health information/history and makes this data available to authorized users worldwide. Further, AHLTA-related capabilities include trend analysis and medical surveillance. In addition, AHLTA is enabled for computer-based provider order entry (CPOE) for labs, radiographs, and pharmaceuticals. The newest version includes a Healthcare Artifact and Image Management Solution (HAIMS) for managing non-computable medical record elements such as EKGs, consent forms, and discharge summaries. Other functions include encounter documentation and coding, result retrieval, consult (referral) tracking, allergies warning, medical alerts, immunization

documentation, and wellness reminders. The legacy system (CHCS) remains active as the backbone to AHLTA. It provides healthcare administration capabilities like patient administration, accounting, billing, patient appointments and scheduling, medical record tracking, quality assurance, and workload assignments.

Sampling Methodology

The sampling methodology ensured representativeness and matching of the ED and primary care groups. The total sample size was n = 460 unique episode-based adult female dependents of active duty military members. The ED group included patients who used ED services in 2008 (i.e., patients who only used ED services or used ED and primary care services). A probability method was employed using systematic random sampling to select the ED group. For the primary care group, an age-matched (paired) sample was selected from all eligible patients who only used primary care services in 2008 (i.e., patients who did not use ED services).

LIMITATIONS OF THIS STUDY

There were several limitations of this study. For instance, this study was most generalizable to Military Health System beneficiaries (i.e., a fully insured, non-co-pay population) since they have 'universal' healthcare. This study did not include attitudinal variables from patients, environmental factors, or outcomes factors. In particular, since this study only uses a subset of the model constructs, external environment, health care system, perceived need, perceived health status, and consumer satisfaction variables were not examined (see Figures 1 and 2). Furthermore, other studies specific to Military Health System beneficiaries were not available so supporting literature is solely drawn from the non-military population.

CONCLUSION

This research may provide new insights into population and health behavior relationships associated with ED utilization that can be used to improve healthcare delivery. Understanding population characteristics that influence use of ED health services may assist administrators and providers when making resource management, customer satisfaction, and outcomes decisions (Phillips et al., 1998). In particular, this research may help with the design and implementation of ED utilization policy, assist in the appropriate use of resources and staff, and increase customer and staff satisfaction. Further, this study built upon the existing body of knowledge since there is a lack of empirical research specific to ED utilization by non-urgent patients with 'universal' access to care.

CHAPTER II

LITERATURE REVIEW

This chapter summarizes the literature relevant to the research objectives of this study. In particular, this chapter is organized into five sections: (1) characteristics of the healthcare environment, (2) characteristics of the ED environment, (3) impact of non-urgent ED use, (4) description of the Behavioral Model of Health Services Use, and (5) the model applied to ED utilization factors. At the end of these sections, the possible solutions to mitigate non-urgent use and limitations of the existing literature are presented.

CHARACTERISTICS OF THE HEALTHCARE ENVIRONMENT

Many factors are influencing the ability of the healthcare environment to care for patients. For instance, increased demand and reduced capacity have resulted in overcrowding of EDs (Cunningham & May, 2003). Over two decades ago, Derlet & Nishio (1990) found the demand for ED services increasing while the number of EDs and urgent care clinics were decreasing.

Physician Shortages

There is a significant shortage of primary care physicians in the US (Newswire, 2011). Therefore, the supply (or capacity) of the healthcare system to meet patient demand may be severely limited (Cunningham, 2011). Of interest, Canada has a greater number of primary care physicians per capita than the US, but Canada's rate of ED use is higher than the US (Kellerman, 1994). Based on this comparison, the imbalance of the supply-demand equation in the US may be due to systemic policy factors rather than capacity.

Over the past several decades, there has been a significant decline in the ratio of primary care physicians to patients. According to Buesching et al. (1985), in 1972, there was one primary care physician to every 2,183 individuals in the area being studied. In 1980, however, there was one primary care physician to every 1,236 individuals (Buesching et al., 1985).

Shortages in physician recruitment is also a common problem within the military environment. According to the Philpott (2006), the Navy planned to recruit 291 medical school students but was only able to access 162 (44% shortfall); whereas, the Army only reached 61% of its goal.

Nursing Shortages

There is a growing need for nurses due to shortages that are expected to continue. The Bureau of Labor Statistics predicts 711,900 new nursing positions will be created between 2010 and 2020 (BLS, 2012). In 2011, Dolan found the nursing shortage is far from over. Rather, the U.S. is expected to be short by over one million nurses by 2020 due to an aging population, a faculty shortage, and the economy (Dolan, 2011). Demand for nursing services will continue to grow as the age and population continue to increase (Dolan, 2011). The demand could be tempered by increasing the capacity of nursing education programs. However, there is a significant shortage in qualified nursing school faculty (Dolan, 2011). Furthermore, the poor economy has brought many previously retired nurses back into the workforce or caused others to delay retirement (Dolan, 2011). Brewster et al. (2001) also suggested the shortage is attributed to greater opportunities for nurses in managed care and pharmaceutical industries, lower enrollment in nursing programs, and an increasing number of retiring nurses.

Health Insurance

The amount of the deductible in a health plan appears to impact care seeking behavior and use of ED services. According to Wharam (2007), traditional health plan members who switched to a high-deductible plan visited the ED less frequently than members in a traditional plan. In particular, the reductions were primarily in repeat visits for conditions that were not classified as high severity (Wharam, 2007). There were decreases in the rate of hospitalizations from the ED (Wharam, 2007). ED visits among members of the high-deductible group decreased from 197.5 to 178.1 per 1,000 members (Wharam, 2007). Visits by those with traditional coverage remained at about 220 per 1,000 (Wharam, 2007). Repeat visits by the high-deductible group decreased from 334.6 to 255.3 per 1,000; whereas, the traditional group increased from 321.1 to 334.4 per 1,000 (Wharam, 2007). Low-severity repeat ED visits decreased in the high-deductible group from 142.5 to 92.1 per 1,000 while increases were seen in the traditional coverage group from 128 to 132.5 per 1,000 (Wharam, 2007). A small decrease was found in high-severity visits in the high-deductible group (Wharam, 2007). In addition, the patients admitted from the ED in the high-deductible group decreased from 11.8% to 10.9% while there was an increase in the traditional coverage group from 11.9% to 13.6% (Wharam, 2007).

CHARACTERISTICS OF THE EMERGENCY DEPARTMENT ENVIRONMENT

The role of EDs are specialized and they fill a unique niche among healthcare service offerings. EDs triage, or prioritize, patients based on the criticality of their illnesses or injuries to ensure the most severe receive care quickly and ahead of the less severe (Derlet & Nishio, 1990). In addition, EDs also function as trauma treatment

centers, primary care physician substitutes, and a source of primary care for the poor/uninsured (Buesching et al., 1985).

EDs are on the decline resulting in concentrated ED usage and increased waiting times. The decrease in ED capacity is caused by a reduction in the number of EDs and increased demand for ED services due to increases in population. Fewer EDs combined with greater demand is causing ED waiting times to increase. This increase in waiting times is being felt by all triage categories, to include urgent and emergent patients.

Emergency Departments on the Decline

The number of healthcare facilities and service offerings has been steadily declining. Hsia et al. (2011) found from 1990 to 2009, the number of EDs declined by 27%. Also, from 1994 to 1999, the number of EDs decreased by 8% due to hospital closures and mergers (Brewster et al., 2001). During the 1990s, many hospitals reduced inpatient capacity based on expectations of lower utilization resulting from managed care and declining reimbursement (Brewster et al., 2001). Nationally, medical/surgical beds declined 18% from 1994 to 1999 and intensive care units (ICU) declined 3% during the same period (Brewster et al., 2001). In addition, many less profitable services (like primary care) were replaced with highly specialized and profitable services (Brewster et al., 2001).

Emergency Department Utilization

Demand for and use of ED services has increased significantly over the past couple decades. In 2011, Bob Isquith with the Agency for Healthcare Research and Quality (AHRQ) found adults 18 and older were associated with 98 million ED visits in 2008. According to Garcia (2010), in 2007, one in five persons and non-Hispanic and

poor persons use ED services one or more times in a 12-month. In 2007, among adults between the age of 18 and 44, uninsured persons were more likely to have one ED visit compared to insured individuals (Garcia, 2010). Brewster et al. (2001) found the number of ED visits increased 15% from 1990 to 1999. However, Mitchell (1994) found ED use increased by 19% from 1985 to 1990 (85 million visits to nearly 100 million). In addition, the National Hospital Ambulatory Medical Care Survey found an average of 108 million ED visits between 2000 and 2001 or an increase of 16% in comparison with 1996 and 1997 (Cunningham & May, 2003). According to Cunningham & May (2003), the average per person utilization rate for ED services between 1996 and 1997 was 35 visits per 100 persons while the average between 2000 and 2001 was 39. Tang et al. (2010) found ED visits increased between 1997 and 2007 more than twice what would be expected from population growth. The National Health Interview Survey (NHIS) found only 17% of the non-institutional US population used ED services and only 5% used services 2 or more times (Zuckerman & Shen, 2004). Further, this study found only 1 in 5 adults used ED services per year and 7% used ED services 2 or more times during the previous 12 months (Zuckerman & Shen, 2004). Bob Isquith with the AHRQ also found the following rates of ED utilization (Isquith, 2011, p. 18):

- 90 percent higher for Americans living in low income areas compared with those living in the highest income areas (544 visits versus 287 visits per 1,000 people)
- 24 percent higher for Americans aged 65 and older compared with those aged 18 to 44 (550 visits versus 444 visits per 1,000 people)

- 39 percent higher for Americans living in rural areas compared with those living in urban areas (515 visits versus 372 visits per 1,000 people)
- 26 percent higher for women than for men (477 visits versus 378 visits per 1,000 people)

The use of ED services varies based on the time and day. For instance, the busiest time of day is 7 PM while peak hours are 10 AM, 5 PM, and 7 PM (Jacobs et al., 1971). Jacobs et al. (1971) found the heaviest ED utilization rates occur on Monday, Thursday, and Saturday with the fewest on Friday. In addition, since the majority of office-based physicians are closed during peak evening hours, EDs capture this demand due to a lack of alternatives (Jacobs et al., 1971).

Increased Waiting Times

As a result of overcrowding due to a decline in the number of EDs, patient wait times for ED services have increased. For instance, from 1999 to 2001, waiting times of 30 minutes or more increased from 36% to 45% while waiting times of less than 15 minutes decreased from 42% to 33% (Cunningham & May, 2003). In contrast, waiting times at urgent care clinics, community health centers, and office-based physician locations are shorter than EDs and only experienced a minor increase as compared to ED waiting times (Cunningham & May, 2003).

Patients often associate increased waiting times with reduced quality of care. Cunningham & May (2003) found longer waiting times are often related to perceptions of lower quality of care by many patients. However, among patients who waited 15 minutes or less, approximately 66% rated their exam as very good or excellent (Cunningham & May, 2003).

Increased waiting times coupled with other factors appear to affect patient perception of ED services. For instance, even with similar waiting times, about 77% of patients rated how well their physician listened as very positive in comparison to only 53% of ED patients (Cunningham & May, 2003). However, Cunningham & May (2003) concede this difference might be explained by the more personal, regular, and familiar doctor-patient relationship that forms in other ambulatory care settings.

Health Policy

Health policy solutions are considered a necessary component to reducing non-urgent ED use. Baker & Baker (1994) conclude policies aimed at identifying alternative, less expensive places of care and encouraging patients to use these alternatives may uncover significant savings.

In contrast, some health policies may result in less than optimal outcomes. For instance, Butler (1998) contends policy-related issues associated with non-urgent use of ED services is a concern since ED services tend to be more costly and do not provide for follow-up care.

Increased demand for ED services has also increased as a result of changes in policies. For instance, less stringent care management policies have been employed by HMOs (Brewster et al., 2001). Many HMOs have reported large increases in ED service use (Brewster et al., 2001). The HMOs attribute the increase to relaxed management in response to consumer attacks on criteria used to determine a medical emergency (Brewster et al., 2001). Further, HMO enrollees have gravitated toward ED care when having difficulty getting appointments with their primary care provider (Brewster et al., 2001).

Physician Attitude

Physician attitude toward non-urgent ED care varies significantly. Anecdotal evidence collected by Guttman et al. (2001) suggests ED providers view non-urgent patients as a nuisance. Physicians characterize non-urgent patients' reasons for seeking treatment in the ED as "trivial, minor, inappropriate, misuse, and abuse" (Guttman et al., 2001, p. 162). In addition, Guttman et al. (2001) found physician attitudes could be categorized as restrictive, pragmatic, or all-inclusive. The "restrictive" group felt urgent patients are the only appropriate type that should use ED services (Guttman et al., 2001). This group also believes non-urgent patients adversely affect the healthcare system and the reasons non-urgent patients present to the ED are more appropriate for a primary care setting (Guttman et al., 2001). Whereas, the "pragmatic" physician group felt the ED is appropriate when other options or access to care are limited (Guttman et al., 2001). Guttman et al. (2001) found this group believes that if other sources of care are unavailable, the use of the ED for non-urgent care is appropriate. Furthermore, this group feels the ED is the only point of access to the healthcare system for some segments of the population (Guttman et al., 2001). Finally, the "all-inclusive" physician group felt any reason is acceptable for seeking care at an ED (Guttman et al., 2001). In particular, this group believes if a patient is worried about a condition, then it warrants care in an ED and the ED is a point of entry into the healthcare system for non-urgent patients (Guttman et al., 2001).

Physician Referral Behavior

Physician referral behavior is another contributing factor to the increase in non-urgent ED utilization. According to Cunningham & May (2003), increased demand

placed on primary care physicians may be prompting many to refer patients to EDs since limitations based on capitation have relaxed (i.e., the disincentives associated with referring patients have been minimized). In addition, some physicians may be referring greater numbers of patients to EDs as a form of "defensive medicine" to counter potential legal issues associated with riskier conditions (Cunningham & May, 2003).

NON-URGENT EMERGENCY DEPARTMENT USE

Over the past few decades, there has been a significant increase in non-urgent patient use of ED services. For instance, in 1983, the National Medical Care Utilization and Expenditure Survey (NMCUES) found 85% of ED visits are for non-urgent conditions. In 1986, a study by Habenstreit found non-urgent ED patients account for over 50% of ED visits nationwide and only about 12% of ED visits are truly emergent. According to Kellerman (1994), several studies have found between 40% and 55% of ED patients present to the ED with non-urgent conditions. And a GAO study found 42% of ED visits were for non-urgent conditions with "non-urgent" defined as conditions that are neither life or limb-threatening nor time sensitive (Mitchell, 1994).

Many studies have identified characteristics associated with non-urgent ED use. For example, Hurley et al. (1989) found the majority of non-urgent ED care is by low-income individuals. According to Cunningham et al. (1995), most ED patients are uninsured all or part of the year while others are without a regular source of care outside the ED. In 2004, Zuckerman & Shen found frequent ED users tend to be more chronically ill with poor health status.

Federal law is also contributing to the problem of non-urgent ED utilization. The Emergency Medical Treatment and Active Labor Act (EMTALA; aka, Patient Anti-

Dumping Law) requires all hospitals that receive Medicare reimbursement to provide screening, stabilization treatment, and appropriate transfer of all patients who present regardless of ability to pay or degree of severity (Zuckerman & Shen, 2004; Brewster et al., 2001; Kellerman, 1994; Derlet & Nishio 1990).

Other factors are further compounding the problem of non-urgent ED utilization. For instance, hospitals have experienced years of downsizing, increased operating costs, and reduced reimbursement and have been left with little flexibility for unexpected patient demand (Brewster et al., 2001). For many patients, EDs have become the primary point of entrance for non-elective acute care in an inpatient setting (Brewster et al., 2001). A study by Grumbach & Keane (1993) found a large proportion of patients (45%) cited access barriers as the reason why they chose to seek care at the ED. In addition, the American College of Emergency Physicians reported in Newswire (2011) that people with one or more barriers to primary care are more likely to visit the ED and that barriers have doubled over the past decade. Barriers included limited physician office hours, wait times for appointments, difficulty in getting in touch with a primary care physician's office to make an appointment, and transportation issues (Newswire, 2011).

The unique characteristics of EDs also affect utilization by non-urgent patients. That is, EDs tend to offer a broader range of services usually not available in office-based physician settings. ED co-pays tend to be much lower and they often waive payment if the patient is unable to pay. In addition, the convenience of "care on demand" may be a driving force behind non-urgent care-seeking behavior in EDs (Derlet & Nishio, 1990). ED providers are available 24 hours a day versus limited office hours for primary care physicians (Kellerman, 1994).

Patient and physician behaviors are two of the root causes of increased ED utilization. For instance, Haddy et al. (1987) found patients typically wait varying lengths of time before seeking care. Therefore, the delay in treatment might be increasing the acuity of some conditions—making ED care the more appropriate setting. In addition, there was much variability in when office-based physicians would direct patients to seek care in an ED (Haddy et al., 1987). This variability could be affected by many factors and might be forcing physicians to rely on EDs to counter legal or regulatory threats (defensive medicine).

Types of Emergency Department Utilization

There is significant variation in the definitions of what constitutes appropriate and inappropriate ED use. According to the American College of Emergency Physicians (ACEP), the definition of an emergency among healthcare professionals suggests the use of "prudent judgment" in the decision to seek care in an ED setting (Buesching et al., 1985).

> California legislation that defined an emergency as a medical condition manifesting itself by acute symptoms of sufficient severity such that absence of immediate medical attention could be reasonably expected to result in any one of the following: (a) serious jeopardy to the patient's health, (b) serious impairment of bodily functions, or (c) serious dysfunction of any bodily organ or part (Derlet & Nishio, 1990, p. 262).

In 1970, the American Hospital Association indicated "the ED should be used for 'any condition that—in the opinion of the patient, his family, or whoever assumes the responsibility of bringing the patient to the hospital—requires immediate medical attention'" (Malone, 1995, p. 471).

Appropriate Use

The definition of an "appropriate" reason for seeking care in an ED is a matter of perspective. According to the model, there are two types of need for determining appropriateness: evaluated and perceived. Evaluated need is based on a professional assessment (triage), and perceived need is based on the patient's desires. Wolcott (1979) found significant differences between physician assessment of urgency and patient perception of need to determine appropriate versus inappropriate ED usage.

According to Mitchell (1994), there is not a generally accepted method for categorizing urgency or appropriateness based on evaluated need. The professionally-assigned triage categories of emergent, urgent, or semi-urgent are related to appropriate utilization based on evaluated need by the professional medical community. In addition, the American College of Emergency Physicians (ACEP, 2004) defines "emergent" as requiring professional medical attention within 15 minutes, "urgent" care between 15 and 60 minutes, "semi-urgent" between 1 and 2 hours, and "non-urgent" treatment between 2 and 24 hours.

> A patient has made an appropriate visit to an emergency department when: an unforeseen condition of a pathophysiological or psychological nature develops which a prudent layperson, possessing an average knowledge of

> health and medicine would judge to require urgent and unscheduled medical attention most likely available after consideration of possible alternatives in a hospital emergency department (ACEP, 2004, p. 47).

The definition of an appropriate ED visit has been described by many researchers. For instance, Neely & Norton (1999, p. 21) define an appropriate ED visit as "an emergency is an unforeseen serious medical condition requiring immediate attention if left untreated." The CDC defined "non-urgent as any patient who did not require attention immediately or within a few hours" (Mitchell, 1994, p. 962). Buesching et al. (1985) characterized an appropriate visit as a visit requiring subsequent review and where symptoms were present for greater than 72 hours and the patient's overall condition had changed. In addition, the criteria used by Buesching et al. (1985, p. 673) to determine an appropriate ED visit consisted of the following:

- Admission to a hospital or nursing home;
- Paramedic run;
- Inter-hospital transfer requiring stabilization or vital signs to avert serious morbidity or mortality;
- Fever in adults greater than 38.8 Celsius and present less than 72 hours;
- Fever in children greater than 39.4 Celsius and present less than 72 hours;
- Chest pain as chief complaint;
- Significant hemorrhage (defined as volume enough to cause concern for patient's emotional well-being or vital functions);
- Referred by a physician to the ED;

- Sudden onset of an acute condition after office hours or on the weekend when increased risk of morbidity or mortality might result if left untreated;
- Acute condition present less than 72 hours and patient unsuccessfully attempted to contact a physician; and
- Acute exacerbation of less than 24 hours of a chronic condition and patient unsuccessfully attempted to contact a physician

Payer organizations define evaluated need differently than ED professionals. Neely & Norton (1999) found only one HMO included "member perception" as a determining factor for what constitutes an emergency. In general, most payers focus on discharge diagnosis and urgency of the medical condition (Mitchell, 1994) which are based on evaluated need criteria. There are two economic factors that further confound any attempts to specify appropriateness of ED use (Guttman et al., 2001, p. 174):

1. Insurance companies are focused on reducing costs by funneling patients toward the least expensive source of care.
2. Hospitals want to increase the number ED visits due to their relative high revenue generation as compared to primary care visits by offering "ED fast-track" services.

In contrast to the above, patients perceive their own level of triage and are motivated to seek ED care for different reasons. A study by Habenstreit (1986) found over 60% of all ED patients believed their condition was emergent. Mitchell (1994) found appropriateness of seeking ED care is dependent on socioeconomic status, medical condition, existence of medical insurance, transportation, prevalence of violence in the

community, need for care outside of primary care operating hours, need for child care, and availability of a regular source of care.

A patient's decision to pursue non-urgent care at an ED is dependent on the product of two probabilities. That is, the probability of seeking care and the probability of going to an ED once a decision to seek care has been made (Cunningham et al., 1995).

Inappropriate Use

Similar to appropriate use, the definition of an "inappropriate" reason for seeking care at an ED is a matter of perspective. There are two types of need for determining inappropriateness: evaluated and perceived. Evaluated need is based on a professional assessment (triage), and perceived need is based on the patient's desires. The professionally-assigned triage category of non-urgent is generally related to inappropriate utilization.

The proportion of patients seeking non-urgent ED varies significantly. For instance, Buesching et al. (1985) found 10.8% of ED visits could be categorized as inappropriate. Whereas, Bond et al. (1999) found 62.5% of ED patients were non-urgent. Some groups are more likely to use ED services for non-urgent reasons. A study by Buesching et al. (1985, p. 672) found the following groups have higher rates of inappropriate ED use and were statistically significant ($p \leq 0.05$):

- Patients with Medicaid as their primary payment source;
- Children aged 5 years or younger;
- Patients who did not have a primary care physician;
- Unemployed patients;
- Patients who visited during normal business hours; and

- Patients who did not attempt to contact their primary care physician

Some of the reasons patients seek ED care are inappropriate even from the layperson's perspective. For instance, patients may recognize their condition does not warrant ED services but no other option is available. A study by Habenstreit (1986) found respondents who indicated their mothers had routinely taken them to the ED for primary care during their childhood now continue to use the ED for themselves and their children. Apparently, these patients "learned" to use the ED for primary care due to early socialization, habit, and convenience rather than through judgment (Habenstreit, 1986). However, many of these patients, regardless of insurance coverage, felt ED care was free (Habenstreit, 1986). Whereas, they felt office-based physicians typically required payment in advance and were expensive (Habenstreit, 1986).

There are significant differences in ED use related to different predisposing characteristics. For instance, Zuckerman & Shen (2004) found single parents are more likely than single adults with no children to be occasional or frequent ED users (OR = 1.13, $p \leq 0.04$ for occasional users and OR = 1.43, $p \leq 0.002$ for frequent users). In addition, when a regular source of care was available, Haddy et al. (1987) found significant differences in ED usage between groups related to marital status (54% vs 43%, $p \leq 0.01$) and smoking status (55% vs 33%, $p \leq 0.001$). That is, patients with a regular source of primary care were more likely to be married and were more likely to be non-smokers (Haddy et al., 1987). There was a significant difference between married with a regular source of care and single patients ($p \leq 0.01$; Haddy et al., 1987).

Many predisposing characteristics are associated with non-urgent ED use. For instance, patients with low socioeconomic status, low income, uninsured or on Medicaid,

and racial and ethnic minorities are more likely to seek care in an ED setting for non-urgent conditions (Grumbach & Keane, 1993; White-Means & Thornton, 1989; Pane et al., 1991; Haddy et al., 1987). Also, several studies have found these types of patients are more likely to use the ED as a regular source of primary care (Baker et al., 1994; Cornelius et al., 1991).

Cost of Emergency Department Utilization

Non-urgent ED use is much more expensive than care provided in primary care settings. Cunningham & May (2003) found the cost of treating patients in an ED setting tends to be higher than other care locations. In addition, the Office of the Inspector General found the average cost of a non-urgent ED visit was 1 to 5 times more costly than care received in a primary care setting (Mitchell, 1994). Baker & Baker (1994) found charges for ED visits were two to three times more than charges in other healthcare settings. Using the National Ambulatory Medical Care Survey, Baker & Baker (1994) found more than half of the 89.8 million ED visits in 1992 were for non-urgent care. Baker & Baker (1994) found the average first visit charge for primary care was $43 while the average first visit charge for ED care was $144 (the differences were statistically significant). Across all conditions, the estimated primary care charge was $50; whereas, the actual visit charge for ED care was $144 (Baker & Baker, 1994). For all conditions, ED charges were approximately $65 more than primary care visits (Baker & Baker, 1994). Since the likelihood of excluding valid episodes was present, Baker & Baker (1994) considered the $65 difference between ED and primary care visit charges to be a conservative estimate.

Non-urgent utilization of ED services is a contributing factor to increasing insurance costs (Cunningham & May, 2003). According to Cunningham & May (2003), demand for non-urgent ED services by the insured is resulting in higher insurance costs.

In contrast to the above studies, Neely & Norton (1999) found overall healthcare cost increases appear to be slowing with the exception of pharmaceuticals. By the end of 2010, pharmaceutical expenditures are expected to reach $100 million (Palma, 2010). However, Palma (2010) suggests costs will continue to rise from 12 – 15% in the future.

Some studies suggest cost savings may not be possible even if non-urgent ED care declined significantly. Kellerman (1994) contends that if non-urgent ED usage decreased, it may not improve the financial posture of hospitals since most of the costs associated with the operation of an ED are fixed and consist of facility and staff expenses (Baker & Baker, 1994; Kellerman, 1994).

DESCRIPTION OF THE BEHAVIORAL MODEL OF HEALTH SERVICES USE

According to Andersen and Davidson (1996), the Behavioral Model of Health Services Use is a systematic framework ideally suited for measuring access to healthcare. The initial purpose of the model was prediction and explanation of health services use (Andersen & Davidson, 1996 and Andersen, 1995). Whereas, the newest iteration was designed to also capture multi-factorial influences that affect utilization (Andersen & Davidson, 1996 and Andersen, 1995). This model was revised several times and the current iteration is in its 4th phase (Andersen, 1995). Feedback loops and outcomes in the 4th phase represent the dynamic and interdependent relationships inherent in health services utilization.

The model consists of four primary constructs: environment, population characteristics, health behavior, and outcomes (Andersen & Davidson, 1996, Andersen, 1995, and Aday & Andersen, 1974). According to Hulka & Wheat (1985), predisposing, enabling, and need factors are the predominant predictors of health care use. The Andersen (1968) model and its constructs can be used to explain care seeking behavior and are associated with choice of health care site. In particular, Andersen and Davidson (1996) indicate serious medical problems can be explained by demographic factors and perceived need; care for less serious conditions can be explained using all model constructs; and discretionary treatments can be explained by social structure, health beliefs, and enabling resources. An adapted version of the Behavioral Model of Health Services Use will be used for this study (see Table 1).

The Andersen (1968) model indicates there are psychological factors that may affect the decision to seek care. According to Butler (1998), a psychological component may help to explain a greater likelihood of non-urgent ED use consisting of:

- Dissatisfaction with primary care physician or staff;
- A belief that the ED is a better source of care;
- An external locus of primary care;
- Focus on the present represented by an unwillingness to schedule appointments or a tendency to delay care;
- A greater perception of need or sensitivity to illness; or
- A lack of knowledge about how or when to seek primary care rather than ED care

Table 1. Behavioral Model of Health Services Use (Adapted), Applied to Topic

Construct	Component	Definition	Applied to Topic
Population Characteristics	**1. Predisposing Characteristics**	Individual factors such as demographics, social structure, and health beliefs	- Age - Race - Gender - Sponsor's Branch
	2. Enabling Resources	Community and personal factors such as supply, personal means and know-how, income, health insurance, regular source of care, transportation, acceptable travel time, and waiting times	- Insurance Status - SES
	3. Need	Perceived need factors (how people judge their own health condition) and evaluated need factors (how professional medical judgment and objective measurement determine health status and necessity for professional services)	- Diagnosis
Health Behavior	**Use of Health Services**	Factors related to quantity or units of care provided/received	- Use - Cost

From "Revisiting the Behavioral Model and Access to Medical Care: Does it Matter?" by R. M. Andersen, 1995, *Journal of Health and Social Behavior, 36(1),* p. 8. Copyright 1995 by the American Sociological Association. Adapted with permission.

Population Characteristics

Population characteristics explain personal health practices and use of health services (Andersen, 1995). Components of the population characteristics construct are predisposing characteristics, enabling resources, and need (Andersen & Davidson, 1996). For instance, care seeking behavior at an ED for non-urgent conditions has become common among patients characterized as poor, non-Whites without a regular source of primary care, unemployed, young, and the uninsured (Grumbach & Keane, 1993). For these patients, EDs have become a substitute for a lack of access to primary care (Grumbach & Keane, 1993).

Predisposing characteristics explain health behaviors and consist of demographic factors that drive the need for health services (Andersen & Davidson, 1996). These characteristics consist of social structure factors that represent status within the community and the ability to adapt to the physical environment (Andersen & Davidson, 1996). These characteristics involve health beliefs associated with attitudes, values, and knowledge (Andersen & Davidson, 1996). In addition, the health beliefs explain the influence of social structure on enabling resources, perceived need, and use of health services (Andersen & Davidson, 1996).

Enabling resources are necessary to facilitate use of healthcare services using community and personal resources (Andersen & Davidson, 1996). According to Andersen & Davidson (1996), community resources consist of physician, bed supply, and availability of healthcare professionals and facilities. In addition, personal resources consist of "income, health insurance, a regular source of care, transportation, and acceptable travel and wait times" (Anderson & Davidson, 1996, p. 15). Socioeconomic status is a personal resource that consists of income and the ability acquire health insurance and transportation.

Need is a dichotomous component and consists of perceived need and evaluated need. Perceived need is a personal judgment of health status by the patient and a decision to pursue or not pursue the use of health services (Andersen & Davidson, 1996). Andersen and Davidson (1996, pp. 15-16) indicate perceived need can explain the "care-seeking process and adherence to a medical regimen." Evaluated need, however, is a professional medical judgment and objective measure of health and functional status (Andersen & Davidson, 1996). According to Andersen and Davidson (1996, p. 16),

evaluated need "will be more closely related to the kind and amount of treatment that will be provided after a patient has presented to a medical care provider."

Health Behavior

Health behavior consists of use of health services. Use and consumption (cost) of health services are directly related to personal health behaviors. According to Andersen and Davidson (1996, p. 16), personal health practices consist of behavior "performed by the individual to maintain or improve health." Andersen and Davidson (1996) further suggest use of health services can be predicted based on predisposing, enabling, and need factors and are directly related to the type of service.

The use of ED health services for non-urgent and optional conditions can be explained by health behaviors. That is, care for less serious conditions can be explained using all model constructs (Andersen & Davidson, 1996). Whereas, discretionary treatments can be explained by social structure, health beliefs, and enabling resources (Andersen & Davidson, 1996).

MODEL APPLIED TO EMERGENCY DEPARTMENT UTILIZATION

Non-urgent patients comprise a significant proportion of all users of ED services. For instance, Cunningham & May (2003) found only 47% of ED visits were emergent and required care within 15 minutes to an hour. Although dated, Gavaler & Van Thiel (1980) discovered the increase in ED use is primarily attributed to non-urgent patients. However, based on insurance sub-groupings, nearly 57% of Medicare beneficiaries were triaged as emergent or urgent (Cunningham & May, 2003). Therefore, the increase in ED utilization might be associated with semi-urgent, non-urgent, or unknown triage categories (Cunningham & May, 2003).

Population-Related Characteristics (Predisposing Characteristics)

Age

Age has been found to be a factor in intensity of care and non-urgent use of ED services. According to Cunningham et al. (1995), the very young and elderly have a higher likelihood of any physician visit. In particular, Long & Lescoe-Long (2005) found intensity of outpatient care is inversely related to age. In addition, only the very young have a higher likelihood of a non-urgent ED visit (Cunningham et al., 1995). Furthermore, a study by Guttman et al. (2001) found over half of pediatric ED visits were medically non-urgent.

Studies to determine whether age is associated with having a regular source of care are still inconclusive. According to a study by Haddy et al. (1987), the average age of patients with a regular source of care was 25.92 years while the average age of patients without was 25.87 years. Haddy et al. (1987) found a statistically significant proportion of patients do not have a regular source of care in the 21 to 30 year old age group as compared to those patients with a regular primary care physician (34% versus 21%, $p \leq 0.00006$). In addition, Habenstreit (1986) found the majority of patients who sought most of their care in the ED and rarely used clinics were more likely to be in their 20s and 30s and to have temporary or acute conditions. However, among other age groups there was not a significant difference between patients with and without a regular source of care ($p \leq 0.05$; Haddy et al., 1987).

Multiple-source patients tend to be older in comparison to patients who use the ED for primary care (Habenstreit, 1986). In particular, these patients are usually in their

mid-50s and most had at least one chronic condition that was being actively monitored (Habenstreit, 1986).

Race

Race appears to be associated with higher levels of ED use. Gavaler & Van Thiel (1980) did concede much of inappropriate ED use is associated with urban, African-American, Medicaid recipients. White patients, however, regardless of type of insurance coverage, averaged 4.3 (+/- 0.7) visits while African-American patients averaged 6.7 (+/- 1.9; not significant; Gavaler & Van Thiel, 1980). In addition, White patients with private coverage averaged 3.0 (+/- 0.3) visits while African-American patients averaged 2.2 (+/- 0.5; not significant; Gavaler & Van Thiel, 1980). Finally, White patients with Medicaid averaged 6.9 (+/- 1.8) visits versus 8.5 (+/- 2.5) visits for African-American patients (not significant; Gavaler & Van Thiel, 1980).

According to Zuckerman & Shen (2004), race appears to be associated with occasional and frequent ED use. For instance, Zuckerman & Shen (2004) found African-Americans had a higher odds ratio than Whites of being occasional users of ED services as compared to non-users (OR = 1.31, $p \leq 0.001$). Also, African-Americans had a higher odds ratio than Whites of being frequent users as compared to non-users (OR = 1.67, $p \leq 0.001$; Zuckerman & Shen, 2004). In comparison to Whites, African-Americans are more likely to be frequent ED users than occasional users (Zuckerman & Shen, 2004). In general, frequent ED users are more likely to be African-American and poor than occasional users (Zuckerman & Shen, 2004). However, adults in other racial groups were no more likely than Whites to be occasional or frequent users (Zuckerman & Shen, 2004).

There is a significant difference in healthcare utilization between African-Americans and Whites. For instance, Cunningham et al. (1995) found African-Americans were much less likely to have any physician visit than Whites but were much more likely to have a non-urgent ED visit. In particular, Cunningham et al. (1995) found African-Americans are less likely than Whites to have any physician visit. However, African-Americans are more likely than Whites to have a non-urgent ED visit while controlling for insurance coverage, socioeconomic status, health status, local area, and market characteristics (Cunningham et al., 1995).

There are many factors associated with minority women that limit or block access to health services. For instance, social isolation, language barriers, discrimination, fear of deportation, dedication to family, shame, and cultural stigma of divorce have been found to be barriers to care (Lipsky & Caetano, 2007).

The relationship between race, gender, and alcohol abuse is significant. For instance, Lipsky & Caetano (2007) found African-American women who use the ED were nearly 4 times more likely to be heavy drinkers compared to African-American women who did not use ED services. Therefore, heavy drinking was associated with African-American women and their use of ED services (Lipsky & Caetano, 2007). Also, Lipsky & Caetano (2007), found alcohol-related visits to the ED for African-Americans is nearly twice that of Whites. However, alcohol abuse was not independently associated with ED use (Lipsky & Caetano, 2007). In contrast, among Hispanic women, no alcohol or illicit drug use factors were confounding variables (Lipsky & Caetano, 2007).

There is also a significant relationship between race, gender, and drug abuse. For instance, Lipsky & Caetano (2007) found drug abuse was independently associated with

ED use (AOR = 1.84; 95% CI = 1.19, 2.86). In particular, white women who abuse or were dependent on illicit drugs were more than twice as likely to use ED services as white women who did not abuse or depend on drugs (Lipsky & Caetano, 2007). Therefore, Lipsky & Caetano (2007) found illicit drug use or dependence was associated with white women and their use of ED services.

A possible explanation for the consistent disparity between African-Americans and Whites could be a matter of perception. For instance, the perception African-Americans have of the health care system could be due to experiences related to discrimination, historically high rates of poverty, unemployment, and a lack of insurance coverage (Cunningham et al., 1995). In general, a greater proportion of African-Americans (18%) do not have health insurance coverage as compared to Whites (9%; Blendon et al., 1995). According to Blendon et al. (1995), the perceptions held by African-Americans of the health care system may, in general, be caused by a greater sense of disconnectedness from the system.

African-Americans generally differ in their attitude about public services as compared to Whites. Blendon et al. (1995) found African-Americans (46%) are more likely than Whites (23%) to rate healthcare services in their community as fair or poor. In addition, African-Americans (42%) are more likely than Whites (31%) to indicate the healthcare system needs to be rebuilt (Blendon et al., 1995). About 50% of African-Americans rated healthcare, education, and police services in their communities as fair or poor (Blendon et al., 1995). In general, a larger proportion of African-Americans feel the nation's institutions perform fairly or poorly for them as individuals and families as compared to Whites (Blendon et al., 1995).

In contrast to the above, a study by Baker et al. (1996) found race and ethnicity were not related to ED use. In addition, other confounding factors, like intimate partner violence, might be affecting the findings. Baker et al. (1996) did not find significant differences or determinants of ED use based on race when controlling for age, insurance, regular source of care, or barriers.

Gender

According to Lipsky & Caetano (2007), gender has been found to be a factor in use of ED services. For instance, Achat et al. (2010) found women were more likely to use ED services more than once per year ($p \leq 0.004$). However, Achat et al. (2010) did find that among respondents who used ED services, most were for urgent needs. Lipsky & Caetano (2007) contend gender is often accompanied by confounding factors such as intimate partner violence (IPV) and alcohol/drug use. Furthermore, women who had experienced IPV in the past 12 months were twice as likely as non-victims to use the ED (unadjusted OR = 2.00; 95% CI = 1.55, 2.58; Lipsky & Caetano, 2007). In addition, women who reported IPV were 1.5 times more likely than non-victims to use the ED after primary careling for socio-demographic and substance use factors (AOR = 1.54; 95% CI = 1.18, 2.01; Lipsky & Caetano, 2007). However, Leavitt (1979) found the significance associated with increased usage by females was linked to use of gynecological services.

Health Status

Patients with a reduced health status are more likely to use ED services. Research by Zuckerman & Shen (2004) found patients in fair/poor health are 3.64 times more likely to use ED services more frequently than patients with a better health status.

Patients with fair or poor health are more likely to be occasional or frequent users than non-users (OR = 1.91, $p \leq 0.001$ for occasional and OR = 3.64, $p \leq 0.001$ for frequent; Zuckerman & Shen, 2004).

There are differences in perceived health status between the races. For instance, a survey conducted by Blendon et al. (1995) found 33% of African-Americans perceived their health to be fair or poor while only 14% of Whites felt the same. In addition, Blendon et al. (1995) found that among a lower-income group, approximately 50% of African-Americans indicated their health was fair or poor in comparison to 33% of Whites.

Cultural & Psychosocial Factors

Cultural and psychosocial factors might be a cause for non-urgent ED use (Guttman et al., 2001). For instance, many segments of the population may feel healthcare is a guaranteed right rather than a privilege (Guttman et al., 2001). Guttman et al. (2001) suggests this type of patient perception could be resulting in greater use of ED services by non-urgent patients since the ED may be viewed as a readily-accessible "one-stop shop."

Population-Related Characteristics (Enabling Resources)

Distance to Emergency Department

Distance from the hospital has been found to be a factor in use of ED services. For instance, the further away a patient resides from their primary care physician, the greater the likelihood of ED utilization (Butler, 1998; Haddy et al., 1987). However, according to Bohland (1984), the higher use of EDs in low-income areas is not related to proximity or availability of hospital-based EDs.

As the density of EDs increases, greater ED utilization tends to occur due to reduced distance. That is, Cunningham et al. (1995) found the use of EDs for non-urgent conditions was more likely in counties with a relatively high number of hospital EDs.

The effects of distance, overcrowding, and long wait times may increase the risk to patients using ambulance services (Brewster et al., 2001). Brewster et al. (2001) found cases where an ambulance was en route to an ED and the destination ED was at capacity. As a result, the ambulance was diverted to a more distant ED resulting in an increased delay of treatment (Brewster et al., 2001).

Regular Source of Care

Many patients do not have regular source or care or have difficulty engaging their personal physician. A 1992 study by Kellerman (1994) found 66% of ED patients lacked a primary care provider. In addition, the remaining 33% were often not able to see their regular provider in an acceptable amount of time due to limited office hours and lack of weekend access (Kellerman, 1994). In support of the Kellerman study, Grumbach & Keane (1993) found 67% of ED patients did not have a regular source of care.

Existence of a regular source of care (personal provider) has been found to be a factor in use of ED services. Grumbach & Keane (1993) found having a regular source of care was a predictor of more appropriate ED use (odds ratio = 2.4, $p \leq 0.01$). In general, patients with a regular source of primary care are more likely to engage an ED for urgent conditions than patients without a regular source of care (Haddy et al., 1987). That is, patients with a regular primary care provider tended to seek unnecessary care in the ED less frequently than patients without a regular source of care (Grumbach & Keane, 1993; Haddy et al., 1987). In addition, patients that did have a regular source of

care tended to be older, female, unemployed, insured, have more chronic illnesses, and poor general health status (Grumbach & Keane, 1993).

The number of ED visits is related to having of a regular source of care. For instance, Gavaler & Van Thiel (1980) found significant differences based on personal provider status among non-urgent ED patients. The results indicated patients with a personal physician averaged 3.1 (+/- 0.4) visits during the previous year (Gavaler & Van Thiel, 1980). Meanwhile, patients without a personal physician averaged 6.6 visits (+/- 1.3; mean +/- SEM; $p \leq 0.01$; Gavaler & Van Thiel, 1980).

A lack of a regular source of care is related to ED use by non-urgent patients. For instance, patients without a regular source of care are more likely to be seen in an ED for non-urgent conditions while patients with a regular primary care provider are more likely to present with urgent problems ($p < 0.05$; Haddy et al., 1987). In addition, a 1993 report found the lack of a primary care provider was the primary reason for non-urgent patients to seek care in an ED setting.

Inappropriate ED use appears to be related to the availability of a regular source of care. Inability to identify a primary care physician was found to be the most significant factor associated with inappropriate ED use ($p \leq 0.001$; Buesching et al., 1985). Buesching et al. (1985) did find the ability to identify a personal physician was a significant factor among many subgroups but did not find significance among all subgroups.

The poor and uninsured often cite the lack of a regular source of care as a significant barrier. In a comparative study of minor illnesses at George Washington University Hospital ED in Washington, DC, poor and uninsured patients were more

likely to cite a lack of a regular source of care (access barrier) as the primary reason for seeking care at the ED (Grumbach & Keane, 1993). In particular, Grumbach & Keane (1993) found uninsured patients were more likely to give access barriers as their reason for seeking care in an ED than insured patients ($p \leq 0.001$).

The type of healthcare coverage (insurance) may determine whether patients have a regular source of care. For instance, according to Gavaler & Van Thiel (1980), patients with Medicaid coverage and a personal physician averaged 4.1 (+/- 1.1) visits. Whereas, patients with Medicaid, but without a personal physician, averaged 9.7 visits (+/- 2.2; $p \leq 0.05$; Gavaler & Van Thiel, 1980). Also, Gavaler & Van Thiel (1980) found patients with private coverage but without a personal physician averaged 3.3 (+/- 0.6) visits. Meanwhile, patients with Medicaid but without a personal physician averaged 9.2 visits (+/- 2.2; $p \leq 0.025$; Gavaler & Van Thiel, 1980). In addition, Haddy et al. (1987) found patients on medical assistance programs tend to use ED services for non-urgent conditions more often than patients with insurance or a higher SES.

The ability to establish a regular source of care is affected by the low reimbursements of Medicaid. According to Cunningham et al. (1995), patients with Medicaid often have difficulty finding a regular source of care due in part to the relatively low reimbursement rates. Also, Cohen (1993) found that Medicaid beneficiaries in states with low reimbursement were more likely to use hospital-based services rather than office-based physician services.

The primary variable related to determining non-urgent ED use appears to be access to a physician rather than variables associated with insurance coverage or race (Gavaler & Van Thiel, 1980). Gavaler & Van Thiel (1980) contend the quality of

healthcare provided to the urban poor may be seriously affected by the "one-shot" visit to an ED. Without a personal provider, a lack of continuity of care and the psychological benefits of familiarity, friendliness, and personalized service/physician are absent (Gavaler & Van Thiel, 1980).

Insurance Status

Managed care programs have been able to demonstrate some reduction in non-urgent ED use. For instance, managed care's focus on controlling costs and reducing inappropriate utilization has reduced non-urgent ED usage by Medicaid beneficiaries (Hurley, Freund, & Taylor, 1989). However, Medicaid patients tend to rely on ED services for their primary care more than other types of patients (Hurley et al., 1989).

There are differences in ED usage between Medicaid and the uninsured and private insurance groups. For example, Cunningham (2006) found more than 33% of Medicaid adult enrollees had an ED visit in the previous 12 months compared to about 20% of both uninsured and privately insured adults. In addition, approximately 20% of both uninsured and privately insured adults used ED services in the past 12 months (Cunningham, 2006).

ED usage tends to be higher for Medicaid patients than for the uninsured and private insurance groups. In addition, the high use of ED services by Medicaid enrollees is consistent with the high use of healthcare in general (Cunningham, 2006). Cunningham (2006) found physician visits for adults with Medicaid are approximately four times higher than for uninsured adults and twice as high as the private insurance group. Furthermore, ED and physician visit usage is higher for Medicaid adults than the other groupings while controlling for individual characteristics (Cunningham, 2006).

Enrollment in Medicaid (universal healthcare) is associated with non-urgent ED utilization. For instance, a study by Butler (1998) found specific attributes associated with Medicaid enrollees and ED usage. Cunningham et al. (1995) found a higher likelihood of non-urgent ED use was associated with enrollment in public health care programs. In particular, patients that are female, older, more satisfied with their HMO, more satisfied with their doctor, and enrolled in the HMO for longer are less likely to visit the ED for non-urgent reasons (Butler, 1998). In addition, Schoenman, Evans, & Schur (1997) found enrollees in Maryland's Medicaid Access to Care Managed Care Program experienced a 5% higher likelihood of an ED visit when compared to a primary care group with no difference in volume of visits. Also, according to State Health Watch (2009), when the Oregon Health Plan cut its benefits package in 2003, ED visits by the uninsured increased significantly from 6,682 per month in 2002 to 9,058 per month in 2004.

Some studies suggest Medicaid patients are the primary cause of the increase in ED usage. A study conducted by Kellerman (1994) in 10 large cities found Medicaid patients felt it was extremely difficult to receive care for non-urgent, yet uncomfortable conditions outside of an ED setting.

Reduced health status coupled with Medicaid is associated with greater use of ED services. Medicaid enrollees tend to have greater health problems that account for some of their higher levels of ED usage compared to other low-income people (Cunningham, 2006). Cunningham (2006) found adults with fair or poor health have higher levels of ED use across all categories. Medicaid adults with fair or poor health have twice as many ED visits as the uninsured and private insurance groups (Cunningham, 2006).

Furthermore, differences in health status and other factors account for more than half of the difference between Medicaid adults and the uninsured and private insurance adult groups (Cunningham, 2006).

In contrast to the studies that found increased ED usage by Medicaid patients, the Sisk et al. (1996) findings did not find significant increases in ED usage. That is, Sisk et al. (1996) found no difference in ED use between enrollees in five managed care plans in New York and a fee-for-service comparison group.

The growing numbers of uninsured patients are increasing the pressures on EDs. In the 1990s, the number of uninsured increased by 10 million (Brewster et al., 2001). According to Brewster et al. (2001), the uninsured have placed significant pressure on EDs to continue providing care in compliance with EMTALA. However, Ullman et al. (1975) found only a small number of poor return to the ED for further treatment of non-urgent conditions. In addition, pressure from the uninsured is high since they tend to use ED services for primary care (Brewster et al., 2001). Cunningham & May (2003) suggest the uninsured increasingly use the ED for primary care due to a lack of access to other primary care options.

The uninsured typically perceive their quality of care to be lower. Cunningham & May (2003) found among subgroups, the uninsured rated all types of care less favorably and they rated perceived quality of ED care much lower (i.e., 38% rated the ED exam as very good or excellent compared to the other subgroups at 50%).

Perceived quality of care by the uninsured is further reduced due to minimal (or zero) reimbursement and practices that are closed to uninsured patients. For instance, Cunningham & May (2003) found greater patient demand coupled with lower

reimbursement rates have reduced the willingness of office-based physicians to provide care for uninsured patients. Therefore, reduced healthcare options for the uninsured are forcing them toward EDs (Cunningham & May, 2003).

The lack of alternative sources of care for the uninsured is adding significant stress on the healthcare system. Cunningham & May (2003) content other viable alternatives must be established for the uninsured or the increasing charges for non-urgent ED care will severely affect the capabilities of the US healthcare system. In particular, as greater numbers of uninsured patients present to EDs for less serious conditions (i.e., non-urgent or primary care-type conditions that could've been treated before becoming urgent or emergent) the cost to the system will continue to grow unchecked.

Anecdotal evidence suggests the uninsured are the cause of increased ED visits while evidence points toward the insured as the primary driver. According to Newton et al. (2008), there are several myths related to ED use by the uninsured. The myths assume the uninsured use the ED for non-urgent care, they are the leading cause of overcrowding, and they use the ED disproportionately based on their population (Newton et al., 2008). Research by Cunningham & May (2003) found the insured account for most of the increase in ED visits. Combined, private insurance and Medicare beneficiaries account for nearly 67% of the increase in ED visits while the increase from private insurance alone is nearly 50% (Cunningham & May, 2003). Although individuals with private insurance increased their ED usage by 24%, there has also been a comparable increase for other types of health services (Cunningham & May, 2003). In addition, the privately insured have increased their use of outpatient hospital services by 31% with a 29%

increase in visits to office-based physicians (Cunningham & May, 2003). For the uninsured, EDs have become their only option for primary care (Cunningham & May, 2003).

There are differences in ED usage between patients with private insurance and the uninsured. For instance, in relation to uninsured patients, any type of coverage (except Medicare only) increased the likelihood of any outpatient physician visit (Cunningham et al., 1995). Research by Zuckerman & Shen (2004) found that while controlling for other individual and market variables, those with private insurance are more likely to be occasional users than the uninsured (OR = 1.11, $p \leq 0.041$). However, those with private insurance are not more likely to be frequent users than the uninsured (OR = 0.95, $p \leq 0.681$; Zuckerman & Shen, 2004). Also, Zuckerman & Shen (2004) found uninsured and privately insured adults are equally likely to be frequent users. Publicly insured adults are more likely to be occasional or frequent users than the uninsured (OR = 1.27, $p \leq 0.005$ for occasional and OR = 2.08, $p \leq 0.001$ for frequent; Zuckerman & Shen, 2004). Adults with private insurance and the uninsured who are frequent ED users have about five ED visits every 12 months (Zuckerman & Shen, 2004). For patients with private health insurance, their coverage generally does not cover the total cost for outpatient care outside the ED which prompted greater use of the ED for non-urgent care (Habenstreit, 1986).

Some research has found no difference in non-urgent ED use between patients with and without insurance. A study by Cunningham et al. (1995) did not find statistically significant differences. Further, this research concluded the likelihood of a non-urgent ED visit between persons with private insurance, public coverage ("universal"

healthcare), or those uninsured for an entire year was no different (Cunningham et al., 1995).

Insurance status is not a factor associated with ED utilization by Hispanic women. According to Lipsky & Caetano (2007), Hispanic women were more likely to use ED services as a result of less access to or lower utilization rates of primary care regardless of insurance status.

The ability to pay for healthcare varies based on insurance status and race. For instance, a study by Blendon et al. (1995) found patients with Medicare had the fewest problems paying for healthcare as compared to patients with other types of coverage. However, a sizable proportion (23%) of African-Americans with Medicare had difficulty paying for care (Blendon et al., 1995). Whereas, only 7% of Whites reported having difficulties paying for care (Blendon et al., 1995). Among patients with private insurance, African-Americans still experienced more difficulty paying for care and prescription drugs than Whites (Blendon et al., 1995).

Insurance status is associated with likelihood of ED utilization. Uninsured and private insurance patients use ED services at approximately the same frequency; however, patients with public insurance are 2.08 times more likely to use ED services (Zuckerman & Shen, 2004). Also, Zuckerman & Shen (2004) found less than 15% of ED users are uninsured and frequent ED users are not more or less likely to be insured/uninsured.

Socioeconomic Status (SES)

SES (or in this study, military pay grade) has been found to be a factor in use of ED services. Low SES patients, those with Medicaid, tend to use the ED more than those

with private insurance (i.e., a higher SES; Cheung et al., 2012; Jacobs et al., 1971). According to Cunningham et al. (1995), patients with higher family incomes are less likely to have a non-urgent ED visit while controlling for insurance coverage. Garcia (2010) also found in 2007 that as family income increased, the likelihood of having one or more ED visit in the previous 12-months decreased. Higher family incomes and higher education were associated with an increased likelihood of having any physician visit but a decreased likelihood of a non-urgent ED visit (Cunningham et al., 1995).

Affluence of residence is a strong proxy measure for SES and is associated with fewer ED visits. For instance, Cunningham et al. (1995) found patients that reside in higher income neighborhoods are more likely to use outpatient physician services but are less likely to have a non-urgent ED visit. In addition, patients in lower income areas are less likely to use any outpatient physician services (Cunningham et al., 1995). However, Cunningham et al. (1995) concedes this may be explained by the relatively low distribution of office-based physicians in low-income areas and increased availability of EDs at public hospitals.

As SES increases, the rate of ED use decreases. For instance, Zuckerman & Shen (2004) and Jacobs et al. (1971), found an indirect relationship between SES and rate of ED visits. For instance, Jacobs et al. (1971) found the lowest SES areas have about six times the rate of ED use as the highest SES areas. Therefore, these findings suggest patients from lower SES are more likely to use ED services for non-accidents and non-urgent care (Jacobs et al., 1971).

Family income based on the Federal Poverty Level (FPL) is related to use of ED services. Based on a study by Zuckerman & Shen (2004), about 60% of a non-ED user

groups had incomes above 300% of the FPL (non-poor), 30% had incomes between 100% and 300% of the FPL (near-poor), and 9% had incomes below the 100% FPL (poor). Near-poor and poor adults were more likely than non-poor to be occasional users (OR = 1.12, $p \leq 0.002$ for near-poor and OR = 1.17, $p \leq 0.014$ for poor; Zuckerman & Shen, 2004). Near-poor and poor adults are much more likely than non-poor to be frequent users (OR = 1.62, $p \leq 0.001$ for near-poor and OR = 1.81, $p \leq 0.001$ for poor; Zuckerman & Shen, 2004).

The poor and minority populations have been found to be high utilizers of ED services. Habenstreit (1986) found non-urgent use of ED services by indigent and minority populations in inner city EDs have increased significantly in the last 25 years. An assessment of ED utilization at an inner city ED in Brooklyn, New York found 60% of ED patients were triaged as non-urgent and only 10% of patients were emergent (Habenstreit, 1986).

Individuals with lower income are more likely to use ED services for different reasons than higher income patients. Grumbach & Keane (1993) found many low income patients view their use of the ED as a default choice caused by a lack of alternatives; whereas, higher income patients view their medical problems as requiring ED care. In a study by Cunningham et al. (1995), over half of ED patients were middle or high income, 65.4% identified a physician's office as their usual source of care, and nearly 70% were White. In addition, Hurley et al. (1989) found low-income individuals are less likely to have a regular source of care than medium or high-income individuals. Furthermore, Cunningham et al. (1995) found a higher likelihood of non-urgent ED use was associated with lower socioeconomic status. However, based on the results of the

Gavaler & Van Thiel (1980) study, it appears the problem is not how to control non-urgent ED usage since the greatest benefit would be realized by improving health care delivery for the urban poor. Gavaler & Van Thiel also noted low-income patients who lack a personal physician often use the ED as their primary source for care (1980).

In the military environment, SES is equivalent to rank or pay grade. Aside from special types of pay, which tend to be a small proportion of overall pay, rank is equivalent to income. Further, all members of the same rank are paid approximately the same with an exception of a minor increase at the 2-year anniversary of a given rank. In addition, SES in the military is also a loose proxy measure for education since 100% of officers are required to have, at minimum, a bachelor degree. Whereas, only 7.8% of the enlisted force have a bachelor degree or higher (AFPC, 2012).

Mode of Transportation

The mode of transportation used by most patients indicates the severity of their conditions. In a study by Jacobs et al. (1971), the transportation method used by the majority of patients (86.2%) was to walk or arrive by car or bus. Jacobs et al. (1971) found only 10.8% of patients arrived by ambulance. In addition, since a large proportion of patients arrive by their own means, this suggests "simple medical problems" as opposed to more emergent conditions (Jacobs et al., 1971).

Access to Care

Some of the barriers and reasons for using ED services are related to access to care. About 49% of patients indicated primary care access barriers as their reason for seeking care at EDs (Grumbach & Keane, 1993). Also, Guttman et al. (2001) found the reasons patients use the ED for non-urgent care usually occur when there is limited

access to care. Patients who "feel" they have little choice or opportunity to establish a lasting primary care relationship resort to non-urgent ED use (Guttman et al., 2001).

Population-Related Characteristics (Need)

Need for healthcare services can be affected by unmet medical needs, patient health status, diagnosis, or other factors (such as intimate partner violence). Unmet medical needs can affect care seeking behavior for ED services. For instance, Zuckerman & Shen (2004), found 6% of non-ED users reported having an unmet medical need while 11% of occasional users and 19% of frequent users report having an unmet need. Therefore, occasional and frequent users are more likely than non-ED users to report having an unmet medical need (OR = 1.67, $p \leq 0.001$ for occasional and OR = 2.38, $p \leq 0.001$ for frequent users; Zuckerman & Shen, 2004).

Patient health status is associated with non-urgent ED utilization. According to Cunningham et al. (1995), perceived poor health as indicated by a high number of bed and restricted activity days, increased the likelihood of any type physician visit and use of ED services for non-urgent conditions. In addition, Cunningham et al. (1995) found a higher likelihood of non-urgent ED use was associated with poor health status, larger family size, and less education.

The determination of whether a medical condition is appropriate for ED care is much different between parents and professional medical staff. For instance, when children are non-urgent patients, the decision to engage the healthcare system falls to the parents (Guttman et al., 2001). In addition, what parents consider an appropriate reason for ED use tends to be significantly different than professionally assigned triage categories (Guttman et al., 2001).

Diagnosis

Professionally assigned diagnoses following an ED visit can be used as a proxy for triage category. However, according to a study by Haddy et al. (1987), there were no statistically significant diagnoses among urgent ED patients with and without a regular a source of care. The Children's Health Program (CHP) is a public program that covers outpatient care for low-income children and identified a list of diagnosis codes that it considered emergencies qualified for payment for ED services (Butler, 1998). Based on this list, the CHP found 76.7% of ED visits are not emergencies (Butler, 1998). However, Cunningham et al. (1995) emphasized the importance of assessing the magnitude of non-urgent care compared to overall outpatient visits. In contrast, a study by Butler (1998) found an analysis of complexity and resource intensity of ED and primary care visits suggested the majority of patients choose the proper setting for non-urgent health care.

Among non-urgent ED patients who present for care, the reasons they engage EDs for services vary significantly (see Table 2). Derlet & Nishio (1990) found the most common chief complaint of non-urgent patients were back pain (8%, n = 335) and joint pain (7%, n = 304).

A previous study comparing diagnosis to ED use found the reasons most patients seek ED care are not serious and could be satisfied in a non-ED setting. For instance, Jacobs et al. (1971, p. 309) collected diagnostic data using diagnosis codes and the "injuries and adverse effects of chemicals and other external causes" group were the most common. Accidents accounted for nearly half of visits and among these, falling, piercing or cutting, and auto accidents comprised the majority (Jacobs et al., 1971). According to

Table 2. Non-Urgent ED Visit Chief Complaints

Complaint	Percent
Other complaints (< 2.5% each)	22.5
Back	8
Joint	7
Rash	6.5
Pharyngitis	6.4
Recently evaluated elsewhere trauma	6.3
Dental problems	6.1
Prescription refill	6
Ear pain	5.7
Urinary tract infection	4.3
Myalgias	3.5
Minor trauma within 48 hours	3.4
Headache	3.2

From "Refusing Care to Patients Who Present to an Emergency Department" by R. Derlet & D. Nishio, 1990, *Annals of Emergency Medicine, 19 (3),* 262 – 267. Copyright 1995 by the Annals of Emergency Medicine. Adapted with permission.

Jacobs et al. (1971), a "bona fide emergency" was determined by a physician and a masters-level nurse answering the question, "was the visit a 'true medical emergency'?" The results of this determination found 35% of visits were true emergencies, 57% required treatment within 24 hours by an office-based physician, and 6% of visits did not require care by a physician within 24 hours (the remaining 2% could not be properly determined; Jacobs et al., 1971). In general, these findings suggested 65% of ED visits are not serious enough to justify use of ED services (Jacobs et al., 1971).

Intimate Partner Violence

Intimate partner violence (IPV) is associated with ED usage. According to Lipsky & Caetano (2007), African-American and Hispanic women who experienced IPV are more likely to use ED and inpatient services compared to non-Hispanic women. For instance, African-American race and ethnicity of IPV victims were positively associated with ED use (AOR = 1.46; 95% CI = 1.13, 1.88; Lipsky & Caetano, 2007). Hispanic

victims of IPV were 3.7 times more likely than their non-victim counterparts to use ED services in the past year (AOR = 3.68; 95% CI = 1.89, 7.18; Lipsky & Caetano, 2007). Further, Lipsky & Caetano (2007) found Hispanic women who experienced IPV were 3 times more likely than other race/ethnicity IPV victims to use ED services (AOR = 2.99; 95% CI = 1.37, 6.54). Therefore, IPV may be a driving factor associated with Hispanic women and their use of ED services.

IPV, Hispanic ethnicity, and use of ED services are associated with use of other services. Lipsky & Caetano (2007) found Hispanic women who were IPV victims and used ED services were less likely to have used social or health services in the past 12 months.

Health Behavior

A health behavior of significant concern involves patients who seek ED care but later leave without being seen. In particular, Baker et al. (1991) found patients with different triage categories who faced long ED waiting times were equally likely to leave without being seen. And more importantly, many patients who left had more acute problems that subsequently resulted in hospitalization (Baker et al., 1991).

Health seeking behavior is influenced by many factors. For instance, according to Cunningham (2006), adults in fair or poor health have higher levels of ED use across all coverage groups. The annual utilization rate for physician visits (ages 18 – 64) for the private insurance group is 3.59 visits per person, 1.95 visits per person for the uninsured, and 7.41 visits per person for Medicaid enrollees (Cunningham, 2006). Furthermore, low use levels were associated with a larger proportion of clinical appropriate visits (Hurley et al., 1989).

Patient satisfaction may influence non-urgent ED use while other attitudinal factors may have no effect. For instance, Butler (1998) found satisfaction was only marginally associated with non-urgent ED use. Whereas, other attitudinal factors like personal sensitivity to illness, knowledge of when to use primary care services, belief the ED is a better source of care, and willingness to seek care from a regular primary care physician were not significant predictors of non-urgent ED use (Butler, 1998).

Health-Related Behavior (Use)

There are general characteristics associated with non-urgent ED utilization. In 1995, Cunningham et al. found most non-urgent users of ED services are not poor, uninsured, minority, and with no other source of care. However, in 2010, Kroner et al. found people with lower education, low income, public insurance, or African-Americans are more likely to use ED services.

There are specific groups that tend to be frequent ED users. A study conducted by Kroner et al. (2010), found two groups were statistically significant frequent ED users. Kroner et al. (2010) defined high ED utilizers as having two or more ED visits per year. Among the high ED utilize group, "young children and children with special health care needs were less likely (odds ratio: 0.55 and 0.72, respectively) to have" a high ED utilization rate (Kroner et al., 2010, p. 133).

Many health system factors could be contributing to the increase in non-urgent ED use. For instance, increased usage by non-urgent patients may be a result of limited capacity of hospital ambulatory care or office-based physicians (Cunningham & May, 2003). Also, difficulty making appointments with physicians, long wait times, perceived inadequate time spent with the physician, and closing of practices to new patients might

be the cause of the increase (Cunningham & May, 2003). Since EDs tend to remain open 24/7 and don't require an appointment (i.e., walk-ins are the standard), many patients may consider EDs a viable and more convenient alternative to other sources of primary care (Cunningham & May, 2003).

Demand for ED services has increased due to the increasing number of patients (Brewster et al., 2001). Brewster et al. (2001) found demand is increasing due to a larger number of patients seeking all types of care.

The number of visits to outpatient physician settings is associated with use of ED services. The average number of physician visits in outpatient settings other than the ED was higher for patients with a non-urgent ED visit than for patients who had only outpatient physician visits (5.6 versus 4.8, $p \leq 0.05$; Cunningham et al., 1995). Further, the number of physician visits in outpatient physician settings was higher for non-urgent ED users than for patients who did not have a non-urgent ED visit (there were no statistically significant differences between these groups; Cunningham et al., 1995). According to McCaig (1994), over half of all visits to the ED are for conditions that are not life threatening or would be considered non-urgent or routine. Butler (1998, p. 94) recommended further research focused on "more precise and usable definitions of emergency care." Also, patients who use the ED for non-urgent care tend to use other outpatient services at a level nearly equal to that for patients who did not use the ED (Cunningham et al., 1995). Patients with less acute medical conditions tend to seek care in EDs when they have difficulty receiving care in primary care settings (Brewster et al., 2001).

An ED physician is more likely to describe an appropriate reason for an urgent or emergent ED visit differently than a patient with symptoms, a primary care physician, or an administrator (Butler, 1998). Treatment of minor illnesses and for primary care services have become a significant proportion of medical care provided in EDs (Guttman et al., 2001). In addition, Guttman et al. (2001) suggested some studies have found a slight decrease in non-urgent use of ED services; however, these studies still found nearly half of ED use was for non-urgent conditions.

Utilization in primary care settings is related to use of ED care. According to Zuckerman & Shen (2004), adults with a utilization rate of three (3) or more visits to physicians are 5.29 times more likely to be frequent ED users. This research suggests frequent ED users do not seek care in an ED setting as a replacement for primary care, rather frequent ED users tend to be a less healthy sub-population and therefore need greater and more often medical attention (Zuckerman & Shen, 2004). From 1992 to 2001, ED visits increased by 20% to 108 million visits while the number of EDs decreased 15% to 3,934 (Zuckerman & Shen, 2004). Although the number of ED visits increased and the availability decreased, most people do not use ED services in any given year (Zuckerman & Shen, 2004). Among the ED non-user group, 26% reported no ED visits, 29% reported one (1) to two (2) visits, and 35% reported three (3) or more visits during the previous 12 months (Zuckerman & Shen, 2004). Among frequent ED users, 76% reported having three (3) or more visits to primary care or use of other healthcare services (Zuckerman & Shen, 2004). Non-users with one (1) to two (2) non-ED visits are more likely to be occasional users than adults without any primary care or other non-ED visits (OR = 1.47, $p \leq 0.001$), but there was not a statistically significant odds-ratio

between the frequency of non-users versus adults with no non-ED visits (OR = 1.03, $p \leq 0.867$; Zuckerman & Shen, 2004). However, adults with three (3) or more visits to primary care or other healthcare services in the previous 12 months are more likely to be occasional or frequent users (OR = 2.71, $p \leq 0.001$ for occasional and OR = 5.29, $p \leq 0.001$ for frequent users; Zuckerman & Shen, 2004).

Continuity of Care

Continuity of care can lower costs, reduce unnecessary ED usage, and improve patient satisfaction. The benefits of continuity of care are more cost-effective care due to early preventive and primary care services (Butler, 1998). Also, according to Butler (1998), continuity of care reduces non-urgent ED use and improves patient satisfaction with HMO services.

In contrast to episodic ED care, there are many benefits to continuity of care. For instance, a study by Butler (1998) found continuity of care to be more cost-effective including early preventative and primary care services resulting in reduced non-urgent ED usage. In addition, medical care provided in an ED environment lacks the benefits of long-term therapeutic and prevention-oriented care provided in primary care setting (Guttman et al., 2001). Further, Butler (1998) found satisfied enrollees and increased continuity of eligibility included additional benefits contrary to ED services.

Multiple Source Users

Patients seek care from multiple-sources, to include EDs, for various reasons. For instance, non-urgent multiple source users typically consider cost, quality of care, accessibility, prior experience, convenience, and availability of a pharmacy (Habenstreit, 1986).

Multiple-source users tend to prefer office-based physicians over EDs to avoid waiting for quality care. Habenstreit (1986) found private physicians were preferable to EDs for serious conditions due to shorter wait times and more personalized service. In addition, when multiple-source users have serious or painful medical conditions, they often seek care in a primary care setting to avoid the long wait in an ED (Habenstreit, 1986).

Some ED usage by multiple-source users may be the result of increased convenience in comparison to office-based care. Many multiple-source users admit they would use clinics or office-based physicians if they could've gotten a more convenient appointment (Habenstreit, 1986). According to Cunningham (2011), some patients go to the ED even when they have a primary care physician due to greater convenience.

Health-Related Behavior (Cost)

Non-urgent use of EDs adds a significant cost burden to the healthcare system. In addition, care in an ED setting for non-urgent problems is more costly than comparable care in a primary care setting (Kellerman, 1994). Baker & Baker (1994) found ED visit charges tend to range from 2.5 to 3 times higher than primary care. Costs for non-urgent ED use totaled $3.2 billion in 1987 and $5 to $7 billion in 1993 (Cunningham et al., 1995; Baker & Baker, 1994). The cost of non-urgent ED care is about 4% of all outpatient physician services to include ED visits for urgent care (Cunningham et al., 1995). However, the American College of Emergency Physicians reported in Newswire (2011) that ED care only consumes 2% of all healthcare spending.

Treatment of non-urgent conditions in primary care settings is less costly than non-urgent treatment in an ED (Grumbach & Keane, 1993). The average cost per visit

for non-urgent ED care was about $150 and the average cost of urgent care was nearly $176 (Cunningham et al., 1995). However, the cost for a non-urgent ED visit is about three time the cost of a typical $54 office-based physician visit (Cunningham et al., 1995). In comparison, outpatient physician visits in a hospital setting tend to average $397 when they include outpatient surgeries and expensive tests and procedures (Cunningham et al., 1995). Less resource intensive and non-surgical visits still remain high at about $200 per visit (Cunningham et al., 1995). In contrast, the American College of Emergency Physicians reported in Newswire (2011), that the cost of caring for a non-urgent patient are the same as a visit to a primary care physician.

POSSIBLE SOLUTIONS TO MITIGATE NON-URGENT USE

Many possible solutions have been considered to mitigate ED overcrowding and reduce non-urgent care seeking. For instance, according to Grumbach & Keane (1993), referral of non-urgent ED patients to primary care settings is a viable alternative. However, this solution is contingent upon greater availability and coordination between EDs and primary care settings (Grumbach & Keane, 1993). Based on interview results from the Grumbach & Keane (1993) study, 38% of patients expressed a willingness to accept a primary care appointment within 3 days for their non-urgent condition. Other solutions discussed by Grumbach & Keane (1993) included:

- Augmenting ED resources;
- Expediting patient admissions to inpatient status;
- Using urgent care clinics;
- Instituting patient cost-sharing programs;
- Reducing ED care for patients presenting with non-urgent conditions;

- Increase/substitute the number of community-based primary care offices while decreasing the number of EDs;
- Concentrating ED services at a select few EDs resulting in economies of scale benefits and specialization of care (Jacobs et al., 1971); and
- Patient education programs (Haddy et al., 1987)

Another viable solution is to ensure patients have a regular source of primary care. Hurley et al. (1989) found the availability of a regular source of care can decrease non-urgent ED use. Research by Haddy et al. (1987) suggests that if patients had a regular primary care provider, non-urgent ED utilization may decrease. However, it is unclear whether patients elect to not have a regular source of care because of easy access to ED services (Haddy et al., 1987). Haddy et al. (1987) concedes patients may not be able to afford or cannot gain access to a regular primary care physician. In general, a regular source of primary care is associated with reductions in non-urgent ED use, lower medical expenditures, and improved continuity and access to care (Hurley et al., 1989; Haddy et al., 1987).

Derlet & Nishio (1990) found a referral management program (selective triage) can reduce non-urgent ED visits. This type of program resulted in a decrease of non-urgent visits from 8,795 to 4,339 in a two-tier ED (Derlet & Nishio, 1990). The minor ED was able to provide care to non-urgent patients while reducing overcrowding in the major ED (Derlet & Nishio, 1990). Also, Derlet & Nishio (1990) found 99% of non-urgent patients were agreeable to a more appropriate source of care. And none of the patients referred to other care settings experienced a deteriorated condition (Derlet & Nishio, 1990).

Primary care case management is another solution related to referral management (Hurley et al., 1989). The availability of a round-the-clock case manager can provide a viable alternative to the ED for entry into the healthcare system (Hurley et al., 1989). In addition, focusing access to all medical services through a case manager applies access constraints to non-urgent ED care (Hurley et al., 1989). According to Zuckerman & Shen (2004), frequent ED users are generally frequent users of all healthcare services. And a medical (disease, case, and/or utilization) management program might help to mitigate unnecessary ED usage (Zuckerman & Shen, 2004). Also, Hurley et al. (1989) found the use of a gatekeeper resulted in reduced ED visits with no significant change in primary care visits. Hurley et al. (1989) suggested this finding might be attributed to greater continuity of care and clinically appropriate decisions by the case manager. In general, the use of primary care case managers appears to result in appropriate access to care, consistent quality of care, improved continuity of care, and cost savings (Hurley et al., 1989).

A viable solution that would be challenging to implement is to refuse care to non-urgent ED patients. Grumbach & Keane (1993) found refusal to provide care to non-urgent patients in EDs was a practical and effective solution. In addition, this option was evaluated by the University of California Davis Hospital ED in 1988 and negative outcomes were not detected (Grumbach & Keane, 1993). This option appears to be effective but acceptance by patients and the local community could be challenging. The problem with turning away non-urgent patients who present to the ED is that triage at the ED reception desk is not definitive (Kellerman, 1994).

The creation of an urgent care clinic in association with the ED has also been suggested as a viable solution (Grumbach & Keane, 1993). However, the urgent care clinic would need to be able to receive non-urgent (new) patients for same-day or next-day appointments (Grumbach & Keane, 1993). The benefits of this option is that many patients engage the healthcare system for episodic care and do not require or expect follow-up care typically received in a primary care setting (Grumbach & Keane, 1993). Further, establishing a regular source of care may reduce non-urgent use of ED services by indigent patients since patients with a regular source of care tend to use the ED appropriately (Grumbach & Keane, 1993).

A two-tiered system using related hospital services is also a viable solution. For instance, Jacobs et al. (1971) suggested using two hospital services consisting of the typical ED associated with a convenience-type clinic designed to provide primary care. However, to maximize its ability to absorb and appropriately distribute demand, a jointly designed solution is necessary (Jacobs et al., 1971).

Many hospitals have tried other solutions in direct response to overcrowding. Brewster et al. (2001) suggested the following methods can improve access to care for patients and re-direct inappropriate ED care:

- Increase ED capacity and number of inpatient beds;
- Focus on improving recruitment and retention of nursing staff or reassign nursing staff from outpatient to inpatient clinics;
- Improve the admissions and discharge process to open beds more quickly for other patients;

- Increase the use of clinical practice guidelines to standardize treatment to optimize patient discharges;
- Assign physicians with patient management expertise to assist with the discharge process; and
- Postpone elective admissions and surgical procedures

Solutions involving the use of technology also show promise. For instance, Neely & Norton (1999) suggested telephonic services for managing demand can be used to mitigate non-urgent ED utilization. This service would provide medical advice over the phone, health education recordings, automated calling to remind patients of regular follow-ups, and telephone triage (Neely & Norton, 1999). Another solution involved using an electronic application for capturing and sharing patient data between medical facilities (Kellerman, 1994; Jacobs et al., 1971).

Educational EDs may mitigate unnecessary ED utilization (Chande et al., 1996; Roberts et al., 1983). The findings and groupings identified in the Guttman et al. (2001) study suggested there would be value in developing educational materials for healthcare providers related to ED usage. This takes into account different types of provider ideologies by recognizing different assumptions by providers and patients and what they consider appropriate reasons for ED use (Guttman et al., 2001).

Negative outcomes are not associated with reductions in non-urgent patient ED use. A quality of care study performed by the Research Triangle Institute (1988) found no evidence of poor outcomes associated with reduced ED use.

Improvements to the healthcare delivery system and information for patients to make appropriate care decisions are needed to mitigate unnecessary use. Guttman et al.

(2001) suggested mitigating non-urgent ED use should consist of methods to manage the logistics of the healthcare system. In addition, methods aimed at improving the delivery of primary care and managing non-urgent conditions without the use of ED services will also help to alleviate non-urgent utilization.

Many policy-based solutions have been proposed that fail to deliver. For instance, Zuckerman & Shen (2004) found policies aimed at mitigating unnecessary ED use might be ineffective. The shortfall of access to care policies may be due to the interconnected relationship between ED and non-ED services (Zuckerman & Shen, 2004). In addition, all patients that present to EDs for care may not require emergent care (Grumbach & Keane, 1993). However, they still deserve medical attention. Therefore, policies that deny access to ED services without providing a timely and appropriate alternative are ethically and clinically inappropriate (Grumbach & Keane, 1993).

Most recently, a three-tiered approach to mitigate unnecessary ED use was identified by the Government Accountability Office. The approach included diversion, care coordination, and access (GAO, 2011). Diversion involves educating patients on the appropriate use of ED and other healthcare services (GAO, 2011). Care coordination can be provided to existing patients to use primary care services as their first response and includes education aimed at reducing preventable conditions that could result in use of ED services. Moreover, access methods include evening, weekend, same-day, and walk-in appointments that make primary care services a viable and convenient alternative to the ED (GAO, 2011).

Although there are many possible solutions, many confounding issues remain and result in unintended consequences. For instance, frequent ED users with chronic

conditions may continue to seek ED care for access to specialty care (Zuckerman & Shen, 2004). Another solution posed by Grumbach & Keane (1993) considered re-directing non-urgent patients to primary care to shorten ED wait times. However, the potential improvement in wait times may result in attracting greater numbers of new patients (Grumbach & Keane, 1993). Another solution many EDs unintentionally employ is waiting times resulting from overcrowding and limited resources (Grumbach & Keane, 1993). Also, Grumbach & Keane (1993) found ED waiting times do not appear to limit care-seeking behavior. The major drawback with waiting times is that they often do not discriminate between necessary and unnecessary triage categories (Grumbach & Keane, 1993). Another solution used in Arkansas involved denial of claims for inappropriate use of ED services for Medicaid recipients (Kellerman, 1994). As a result, the program resulted in fewer payments but no change in number of visits (Kellerman, 1994).

The development of a viable and effective solution to mitigate non-urgent ED use should consist of policy and process components. For instance, key factors to consider in developing a solution should balance availability and accessibility with comprehensiveness and continuity (Jacobs et al., 1971). Jacobs et al. (1971, p. 312) suggested a "cooperative effort which will result in evolutionary change beneficial to both provider and receivers of ambulatory services" should be the focus of any solution. In addition, according to Kellerman (1994), policymakers should place more emphasis on improving access to primary care since there are many barriers. Also, Kellerman (1994) further suggested universal healthcare and integration of EDs as an integral part of the outpatient care system may help to solve many access to care problems.

LIMITATIONS OF THE EXISTING LITERATURE

There are many limitations and shortcomings in the existing literature. In addition, there are conflicting results found in much of the literature. For instance, there may not be a clear association between non-urgent ED users and their preference to use the ED as a regular source of care (Cunningham et al., 1995).

Another shortcoming of the literature is the lack of comparison between non-urgent ED and primary care utilization. For instance, Cunningham et al. (1995) found few studies consider utilization of other outpatient services that are viable alternatives to non-urgent ED use.

There were no studies found that used the Behavioral Model of Health Services Use as a framework for assessing ED utilization. In particular, there was a lack of research aimed at mitigating non-urgent ED usage using the Behavioral Model of Health Service Use.

The literature also falls short due to the lack of studies focused on the imbalance in the supply and demand equation for ED services. Few studies focus on population growth, long-term economic factors, physician discretion, or the lack of consistent and equitable policy. In addition, the research aimed at identifying viable and enduring policies and practices are deficient.

As the research shows, there is a lack of clarity among triage definitions, ED costs, and outcomes. For instance, Mitchell (1994) suggested more research is needed to clearly define triage categories and analyze costs and outcomes associated with providing care in ED versus primary care settings.

CONCLUSION

The prudent layperson criterion provided the foundation for many federal regulations. This criteria does not stop patients from contacting their primary care provider in emergent situations (Neely & Norton, 1999). According to Neely & Norton (1999), the prudent layperson definition has been added to the following federal mandates:

- Medicare and Medicaid reimbursement guidelines in the 1997 Balanced Budget Amendment
- Patient Access to Responsible Care Act (PARCA)
- Health Care Consumers Bill of Rights as supported by the Secretaries of Defense, Labor, Veterans Affairs, and Health and Human Services

  Instructions provided to patients by HMO

Some instructions are very complex, open to interpretation, and do not clearly define an emergency or differentiate between an urgent and non-urgent medical condition (Neely & Norton, 1999).

Within the private sector, there is an expectation that "universal" healthcare coverage will result in decreased demand for ED services (Kellerman, 1994). In addition, Kellerman (1994) contends "universal" healthcare might decrease non-urgent ED utilization (Kellerman, 1994).

In contrast to some anecdotal evidence, the Zuckerman & Shen (2004) study found frequent ED use is not related to being uninsured or having a lack of access to other types of care. Frequent ED users are more likely to be publicly insured, to report health problems, and to have two or more primary care or other non-ED visits in the

previous 12 months (Zuckerman & Shen, 2004). However, according to this research, frequent ED users do not appear to use ED services as a replacement for a lack of access to primary care – in general, these patients simply use more services of all kinds (Zuckerman & Shen, 2004). In addition, the Journal of the American Medical Association reported in the Hospitals & Health Networks (2008) the uninsured are not the cause of ED overcrowding and do not use the ED disproportionately to insured patients. Garcia (2010) also found for those under age 65, the uninsured were no more likely than the insured to have one ED visit in a 12-month period.

Reductions in reimbursement can affect physician and hospital acceptance of federal or state sponsored insurance plans. According to Habenstreit (1986), a potential unintended consequence of reduced Medicaid reimbursement in comparison to higher private pay fee-for-services, is a greater proportion of less qualified physicians may focus on Medicaid patients due to competition for patients. If this were to happen, the result could be that lower income patients receive lower quality of care in relation to patients who can support higher reimbursement (Habenstreit, 1986). It has been found that "many of the doctors whose primary income is from Medicaid reportedly lack hospital affiliations, have fewer credentials, and are less likely to be board certified than community based physicians who see relatively few Medicaid patient or do not accept them at all" (Habenstreit, 1986, p. 521). Hospital clinics are not a viable alternative for Medicaid patients since these clinics usually lack appointment flexibility, have limited hours, and often provide specialized services rather than routine primary care (Habenstreit, 1986).

Many hospital EDs provide a rarely used but essential service of responding to public emergencies (e.g., 9/11) due to their 24/7 availability and offer of care regardless of ability to pay (Cunningham & May, 2003). In addition, since facilities and staff are on duty 24 hours a day, it may be more cost effective for companies to select an insurance program permitting episodic ED care rather than requiring patients to make a subsequent appointment during work hours (Kellerman, 1994). According to Brewster et al. (2001, p. 4), the issues that have adversely affected EDs has resulted in an "erosion of emergency stand-ready capacity" which makes EDs an extremely valuable yet expensive asset. As overcrowding continues to adversely impact EDs, the benefit they provide could reduce their ability to respond (Cunningham & May, 2003). As a potential solution, higher copayments for insured patients for non-urgent ED usage and charging uninsured patients more (and more aggressive collections) for non-urgent care may reduce non-urgent workload but may not reduce overall demand for ED services (Cunningham & May, 2003). However, Wallace et al. (2008) found no significant change in healthcare expenditures when copayments were used to reduce non-urgent ED utilization.

EDs often provide services not typically expected in a healthcare setting. Since non-urgent care seeking at EDs has increased significantly, EDs often find they are providing not only routine, primary care services, but are also providing social work services (Grumbach & Keane, 1993).

Non-urgent ED use fills a unique void in the healthcare system for the uninsured. That is, rather than treating unnecessary ED usage as a problem, Kellerman (1994)

suggested EDs can be part of the solution since vulnerable populations tend to use the ED as their only interaction with the healthcare system.

Understanding attitudinal factors associated with ED use might be used to improve delivery of health services. According to Butler (1998), understanding psychological reasons behind the use of ED care seeking can aid administrators in improving the comfort, convenience, and accessibility of managed care systems.

Several ED utilization topics would add to the existing body of knowledge. For instance, research is needed on ED usage by patients with a regular source of preventive care. In addition, study is needed on methods to mitigate non-urgent ED use similar to those methods employed in primary care settings (e.g., copays). Moreover, from an ethical standpoint, research (and debate) is need on whether non-urgent ED care is a "privilege" or a right like emergent, urgent, and semi-urgent ED care.

CHAPTER III

METHODS

This chapter identifies the population, research questions and design, data source and collection, sampling methodology, human subjects protection, study variables, hypotheses, and statistical tests used in this research. All data used in this research was secondary data extracted from the Air Force Medical Service electronic health record (EHR). The unit of observation was episode-based ED and primary care utilization by adult female family members (spouses) of active duty military. Variables were selected from EHR data elements associated with model constructs and episode-based encounters. Statistical tests were used to assess the effectiveness of the Behavioral Model of Health Services Use (Andersen & Davidson, 1996; Andersen, 1995; Aday & Andersen, 1974) as a theoretical framework for explaining ED utilization in the context of the Air Force Medical Service for patients with "universal" access to care (see Figure 2).

HUMAN SUBJECTS

The data used in this study was approved by the US Air Force per the data use agreement with the Air Force Medical Service Information Technology & Information Management Branch. Furthermore, this study was approved by the Old Dominion University Institutional Review Board. The data did not include protected health information (PHI); however, randomly created unique patient IDs were created to select/deselect cases based on inclusion and exclusion criteria (the IDs were created arbitrarily and did not contain, in whole or part, any PHI). The data was handled in compliance with the Administrative Simplification section of the Health Insurance Portability and Accountability Act of 1996; the Privacy Act of 1974; the Institutional

Review Board of Old Dominion University; 21 CFR 50 Protection of Human Subjects; 21 CFR 52 Protection of Human Subjects; 32 CFR 219 Protection of Human Subjects; Air Force Instruction (AFI) 40-402 Protection of Human Subjects; AFRLI 40-402 Using Human Subject in Research, Development, Test, and Evaluation; DoD Directive 3216.2; 10 USC 980 Limitations on Use of Humans as Experimental Subjects; the data use agreement between the author and the Air Force Medical Service; and via guidance provided from the Air Force Medical Service Institutional Review Board office. In addition, the data used for this research was destroyed at the conclusion of this study in accordance with the data use agreement and the Old Dominion University Institutional Review Board.

POPULATION OF INTEREST

The population of interest consisted of all Air Force Medical Service beneficiaries (9.2 million in 2008). Female dependents of active duty military were selected as the sample population for this research since this group consumes a large proportion of ED and primary care services. This population, however, is markedly different from the general population since the personal costs associated with medical care are nominal (i.e., active duty and their family members do not pay for services; retirees and their family members pay a flat fee of $230 for an individual or $460 for a family per year; time is the only cost incurred by active duty and their family members). Therefore, there are no monetary disincentives to limit use of health services – in general, this population has no-cost, universal access to healthcare.

RESEARCH QUESTIONS

The main research question was, "Why do adult female dependents of active duty military members with 'universal' healthcare misuse ED services?" More specifically, this research attempted to answer the question, "Using a subset of constructs from the Behavioral Model of Health Services Use as a framework, what are the factors affecting non-urgent (inappropriate) patient utilization of ED services within the Air Force Medical Service?" In particular, this research explored the following questions:

1. What are the characteristics of non-urgent ED, emergent ED, acute primary care, and routine primary care patients related to population characteristics and health behavior factors (descriptive analysis)?
2. What are the differences between non-urgent ED, emergent ED, acute primary care, and routine primary care patients related to population characteristics and health behavior factors (differential analysis)?
3. What are the odds of non-urgent ED use related to specific population characteristics and health behavior factors while controlling for other characteristics and factors (predictive analysis)?

RESEARCH DESIGN

The research design (see Figure 3) was a post-test only with a matched equivalent control group (observational retrospective causal-comparative study) using secondary data. This design assessed the effectiveness of the Behavioral Model of Health Services Use (Andersen & Davidson, 1996; Andersen, 1995; Aday & Andersen, 1974) as a theoretical framework for explaining ED utilization in the context of the Air Force Medical Service (see Figure 2). An ED intervention was not performed by the

Figure 3. Research Design

Post-test only with equivalent control group		
ED group (used non-urgent ED services in 2008)		
Systematic random sample of female dependents of active duty	ED (non-urgent use of ED services)	Observation
Primary care group (equivalent control) (used routine primary care services in 2008 and did not use ED services in 2008)		
Age-matched (paired) sample of female dependents of active duty		Observation

researcher. The ED group (non-urgent users of ED services in 2008) was the cohort that sought ED treatment and the primary care group used primary care services in 2008 and did not use ED services in 2008 (January thru December).

The research design was simply an observation of behaviors and how different behaviors are associated with one another. Since an observational design can be used to collect data at the time of ED use or from archived records, statistical tests and conclusions were derived from the observations (Bluman, 2001).

DATA SOURCE & COLLECTION

This study employed secondary data from ED and primary care patient encounters from 2008 at a military medical center within the continental US with a fully operational 24/7 ED. In total and according to the Air Force Medical Service website, there were over 34 million outpatient visits at over 63 military hospitals in 2008. Episode-based ED and primary care patient information from the Air Force Medical Service's EHR (called 'AHLTA') was associated with constructs from the Behavior Model of Health Services Use. In particular, the unit of observation was episode-based non-urgent ED and primary care utilization by adult female family members (spouses) of active duty military.

Variables were selected from a review of data elements in the EHR that were associated with model constructs and episode-based encounters.

Data was collected using the Air Force Medical Service's COHORT Microsoft SQL database. This database receives an automated electronic transfer of clinical and business data from the local EHR servers on a nightly basis. Data extracted from COHORT was delivered in Microsoft Excel CSV format via download from the Air Force's secure File Transfer Protocol (sFTP) website. The inclusion and exclusion criteria and sampling methodology were applied using Microsoft Excel since the available student version of SPSS only permits 1,500 cases. Once the Excel file was reduced to N = 460, the data was imported into SPSS Version 16.0 (student version) for analysis.

Triage Category

The triage category (i.e., non-urgent, semi-urgent, urgent, and emergent) for ED care was input by ED staff upon patient arrival and explanation of the chief complaint. This variable was based on a professionally-assigned triage of the patient's condition (evaluated need). The reliability of the triage category was dependent on the training, expertise, and qualifications of the medical staff. For this study, the reliability of this variable was considered high since there are standardized criteria taught to all ED staff.

Inclusion Criteria

The following criteria were used to select (include) cases for the sample:

- Female dependents of active duty
- Aged 18 years and older (i.e., adults)
- Patients seen in the ED and assigned a triage category

- Patients seen in primary care for routine or acute care services
- NOTE: For the ED group, the first unique case will be randomly selected. For the primary care group, the first unique age-matched case will be selected.

Exclusion Criteria

The following criteria were used to deselect (exclude) cases from the sample:

- Subsequent cases if the patient was already selected
- Males
- Patients under age 18
- Patients not classified as Air Force Medical Service beneficiaries
- Active duty military
- Retirees
- Family members of retirees
- Foreign military and their family members
- Others not captured by the inclusion criteria

Patients not classified as Military Health System beneficiaries were excluded since their insurance and co-pay status are unknown. Active duty military were excluded since this population is required to engage the Air Force Medical Service on an annual basis. In addition, this category was also required to seek care anytime work will be missed due to poor health status (e.g., feeling ill). This group was required to maintain a level of health that may be higher than the general population (i.e., per physical fitness requirements and annual testing). Male spouses of active duty were excluded since this population is much smaller in proportion to female spouses of active duty. Patients under

age 18 were excluded since the decision to seek ED or primary care is typically decided by a parent or guardian. Retirees and family members of retirees were excluded since they pay a nominal annual fee (insurance) and anecdotal evidence suggests this group may seek inappropriate care due to convenience. For instance, retirees often use other military services, such as the commissary (base grocery store), and they may seek unnecessary care due to the hospital's proximity to other base services. There are other categories of patients, not specifically identified here, that were excluded and are not accounted for by the inclusion criteria (e.g., ED patients without a professionally-assigned triage category identified as "no triage/unknown").

SAMPLING METHODOLOGY

The sampling methodology ensured representativeness and matching of the ED and primary care groups. The total sample size was n = 460 unique episode-based ED and primary care adult female dependents of active duty military members.

Selection of the ED and Primary care (Matched) Groups

A probability method was employed using systematic random sampling to select the ED group. The ED group was selected from patients who used ED services in 2008 (i.e., patients who only used ED services).

An age-matched (paired) sample was selected from all eligible patients who only used primary care services in 2008 (i.e., patients who did not use ED services). The following steps were used to select the ED and primary care groups:

1. A frequency distribution table using the age variable was produced using the complete inclusive population (i.e., female spouses of active duty who used non-urgent ED services in 2008).

2. The percentage by age was multiplied by half the planned sample size of n = 460. For example, if 50% of the total inclusive population are 25 years of age, then 50% x 230 = 115. Therefore, using this methodology, 115 cases (persons) at age 25 were randomly selected from the ED group. This was calculated using all ages from the frequency distribution table in step #1 to ensure the total proportions used total 100%.
3. The ED group was organized by age. Using the number to be included from step #2, the first instance of the age through the total number to be included was selected.
4. A frequency distribution table using the age variable was produced using the ED group. Using the frequencies by age from the ED group as a guide, step #3 was applied to all eligible patients who only used primary care services in 2008 (i.e., patients who did not use ED services). Using this methodology, an age-matched primary care group with a sample size of n = 230 was selected.

DATA TRANSFORMATION

Data transformation (normalization) methods are meant to change the shape of the data into a normal (or nearly normal) distribution. Since some statistical tests require normally distributed data, normalization might be appropriate. The result of transformation is a derived measurement (Rothstein & Echternach, 1993). Common methods include square root, log, and inverse transformations (Osborne, 2002). According to Osborne (2002), the order presented is the power of the transformation from weakest to strongest. In addition, the method selected should be the minimum

appropriate transformation to achieve a normal (or nearly normal) distribution (Osborne, 2002).

BONFERRONI ADJUSTMENT

Multiple bivariate statistical tests (hypotheses) were performed on this dataset. To mitigate the chances of a Type I or II error and make it more difficult for any single test to be statistically significant (StatSoft, 2011), a Bonferroni Adjustment was used. For this study, an alpha (α) of 0.05 would normally be used to determine significance. However, using this adjustment (α/k), the α of 0.05 will be divided by the number of statistical tests (k). Therefore, for bivariate statistical tests, they were considered statistically significant based on an alpha (α) of 0.0003 for 188 tests (0.05/188 = 0.0003). For multivariate statistical tests, the number of hypotheses were low so a Bonferroni Adjustment was not used (an alpha (α) of 0.05 was used).

STATISTICAL TESTS

In this study, descriptive and inferential statistics were calculated using the Behavioral Model of Health Services Use as a framework. Hypotheses were tested using several statistical methods to arrive at a conclusion that can be generalized to the population by examining a sample from the population (Daniel, 1999).

Parametric and non-parametric tests were employed to examine several hypotheses. However, most tests used were parametric since the number of cases is large (n = 460). Parametric techniques assume a normal distribution of the sample and compare the difference between two or more means. According to Daniel (1999), it is standard practice to use parametric methods when the data are approximately normally distributed (i.e., provided the data is not significantly different from a normal

distribution). Nonparametric techniques do not make an assumption about the distribution of the sample and are also referred to as distribution-free procedures (Daniel, 1999). According to Shott (1990) and Polio (1996), nonparametric techniques used to test differences will minimize the risks associated with Type I errors. A Type I error is defined as rejecting a true null hypothesis and a Type II error is failure to reject a false null hypothesis (Kelley, 1999).

Tests of Difference

Differences between ED and primary care groups were tested. Parametric and non-parametric tests of difference were employed to examine several hypotheses. Parametric tests assume a normal distribution and compare the difference between two or more means; whereas, nonparametric methods do not assume a normal distribution and compare the difference between two or more medians.

Independent t-Test (Student's t-Test)

The independent t-test is a parametric test that compares the difference between two independent (not related) sample means (Bluman, 2001). The two options associated with the use of the independent t-test are (1) equal population variances and (2) unequal population variances (Daniel, 1999). Additional assumptions associated with this test include a sample size of 30 or more cases (Bluman, 2001), interval or ratio dependent variables, a nominal independent variable, and two independent (dichotomous) groups (independent variables).

Test of Independence

Independence between ED and primary care groups were tested. A nonparametric test of independence was employed to examine several hypotheses. According to Daniel

(1999), independence is present if the distribution of the dependent variable is the same regardless of the distribution of the independent variable(s). In addition, Kelley (1999) contends these types of tests are used to assess whether ordinal variables are independent or dependent on one another.

Chi-Square Test (Association)

The chi-square test of independence is a nonparametric test that can be used to test the independence (difference) of two variables (Bluman, 2001). The chi-square test assumes both variables are nominal (or can be treated as nominal) and mutually exclusive (Plichta, 2001) and compares the observed frequencies in each contingency table cell with expected frequencies (Zimbro, 2000). Observed frequencies are frequencies from the actual data set; whereas, expected frequencies are the number of cases that would result in each table cell if the two variables were unrelated (Zimbro, 2000). In addition, according to Zimbro (2000), the chi-square test of independence can be used to test the differences between groups when the dependent variable and independent variable are nominal (Shott, 1990; Polit, 1996).

Multivariate Tests

In general, multivariate tests consist of analyzing multiple variables at the same time. According to Tabachnick & Fidell (2001), these types of tests permit analysis when there are many variables and all correlate to one another to varying degrees. In particular, these methods assess the relationship between two variables while controlling for influences from other variables (Plichta, 2002). Multivariate tests require an assessment to determine multicollinearity among the independent variables and if there is

a high correlation between IVs, there may be a need to eliminate some variables from the equation (Plichta, 2002).

Logistic Regression

Logistic regression is a method used to predict membership using independent variables from any level of measurement. In general, this method can be used to assess the odds (or probability) of membership in one of two groups using a dichotomous dependent variable (Tabachnick & Fidell, 2001). This test is used to determine the 'adjusted odds ratio' (measure of the strength of the association) of having a condition contingent upon having another condition while controlling for other variables (Plichta, 2002; Bernard & Rosner, 1990). According to Tabachnick & Fidell (2001), logistic regression is considered more flexible than other methods since it has no assumptions related to the predictor variables (i.e., it does not have to be normally distributed or of equal variance). However, there are other assumptions associated with logistic regression. For instance, Plitcha (2002) posed the dependent variable is dichotomous, the distribution of the dichotomous dependent variable is at least a 95% to 5% split (i.e., no less than 5% for the dependent variable value), for all independent variables there are some cases in combination with the dependent variable (i.e., using crosstabs, there are no empty cells), and there are at least 20 to 30 cases per independent variable.

STUDY VARIABLES

Using the Behavioral Model of Health Services Use (see Figure 1), variables used in this study were aligned with the model and were categorized as population characteristics (predisposing characteristics, enabling resources, and need) and health behavior (use of health services and cost) constructs.

Population Characteristics Construct

Population construct factors measured in this research included predisposing characteristics factors, enabling resources factors, and need factors. Predisposing characteristics factors consisted of patient age, race, and sponsor branch of service. Gender was not a factor since the inclusion criteria specifies 'females' only (males are excluded). The enabling resources factor consisted of socioeconomic status and the need factor consisted of diagnosis.

Predisposing Characteristics Factors

Predisposing characteristics factors consisted of patient age, race, and sponsor branch of service (see Table 3). Patient age was a ratio variable with multiple values. However, patient age was recoded into (1) an ordinal variable, titled 'age range', with 13 values: 18 – 24, 25 – 29, 30 – 34, 35 – 39, 40 – 44, 45 – 49, 50 – 54, 55 – 59, 60 – 64, 65 – 69, 70 – 74, 75 – 79, and 80+ and (2) a nominal, dichotomous variable titled 'age group' with two values: 18 – 39 and 40+. Race was a nominal variable with six values: Caucasian, Asian, African American, Native American, other, and unknown. Race was recoded into (1) a nominal, dichotomous variable titled 'Caucasian' with two values: Caucasian and all others and (2) a nominal, dichotomous variable titled 'African American' with two values: African American and all others. Sponsor's branch of service was a nominal variable with five values: Army, Coast Guard, Air Force, Marines, and Navy. Sponsor's branch of service was recoded into a nominal, dichotomous variable titled, 'Air Force' with two values: Air Force and all others.

Table 3. Predisposing Characteristics Factors

Variable	Variable Options	Level of Measurement
Patient Age (initial)	Varies (0 to 127)	Ratio
Age Range (recoded)	18 – 24, 25 – 29, 30 – 34, 35 – 39, 40 – 44, 45 – 49, 50 – 54, 55 – 59, 60 – 64, 65 – 69, 70 – 74, 75 – 79, 80+	Ordinal
Age Group (recoded)	18 – 39, 40+	Nominal (dichotomous)
Race (initial)	C = Caucasian, M = Asian, N = African American, R = Native American, X = Other, Z = Unknown	Nominal
Race Caucasian (recoded)	Caucasian, all others	Nominal (dichotomous)
Race AA (recoded)	African American, all others	Nominal (dichotomous)
Sponsor's Branch of Service (initial)	A = Army, C = Coast Guard, F = Air Force, M = Marines, N = Navy	Nominal
Sponsor's Branch of Service AF (recoded)	Air Force, all others	Nominal (dichotomous)

Enabling Resources Factors

The enabling resources factors consisted of socioeconomic status (see Table 4). Socioeconomic status was assessed using the sponsor's pay grade. Sponsor's pay grade was an ordinal variable with 19 values ("E" represents enlisted sponsors and "O" depicts officer): E-1, E-2, E-3, E-4, E-5, E-6, E-7, E-8, E-9, O-1, O-2, O-3, O-4, O-5, O-6, O-7, O-8, O-9, and O-10. In addition, socioeconomic status using sponsor's pay grade was

Table 4. Enabling Resources Factors

Variable	Variable Options	Level of Measurement
Sponsor's Pay Grade (recoded)	E-1, E-2, E-3, E-4, E-5, E-6, E-7, E-8, E-9, O-1, O-2, O-3, O-4, O-5, O-6, O-7, O-8, O-9, O-10	Ordinal
Sponsor's Pay Grade Group (recoded)	Enlisted, officer	Nominal (dichotomous)

recoded into (1) an ordinal variable titled 'sponsor's pay grade range' with six values: junior enlisted (E-1 to E-4), noncommissioned officer (E-5 and E-6), senior noncommissioned officer (E-7 to E-9), company grade officer (O-1 to O-3), field grade officer (O-4 to O-6), and flag officer (O-7 to O-10) and (2) a nominal, dichotomous variable titled 'sponsor's pay grade group' with two values: enlisted and officer.

Need Factors

The need factor consisted of diagnosis (see Table 5). The primary diagnosis was grouped into a major diagnostic category. Major diagnostic category was recoded into a nominal, dichotomous variable titled, 'Top-5 diagnosis' with two values: Top-5 diagnosis and all others.

Table 5. Need Factors

Variable	Variable Options	Level of Measurement
Major diagnostic category (MDC)	0 = Pre-MDC, 1= Nervous System, 2 = Eye, 3 = Ear, Nose, Mouth And Throat, 4 = Respiratory System, 5 = Circulatory System, 6 = Digestive System, 7 = Hepatobiliary System And Pancreas, 8 = Musculoskeletal System And Connective Tissue, 9 = Skin, Subcutaneous Tissue And Breast, 10 = Endocrine, Nutritional And Metabolic System, 11 = Kidney And Urinary Tract, 12 = Male Reproductive System, 13 = Female Reproductive System, 14 = Pregnancy, Childbirth And Puerperium, 15 = Newborn And Other Neonates (Perinatal Period), 16 = Blood and Blood Forming Organs and Immunological Disorders, 17 = Myeloproliferative DDs (Poorly Differentiated Neoplasms), 18 = Infectious and Parasitic DDs, 19 = Mental Diseases and Disorders, 20 = Alcohol/Drug Use or Induced Mental Disorders,21 = Injuries, Poison And Toxic Effect of Drugs, 22 = Burns, 23 = Factors Influencing Health Status, 24 = Multiple Significant Trauma, 25 = Human Immunodeficiency Virus Infection	Nominal
Top-5 diagnosis (recoded)	Top-5 diagnosis, all others	Nominal

Health Behavior Construct

Health behavior construct factors measured in this research included use of health services and cost of health services. Personal health practice factors were not included in this study due to non-availability from the Air Force Medical Service EHR. The use of health services factor consisted of triage category (ED only), appointment type (primary care only), calendar month, and clinic (ED or primary care). Cost of health services factors consisted of full cost lab services, full cost of pharmacy, full cost of radiology, total full cost, and physician work RVU.

Use of Health Services Factors

Use of health services factors consisted of calendar month, calendar year, primary care appointment type, triage category, and triage category groups (see Table 6). Calendar year was a nominal variable with a fixed value of 2008. Calendar month was a nominal variable with 12 values: January, February, March, April, May, June, July, August, September, October, November, and December. Primary care appointment type was a nominal variable with 11 values: ACUT, OPAC, ROUT, WELL, PCM, SPEC,

Table 6. Use of Health Services Factors

Variable	Variable Options	Level of Measurement
Calendar Month (initial)	1 = January, 2 = February, 3 = March, 4 = April, 5 = May, 6 = June, 7 = July, 8 = August, 9 = September, 10 = October, 11 = November, 12 = December	Nominal
Primary Care Appointment Type2 (recoded)	Routine, acute	Nominal
Triage Category Groups (recoded)	Emergent/urgent, non-urgent	Nominal
Clinic (initial)	ED, primary care	Nominal

PROC, EST, GRP, APV, and DROUT. Primary care appointment type was recoded into a nominal, dichotomous variable titled, 'primary care appointment type2' with two values: routine or acute. Triage category was recoded into a nominal, dichotomous variable titled, 'triage category groups' with two values: emergent/urgent or non-urgent. Clinic was a nominal variable with two values: ED and primary care.

Cost of Health Services Factors

Cost of health services factors consisted of full cost of lab services, full cost of pharmacy, full cost of radiology, total full cost, and physician work RVU (see Table 7). Full cost of laboratory services, full cost of pharmacy services, full cost of radiology services, and total full cost were ratio variables with multiple values. In addition, Physician (individual) work RVUs was a ratio variable with multiple values.

Table 7. Cost of Health Services Factors

Variable	Variable Options	Level of Measurement
Full Cost of Lab Services	Varies	Ratio
Full Cost of Pharmacy Services	Varies	Ratio
Full Cost of Radiology Services	Varies	Ratio
Total Full Cost	Varies	Ratio
Physician Work RVUs	Varies	Ratio

RESEARCH HYPOTHESES

This research focused on relationships between Behavioral Model of Health Services Use construct components related to ED and primary care utilization. In particular, relationships between population characteristics and health behavior were tested.

Descriptive Statistics

Descriptive statistics measure the level of non-urgent ED use in the Air Force Medical Service adult female spouse population (see Table 8). In particular, statistics from variables in Table 8 answered the question, "What is the level of non-urgent ED use in the Air Force Medical Service adult female spouse population?" All study variables that are an appropriate level of measurement were described using measures of central tendency (mean, median, mode), measures of dispersion (range, variance, standard deviation), frequency distribution tables, and graphs/charts (bar charts, histograms, pie charts, or line graphs).

Table 8. Variables, Descriptive Statistics, and Methods of Display

Variable	Descriptive Statistics/Method of Display
Calendar Month (CM) Clinic (ED vs Primary Care) Age Age Category (< 40 or ≥ 40) Race Marital Status Sponsor Branch of Service Other Health Insurance (Yes or No) Distance from Hospital Sponsor Pay Grade Pay (Officer or Enlisted) Major Diagnostic Category (MDC) Diagnosis (Top-5 or All Others) Triage Category Primary Care Appointment Type Full Cost Lab Services Full Cost of Pharmacy Full Cost of Radiology Total Full Cost Physician Work RVUs	1. Mean 2. Median 3. Mode 4. Range 5. Variance 6. Standard Deviation 7. Frequency Distribution Table

BIVARIATE HYPOTHESES

Bivariate hypotheses measure differences and relationships between (1) population-related factors, (2) health behavior-related factors, and (3) population and health behavior-related factors. In addition, these hypotheses were grouped as ED only, primary care only, and ED and primary care. These hypotheses answered the question, "Do the constructs of the Behavioral Model of Health Services Use explain differences and relationships between patients associated with non-urgent (inappropriate) ED use, appropriate ED use, routine primary care use, and acute primary care use?"

Population-Related Factors (ED only)

The following hypotheses were assessed by selecting only patients with a non-urgent triage category and patients with an emergent triage category. These hypotheses answered the question, "What are the differences in population characteristics between patients with non-urgent (inappropriate) ED use and those with appropriate ED use?"

H1. There is a significant difference between patients with non-urgent vs emergent ED usage related to:

a. Age (ratio age variable; under 40 vs 40 and over)

b. Race (African American vs all others; Caucasians vs all others)

c. Sponsor's branch of service (Air Force vs all others)

d. Other health insurance (yes or no)

e. SES (enlisted vs officers)

f. Diagnosis (Top-5 diagnosis vs all others)

Health Behavior-Related Factors (ED only)

The following hypotheses were assessed by selecting only patients with a non-urgent triage category and patients with an emergent triage category. These hypotheses answered the question, "What are the differences in health behavior-related factors between patients with non-urgent (inappropriate) ED use and those with appropriate ED use? Specifically, these hypotheses answered the following questions:

- Do patients associated with non-urgent (inappropriate) ED use consume more resources than other types of patients?
- Are patients associated with non-urgent (inappropriate) ED use more expensive (cost more) than patients associated with appropriate ED use?
- Do patients associated with non-urgent (inappropriate) ED use account for higher physician relative value units (RVU) than patients associated with appropriate ED use?

H2. There is a significant difference between patients with non-urgent vs emergent ED usage related to:

a. Cost of laboratory services
b. Cost of pharmacy services
c. Cost of radiology services
d. Full cost of health services
e. Relative value units (RVU)

Population and Health Behavior-Related Factors (ED only)

The following hypotheses were assessed by selecting only patients with a non-urgent triage category and patients with an emergent triage category. These hypotheses

answered the question, "What are the differences in population characteristics and health behavior-related factors between various ED use subgroups?"

H3. There is a significant difference between patients under 40 years of age vs patients 40 and over who use non-urgent ED services related to:

a. Race (African American vs all others; Caucasians vs all others)
b. Sponsor's branch of service (Air Force vs all others)
c. Other health insurance (yes or no)
d. SES (enlisted vs officers)
e. Diagnosis (Top-5 diagnosis vs all others)
f. Cost of laboratory services
g. Cost of pharmacy services
h. Cost of radiology services
i. Full cost of health services
j. Relative value units (RVU)

H4. There is a significant difference between African-American (or Caucasian) patients vs all other races who use non-urgent ED services related to:

a. Age (ratio age variable; under 40 vs 40 and over)
b. Sponsor's branch of service (Air Force vs all others)
c. Other health insurance (yes or no)
d. SES (enlisted vs officers)
e. Diagnosis (Top-5 diagnosis vs all others)
f. Cost of laboratory services
g. Cost of pharmacy services

h. Cost of radiology services

i. Full cost of health services

j. Relative value units (RVU)

H5. There is a significant difference between patients with an Air Force sponsor vs all other patients who use non-urgent ED services related to:

a. Age (ratio age variable; under 40 vs 40 and over)

b. Race (African American vs all others; Caucasians vs all others)

c. Other health insurance (yes or no)

d. SES (enlisted vs officers)

e. Diagnosis (Top-5 diagnosis vs all others)

f. Cost of laboratory services

g. Cost of pharmacy services

h. Cost of radiology services

i. Full cost of health services

j. Relative value units (RVU)

H6. There is a significant difference between patients with other health insurance vs those without who use non-urgent ED services related to:

a. Age (ratio age variable; under 40 vs 40 and over)

b. Race (African American vs all others; Caucasians vs all others)

c. Sponsor's branch of service (Air Force vs all others)

d. SES (enlisted vs officers)

e. Diagnosis (Top-5 diagnosis vs all others)

f. Cost of laboratory services

g. Cost of pharmacy services

h. Cost of radiology services

i. Full cost of health services

j. Relative value units (RVU)

H7. There is a significant difference between patients (spouses) with an enlisted sponsor vs those with an officer spouse who use non-urgent ED services related to:

a. Age (ratio age variable; under 40 vs 40 and over)

b. Race (African American vs all others; Caucasians vs all others)

c. Sponsor's branch of service (Air Force vs all others)

d. Other health insurance (yes or no)

e. Diagnosis (Top-5 diagnosis vs all others)

f. Cost of laboratory services

g. Cost of pharmacy services

h. Cost of radiology services

i. Full cost of health services

j. Relative value units (RVU)

H8. There is a significant difference between patients with a top-5 diagnosis vs those with any other diagnosis who use non-urgent ED services related to:

a. Age (ratio age variable; under 40 vs 40 and over)

b. Race (African American vs all others; Caucasians vs all others)

c. Sponsor's branch of service (Air Force vs all others)

d. Other health insurance (yes or no)

e. SES (enlisted vs officers)

f. Cost of laboratory services

g. Cost of pharmacy services

h. Cost of radiology services

i. Full cost of health services

j. Relative value units (RVU)

Population-Related Factors (Primary Care only)

The following hypotheses were assessed by selecting only patients with a routine primary care appointment and patients with an acute primary care appointment. These hypotheses answered the question, "What are the differences in population characteristics between patients with routine primary care use and those with acute primary care use?"

H9. There is a significant difference between patients who use routine vs acute primary care services related to:

a. Age (ratio age variable; under 40 vs 40 and over)

b. Race (African American vs all others; Caucasians vs all others)

c. Sponsor's branch of service (Air Force vs all others)

d. Other health insurance (yes or no)

e. SES (enlisted vs officers)

f. Diagnosis (Top-5 diagnosis vs all others)

Health Behavior-Related Factors (Primary Care only)

The following hypotheses were assessed by selecting only patients with routine primary care use and patients with acute primary care use. These hypotheses answered the question, "What are the differences in health behavior-related factors between

patients with routine primary care use and those with acute primary care use?"

Specifically, these hypotheses answered the following questions:

- Do patients associated with acute primary care use account for higher physician relative value units (RVU) than patients associated with routine primary care use?
- Do patients associated with routine (or acute) primary care use consume more resources than other types of patients?

H10. There is a significant difference between patients who use routine vs acute primary care services related to:

a. Cost of laboratory services

b. Cost of pharmacy services

c. Cost of radiology services

d. Full cost of health services

e. Relative value units (RVU)

Population and Health Behavior-Related Factors (Primary Care only)

The following hypotheses were assessed by selecting only patients with routine primary care use and patients with acute primary care use. These hypotheses answered the question, "What is the difference in population characteristics and health behavior-related factors between routine and acute primary care patients?"

H11. There is a significant difference between patients who use routine vs acute primary care services related to:

a. Age (ratio age variable; under 40 vs 40 and over)

b. Race (African American vs all others; Caucasians vs all others)

c. Sponsor's branch of service (Air Force vs all others)

d. Other health insurance (yes or no)

e. SES (enlisted vs officers)

f. Diagnosis (Top-5 diagnosis vs all others)

g. Cost of laboratory services

h. Cost of pharmacy services

i. Cost of radiology services

j. Full cost of health services

k. Relative value units (RVU)

Population-Related Factors (ED & primary care)

The following hypotheses were assessed by comparing (1) non-urgent triage category, (2) emergent triage category, (3) routine primary care use, and (4) acute primary care use. These hypotheses answered the question, "What are the differences in population characteristics between non-urgent ED use, emergent ED, routine primary care use, and acute primary care use?"

H12. There is a significant difference between patients who use non-urgent ED, emergent ED, routine primary care, or acute primary care services related to:

a. Age (ratio age variable; under 40 vs 40 and over)

b. Race (African American vs all others; Caucasians vs all others)

c. Sponsor's branch of service (Air Force vs all others)

d. Other health insurance (yes or no)

e. SES (enlisted vs officers)

f. Diagnosis (Top-5 diagnosis vs all others)

Health Behavior-Related Factors (ED & primary care)

The following hypotheses were assessed by comparing (1) non-urgent triage category, (2) emergent triage category, (3) routine primary care use, and (4) acute primary care use. These hypotheses answered the question, "What are the differences in health behavior-related factors between non-urgent ED use, emergent ED use, routine primary care use, and acute primary care use?" Specifically, these hypotheses answered the following questions:

- Do patients associated with non-urgent (or emergent) ED use consume more resources than other types of patients?
- Do patients associated with non-urgent (or emergent) ED use consume more resources than routine (acute) primary care patients?
- Are patients associated with non-urgent (inappropriate) ED use more expensive (cost more) than patients associated with routine (acute) primary care?
- Do patients associated with non-urgent (inappropriate) ED use account for higher physician relative value units (RVU) than patients associated with routine (acute) primary care?

H13. There is a significant difference between patients who use non-urgent ED, emergent ED, routine primary care, or acute primary care services related to:

a. Cost of laboratory services
b. Cost of pharmacy services
c. Cost of radiology services
d. Full cost of health services
e. Relative value units (RVU)

MULTIVARIATE HYPOTHESES

Multivariate hypotheses (1) measure whether the Behavioral Model of Health Services Use predicts the likelihood of patient use of non-urgent (inappropriate) ED services and (2) whether the inclusion of other types of health care utilization in the model help to explain more of the variance in non-urgent care use. These hypotheses answered the question, "What are the odds of non-urgent ED use related to specific population characteristics and health behavior factors while controlling for other characteristics and factors (predictive analysis)?" Hypotheses were considered statistically significant based on an alpha (α) of 0.05. A Bonferroni Adjustment was not applied to the multivariate analyses given the total number of hypotheses were low.

MH1. Increased odds of non-urgent ED use is related to specific population characteristics and health behavior factors while controlling for other characteristics and factors:

a. Age (under 40 vs 40 and over)
b. Race (African American vs all others; Caucasians vs all others)
c. Sponsor's branch of service (Air Force vs all others)
d. Other health insurance (yes or no)
e. SES (enlisted vs officers)
f. Diagnosis (Top-5 diagnosis vs all others)

CHAPTER IV

RESULTS

This chapter describes the results of descriptive and inferential statistical analyses of the sample. First, descriptive statistics show demographics and utilization characteristics. Second, results from bivariate tests are presented to show the differential analyses. And third, results from multivariate tests are presented to show the predictive analyses using logistic regression. Data transformation was not necessary given the large sample size (n = 460). In addition, histograms of all variables did not indicate a need for transformation since all variables demonstrated a normal (or nearly normal) distribution.

POWER OF THE SAMPLE

A comparison of the population set and sample was conducted to assess the 'power' of the sample. Table 9 presents a description of the results by age range:

Table 9. Distribution by Age Range

Age Range	Population N and Percent		Sample N and Percent	
18 to 24	2,675	20	104	23
25 to 29	3,784	28	132	29
30 to 34	2,660	20	92	20
35 to 39	2,261	17	66	14
40 to 44	1,222	9	46	10
45 to 49	605	4	12	3
50 to 54	192	1	4	1
55 to 59	63	0	4	1
60 to 64	9	0	0	0
65 to 69	2	0	0	0
70 to 74	10	0	0	0
75 to 79	0	0	0	0
80+	1	0	0	0
Student's t-test ($p \leq 0.058$)	Mean Age = 31.35 (Var = 61.27)		Mean Age = 30.64 (Var = 55.76)	

The proportions by 'age range' were somewhat similar based on percentages. As confirmation, a Student's t-test (two-tailed, equal variance) indicated no significant difference ($p \leq 0.058$) between the population and sample. Therefore, by 'age range', the population and sample were similar.

A comparison of the population and sample indicated the 'power' of the sample to be moderately high. An analysis of 'age range' between the population and sample clearly indicated similarity (i.e., there was not a statistically significant difference). However, the analysis by 'age range' between the population and sample does not provide definitive evidence of similarity. Therefore, the proportions between the population and sample by 'race' and 'branch of service' variables were also assessed and found to be similar (see Table 10 for 'race' and Table 11 for 'branch of service' comparisons).

Table 10. Distribution by Race

Race	Population N and Percent		Sample N and Percent	
Caucasian	3,513	26	127	28
Asian	114	1	4	1
African-American	665	5	32	7
Native American	10	0	1	0
Other	2,633	20	79	17
Unknown	6,490	48	217	47

There was much similarity in 'race' and 'sponsor's branch of service' by proportions. Therefore, statistical analysis coupled with the similar proportions of the two additional variables suggested similarity between the population and sample. Nevertheless, given the above assessment, the likelihood of Type I/II errors remain possible.

Table 11. Distribution by Sponsor's Branch of Service

Sponsor's Branch of Service	Population N and Percent		Sample N and Percent	
Army	2,444	18	109	24
Coast Guard	77	1	5	1
Air Force	9,589	71	296	64
Public Health Service	0	0	0	0
Marines	303	2	15	3
Navy	1,071	8	35	8
NOAA	0	0	0	0
Other	0	0	0	0
Unknown	0	0	0	0

RESULTS

These results answer the question, "Using a subset of constructs from the Behavioral Model of Health Services Use as a framework, what are the factors affecting non-urgent (inappropriate) patient utilization of ED services within the Air Force Medical Service?" In particular, the results of the hypotheses tested in this research were categorized as descriptive, differential, and predictive analyses.

DESCRIPTIVE ANALYSIS

The descriptive analysis answered the research question, "What are the population characteristics and health behavior factors of non-urgent ED, emergent ED, acute primary care, and routine primary care patients?" Demographics for patients in this sample (n = 460) included age, race, marital status, branch of service, and pay grade (or rank/proxy for SES) of the active duty spouse. Age was the primary matching characteristics between the ED and primary care groups. Age was recoded to a nominal, dichotomous variable consisting of under 40 years of age and 40 years of age and over. To mitigate seasonal influences, age matching was conducted by month (see Table 12). Therefore,

the monthly distribution of patients selected in the ED and primary care groups are identical.

Table 12. Patient Distribution by Month (Complete Sample)

Month	N	Percent
January	58	12.6
February	54	11.7
March	42	9.1
April	38	8.3
May	42	9.1
June	28	6.1
July	40	8.7
August	40	8.7
September	28	6.1
October	32	7
November	26	5.7
December	32	7
TOTAL	460	100

The distribution by race shows the primarily category was 'unknown' with Caucasian and 'other' as the secondary and tertiary categories (see Table 13). The distribution of these races is similar to those found in the inclusive population used to draw this sample. The majority of patients were married while many were 'unknown'. Most patients were spouses of active duty Air Force members. Also, most of the patients were spouses of enlisted with a pay grade of E-5. However, pay grade was recoded to a nominal, dichotomous variable consisting of enlisted and officer.

Demographics of the ED and Primary Care Groups

The age variable was used to match the primary care group to the ED group. Therefore, descriptive statistics for age for both groups were identical with the average age equal to 30.64 years (median = 29, mode = 27, SD = 7.484, var = 56.003, range = 19 to 55).

Table 13. Demographics (Complete Sample)

Demographics	N	Percent
Age		
- Under 40 Years of Age	394	85.7
- 40 Years of Age and Over	66	14.3
Race		
- Caucasian	127	27.6
- Asian	4	0.9
- African-American	32	7
- Native American	1	0.2
- Other	79	17.2
- Unknown	217	47.2
Marital Status		
- Divorced	1	0.2
- Legally Separated	1	0.2
- Married	236	51.3
- Single, Never Married	18	3.9
- Unknown	204	44.3
Sponsor's Branch of Service		
- Army	109	23.7
- Coast Guard	5	1.1
- Air Force	296	64.3
- Marines	15	3.3
- Navy	35	7.6
Sponsor's Pay Grade (proxy for SES)		
- Officer	93	21.2
- Enlisted	346	78.8

Demographics for patients in the ED (n = 230) and primary care groups (n = 230) included age, race, marital status, branch of service, and pay grade (or rank; a proxy for SES) of the active duty spouse (see Table 14). In the ED and primary care groups, the racial distribution found the majority of patients were categorized as 'unknown' with 'Caucasian' and 'other' as the secondary and tertiary categories. Also, the majority of patients in the ED group were married while the remaining were 'unknown', 'single and never been married' and 'legally separated'. In the primary care group, the majority of patients were 'unknown' while the remaining were 'married', 'single and never been married', and 'divorced'. In the ED and primary care groups, most patients were spouses of active duty Air Force members. Finally, in the ED and primary care groups, most of

the patients were spouses of enlisted with a pay grade of E-5 (n = 61, 26.5% and n = 63, 27.4%). However, within the ED and primary care groups, pay grade was recoded to a nominal, dichotomous variable consisting of enlisted and officer.

Table 14. Demographics of the ED and Primary Care Groups

Demographics	ED Group N and Percent		Primary Care Group N and Percent	
Race				
- Caucasian	63	27.4	64	27.8
- Asian	1	0.4	3	1.3
- African-American	20	8.7	12	5.2
- Native American	1	0.4	0	0
- Other	41	17.8	38	16.5
- Unknown	104	45.2	113	49.1
Marital Status				
- Divorced	0	0	1	0.4
- Legally Separated	1	0.4	0	0
- Married	128	55.7	108	47
- Single, Never Married	6	2.6	12	5.2
- Unknown	95	41.3	109	47.4
Sponsor's Branch of Service				
- Army	71	30.9	38	16.5
- Coast Guard	3	1.3	2	0.9
- Air Force	128	55.7	168	73
- Marines	7	3	8	3.5
- Navy	21	9.1	14	6.1
Sponsor's Pay Grade (proxy for SES)				
- Officer	43	18.7	50	21.7
- Enlisted	187	81.3	159	69.1

Utilization Statistics

Utilization statistics for the complete sample included calendar month, other health insurance, and major diagnostic category (see Table 15). For the complete sample, the majority of patients were seen in calendar month January (12.6%) and February (11.7%); whereas, the fewest number of patients were seen in June (6.1%), September (6.1%), and November (5.7%). The major diagnostic categories show an ENT (ear, nose, & throat) diagnosis was the most common condition (n = 94, 20.4%). Musculoskeletal (n

= 67, 14.6%), skin (n = 42, 9.1%), and digestive system (n = 41, 8.9%) diagnoses were also higher than all other diagnoses. Major diagnostic category was recoded to a nominal, dichotomous variable consisting of top-5 diagnosis and all other diagnoses.

Table 15. Descriptive Utilization Statistics (Other Health Insurance & Diagnosis)

Variable	N (%)
Other Health Insurance	
- Yes	7 (1.5)
- No	453 (98.5)
Major Diagnostic Category	
- Top-5 Diagnosis	280 (60.9)
- All Other Diagnoses	180 (39.1)

Cost and consumption variables included full cost of laboratory services, full cost of pharmacy services, full cost of radiology services, full cost of healthcare services, and relative value units (RVU; see Table 16).

Table 16. Descriptive Utilization Statistics (Cost & Consumption; N = 460)

Variable	Average	Median	Mode	SD	Variance	Range
Cost of Laboratory Service	$21.30	$10.56	$0.00	$25.21	$635.75	$0 to $206.28
Cost of Pharmacy Service	$33.14	$23.02	$0.00	$37.99	$1443.12	$0 to $357.85
Cost of Radiology Services	$30.97	$19.86	$0.00	$29.57	$874.25	$0 to $150.23
Full Cost of Healthcare Services	$422.30	$349.09	$210.97	$253.71	$64367.72	$0 to $1388.01
Relative Value Units	1.46	1.34	1.34	0.76	0.58	0 to 3.8

Utilization Statistics of the ED and Primary Care Groups

Utilization variables for patients in both groups included triage category (ED group), appointment type (primary care group), other health insurance, full cost of labs, full cost of pharmacy, full cost of radiology, total full cost, relative value units (RVU), and major diagnostic category. Within the ED group, the largest proportion of patients were triaged as non-urgent (n = 172, 74.8%) while a smaller proportion were categorized as emergent (n = 58, 25.2%). In the primary care group, most primary care patients were scheduled for routine (n = 143, 62.2%) appointments while a smaller number were scheduled for acute (n = 87, 37.8%) appointments.

Most patients did not have other health insurance. In the ED group, the majority of patients did not have other health insurance (n = 225, 97.8%; see Table 17). Other health insurance is defined as insurance in addition to the Military Health System's TRICARE healthcare coverage. Also, within the primary care group, most patients did not have other insurance (n = 228, 99.1%).

Table 17. Other Health Insurance

Variable	ED Group N and Percent		Primary care Group N and Percent	
Other Health Insurance				
- Yes	5	2.2	2	0.95
- No	225	97.8	228	99.1

The costs and consumption of the ED group were much higher than the primary care group across all variables (see Table 18). Full cost of laboratory services used by the ED group averaged $33.88 per episode of care while the primary care group averaged $8.72. Full cost of pharmaceuticals used by the ED group averaged $39.63 per episode

of care while the primary care group averaged $26.65. Full cost of radiology services used by the ED group averaged $47.85 per episode of care while the primary care group averaged $14.09. Total full cost of healthcare services used averaged $562.39 per episode of care for the ED group and $282.20 for the primary care group. Relative value units generated by the ED group averaged 1.93 per episode of care while the primary care group averaged 1.00.

Table 18. Descriptive Utilization Statistics of ED & Primary Care Groups (Cost & Consumption)

Variable (Cost)	N	Average	Median	Mode	SD	Variance	Range
Laboratory							
- ED	230	$33.88	$23.62	$6.00	$29.84	$890.61	$3.64 to $206.28
- Primary care	230	$8.72	$6.47	$0.00	$8.11	$65.84	$0 to $50.21
Pharmacy							
- ED	230	$39.63	$27.27	$12.43	$37.31	$1392.38	$1.96 to $357.85
- Primary care	230	$26.65	$14.60	$0.00	$37.62	$1415.53	$0 to $315.37
Radiology							
- ED	230	$47.85	$40.16	$11.19	$31.35	$982.86	$5.16 to $150.23
- Primary care	230	$14.09	$11.19	$0.00	$14.05	$197.28	$0 to $114.78
Total Healthcare							
- ED	230	$562.39	$508.97	$210.97	$269.05	$72386.16	$166.96- $1388.01
- Primary care	230	$282.20	$252.28	$186.17	$131.17	$17204.70	$0 to $793.62
Relative Value							
- ED	230	1.93	1.62	1.34	0.79	0.62	0.45 to 3.8
- Primary care	230	1.00	0.92	0.92	0.33	0.11	0 to 1.96

The most common major diagnostic categories among the ED group were ENT (17.4%), musculoskeletal (16.1%), and pregnancy (13%; see Table 19). Within the primary care group, the most common major diagnostic categories were ENT (23.5%), musculoskeletal (13%), and other factors influencing health (13%). The major diagnostic

category variable was recoded to a nominal, dichotomous variable consisting of top-5 diagnosis and all other diagnoses.

Table 19. ED and Primary Care Top-5 and All Other Diagnoses

Variable	ED Group (%)	Primary care Group (%)
Diagnosis		
- Top-5 Diagnosis	151 (65.7)	153 (66.5)
- All Other Diagnoses	79 (34.3)	77 (33.5)

DIFFERENTIAL ANALYSIS

The differential analysis answered the research question, "What are the differences between non-urgent ED, emergent ED, acute primary care, and routine primary care patients related to population characteristics and health behavior factors?" Differences between ED and primary care patients are likely based on age, race, sponsor's branch of services, socioeconomic status, diagnosis, use, and cost. Among population characteristics for ED patients, the results in Table 20 answered the question, "Is there a significant difference between emergent and non-urgent ED triage categories related to SES, age category, and race?"

Table 20. Significant Emergent & Non-Urgent ED Results (Chi-Square)

	%	Sub-test	df	p-value
Emergent - Enlisted under 40 years of age	77.6	Phi = 0.561	1	0.000
Emergent - Caucasian patients are married	100	Phi = 0.576	1	0.000
Non-urgent - Caucasian patients are married	93.6	Phi = 0.46	1	0.000
Non-urgent - African American patients are married	82.4	Cramer's V = 0.374	3	0.000

Among population factors for primary care only patients, the result in Table 21 answered the question, "Is there a significant relationship between acute primary care characteristics related to SES and age category?" Acute patients under 40 years of age are more likely to be spouses of officers than acute patients 40 years of age and over.

Table 21. Significant Acute Primary Care Results (Chi-Square)

Acute Only			Age Category		Total
			Under 40	40 and over	
SES	Enlisted	Observed	55	2	57
		Expected	49.2	7.8	57
		within SES	96.5%	3.5%	100%
		within Age	79.7%	18.2%	71.3%
		of Total	68.8%	2.5%	71.3%
	Officer	Observed	14	9	23
		Expected	19.8	3.2	23
		within SES	60.9%	39.1%	100%
		within Age	20.3%	81.8%	28.7%
		of Total	17.5%	11.3%	28.7%

Phi = 0.468, $p \leq 0.000$

Among population and health behavior factors of primary care only patients, the result in Table 22 answered the question, "Is there a difference between routine primary care patients related to pharmacy costs and race?" Routine patients from all other races were more likely to incur higher pharmacy services costs than African-American patients.

Table 22. Significant Routine Primary Care and Pharmacy Cost Results (t-test)

	Average	t-score	p-value
Routine patients (higher pharmacy services costs)		-5.123	0.000
- All other races	$25.58		
- African-American	$6.07		

Among health behavior factors of ED and primary care patients, the results in Table 23 answered the question, "Is there a difference between ED and primary care patients related to laboratory costs, pharmacy costs, radiology costs, full costs, and RVUs?" ED patients were more likely to incur higher cost of laboratory, pharmacy, radiology, full cost, and physician work RVUs than primary care patients.

Table 23. Significant ED and Primary Care Results (t-test)

	Average	t-score	p-value
Laboratory services costs		12.336	0.000
- ED	$33.88		
- Primary care	$8.72		
Pharmacy services costs		3.716	0.000
- ED	$39.63		
- Primary care	$26.65		
Radiology services costs		14.902	0.000
- ED	$47.85		
- Primary care	$14.09		
Full cost of health services		14.197	0.000
- ED	$562.39		
- Primary care	$282.20		
Physician work RVUs		16.369	0.000
- ED	1.93		
- Primary care	1.00		

The results in Table 24 answered the question, "Is there a difference between non-urgent ED and routine primary care patients related to laboratory costs, pharmacy costs, radiology costs, full costs, and RVUs?" Non-urgent ED patients were more likely to incur higher cost of laboratory, radiology, full cost, and physician work RVUs than routine primary care patients.

The results in Table 25 answered the question, "Is there a difference between non-urgent ED and acute primary care patients related to laboratory costs, pharmacy costs, radiology costs, full costs, and RVUs?" Non-urgent ED patients were more likely to

incur higher cost of laboratory, radiology, full cost, and physician work RVUs than acute primary care patients.

Table 24. Significant Non-Urgent ED and Routine Primary Care Results (t-test)

	Average	t-score	p-value
Laboratory services costs		9.526	0.000
- Non-urgent ED	$34.49		
- Routine primary care	$8.63		
Radiology services costs		12.128	0.000
- Non-urgent ED	$46.52		
- Routine primary care	$12.84		
Full cost of health services		11.056	0.000
- Non-urgent ED	$552.87		
- Routine primary care	$281.88		
Physician work RVUs		13.578	0.000
- Non-urgent ED	1.90		
- Routine primary care	0.96		

Table 25. Significant Non-Urgent ED and Acute Primary Care Results (t-test)

	Average	t-score	p-value
Laboratory services costs		7.476	0.000
- Non-urgent ED	$34.49		
- Acute primary care	$8.80		
Radiology services costs		9.004	0.000
- Non-urgent ED	$46.52		
- Acute primary care	$16.15		
Full cost of health services		8.982	0.000
- Non-urgent ED	$552.87		
- Acute primary care	$282.73		
Physician work RVUs		9.65	0.000
- Non-urgent ED	1.90		
- Acute primary care	1.07		

The results in Table 26 answered the question, "Is there a difference between emergent ED and acute primary care patients related to laboratory costs, pharmacy costs, radiology costs, full costs, and RVUs?" Emergent ED patients were more likely to incur

higher cost of laboratory, radiology, full cost, and physician work RVUs than acute primary care patients.

Table 26. Significant Emergent ED and Acute Primary Care Results (t-test)

	Average	t-score	p-value
Laboratory services costs		8.325	0.000
- Emergent ED	$32.09		
- Acute primary care	$8.89		
Radiology services costs		8.886	0.000
- Emergent ED	$51.77		
- Acute primary care	$16.15		
Full cost of health services		9.042	0.000
- Emergent ED	$590.63		
- Acute primary care	$282.73		
Physician work RVUs		9.397	0.000
- Emergent ED	2.01		
- Acute primary care	1.07		

PREDICTIVE ANALYSIS

The predictive analysis answered the research question, "What are the odds of non-urgent ED use related to specific population characteristics and health behavior factors while controlling for other characteristics and factors?" The likelihood is high ED usage is based on age, race, sponsor's branch of services, socioeconomic status, diagnosis, use, or cost (see Table 27). Among all ED patients, those with a diagnosis in the top-5 are 2.425 times more likely to be triaged as emergent. However, Caucasian patients with non-urgent ED use are 3.751 times more likely to be spouses of Air Force members. Also, patients with non-urgent ED use and a diagnosis in the top-5 are 2.344 times more likely to be spouses of a member in another branch of service (other than the Air Force). The counter to the previous finding is Air Force patients with non-urgent ED

Table 27. Significant Results (Logistic Regression)

Group	Dependent Variable	Variable in Equation	B	SE	df	Sig	Exp(B)
ED (emergent & non-urgent)	Triage categories - Emergent	Top-5 diagnosis	0.886	0.324	1	0.006	2.425
Non-urgent	Caucasian	Air Force	1.322	0.419	1	0.002	3.751
Non-urgent	Top-5 diagnosis	Air Force	-0.852	0.377	1	0.024	[1]0.426
Non-urgent	Air Force	Top5 diagnosis	-0.820	0.373	1	0.028	[2]0.44
Non-urgent	Enlisted	40 and over	-1.049	0.5	1	0.036	[3]0.35
		Air Force	1.203	0.707	1	0.012	3.329
Non-urgent	40 and over	Enlisted	-1.05	0.499	1	0.035	[4]0.35

[1]Anti-log = 2.344
[2]Anti-log = 2.27
[3]Anti-log = 2.855
[4]Anti-log = 2.858

use are 2.27 times more likely to have a diagnosis not in the top-5. In addition, spouses of enlisted military members with non-urgent ED use are 3.329 times more likely to be spouses of Air Force members. Finally, patients 40 years of age and over with non-urgent ED use are 2.858 times more likely to be spouse of officers.

The most significant predictor of non-urgent ED use is related to SES and age category. That is, spouses of enlisted military members with non-urgent ED use are 2.855 times more likely to be under 40 years of age.

EXPLANATORY POWER OF THE MODEL

Empirical studies using the Behavioral Model of Health Services Use to explain ED utilization in the context of the Military Health System are not available. Therefore, this was the first study to use this framework applied to Military Health System patients. This model provided the framework for organizing variables, developing hypotheses, and conducting bivariate and multivariate analyses. Many of the differential and predictive tests were statistically significant. Also, since several tests were significant using the

model as a framework, the explanatory power of the model and its constructs was considered high. Further support for the use of this model was provided by Jensen (1990) who used the model to explain "Utilization of Outpatient Health Services by Army Retirees and Spouses." In this case, her findings validated the explanatory power of the model constructs by societal, individual, health services system, and need determinants related to discretionary use of outpatient health services (Jensen, 1990).

CHAPTER V

DISCUSSION AND CONCLUSIONS

Non-urgent (inappropriate) utilization of ED services by individuals with "universal" coverage is a significant strain on the healthcare system. This research explored patient factors related to non-urgent use of ED services for the purpose of reducing inappropriate use of ED services. The Behavioral Model of Health Services Use (Andersen & Davidson, 1996; Andersen, 1995; Aday & Andersen, 1974) was used as a theoretical framework for grouping patient factors in the context of the Air Force Medical Service. In particular, the primary constructs of the model were used to group variables related to utilization in military EDs and primary care clinics. The unit of observation was unique episode-based ED and primary care factors of adult female spouses of active duty military members. Since Air Force Medical Service beneficiaries have free and unlimited use of the full-range of healthcare services, they were ideally suited for this study. The findings of this research may apply to other populations with free or low-cost access to healthcare.

DISCUSSION

Inappropriate utilization of ED services has become a significant problem. A large proportion of patients present to the ED with medical problems classified as non-urgent and could be safely treated by primary care providers (Ray, 1993; Bond et al., 1999). In addition, the costs associated with the non-urgent (inappropriate) use of ED services are very high in comparison to appropriate care options.

DESCRIPTIVE ANALYSIS

A descriptive analysis was performed to answer the research question, "What are the characteristics of non-urgent ED, emergent ED, acute primary care, and routine primary care patients related to population characteristics and health behavior factors?" Within a military context and based on the sample characteristics, this research is most applicable to adult, female spouses of active duty military under age 40, married, and with an Air Force and enlisted affiliation. Race, as a patient characteristic, is less important since the majority were categorized as unknown.

In general, this research is generalizable to a population where the majority of members are under 40 years of age, married, and from a lower SES. Based on the description of the sample used in this study, this research provides insight into ED usage by vulnerable sub-populations. According to the National Coalition for the Homeless (2009) Factsheet, in 2004, 25% of the homeless were between the age of 25 and 34 while only 6% were between the age 55 and 64. This adds further credence to the applicability of this study to vulnerable groups under age 40.

Initiatives aimed at reducing non-urgent ED usage and/or redirecting care to more appropriate primary care settings should be focused on individuals under 40 years of age, married, and from a lower SES. Given this group comprises Generations X, Y, Z, and AO (always on), initiatives that capitalize on technology and electronic networking would be more successful. For example, Facebook pages for medical facilities showing real-time access to care. Some EDs have already joined the "app" and GPS world with iPod applications showing nearest ED and average wait time. Similar solutions for primary care would help by giving patients options. Further, since these generations are

more attuned to electronic communications, continuity of care is less important than speed of access and convenience.

DIFFERENTIAL ANALYSIS

A differential analysis was performed to answer the research question, "What are the differences between non-urgent ED, emergent ED, acute primary care, and routine primary care patients related to population characteristics and health behavior factors?" Several themes emerged from the differential analysis. First, ED patients are more expensive than primary care. Therefore, this research validated both anecdotal and other objective research. In addition, given these findings, any action that reduces inappropriate ED usage and redirects this care to primary care settings will lower ED-related costs while improving access to care for appropriate ED patients. Second, non-urgent patients are more expensive than routine and acute primary care. And third, ED patients generate higher RVUs than primary care patients. Since RVUs are a composite measure of resource consumption, the use of EDs for inappropriate care (primary care) is consuming unnecessary resources that should be used to care for appropriate (emergent) patients and for disaster preparedness and/or mass casualty events.

Proper healthcare utilization can be achieved through real-time, on-demand patient education and systemic changes aimed at patient behavior and motivations. Flores-Mateo (2012), found that health education, teaching patients how to use the health care system, and providing counseling in social/emotional issues was significantly correlated with a decrease in ED visits. Again, most patients using the ED inappropriately are electronically savvy, so any solution must involve the use of WiFi technologies. An application that queries the patient with a few key questions to

establish triage category followed by the nearest appropriate medical facility would 'educate' patients. Furthermore, patients should not be underestimated, television has become the primary entertainment option for most. In addition, healthcare-related television shows have become common and very popular. Therefore, much of the American public is already somewhat familiar with accurate (although dramatized) healthcare and most are able to triage. A key assumption for these patients is that they will engage the nearest healthcare setting with no consideration for continuity of care. Since all patients know EDs are open 24/7 and an appointment is not necessary, EDs have become the perfect convenience clinic for all care needs (true "open access"). Therefore, primary care and urgent care clinics with true "open access" are necessary to ensure patients have options. This could take time to embed the concept of 24/7 ED, urgent, and primary care in the American psyche. With electronic solutions, education, and 24/7 access to ED, urgent, and primary care, most patients will select the proper option (thereby reducing inappropriate ED usage).

PREDICTIVE ANALYSIS

A predictive analysis was performed to answer the research question, "What are the odds of non-urgent ED use related to specific population characteristics and health behavior factors while controlling for other characteristics and factors?" Among non-urgent ED patients, there are certain population characteristics associated with increased odds ratios. Spouses of enlisted members are 2.86 times more likely to be under 40 years of age. Patients 40 years of age and over are 2.86 times more likely to be spouses of officers. These findings coupled with those in the differential analysis, suggest any initiatives aimed at redirecting inappropriate ED usage should target patients under 40

who are spouses of enlisted members. Since those under 40 and spouses of enlisted are the larger proportion, solutions involving electronic tools and convenience would provide the greatest benefit versus cost.

Spouses of Air Force members are 2.27 times more likely to have a diagnosis that is not in the top-5. Therefore, this suggests these patients use the ED as a primary care, open access solution due to lack of access to primary care services. It's a safe assumption these patients live in closer proximity to a military ED, and therefore, find the ED a more convenient alternative when primary care services are unavailable.

The most significant predictor of non-urgent ED use is related to SES and age category. That is, non-urgent spouses of enlisted military members are 2.855 times more likely to be under 40 years of age. Therefore, enlisted military members, and particularly those under 40 years of age, should be targeted to mitigate inappropriate ED use. In addition, this finding can be translated into a non-military setting and suggests focus placed on young patients in a low SES will reduce non-urgent ED use.

When the results of the various analyses are combined, the focus should again be based on patients in Generation X, Y, Z, and AO. Electronic tools coupled with educational solutions and improved access to urgent care and primary care services would result in more appropriate care seeking behavior by patients. These solutions alone will not solve the problem but will result in a small improvement. However, these solutions combined with those presented in the "Recommendations" section would have significant impact on inappropriate ED utilization.

IMPLICATIONS

The purpose of this research was to identify factors that might be used to reduce inappropriate ED use. This research examined the factors affecting non-urgent utilization of ED services by patients with "universal" healthcare using the Behavioral Model of Health Services Use. Several statistically significant bivariate hypotheses (68) were found. These findings can be used to support the development of policies, regulations, and new patient-centric initiatives focused on decreasing inappropriate ED usage. In addition, these results can be used to support methods focused on decreasing costs (fixed and variable) associated with inappropriate ED usage. Also, these results can be used to improve the perceived quality of care for those who appropriately seek/receive ED services. Finally, the findings from this research add further validity to previous studies, anecdotal evidence, and support for needed changes to healthcare policy with a focus on the physician-patient relationship (i.e., all healthcare policy, not only ED-related policy).

RECOMMENDATIONS

The findings of this research coupled with the literature suggest a multifaceted approach is necessary. This is also true given the inherent complexity of the US healthcare system. The following recommendations would help to mitigate non-urgent use of ED services and redirect patients to more appropriate care. First, the Military Health System needs to require copays to control inappropriate utilization. The literature suggests high-deductible health care plans result in lower use. For instance, Flores-Mateo (2012, p. 4) found "cost-sharing reduced both non-urgent and urgent visits." However, within the Military Health System deductibles are not part of the health program. Therefore, copays might serve a similar purpose since the military already has

a process in all its medical facilities to collect nominal fees from patients. Further, since all military members and dependents carry identification cards with their sponsor's rank, the copays could easily be based on rank (a proxy for SES). That is, lower ranking members would pay less than higher ranking members. In addition, the copay funds received could be used by the hospital to supplement its budget. Second, sharing/exchanging patient care information across different EHRs and between different healthcare providers is needed. "Linking" all EHR systems across all healthcare providers (military and civilian) would improve continuity of care, follow-up care, and would reduce drug seeking behaviors. In the civilian healthcare sector, continuity of care and follow-up care after ED services are lacking since it's dependent on the patient to seek further care and to provide documentation from the ED visit. A national medical database that includes a national (unique) patient identifier would ensure all patients' medical history was available regardless of healthcare setting. Within the military, this already exists but is often hindered by data quality issues and the limitations of an antiquated EHR system. Third, more primary care providers are needed. Policies and funds are needed to incentivize enrollment and graduation from medical school and nurse practitioner and physician assistant programs. Further, these policies should focus more on primary care graduates and less on specialized medical training. In addition, according to Flores-Mateo (2012, p. 3), "the evidence clearly demonstrates that increased numbers of primary care centers or medical doctors is associated with lower ED visits." Fourth, policies and reimbursements need to be focused on prevention, outcomes, and proactive medicine. Reimbursement should be higher for preventive care and positive outcomes rather than reactive and defensive medicine. In addition, primary care in its

current state under the existing reimbursement structure has forced practices into a high-volume business model to maximize income and into referral centers for defensive medicine (anti-malpractice) reasons. Fifth, policy changes are needed in malpractice and tort areas. Defensive medicine (unnecessary care) is a direct result of fear of legal action by the patient. Further, many specialists are forced to maximize services (some might be practicing defensive medicine) resulting in increased revenue to compensate for extremely high malpractice insurance premium payments. Sixth, greater transparency is needed across the entire healthcare continuum. In addition to giving patients the ability to make "educated" choices, transparency would help to control costs through open competition. Seventh, the Food and Drug Administration and Patent Office need to re-evaluate their guidelines to incentivize new drug development while maximizing time-to-market and controlling costs.

The eighth recommendation is to fully promote and implement the Patient Centered Medical Home (PCMH) and Medical Neighborhood concepts. According to David Gans of the Medical Group Management Association (2011, p. 27), the PCMH concept was developed "with the goal of delivering accessible, continuous, comprehensive, family-centered, coordinated, compassionate and culturally effective patient care." When the primary care provider and patient take greater responsibility for care, there are many benefits. However, when coupled with the Medical Neighborhood where the continuum of care, responsibility, and communication are expanded, the benefits are magnified. Based on a study conducted by the Medical Group Management Association (Gans, 2011), several key characteristics are associated with an effective PCMH: care coordination, electronic information exchange, care plans with patient

collaboration, use of disease registries for population management, shared decision making, and an assigned primary care provider. In addition, the American College of Physicians (ACP, 2010, p. 3 - 4), cite the following components of PCMH:

- Personal physician—each patient has an ongoing relationship with a personal physician trained to provide first contact and continuous and comprehensive care.
- Physician-directed medical practice—the personal physician leads a team of individuals at the practice level that collectively takes responsibility for the ongoing care of patients.
- Whole-person orientation—the personal physician is responsible for providing all the patient's health care needs or taking responsibility for appropriately arranging care with other qualified professionals.
- Care is coordinated and/or integrated across all elements of the complex health care system. Care is facilitated by registries, information technology, health information exchange, and other means to ensure that patients get the indicated care when and where they need and want it in a culturally and linguistically appropriate manner.
- Quality and safety are hallmarks of the medical home and are promoted through such practices as having patients actively involved in decision making, using evidence-based medicine and clinical decision-support tools to guide decision making, and expecting physicians in the practice to be accountable for continuous quality improvement.

- Enhanced access to care is available through such systems as open-access scheduling, expanded hours, and new options for communication (e.g., e-consults) between patients, their personal physician, and practice staff.

The benefit of this type of integrated, patient-centric model is a reduction in unnecessary medical appointments, tests, procedures, and non-urgent ED use. Therefore, medical resources could be used more efficiently and appropriately based on patient acuity (evaluated need).

CONCLUSIONS

This research is 'valuable' to the healthcare system, both military and civilian, for several reasons. For instance, this research is the first comprehensive assessment of Air Force Medical Service ED utilization. The findings from this study could be used to (1) reduce costs and waiting times, (2) increase patient satisfaction and quality of care, and (3) support future ED policies. In addition, the results from this research provide insights into why other groups with 'universal' healthcare (i.e., free or low-cost access to care) use the ED inappropriately. Therefore, it is likely this research will provide decision makers with information that supports policies and/or processes aimed at mitigating non-urgent utilization of ED services. Finally, this study identified other factors associated with non-urgent ED use for future research. For example, attitudinal assessments that include perception of quality, satisfaction, extent of medical knowledge, effective educational methods, and feeling toward waiting times coupled with this study could identify more effective and efficient techniques for reducing non-urgent usage.

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APPENDIX A

AIR FORCE PERSONNEL DEMOGRAPHICS

Number of Active Duty Personnel

- Total = 328,896
- Officers = 64,932
- Enlisted = 263,964

Age

- Average age of officer force = 35
- Enlisted force = 28
- 38% of the total are below the age of 26
- 44% of enlisted are below 26
- 14% of officer are below 26

Gender

- Women = 18.9%
- Officers and women = 19.2%
- Enlisted and women = 18.8%
- Total number of women = 62,234

Race

- White = 73%
- African American = 14%
- Asian = 3%
- Native American = 0.7%

Ethnicity

- Hispanic = 12%

Marital Status

- Total married = 58%
- Married officers = 70%
- Married enlisted = 55%

Education

- Officer
  - Advanced = 58.6%
  - Masters = 46.9%
  - Professional = 10%
  - Doctorate = 1.6%
- Enlisted
  - Some college = 66.6%
  - Associates = 21.2%
  - Bachelors = 6.6%
  - Masters = 1.2%

From "Air Force Personnel Center, Library, Air Force Personnel Demographics," 2012. Retrieved from http://www.afpc.af.mil/library/airforcepersonneldemographics.asp

APPENDIX B

CORRELATIONAL ANALYSIS

Correlations between ED and primary care groups were tested. A parametric test of correlation was employed to examine several hypotheses. Correlations can be used to investigate whether there is a relationship between two variables (Bernard & Rosner, 1990). In addition, according to Bernard & Rosner (1990), the interpretation of the correlation coefficient (r) is such that a coefficient greater than zero indicates a positive correlation (direct relationship). Whereas, a coefficient less than zero indicates a negative correlation (indirect relationship) and a coefficient of exactly zero indicates no correlation (no relationship). In general, a "r" from 0.00 to 0.25 indicates little (if any) strength, 0.26 to 0.49 indicates low, 0.50 to 0.69 indicates moderate, 0.70 to 0.89 indicates high, and 0.90 to 1.00 indicates very high (Plichta, 2001).

The Pearson's Correlation Coefficient test is a parametric method that determines the strength of the relationship between two variables. The sign (+/-) associated with the r-value indicates whether the relationship is positive (direct) or negative (indirect). According to Plichta (2000), the r-square (coefficient of determination) indicates how much (magnitude) the independent variable accounts for r-square percent of the variance of the dependent variable (i.e., r-square percent of variance in the dependent variable is attributable to the independent variable or percent of shared variance).

Correlations are likely between ED and primary care patients based on age, race, sponsor's branch of services, socioeconomic status, diagnosis, use, and cost (see Table 1). Statistical analysis of correlations using Pearson's Correlation Coefficient found several significant results. For instance, among non-urgent patients, there was a direct relationship between cost of laboratory services and the cost of pharmacy services, the cost of radiology services, full cost of health services, and physician work RVUs. Among emergent patients, there was a direct relationship between the cost of laboratory services and the cost of radiology services, full cost of health services, and physician work RVUs. Among non-urgent patients, there was a direct relationship between the cost of pharmacy services and the cost of radiology services, full cost of health services, and physician work RVUs. Among emergent patients, there was a direct relationship between the cost of pharmacy services and the full cost of health services. Among non-urgent patients, there was a direct relationship between the cost of radiology services and the full cost of health services and physician work RVUs. Finally, among emergent patients, there was a direct relationship between the cost of radiology services and the full cost of health services and physician work RVUs.

Table 1. Significant ED Results (Pearson Correlation Coefficient; $p \leq 0.000$)

	Coefficient (r)	r^2
Among non-urgent (cost of laboratory services)		
- Cost of pharmacy services	0.416	0.173
- Cost of radiology services	0.627	0.393
- Full cost of health services	0.831	0.691
- Physician work RVUs	0.396	0.157
Among emergent (cost of laboratory services)		
- Cost of radiology services	0.721	0.52
- Full cost of health services	0.862	0.743
- Physician work RVUs	0.468	0.219
Among non-urgent (cost of pharmacy services)		
- Cost of radiology services	0.662	0.438
- Full cost of health services	0.656	0.43
- Physician work RVUs	0.309	0.095
Among emergent (cost of pharmacy services)		
- Full cost of health services	0.449	0.202
Among non-urgent (cost of radiology services)		
- Full cost of health services	0.864	0.746
- Physician work RVUs	0.47	0.221
Among emergent (cost of radiology services)		
- Full cost of health services	0.85	0.723
- Physician work RVUs	0.581	0.338

Among health behavior factors for primary care only patients, the results in Table 2 answered the question, "Is there a significant difference between patients associated with acute primary care and those associated with routine primary care related to RVUs?"

Table 2. Significant Primary Care Results (Pearson Correlation Coefficient; $p \leq 0.000$)

	Coefficient (r)	r^2
Among routine (cost of laboratory services)		
- Cost of pharmacy services	0.464	0.215
- Cost of radiology services	0.765	0.585
- Full cost of health services	0.723	0.523
Among acute (cost of laboratory services)		
- Cost of pharmacy services	0.37	0.137
- Cost of radiology services	0.773	0.598
- Full cost of health services	0.731	0.534
Among routine (cost of pharmacy services)		
- Cost of radiology services	0.293	0.086
- Full cost of health services	0.578	0.334
Among acute (cost of pharmacy services)		
- Full cost of health services	0.444	0.197
Among routine (cost of radiology services)		
- Full cost of health services	0.293	0.086
Among acute (cost of radiology services)		
- Full cost of health services	0.71	0.504

Statistical analysis of correlations using Pearson's Correlation Coefficient found several significant results. For instance, among routine patients, there was a direct relationship between the cost of laboratory services and the cost of pharmacy services, the cost of radiology services, and the full cost of health services. Among acute patients, there was a direct relationship between the cost of laboratory services and the cost of pharmacy services, the cost of radiology services, and the full cost of health services. Among routine patients, there was a direct relationship between the cost of pharmacy services and the cost of radiology services and the full cost of health services. Among acute patients, there was a direct relationship between the cost of pharmacy services and the full cost of health services. Among routine patients, there was a direct relationship between the cost of radiology services and the full cost of health services. Finally, among acute patients, there was a direct relationship between the cost of radiology services and the full cost of health services.

VITA

GREGORY SMITH FELTENBERGER

Education

Old Dominion University — **Norfolk, VA**
Doctor of Philosophy (PhD) in Health Services Research — August 2001 – December 2012

Kent State University — **Kent, OH**
Master of Business Administration (MBA) — August 1998 – December 2000
- Concentration: Information Systems

Edinboro University of Pennsylvania — **Edinboro, PA**
Bachelor of Arts in Specialized Studies (BA, Summa Cum Laude) — August 1996 – August 1998
- Concentration: Biomedical Equipment Technology

Professional Experience

10th Medical Support Squadron (Hospital) — **US Air Force Academy, CO**
Commander (Chief Operating Officer) — May 2012 - Present

10th Medical Group (Hospital) — **US Air Force Academy, CO**
TRICARE Operations & Patient Administration Flight Commander — June 2010 – June 2011

DoD/Dept of Veterans Affairs Interagency Program Office — **Washington, DC**
Assistant Chief of Staff — July 2009 – June 2010

Office of the Surgeon General, Data Modeling & Analysis — **Washington, DC**
Chief, Performance Improvement — July 2006 – July 2009

Medical Group Management Association — **Englewood, CO**
Air Force Fellow in Residence — September 2005 – July 2006
Survey Development, Analysis, and Performance Measurement Fellowship

1st Medical Group (Hospital) — **Langley Air Force Base, VA**
Group Practice Manager — June 2003 – July 2005
Chief, Information Management — April 2001 – June 2003

Professional Credentials

- Board Certified Fellow in the American College of Healthcare Executives (FACHE), American College of Healthcare Executives (ACHE), May 2006
- Board Certified Fellow in the American College of Medical Practice Executives (FACMPE), American College of Medical Practice Executives (ACMPE), Medical Group Management Association (MGMA), April 2006
- Board Certified Professional in Healthcare Information and Management Systems (CPHIMS), Healthcare Information and Management Systems Society (HIMSS), February 2004

Publication

- Feltenberger, G. & Gans, D. (2008). *Benchmarking Success: The Essential Guide for Medical Groups*. Englewood, CO: Medical Group Management Association.