

THE EFFECT OF RACE OF PATIENTS WITH CORONARY HEART DISEASE ON  
THE PROVIDER CHOICE OF ASPIRIN, BETA-BLOCKERS, AND ACE-  
INHIBITORS IN AMBULATORY CARE

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TEXAS WOMAN'S UNIVERSITY

COLLEGE OF NURSING

BY  
DOROTHY GREENE JACKSON, MSN

DENTON, TEXAS

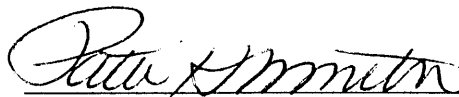
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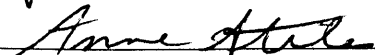
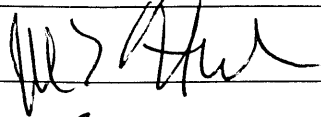
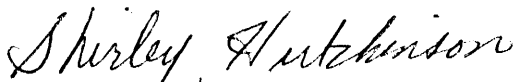
To the Dean of the Graduate School:

I am submitting herewith a dissertation written by Dorothy Greene Jackson titled "The Effect of Race of Patients with Coronary Heart Disease on the Provider Choice of Aspirin, Beta-blockers, and ACE-inhibitors in Ambulatory Care." I have examined this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy with a major in Nursing.



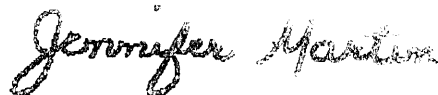
Patti Hamilton, PhD, Major Professor

We have read this dissertation and recommend its acceptance:



Associate Dean, College of Nursing

Accepted:



Dean of the Graduate School

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## DEDICATION

I dedicate this work of labor and love first to my husband David; then to my family:

My mother, Ruby Greene,

My father, Shellie Greene, Sr. and little brother Vincent (both deceased)

My children:

David and Sandy

Danese and Lamont

My grandchildren: Dorian, Taivon, Cyrus, Sophia, and Noah

My brother and his wife: Shellie and Flora

My Sisters and their husbands: Dovie and Isaac, Henretta and Jerry, and Marilyn and Ray

And a Special Dedication to my mentor in Gerontology, the late:

Leonard W. Morgan, MD

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The patience and support of many named and unnamed persons have contributed to my completion of this dissertation. The named persons I will list. The unnamed persons I will acknowledge by saying thank you for the smiles and forgiveness of my blank stares, when I did not say hello or thank you for letting me sit next to you in church, stand in front of you in the grocery line, or stop next to you at the traffic light while I created the next line in Chapter 1 or 2, or 3, or 4 or 5 of my dissertation.

I will try to name all that I can still remember that have helped me along this journey to my doctorate.

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health delivery and approach elimination of health disparities. Her encouragement and support will help me to be another role model for those who achieve this honor, maybe less frequently than others.

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And last but not least –

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## ABSTRACT

DOROTHY GREENE JACKSON

### THE EFFECT OF RACE OF PATIENTS WITH CORONARY HEART DISEASE ON THE PROVIDER CHOICE OF ASPIRIN, BETA-BLOCKERS, AND ACE- INHIBITORS IN AMBULATORY CARE

DECEMBER 2008

The purpose of this study was to examine the effect of race as a predictor in the treatment of heart disease. The study measured the effect of race on the evidence-based recommendations regarding aspirin, beta-blockers, and ACE-inhibitors in the management of coronary heart disease in ambulatory care, using secondary data analysis of the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey. Location and type of facility were also examined as possible predictors of care. Although disparities in hospital-based studies comparing Blacks and Whites have been well documented, little is known about race and coronary care in ambulatory care settings. This study showed Blacks received higher proportions of the evidence-based medications than Whites. The implications may mean racial/ethnic disparities of care favor better treatment for Blacks in ambulatory settings and Blacks receive low cost and efficient treatment. However; unlike Whites, they may not be subsequently referred for cardiac catheterization and angioplasty.



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## CHAPTER I

### INTRODUCTION

Coronary heart disease (CHD) remains the leading cause of death in the United States (U.S.). This has remained consistent since 1900, with the exception of the year 1918 (Rosamond et al., 2006). Although death rates from diseases of the heart in general declined 25 percent from 1994 to 2004, these diseases claim more lives than any other diagnostic group (Rosamond et al.). Coronary heart disease includes acute myocardial infarction, acute coronary syndrome, subacute forms of ischemic heart disease, old myocardial infarction, angina pectoris, and other forms of chronic ischemic heart disease (Cardiovascular Health Studies Division of Adult and Community Health, 2001). The coronary heart disease death rates in 2004 per 100,000 people were 194.4 for White males, 222.2 for Black males, 115.4 for White females, and 148.6 for Black females (Rosamond et al.). When Blacks and Whites both have heart disease, Blacks are 1.3 times more likely to die from heart disease than Whites (Minino, Heron, Murphy, & Kochanek, 2007).

Historically, studies have documented relatively poor health and poor outcomes for Blacks (Collins, Hall, & Neuhaus, 1999; Jha, Fisher, Zhonghe, Orav, & Epstein, 2005). Blacks with coronary heart disease suffer greater burden of mortality and morbidity when compared to Whites with heart disease. In a prospective study (Spertus, Safley, Garg,

Jones, & Peterson, 2005) researchers examined the effect of race on health status one year post acute coronary syndrome (ACS). In this study, with regards to invasive treatment, Whites compared to Blacks were more likely to receive invasive treatments: percutaneous coronary intervention (PCI) (Whites 32% vs Blacks 10%); diagnostic cardiac catheterization (Whites 86% vs Blacks 55%), and coronary artery bypass surgery (Whites 11% vs Blacks 6%) (Spertus et al., 2005).

The researchers measured health status using the *Seattle Angina Questionnaire* (SAQ) and the *Short Form-12 Physical Component Summary* (SF-12 PCS). The SAQ is a 19-item scale that was designed to measure five domains of coronary disease. It is a disease specific functional status questionnaire that measures physical and emotional effects of coronary artery disease (Spertus et al. 1995). The instrument measures physical limitation, anginal stability, angina frequency, treatment satisfaction, and quality of life for patients with coronary heart disease (Spertus et al., 2005). Summed scale scores can range from 0 to 100. The higher SAQ scores indicate better functioning, higher quality of life, and fewer symptoms of angina (Spertus et al., 2005).

The SF-12 PCS instrument is a short version of the SF-36 Health Survey. The SF-12 PCS is a generic health status instrument that measures components of physical and mental health (Ware, J, Kosinski, & Keller, S, 1994). A summed score of 50 on the SF-12 PCS reflects the U. S. population mean (Spertus et al., 2005). The SF-12 is scored so that a higher score indicates better health (Farivar, Cunningham, & Hays, 2007). One year

after the ACS 43.4% of Blacks had angina compared to 27.1% of Whites; the *SF-12 PCS* scores were lower among Blacks ( $36.8 \pm 12.3$ ) as compared to Whites ( $43.2 \pm 11.4$ ),  $p < 0.0001$ ); and the *SAQ* quality of life scores were lower among Blacks ( $70.6 \pm 28.3$  vs.  $83.9 \pm 20.8$  among Whites,  $p < 0.0001$ ). Based on these measures Blacks had more symptoms of angina, lower perceived quality of life, and lower levels of physical functioning. Even after using multivariate analysis models to adjust for sociodemographic, clinical, and treatment differences, Blacks after one year had worse outcomes compared to Whites (Spertus et al., 2005).

Worse health outcomes in Blacks have raised the question of disparities in health care provided. Evidence of differences in care is strong in cardiac care (Henry J. Kaiser Family Foundation, 2002). Even among physicians, there is evidence that they perceive disparities in treatment do exist. Almost two-thirds of doctors surveyed (65%) disagreed with the statement “African Americans with heart disease are just as likely as whites who have heart disease to get specialized medical procedures and surgery” (correct [on survey as is] answer). (Kaiser Foundation). The Institute of Medicine report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* unveiled a convincing body of knowledge that Blacks receive a lower quality of health care than other racial and ethnic groups (Smedley, Stith, & Nelson, 2003). They are less likely to receive routine medical procedures, appropriate cardiac medications, adequate cardiac diagnostic workups, and/or less likely to undergo coronary bypass surgery, and kidney



transplants compared to White Americans. In the National Health Disparity Reports (NHDR), similar trends are highlighted. Using hospital records and 20 of 46 report measures of healthcare quality, Blacks had received poorer quality of care than Whites (2005). In 2002 and 2003, when comparing Black and White Medicare patients received recommended treatment for heart attack, including aspirin, beta-blockers, and angiotensin-converting-enzyme (ACE)-inhibitors, 80 percent and 82 percent of the time respectively. In both years the percent was lower among Blacks than Whites (NHDR, 2004).

Although Blacks comprise only 12 percent of the population (U. S. Census Bureau, 2000), their mortality rate for the leading cause of death, is higher than any other racial or ethnic group in this country. It is not clear why this disparity exists. Providing further insight into this disparity may help to uncover the source of the problem so that healthcare providers, patients, and policy makers can attack the problem with an informed sense of sustained effort and responsibility to lower the mortality rate and increase life quality for all. It is important to examine how such a small group of the population can bear such a great burden of death, in a disease that has known preventive measures.

Studies consistently demonstrate that hospitalized Blacks are less likely to receive standard medications and diagnostic and cardiovascular procedures (Sheifer, Escarce, & Schulman, 2000; Sonel et al. 2005). These studies illustrate disparities in care based on

hospitalization admissions, and discharge data. However, little is known about cardiac care in ambulatory care settings. The purpose of this study was to examine the effect race of patients on providers' use of evidence-based standards of care, aspirin, beta-blockers, angiotensin-converting-enzyme (ACE)-inhibitors for the secondary prevention of CHD in ambulatory care. The specific aims of the study are (a) to determine whether racial differences in care provided exist in ambulatory care and (b) to determine whether the site and type of facility where the care is provided affects the type of care received by Blacks.

#### Problem of Study

The authors of the Institute of Medicine landmark report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* (Smedley, Stith, & Nelson, 2003), substantiated that racial and ethnic disparities in the delivery of health care and outcomes exist in persons with CHD. They reported the disparities in care are not related solely to socioeconomic factors, insurance, or patient preferences. The study suggests that the disparities may be related to factors associated with the healthcare system, health care providers, and patients. One of the imperatives of the study was to increase research on causes of disparities.

Many studies have reported poorer health care quality and variation in treatment for Blacks when compared to Whites. For example, Schulman and colleagues (1999), using standardized patients and vignettes, reported that Black women compared to Black

men and White men and women, were less likely to be referred for cardiac catheterization, despite identical clinical presentations. Similarly, authors using a hospital based National Registry of Myocardial Infarction, reported persistent racial differences in the use of reperfusion therapy and coronary angiography for patients with similar clinical features (Vaccarino, Rathore, Wenger, Frederick, Abramsom, & Mallick, 2005). Patients were evaluated for the use of treatments for myocardial infarction recommended by the American College of Cardiology-American Heart Association. Measures included reperfusion therapy within 24 hours of admission, administration of aspirin and beta blockers within 24 hours, and coronary angiography during hospitalization. The data were categorized according to characteristics of patients (race, gender, age, clinical features) hospital characteristics (staffed beds >200, teaching, urban, ability to perform specific cardiovascular procedures) and year of treatment. Three logistic regression models were used to predict the likelihood of treatment. Model one consisted of sex (gender), race, year and all two-way and three –way interactions among sex, race, and year; model two used the data in model one and demographic and clinical features; and model three included the data in model two and additionally included characteristics of the hospitals. The unadjusted analysis (unadjusted for characteristics for patients and hospitals) showed differences were highest between Blacks and Whites for receiving reperfusion therapy and angiography (Vaccarino et al., 2005). The differences were smaller for the rates of usage of aspirin and beta-blockers. The rates for reperfusion for

White men were 86.5 %; for White women, 83.3%; for Black men, 80.4%; and Black women, 77.8 percent. These rates were significant at a  $p$  value of  $< 0.001$ . The unadjusted use of beta blockers were 66.6% for White men; 62.9% for White women; 67.8% for Black men; and 64.5% for Black women;  $p < 0.001$ . The unadjusted rates for the use of aspirin were 84.4% for White men; 78.7% for White women; 83.7% for Black men; and 78.4% for Black women;  $p < .001$ . The rates for coronary angiography were 69.1% for white men; 55.9% for White women; 64.0% for Black men; and 55.0% for Black women. After multivariate adjustment for characteristics of patients and hospital characteristics, rates of reperfusion therapy and coronary angiography were lower among Blacks. These hospital based studies consistently showed less treatment for Blacks when compared to Whites.

Some studies suggest that the type of facility may influence the level of care received. Jha, Li, Orav, & Epstein (2005) measured the use of aspirin, beta-blockers, and ACE inhibitors, in the Hospital Quality Alliance study. The median score was at least 90 percent on performance measures for acute myocardial infarction. The authors concluded: teaching hospitals had higher scores than non-teaching hospitals; not-for profit hospitals had higher scores than for-profit hospitals and hospitals in the Midwest and Northeast outperformed the hospitals in the West and South (Jha et al.). Sonel et al. (2005), from a study called CRUSADE, used data from 400 U. S. hospitals where Black and White patients were enrolled. The authors reported that Black patients were as likely

as White patients to receive heparin and beta-blockers within 24 hours of admission; however, Blacks were less likely to receive the more expensive drug, clopidogrel (Plavix).

### Rationale for Study

Life expectancy and mortality and morbidity trends are important for understanding and monitoring the health and well-being of a nation. Despite improved rates for living longer in the U. S., high life expectancy for Blacks still trail that of Whites. In 1960 Black men had a life expectancy of 61 years compared to 67 years for White men; in 1996 Blacks had a life expectancy of 66 compared to White men's 74 years. In 2003 and 2004 the life expectancy for Blacks increased at a higher rate, 0.5 year compared to Whites which decreased by 0.4 year. This made the life expectancy for Blacks 73.1 years still trailing that of Whites, which was 78.3 years. Life expectancy remains higher in Whites than in Blacks by about five years. These trends make appropriate care for Blacks an urgent goal for all.

The morbidity of persons with heart disease can have a devastating impact on these individuals as well as on the healthcare system. Persons who suffer from heart disease utilize the healthcare system at relatively higher rates compared to persons with other disease conditions (National Center for Health Statistics (NCHS), 2002). Persons with heart disease account for 23 percent of hospice care, 28 percent of home health care, 29 percent of all hospitalizations and over a third of all nursing home care (National Center for Health Statistics (NCHS), 2002). Blacks suffer higher cardiovascular disease

morbidity and mortality than any other racial groups in this country. In 2000, rates of death from diseases of the heart were 29 percent higher among Black adults than among White adults.

The mortality rates for all causes in this country decreased by 3.8 percent between 2003 and 2004. This decline in death rate is attributed in part to the decrease in death caused by heart disease (Minino et al., 2007). The decline in the death caused by heart disease is attributed in part to primary and secondary treatment of coronary heart disease (Gillum, 1994; McGovern, Pankow, & Shahar, 1996; Hunink, Goldman, and Tosteson, et al., 1997; Ergin, Muntner, Sherwin and He, 2004). Prevention is the key strategy in the reduction of deaths from CHD (Cardiovascular Health Studies Division of Adult and Community Health, 2001). Research has shown adherence to established preventive guidelines is associated with significant reductions in short and long-term mortality in persons with coronary heart disease (Antman et al., 2004).

The nursing profession can improve the quality of health care through research on equality in health care delivery. Nursing researchers may help provide strategies to other health care providers, policy makers, and consumers of health care choices from research results. This study examines a major component of care delivery in coronary care to Blacks, the group at greatest risk for death. Nurses are typically prepared to champion good health care practices through health assessment, education, and advocacy. Through health assessment nurses can monitor and document the use of standards of care for

coronary heart disease. Through education nurses can help patients be aware of the preventive drug therapies, treatments and diagnostic procedures for the evaluation and treatment of heart disease. And in what some may call their most pivotal role of all, nurses as patient advocates and healthcare providers can help patients assertively seek the care they need and deserve. The patient-centered approach of nursing care is well suited to health prevention, risk reduction education, and appropriate medication therapy. Findings from this study may provide information that nurses can use to teach patients how to make choices where to seek care that match their health care needs. Additionally, findings from this study may also help policy makers set standards of care in ambulatory care settings that monitor established evidence-based guidelines for CHD. As consumers take on greater proportions of their care and pay more out of pocket expenses, they will want more information on how well and where that care is provided. When consumers have the correct information they can demand better care in areas that are important to them and know where to receive optimal care.

The problem of increased death rates among Blacks in an environment of well recognized health care disparities makes the study of the effect of race on heart care an issue of importance. It seems reasonable that secondary prevention can best be dealt with at earlier stages in the ambulatory care setting. Little is known about the care of Blacks with coronary heart disease in this setting.

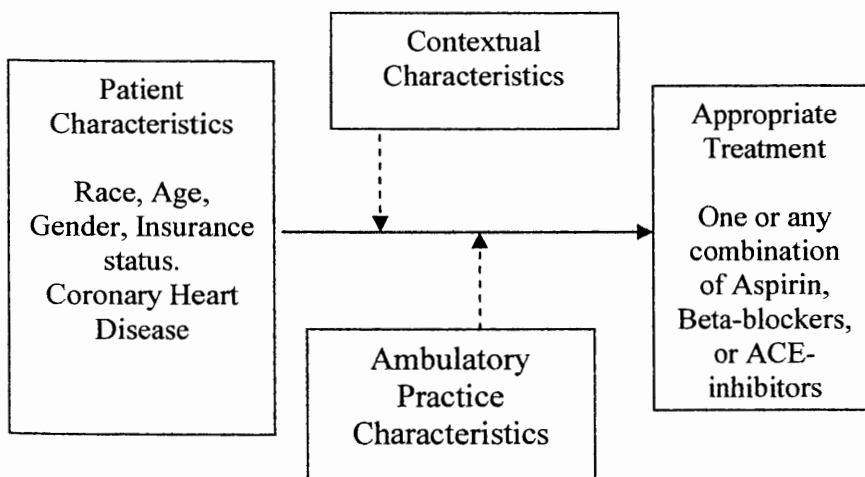
Given that *Healthy People 2010* has placed a high priority on elimination of health disparities, and the Institute of Medicine has substantiated that Blacks experience unequal treatment in cardiac care, it is urgent to address this problem. It is important to understand the impact of race on health care in order to determine where disparities exist and to discern ways to provide appropriate health care for all. The goal of the study is to examine the care of Blacks with CHD in ambulatory settings to determine whether there are differences in care provided. The guidelines established by the American College of Cardiology and the American Heart Association for primary and secondary prevention of CHD, aspirin, beta-blockers, and ACE-inhibitors are not based on gender or race. Using this recognized standard of care where little discretion is required may help shed light on whether race is a factor in the ambulatory health care of Blacks with CHD.

### Conceptual Framework

This researcher proposes a model which consists of four dimensions: the patient, the practice, the treatment, and the system. The proposed model depicts a causal relationship of the patient characteristics to the type of treatment prescribed. The patient characteristics include race as the primary variable of interest along with the diagnosis of CHD. Other demographics about the patient include age, gender, and insurance status. The practice characteristics consist of the process or the setting where information about the patient is processed and acted upon. Characteristics of the practice include private office-based practice and hospital clinic-based practice. Both practice settings are



operated by physicians and include nurses, nurse practitioners and physician assistants. The system represents broader characteristics that may influence the care. Descriptors of the system include the metropolitan statistical area and geographic location. In the proposed model it is theorized that the system and the practice both influence the process by which the patient characteristics affect the type of treatment prescribed. The model provides a structure for identifying and evaluating variables of the study and guides the development and statistical testing of the hypotheses. A schematic depiction of the proposed model is presented in Figure 1.



*Figure 1. Jackson Primary Care Model (2008).*

## Assumptions

The assumptions of the study are those depicted in the proposed model:

1. Variables in the data set will appropriately measure the study variables.
2. A race-specific model is most sensitive for identifying gaps in care (Jha et al., 2007; Vaccarino et al., 2005).

## Hypotheses

The following hypotheses will be tested:

1. Race will determine the care persons 18 years and older receive for CHD in ambulatory care settings. The statistical test will be logistic regression.
2. Practice characteristics will moderate the effect of the race of persons 18 years and older with CHD on the odds of receiving appropriate treatment.
3. System characteristics (geographic location and metropolitan statistical area) will moderate the effect of the race of persons 18 years and older with CHD in ambulatory care settings, on the odds of receiving appropriate treatment. The outcome of interest is dichotomous: appropriate treatment (yes or no for the prescription of one or more or any combination of the evidence-based medications: aspirin, ACE-inhibitors, and beta-blockers).

## Definition of Terms

Definitions of terms reflect the dimensions of the conceptual framework described by the student researcher (Jackson, 2008). The dimensions are patient characteristics,

appropriate treatment, practice characteristics, and contextual characteristics. Other terms are used that add clarity and understanding of the aims of the study.

### *Independent Variable*

Race is the major independent variable. The terms Black or White are used to describe race in this study. The conceptual definition of race is defined by the Office of Management and Budget (2001). Black or African American is defined as a person having origins in any Black racial group or Africa. The term White is defined as a person having origins in any of the original peoples of Europe, the Middle East, or North Africa (Office of Management and budget, 2001). The operational definition for race in the dataset is the variable *race* that is recoded as 1 = White; 2 = Black; and all else = 0.

### *Co-variates*

*Patient characteristics.* Patient characteristics include race (described above), age, gender, insurance status, and a diagnosis of coronary heart disease (CHD).

The conceptual definition for age is a person 18 years and older. The operational definition is the variable *ager* and was recoded in the dataset as: newager = 3 = 19 – 44 years; 4 = 45 – 64 years; 5 = 75 years and over; 6 = 65 – 74 years. In the original data levels 1 = 0 -14; 2 = 15 – 24. The conceptual definition for gender is male or female. The operational definition for gender is the variable *sex* in the dataset and is coded as 1 = male and 2 = female. The conceptual definition for insurance status is the patient's expected source of payment for the visit. The operational definition is the variable

*paytype* and was recoded in the dataset as *newpayment* with the following recodes: 1 = other (collapsed from worker's compensation, self-pay, no charge, and unknown); 2 = Medicare; 3 = Medicaid; and 4 = private insurance. The conceptual definition for coronary heart disease (CHD) is disease of the heart whereby atherosclerotic deposits of the coronary arteries block blood flow to the heart causing ischemia and/or myocardial infarction (American Heritage Medical Dictionary, 2007). Coronary heart disease is operationalized by selection of any ICD-9 codes for angina pectoris, myocardial infarction (MI), and all other forms of chronic ischemic heart disease (CIHD). The following ICD-9 codes were used: angina pectoris=413; MI=410; CIHD: 411, 412, and 414.1-414.9. The diagnostic recodes for CHD are listed in Table 1.

---

Table 1

*Coronary Heart Disease Diagnoses Recodes*

---

RECODE		
(14100=1)	(141060=1)	(141300=1)
(141001=1)	(141061=1)	(141310=1)
(141002=1)	(141062=1)	(141390=1)
(141010=1)	(141070=1)	(141400=1)
(141011=1)	(141071=1)	(141401=1)
(141012=1)	(141072=1)	(141402=1)
(141020=1)	(141080=1)	(141403=1)
(141021=1)	(141081=1)	(141404=1)
(141022=1)	(141082=1)	(141405=1)
(141030=1)	(141090=1)	(141406=1)
(141031=1)	(141091=1)	(141407=1)
(141032=1)	(141092=1)	(141410=1)
(141041=1)	(14110=1)	(141411=1)
(141042=1)	(141110=1)	(141412=1)
(141050=1)	(141180=1)	(141419=1)
(141051=1)	(141189=1)	(141490=1)
(141052=1)	(141200=1)	(ELSE=0)

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*Practice characteristics.* Practice characteristics consist of the setting in which care is provided either in a physician-based office or a hospital-based clinic. The conceptual definition of a physician-based office is a site identified by the physician as the location of his ambulatory practice and responsibility over time for the patient care and professional services rendered there generally reside with the individual physician rather than with any institution (CDC, 2002). The services rendered do not include anesthesiology, pathology and radiology; and are not part of an emergency or hospital-based outpatient department. The operational definition is the variable *settype* in the dataset and was recoded as 1 = office. The conceptual definition of a hospital-based clinic is a physician operated-outpatient department of noninstitutional general and short-stay hospitals (excluding anesthesiology, pathology and radiology), exclusive of Federal, military, and Veterans Administration hospitals, located in the 50 States and the District of Columbia (CDC, 2002). The operational definition is the variable *settype* and was recoded in the dataset as 2 = clinic.

*Contextual characteristics.* Contextual characteristics represent the larger universe in which the patient care takes place and include the metropolitan service area and the region of the U.S. The conceptual definition of a Metropolitan Service Area (MSA) is that part of a system that is urban (MSA) or rural (non-MSA). An MSA is a large population nucleus, together with adjacent communities having a high degree of social and economic integration with that core. Each MSA must have at least 50,000 or more

inhabitants (Office of Budget and management, 2000). The operational definition is the variable *msa* in the dataset and is coded as MSA = 1 and non-MSA = 2. The conceptual definition of geographic region is the location in the U.S. where the practice is located. The regional locations consist of four areas: Northwest, Midwest, South and West. They correspond to the geographic regions used by the U.S. Bureau of the Census (NHCS). The operational definition is identified as the variable *region* in the dataset and was recoded as *newregion*: Northeast = 1; Midwest = 2; West = 3; and South = 4. The regions and corresponding states are listed in Table 2.

Table 2

*Regions and States*

Region States Included			
Northeast	Midwest	South	West
Connecticut	Illinois	Alabama	Arizona
Maine	Indiana	Arkansas	California
Massachusetts	Iowa	Delaware	Colorado
New Hampshire	Kansas	District of Columbia	Idaho
New Jersey	Michigan	Florida	Montana
New York	Minnesota	Georgia	Nevada
Pennsylvania	Missouri	Kentucky	New Mexico
Rhode Island	Nebraska	Louisiana	Oregon
Vermont	North Dakota	Maryland	Utah
	Ohio	Mississippi	Washington
	South Dakota	North Carolina	Wyoming
	Wisconsin	Oklahoma	Alaska
		South Carolina	Hawaii
		Tennessee	
		Texas	
		Virginia	
		West Virginia	



### *Dependent Variables*

*Appropriate treatment.* The dependent variable for the study is the pharmacotherapy of medications prescribed for coronary heart disease. They are one or more or any combination of aspirin, beta-blockers or ACE-inhibitors (nominal variables) and are considered appropriate treatment of the study. Aspirin is an over the counter drug that inhibits the synthesis of prostaglandins and platelet aggregation. Research evidence indicates it is effective in the primary and secondary prevention of myocardial infarction in high risk patients (The Medical Letter, 1995; 2007). Aspirin is operationalized and was recoded in the dataset as gen 1 code=gen1=50410, gen 1=Aspirin; all else=0. Beta-blockers are beta-adrenoceptor blocking drugs or antagonists that compete for or block catecholamines at beta-adrenergic receptors (Martindale, The Complete Drug Reference). Evidence shows that beta-blockers slow the progression of coronary atherosclerosis in patients with documented coronary artery disease (Sipahi et al., 2007). The drug group, beta-blockers, is operationalized and recoded in the dataset as New NDC2=beta-blockers=0512=1; all else = 0. The conceptual definition for the drug group, ACE-inhibitors, is they inhibit the renin-angiotensin system by interruption of the angiotensin-converting-enzyme; inhibit the conversion of relatively inactive angiotensin I to the active angiotensin II; thereby decrease blood pressure; and attenuate left ventricular dilation (Dagenais, Pogue, Fox, Simoons, and Yusuf, 2006; Jackson, 2006).

This drug group is operationalized and recoded in the data as New NDC2=ACE-inhibitors=0514=1; all else = 0.

### Limitations

There are several important limitations to the study. The first limitation is the unit of measure. In the data sets, a face to face visit by an individual patient is the unit of measure; therefore, each visit is not independent. That means that not every visit is by a different person. The disadvantage of this limitation is that this cannot be a correlation study. Another limitation is the database does not provide a mechanism for determining the reason the standard of care was not provided. In other words, no contraindications or any other decision making by the provider, were documented on the patient care record that may have justified other treatment options. A limitation of considerable importance is the designation of race is determined by the individual patient and also by the person collecting the data. Some patients indicated more than one race and many did not choose an ethnicity. Also, ethnicity in this data base may also include race. For example, a Black person may also choose Hispanic as an ethnicity or a White person may choose more than one race. Another limitation is the treatment prescribed may not have been fully documented at every visit; therefore, caution should be used in considering the generalizability of the findings. While combining the datasets for each year provides larger samples, any modification of data from one year to the next may have affect the analysis in some way. For example, beginning in year 2004, a maximum of eight

medications could be listed for each visit, instead of six. Finally, an overriding limitation is the fact that the original data base was not developed for the specific research question of this study, and therefore, some elements may not be able to be manipulated. While these limitations are acknowledged, the advantage of the data is their integrity over the years.

### Summary

Despite the documented higher death rate from CHD for Blacks compared to Whites, less aggressive treatment in hospital based studies persists; however, ambulatory care for CHD among Blacks is not as well known. This study provides the opportunity to examine the care of Blacks in the ambulatory setting where most of the healthcare services are provided in this country. The study seeks to answer two questions: do differences in healthcare provided exist based on race and do location and the system characteristics affect the amount of care prescribed?

The framework proposal is a risk model that theorizes the race of the patient affects the treatment prescribed and the system and practice characteristics mediate how the characteristics of the patient affect the care prescribed. The encounter of the patient with the ambulatory care system and the provider is the unit of analysis of the study to help disentangle the complexity of factors that may contribute to health disparities in care for Blacks with CHD.

The encounter between the provider and the patient is a very personal and social event that may not be fully captured in the written record. Important information could have been exchanged that could have added to the strength and depth of the interpretation of the findings of the study that are absent from the data base. Despite these limitations the data from the National Ambulatory Medical Care Survey and the outpatient departments of the National Hospital Ambulatory Medical Care Survey are representative of a large geographic region of the United States and have been sampled in such a way, that give strength to elements of reliability and validity for making credible inferences from the findings. The findings may provide information that will assist nurses, policy-makers, patients, and other consumers of health services make and receive appropriate healthcare that is equitable and possible for all.

## CHAPTER II

### THE EFFECT OF PATIENTS' RACE ON PROVIDER TREATMENT CHOICES IN CORONARY CARE: A LITERATURE REVIEW FOR MODEL DEVELOPMENT

#### Abstract

This selective literature review provides insight into the depth and breadth of the problem of unequal medical treatment of Blacks compared to Whites with particular focus on coronary heart disease. Poor health outcomes among Blacks compared to Whites are well documented and these disparities are linked to lower quality and less aggressive medical treatment. It is not clear why these disparities in treatment occur. The review provides theoretical frameworks that attempt to explain the effect of race on treatment and presents an analysis of the quality and strength of existing evidence of racial disparity related to coronary care. Based on the review, implications for policy makers and providers are identified.

## The Effect of Patients' Race on Provider Treatment Choices in Coronary Care

The thrust of current research on health disparities is to determine to what extent unequal treatment occurs and to demonstrate whether the poor health experienced by Blacks and other racial and ethnic minorities is consequential to these inequities. Probably the most widely known research study where Blacks were the primary subjects of interest was the Tuskegee Syphilis Study that lasted 40 years, 1932 to 1972 (Kampmeier, 1972). The study recorded the natural history of syphilis in Black men with the goal of justifying treatment programs for Blacks (Centers for Disease Control and Prevention, 2008). Even after penicillin was recognized as an effective treatment for syphilis, the Black study subjects were not offered the treatment. Associated Press reporter Jean Heller wrote on July 25, 1972, "For 40 years, the U.S. Public Health Service has conducted a study in which human guinea pigs, not given proper treatment, have died of syphilis and its side effects" (Heller, 1972). This single historical event may provide a perspective of the nature of the problem of current day health disparities and their association with disproportional poor health outcomes among Blacks when compared to Whites. This study may have cast a shadow on improving healthcare for Blacks in this country (Gamble, 1997). The purpose of this selective literature review was to provide insight into the depth and breadth of the problem of unequal healthcare treatment among Blacks compared to Whites; theoretical explanations of the effect of race on treatment in coronary heart disease; and analysis of the quality and strength of

evidence in existing research. Implications for policy makers and providers were also identified.

The search strategy for selection of studies for this selected literature review was conducted in MEDLINE which included years 1985 to 2007. The studies were selected based on criteria adapted from the Henry J. Kaiser Report (2002). The criteria are listed in Table 3.

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Table 3

*Criteria for Selective Literature Review*

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Criteria for Study Selection

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- Study took place primarily in the United States.
- Focus of study was to measure receipt of care for Blacks or other racial minority groups compared to Whites.
- Study design and methodology were well described.
- Procedure for selecting the sample population was well defined.
- Potential confounding factors such as comorbidities, socioeconomic status, and insurance were controlled by statistical analyses.

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Adapted by Jackson, et al., 2008, from *Racial/Ethnic Differences in Cardiac Care: The Weight of the Evidence* (2002). The Henry J. Kaiser Foundation & the American College of Cardiology.

Studies published in peer-reviewed journals, or national reports sponsored by government or research foundations that focused on racial or ethnic differences in the treatment of coronary heart disease (CHD) were included. Explanatory studies and literature on the perceptions and explanations of racial and ethnic disparities were also selected. The search was supplemented by manual abstraction of citations from related references from review articles and landmark reports on race and healthcare.

### Scope of the Problem

The problem of unequal medical treatment in hospital cardiac care for Blacks is well documented. At least three landmark reports have demonstrated the magnitude of the problem. The 1985 Secretary's Task Force Report on Black and Minority Health (U.S. Department of Health and Human Services, 1985) indicated that there was an excess of approximately 60,000 preventable deaths annually among Blacks, most of which were from cardiovascular disease.

A second report of significance, by the Henry J. Kaiser Foundation (2002), examined 81 research studies from 1984 to 2001. The results from these studies, according to the Kaiser Report, showed credible evidence that Blacks when compared to Whites were less likely to receive diagnostic cardiac procedures, coronary revascularization, thrombolytic therapy, drug therapy, and other cardiac procedures. In general, the report and other landmark studies show that the disparities in care remain after adjusting for factors such as age, sex, insurance status, co-morbidities, and heart



disease severity (Henry J Kaiser Foundation, 2002; Smedley, Stith, & Nelson, 2003) .

These reports substantiate that disparities in health care delivery are prominent and cardiac care document the most convincing evidence.

The third landmark publication, the IOM report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare* (2003), presented convincing evidence that health disparities in the delivery of health care existed, with the strongest evidence was in cardiac care. The IOM examined health disparities at the healthcare system level, the climate in which the legal system regulates healthcare, and discrimination at the individual provider-patient level (2003). Findings reflected that racial and ethnic minorities tend to receive lower quality and less aggressive health care than non-minorities. The sources of these inequities in healthcare, according to the IOM report (2003), are complex and not solely based on economics, poverty, lack of insurance or patient preferences. It is suggested that these health disparities occur at many levels including health institutions, health systems, providers, patients, utilization managers and administrative and bureaucratic processes (IOM). The report and other literature also suggest that the causes may be historically steeped in segregation.

#### *Historical Perspective of the Problem of Unequal Treatment in Blacks*

*Social climate.* In a report by the *Commonwealth Fund*, Smith (2005) chronicles the main events of the civil rights era to provide analogies and lessons that have contributed to health disparities of today. He points out that before 1954, at the time of

*Brown vs. the Board of Education*, health care was racially segregated. As a result of the decision, Title VI of the Civil rights Act of 1964 prohibited the use of federal funds to organizations or programs that participated in racial segregation or other forms of discrimination. Segregation was the central issue of the implementation of Medicare (Smith, 2005). With the arrival of the Medicare program, in 1966, desegregation took place at break neck speed in many of the major hospitals throughout the country. According to the author, 1,000 hospitals were desegregated in less than four months.

Health care providers outside the hospitals were not affected by this movement to reduce segregation. Outpatient services tended to increase in predominantly White affluent suburban areas and services in predominantly minority, inner-city areas were decreased. Minorities in most metropolitan areas relied on medical schools, teaching hospitals, and public clinics. In the South where “separate but equal” facilities could not be funded (Smith, 2005), Blacks were often cared for in basement wards or separate wings. Other separate services included separate emergency rooms, operating rooms, and even morgues. In the Northern region of the U.S., where large concentrations of Blacks resided, segregated services were provided in more subtle ways by providing care in primarily county or indigent hospitals. For example, in Chicago, most Blacks were treated at Cook County Hospital and Provident Hospital (Smith, 2005).

Smith (2005) argues that the neighborhoods where people live determine their quality of schools and healthcare and also influence the characteristics of the type of

hospital they can access. He goes on to postulate that the degree of hospital segregation in metropolitan areas in the U.S. is influenced by the size of the metropolitan area, the number of hospitals (thereby the number of choices), and the degree of residential segregation.

Since outpatient care facilities are not tied to the Medicare Title VI compliance rules, they tend to be more segregated than hospital care. Compared with Whites, as reported by Smith (2005), Blacks have 1.67 times the number of emergency department visits per year, 2.2 times the number of outpatient visits, but only 87 percent the number of physician office visits.

The theme of the report by Smith (2005) is that segregation is the root of health disparities and health care for Blacks is separate but unequal when compared to Whites. Healthcare is a reflection of segregated neighborhoods, geographic regions, differences in insurance coverage, patient preferences and provider bias (2005).

*Medical climate.* Disparities in outcomes of various diseases date back as far as 1895, and records were first kept, when Black physicians formed the National Medical Association. One of the key goals of the organization was to improve health care and health outcomes for Blacks. As early as the 1920s it was reported that hypertensive disease was twice as prevalent among Blacks when compared to Whites (Stone and Vanzant, 1927); yet atherosclerotic heart disease and angina pectoris were rare among

Blacks. These coronary conditions were not recognized as important among providers until decades later.

### *Prevalence and Significance of the Problem*

The clinical range of coronary heart disease conditions in Blacks are similar to that of Whites, but Blacks have higher out of hospital coronary mortality rate than any other racial/ethnic group (Clark, 2005). Blacks also suffer annual rate of first time myocardial infarctions at all ages higher than Whites (2005). The coronary heart disease death rates in 2004, per 100,000 people were 194.4 for White males, 222.2 for Black males, 115.4 for White females, and 148.6 for Black females (Rosamond et al). Blacks are 1.3 times more likely to die from heart disease than Whites (Minino, Heron, Murphy, and Kochanek, 2007). This means Blacks have a 30 percent higher risk of dying from heart disease than Whites.

### *Potential Sources of the Problem*

*Patient level sources.* Some studies claim that patient preferences contribute to disparities in care. For example, it is reported that minority patients are more likely to refuse recommended services (Sedlis et al., 1997). Although patient level preferences and attitudes may differ, refusal rates and preferences are small and have not fully accounted for the racial and ethnic disparities in the receipt of health care (Hannan et al., 1999; Ayanian, Cleary, Weissman, & Epstein 1999). Others show that even the possible

overuse of cardiovascular services by Whites does not explain the racial disparities in service by Blacks (Schneider et al., 2001).

*Provider level sources.* Some evidence exists that providers in situations of uncertainty, and time pressure, may revert to categorical thinking and place patients in groups based on their ethnicity and race. This can lead to stereotypical thinking and biased decision-making (Balsa and McGuire, 2001). Negative outcomes due to lack of information, stereotypes and prejudice may result (van Ryan and Burke, 2000; van Ryan, 2002). Population based statistics used by health care providers may encourage stereotypical behavior that does not serve the patient's best interest. Some have argued that it may be acceptable to use stereotypes if they are based on statistical evidence. According to van Ryn and Burke (2000) physicians may rely on epidemiologic evidence and incorporate the information into their general belief systems. They may generally apply the information to all situations without adjustments for individual differences in patients. This practice of placing patients into a sociodemographic category may contribute to health disparities (van Ryan and Burke, 2000).

Another example of provider bias was revealed in a survey study, based on actual clinical encounters, conducted by van Ryan and Burke (2000). In the study doctors rated Black patients when compared to White patients as less intelligent, less educated, more likely to abuse drugs, less likely to follow medical advice, more likely to lack social support, and less likely to participate in cardiac rehabilitation. This attitude remained

even after it was known to the doctor the patient was insured and well educated. When doctors hold these beliefs they may be less likely to spend much time and effort into recommending appropriate treatment for Blacks.

*System levels.* The systems in which health care is practiced and regulated are also recognized as sources of disparities. Perceptions of physicians in the Kaiser Family Foundation National Survey of Physicians (2002) indicated that physicians believe that disparities in healthcare rarely or never happen related to such factors as income, fluency in the English language, educational status, or race, or ethnicity. They are more likely to believe that disparities in healthcare happen based on lack of insurance rather than any other socioeconomic factors. However, over half of the minority physicians believed just the opposite. For example, when asked the question, “generally speaking, how often do you think our health care system treats people unfairly based on race,” seventy-seven percent of Black physicians and 54% of Latino physicians said unfair treatment based on race or ethnicity occurs at least somewhat often compared to only 33% of Asians, and 25% of White physicians who say this (2002). Although the physicians differ in their perceptions in how patients are treated, two-thirds of those surveyed believed that racial and ethnic disparities do exist in the healthcare system in the treatment of heart disease (Henry J. Kaiser Foundation, 2002).

Black persons were treated by White health care providers as early as the 1600s when they were inspected by maritime surgeons prior to the Blacks journey as slaves to

America (Sullivan et al., 2004). The healthcare was delivered as an economic investment for White land owners of the new world. This system was rooted in inferiority and transferred over into the health care system of the nineteenth century (2004). This system was supported by the local and federal government as two separate but unequal systems (Whites vs. non-Whites) until the hospitals were desegregated in the 1960's. Before this time hospitals that served Blacks limited their services in location to "colored wards" in basements or back door entrances or even in separate buildings. Many White physicians refused to treat Black patients and some thought it was a wasteful use of health resources (Byrd, 2002). Hospital policies often banned Black healthcare providers including nurses, physicians, and dentists (Sullivan, 2004). These acts set an atmosphere for healthcare that is still suspect for unequal treatment in the 21<sup>st</sup> century.

Several studies using hospital data have demonstrated system level problems. Systematic geographical and institutional policies have been examined and some evidence exists that neighborhoods where Blacks live may affect the type of care received by Blacks and ethnic minorities. In a study by Groeneveld and colleagues, Medicare claims from 1989 to 2000 were examined to assess patterns of treatment. This study found that hospitals with higher concentration of Black patients were less likely to perform coronary artery bypass surgery, regardless of race, and racial disparities were also larger within these hospitals.

At least two studies have demonstrated that variations in quality across hospitals or regions contribute to racial disparities in care. Using data from the Cooperative Cardiovascular Project (CCP) for approximately 140,000 Medicare beneficiaries treated in the mid 1990s treated at 4,700 hospitals, Barnato (2005) and colleagues examined the within and between hospital effect on the prescription of coronary procedures. They concluded that when Blacks were treated in hospitals where effective therapies were less prescribed, coronary procedures were more often used, and 30-day mortality rates were worse. A second study by Rathore et al. (2004) using CCP data found Blacks were disproportionately treated in the southeast where beta blockers were less often prescribed; coronary angioplasty was more common, and risk-adjusted mortality rates were higher in the Northeast.

### Theoretical Review of the Problem

In order to improve the understanding of disparities in treatment of CHD, models that explain how variations in treatment occur need to be examined. A formidable challenge in health disparity research is explaining how healthcare delivery can differ based on anything other than clinical factors. The literature does not present an unambiguous theory or model that explains cause for the problem. There are gaps in the literature on knowledge that would enhance the understanding of how disparities in treatment occur. The IOM report indicates that several sources may contribute to health



care disparities including health care providers, patients, utilization managers and health care systems.

### *IOM Integrated Components Model*

The IOM report (2003) presents an integrated model of how racial and ethnic disparities in health care can occur. Major components of the model are patient inputs which are subject to ambiguity and misunderstanding; medical history and patients preferences; data from physical examinations and diagnostic tests. These components are subject to interpretation through stereotyping and racial prejudice which influence decisions that are shaped by social, economic and cultural influences such as financial incentives, institutional design and a legal environment that may lead to interventions that are racially disparate (Smedley et al., 2003). The model is predicated on discretion in the hands of the provider, patients, and utilization managers. In the climate of not enough information, uncertainty of the provider, discretion of the patient and the provider, they concluded that racial and ethnic disparities may occur (2003).

### *Racism Framework*

The Sullivan report (2004) describes a framework of racism as an explanation that can cause racial and ethnic disparities in health care and access to careers in the health professions. The Sullivan Commission reported that discrimination and racism exist in the healthcare system. The report concludes that in order to eliminate the problem, it must be first acknowledged. Racism according to the report can be present in expression to

individuals, patterns of exclusion, ideologies, policies, practices, and customs that generate and perpetuate unequal treatment based on race and ethnicity. Related factors and how they may relate to healthcare are displayed in Table 4.

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Table 4

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*Factors That Might Cause Racism in the Healthcare System*

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Racism can occur whenever...

- one race or ethnic group neglects to share system governance or institutional power with a certain racial or ethnic group;
- opportunities and resources for health professions education, training, or practice unduly favor a certain racial or ethnic group; and
- healthcare providers unduly deliver diagnostic and treatment services disparately to certain racial and ethnic groups. (Sullivan, 2004).

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Adapted by Jackson et al., 2008, from *Missing Persons: Minorities in the health professions: A report of the Sullivan Commission on diversity in the healthcare workforce* (2004).

The Sullivan Commission report (2004) further explains that “institutional racism becomes normative because of its codification within institutional policies, practices, customs, and organizational structures” (p.41). The report recommends careful and authentic identification and recognition of racism. A first step, according to the report is

to recognize the existence of severe inequities in health care delivery, and then identify how racism operates in the health care system.

Cromwell et al. (2005) studied the likelihood of Medicare beneficiaries, from more than 700,000 hospitalized patients in 1997, to participate in revascularization procedures. The authors concluded that Blacks and American Indians were much less likely to undergo the procedure. On average, Blacks, American Indians, Hispanics and Asian patients experienced substantially lower survival rates when compared to Whites. This study highlights that insurance coverage and therefore comparable access to hospitals are not necessarily predictors of receipt of care. The differences may be related to “unmeasured differences in clinical characteristics, treatment selection by providers or patients, or treatment effectiveness” (Zaslavsky & Ayanian, 2005, p 304).

These studies and many like them point out the need for a very comprehensive framework to sort out causality in health care disparities in cardiac care. Derived from examples of these studies, and no doubt others, Zaslavsky and Ayanian (2005) present the components (described in Table 5) they believe necessary for a more comprehensive approach to studying disparities.

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Table 5

*Components of Comprehensive Framework to Study Healthcare Disparities*

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- Accurate racial/ethnic identification of patients, with adequate samples to assess health care services and outcomes for all major groups
  - Sufficiently detailed clinical data for effective risk adjustment and assessments of clinical appropriateness
  - Socioeconomic measures such as income and education for individuals and geographic areas
  - Adequate measures of insurance coverage and access to care
  - Information on potential mediators related to language, acculturation, and health beliefs and preferences
  - Organizational and area characteristics that also might mediate observed differences in care (Summarized from Zaslavsky and Ayanian, 2005, p 304).
- 

These studies consider the need for a framework that examines differences in cardiovascular care across providers, overtime and across multiple groups. This charge places a challenge for researchers who study Blacks and other racial and ethnic minority groups, as sample size may not provide adequate power to measure differences or to decrease the possibility of type II errors.

### *Racial Composition of Hospitals*

In a study by Skinner et al. (2005) results demonstrate that racial composition of hospitals is a predictor of health outcomes for patients with acute myocardial infarction (AMI). A cohort study of Medicare patients ( $n = 1,136,736$ ), diagnosed with AMI, hospitalized during 1997 to 2001, was conducted to determine if hospitals with a high percentage of Black patients had higher risk adjusted mortality when compared to hospitals with a smaller (or zero) share. The primary diagnosis codes of acute myocardial infarction were 41000-41091. The primary measure of outcomes was risk adjusted 90-day mortality rate. Measures of risk adjusted AMI mortality rate have been used as valid indicators of health care quality by the Agency for Healthcare Research and Quality (Skinner et al, 2005). The researchers calculated the percentage of all AMI patients in a hospital who were Black and created approximate deciles of this measure. The lowest decile was 12.5% of patients admitted to hospitals without any Black patients with AMI. The average AMI patient was treated in a hospital at which 6.9% of the patients were Black. Multivariate logistic regression models were estimated for risk-adjusted 90-day mortality across the deciles of the percentage of Black patients in each hospital. Expected probabilities were reported. Covariates included age, sex, race, and comorbidities. Hospitals that had the greater share of Black AMI patients had higher risk-adjusted mortality. The differences across groups (deciles) was statistically significant ( $p < 0.001$ ). When adjusted for income, hospital ownership, region, and treatment characteristics the

results were the same. According to the authors, this means that hospital characteristics and income were not significant explanatory variables. The percentage of Blacks treated at a hospital rather than hospital characteristics may serve as a framework for explaining disparities in health outcomes.

### *Public Health and Health Services Models*

A group of researchers of the Resource Centers for Minority Aging Research, from a working group conference, coordinated a systematic effort to study the issue of measurement in disparities research. The initiative was funded by the National Institute on Aging, the National Institute for Nursing Research and the Office of Research for Minority Health. The specific problem addressed was whether self-reported measures of race and ethnicity adequately represent the latent constructs such as ecologic or multi-level determinants, including biologic, family, cultural, community, health care, political, economic, social, environment, policy and other contextual factors (Stewart, 2003).

The group identified two broad frameworks to study health disparities: public health (population-level) and health services research models (Stewart & Napoles-Springer, 2003). They explain that public health models consider individuals as embedded within systems that shape their behavior and constrain their access to resources necessary for health; and health services research frameworks consider health care as a determinant of health. Key factors of population-based or public health research are discussed as possible mechanisms of health disparities. They are socioeconomic status,

discrimination, and acculturation/enculturation. Socioeconomic status measurements are limited, according to the authors (2003), because they focus on education, income, occupation, instead of other concepts such as poverty, wealth, deprivation, and social class. Stewart and Napoles-Springer (2003) claim that more lifecourse measures should be considered such as childhood social class, adequacy of health insurance, economic stress, and cumulative socioeconomic disadvantage, ethnicity, and health.

Stewart and Napoles-Springer (2003) acknowledge the research on discrimination or racism and disparities exist at the individual and the institutional level. Subjective measures combined with objective measures, say the authors, may vary across groups and could yield useful information of how disparities can occur. Measurement problems with self-reported discrimination include lack of a consistent definition of discrimination and domains of discrimination.

Acculturation/enculturation can affect disparities in a number of ways. Cultural attitudes about preventive care, fear of outcomes, self-efficacy, could explain differences in adherence, utilization and health (Stewart & Napoles-Springer, 2003). The authors maintain that acculturation is multidimensional including lifestyle behaviors, health beliefs, language, norms and attitudes; yet most measures focus on behavioral and lifestyle changes. Enculturation (the culture which one develops) and the culture acting on them (acculturation) should be considered in disparity research.

In health services research, quality of care is the concept of interest (Stewart & Napoles-Springer, 2003). Differences in quality of care according to the authors rely on self-report measures such as communication, decision-making, and satisfaction. Measurement problems include limited inclusion of cultural competence or discrimination; lack of psychometric measures of quality; mail and telephone surveys fail to reach many minority groups; surveys need to be translated into more than one language.

Stewart and Napoles-Springer (2003) conclude by suggesting that discrepancies and gaps in measurement in disparities research improved by combining qualitative and quantitative research methods. For example qualitative research can help identify missing constructs and cognitive processes of how people interpret words and phrases and construct their answers to self-report. Qualitative research can help understand to what extent a concept is appropriate and complete. Quantitative methods could ensure psychometric criteria for reliability and validity and assess whether measures are replicable across situations and targeted constructs (although there are no guarantees).

Development of rigorous and appropriate instruments for conducting health disparities research remains a challenge of extreme complexity. Concepts that demonstrate health disparities: socioeconomic status, discrimination, acculturation, and quality of care are difficult to operationalize and meet psychometric issues that assure the quality of the information obtained. The problem may have to be unveiled one variable at



time. As Stewart and Napoles-Springer (2003) imply, researchers may need to limit studies to a few key measures and major population subgroups.

### *Race-Specific Models*

Some have also challenged race-specific models to measure health disparities. In the studies that measure racial differences in the treatment of coronary heart disease researchers initially adjust for risk factors in order to account for potential confounders that make the difference rather than race. One study addressed this issue. Jha et al. (2007) used data from the Cardiovascular Cooperative Project (CCP) for 130,709 White and 8,286 Black patients admitted to hospitals with AMI. Most studies use multivariate modeling techniques that assume covariates affect Blacks and Whites equally. If physicians weigh these factors differently in Blacks than Whites, this model (multivariate analysis) would be inadequate. In order to determine whether race made the difference, the researchers measured how physicians evaluate the covariates hypertension and or diabetes. If it could be determined that the decision-making for treating hypertension or diabetes was equal across both racial groups, then that would be a first step in determining how decisions about how treatment of cardiac disease may vary by race. So the question tested was do covariates as diabetes or hypertension affect physician treatment decisions for Blacks and Whites equally? Are racial differences in treatment due to race-specific effects of comorbidities?

Medicare patients with first time AMI, admitted during 1994 to 1995, all Blacks and Whites, excluding all transfer patients from other emergency room facilities were examined. The outcome treatments analyzed were receipt of: reperfusion (thrombolysis or percutaneous coronary interventions [PCIs]) within six hours, aspirin during hospitalization, and cardiac catheterization within 30 days of admission, PCI within 30 days of admission, and coronary artery bypass graft (CABG) surgery within 30 days. Using the conventional model (common-effects model) adjustment for baseline differences was conducted for using age, sex, and each of the covariates available in the CCP database. Next the effect of race was estimated by using an additional set of variables, where each of the covariates interacted with the race indicator variable. The researchers examined whether the predicted values from the two models and the odds ratios on race were significantly different (using the Wald test).

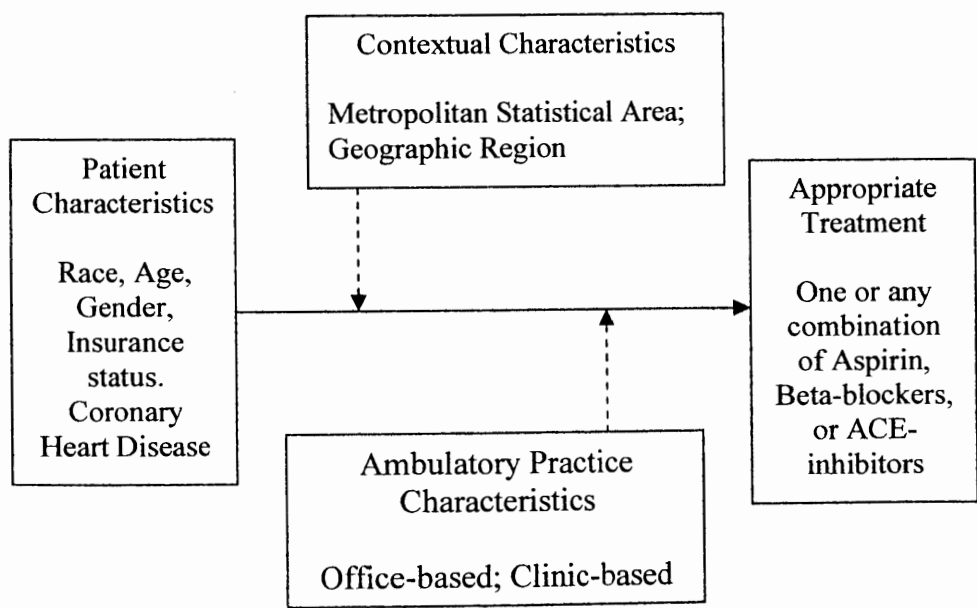
The common-effects multivariate model demonstrated that Blacks were less likely to receive five of the six therapies (except aspirin) with odds ratio comparing Blacks to Whites that varied from 0.64 (95% CI 0.59-.0.69) for CABG within 30 days to 1.10 (1.03-1.19) for aspirin during hospitalization. The treatment differences using the race-specific model models revealed nearly identical results as the common-effects model for all six of the measures. For example, using the common-effects model, the rate for use of beta-blockers for Blacks was 43.4(95% CI 42.4-44.4) and for Whites was 45.6 (95% CI 45.3-45.8). Using the race-specific model the rate of use for beta-blockers for Blacks was

42.7 (95% CI 41.5-44.0). The rates for whites using the race-specific models were essentially the same for all six outcomes. The rates for Blacks using the race-specific models were comparable, but generally lower than using the common effects models. The race-specific models reported a slightly larger gap in care.

A defining point is derived from this study that is important to health disparity research. In previous research on healthcare disparities the assumption was held that health care providers treated comorbidities the same for Blacks and Whites. According to the Jha and associates this assumption has only modest effect on the relationship between race and treatment outcomes. This study may provide insight for provider bias, a prominent finding of the IOM report (2003), on treatment for Blacks with heart disease. According to the authors of this study, “either physicians discriminate against Blacks regardless of clinical appropriateness, or the race effect is proxy for other explanations for disparities such as Blacks being treated at lower quality facilities” (p. 790).

A race-specific model developed by Jackson, one of the authors of this paper, proposes that race greatly affects the type of care received. The proposed model depicts a causal relationship of the patient characteristics to the type of treatment prescribed. The patient characteristics include race as the primary variable of interest along with the diagnosis of CHD. Other demographics about the patient include age, sex, and payor type. The practice characteristics consist of the process or the setting where information about the patient is processed and acted upon. Characteristics of the practice include

private office-based practice and hospital clinic-based practice. The system represents broader characteristics that may influence the care. Descriptors of the system include the metropolitan service area geographic location. In the proposed model it is theorized that the system and the practice both influence the process by which the patient characteristics affect the type of treatment prescribed. The Jackson model is schematically displayed in Figure 2.



*Figure 2. Jackson Primary Care Model (2008)*

## Weight of Existing Evidence

### *Sample Population*

Racial and ethnic disparities in the provision of cardiac care have been well documented. Despite well recognized improvement in the overall mortality from heart disease, Blacks experience the highest mortality rate from heart disease than any other racial or ethnic group. The majority of studies compare differences between Blacks and Whites in hospital rather than outpatient settings. The definition for race provided by the Office of Management and Budget OMB (2000) is used for this paper. The OMB defines race in five categories: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, and White. Categories for ethnicity are Hispanic or Latino or not Hispanic or Latino. These categories are recognized among researchers. The numbers of persons of other ethnic or racial groups other than Blacks or Whites were not sufficient in most studies to compare. Evidence is less conclusive for Latinos, Asians, and Native Americans (Henry J. Kaiser Family Foundation, 2002). In a literature review to evaluate the weight of the evidence for research in cardiac care, of 81 strong studies, the majority (57) compared only Blacks and Whites (Henry J. Kaiser Foundation, 2002).

### *Research Methods*

The studies examined for this review present actual quantitative and comparative data which examine racial and ethnic disparities in treatment of coronary heart disease,

specifically acute myocardial infarction, acute coronary syndrome, subacute forms of ischemic heart disease, old myocardial infarction, angina pectoris, and other forms of chronic ischemic heart disease. A summary of the studies are located in Appendix A. The majority of the studies use administrative and clinical data. Study samples are largely from myocardial infarction registry databases, Medicare claims, and hospital discharge data. The majority of studies that measure health disparities in cardiac care analyze data on the use of cardiac procedures or treatment. Most of the studies use odds ratios to compare receipt of treatment of Blacks compared to Whites.

#### *Quality of Previous Studies*

The landmark report of evidence and quality of studies on racial and ethnic disparities in coronary care was conducted by the Henry J Kaiser Foundation (2002) in association with the American College of Cardiology. The strength of the evidence and quality of the studies were determined by the degree of which the researchers measured and controlled for appropriateness of care and other factors known to be associated with the care given (Henry J. Kaiser Family Foundation, 2002). The report reviewed 81 studies. Sixty-eight of 81 studies demonstrated strong evidence that racial and ethnic differences occurred in cardiac care and that Blacks are less likely than Whites to receive diagnostic procedures, revascularization procedures and thrombolytic therapy even when patient characteristics are similar.

The main findings of the studies were: they met the criteria described in Table 2; they compared Blacks and Whites, and the majority found a racial disparity in at least one of the procedures or medications prescribed for care of CHD. The majority of the studies were in hospital settings. The main gaps include lack of studies in primary care settings and lack of a single clear explanation of how disparities occur.

### Implications for Policy Makers and Providers

Based on this review the following policy implications are suggested:

1. Collect accurate census and healthcare data that include race as a stratified variable.
2. Create a method to operationalize discrimination by making it a civil rights issue.
3. Enhance provider incentives to monitor evidence-based treatment standards in primary care settings as well as hospitals.
4. Implement provider incentives to practice in predominately racially identifiable neighborhoods.
5. Implement public healthcare education on health disparities that develop patients as their own best advocates.

### Summary

The scope of the problem of unequal healthcare treatment for Blacks compared to Whites with CHD is one of great depth and breadth. It is clear from the evidence that unequal treatment does exist. The cause of the disparity is unclear. The problem is no

doubt rooted in a historically segregated country and health care system where Blacks have been less entitled. Providers of care are aware that there are some differences in cardiac care based on race. The problem occurs at the provider and the system level which has been acknowledged. Further research is needed to explain the mechanisms of how racial differences in care occur, so that preventive actions can be taken. If there is a hospital effect on racial differences in care, there may also be variables in ambulatory care that when identified could be used to provide preventive measures that may reduce the burden of the disease of CHD for all.

### Conclusion

This review supports the notion that race matters in this country and is of extreme importance in the treatment of coronary heart disease. The problem seems historically steeped in segregation and packaged in undetectable, *unbelievable-for-the-times* discrimination. There is no one logical or evidence-based approach to solve the problem. The answer at best is a combination of approaches that systematically, unravel layers of the problem, one variable at a time. Armed with creative thought and persistent intellect, researchers and policymakers should develop programs that seek to understand and monitor social behavior of systems where healthcare is provided. It is highly likely when healthcare systems improve, all groups will receive better care.



## CHAPTER III

### PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

With the increased death rate of Blacks with heart disease in this country and the *Healthy People 2010* (U. S. Department of Health and Human Services, 2000) goal to eliminate health care disparities, it is important to examine primary and secondary health care prevention among Blacks with CHD. This study examines the effect of race, of patients with coronary heart disease on the provider use of aspirin, beta-blockers, and ACE-inhibitors in ambulatory care. The purpose of the study was to test the hypotheses:

1. Race will determine the care persons 18 years and older receive for CHD in ambulatory care settings.
2. Practice characteristics will moderate the effect of the race of persons 18 years and older with CHD on the odds of receiving appropriate treatment.
3. Contextual characteristics (geographic location and metropolitan statistical area) will moderate the effect of the race of persons 18 years and older with CHD in ambulatory care settings, on the odds of receiving appropriate treatment.

#### Study Design

The study design was a retrospective, explanatory design, using a secondary data analysis of data from the National Ambulatory Medical Care Survey (NAMCS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS). The NAMCS was

conducted annually from 1973 through 1981; it was conducted again in 1989 and resumed annually in 1989 (McCaig & Woodwell, 2006). The NHAMCS began in 1992 and has been conducted annually since then (McCaig & Woodwell, 2006). The analysis of combined years of these data for 2002, 2003, 2004, and 2005 was conducted. The rationale for combining years and data from both the NAMCS and the NHAMCS was to provide ample sample size and power appropriate to test the hypotheses. The sample data collection process from the NAMCS and the outpatient component of the NHAMCS was designed to be comparable ambulatory care settings in this database. The years 2002 through 2005 were selected for the study because they reflect changes common to both the NAMCS and the outpatient component of the NHAMCS in the data collection process, variable changes, and the patient record form. Beginning in 2002 up to three therapeutic drug classifications for each drug entry were added (National Center for Health Statistics 2004, 2005). Also several updates to the drug characteristics in the drug database and non-active ingredients were removed. Beginning in 2003 the number of drug fields was increased from six to eight, allowing the provider to list a possible eight drugs that the patient was continued on or was placed on that day of the visit (National Center for Health Statistics, 2006a). The drug change had a great impact on the way the drugs were coded in this study and is further explained in the data collection section. Another change relevant to the study occurred in 2005 when the paytype variable to assess insurance status, was modified so that the patient could check all of the categories that applied

instead of the primary source of payment (National Center for Health Statistics, 2007).

The assigned primary source of payment was made in the data processing. Based on these changes it would have been problematic to combine data from years that preceded 2002. Combining the years 2002 – 2005 provided adequate sample with variables common to both the NAMCS and the NHAMCS outpatient component.

The study used logistic regression to evaluate the effect of race on the odds of receiving appropriate care. This statistical method is appropriate to determine the influence of selected variables to odds of the outcome of particular variables (Munro, 2001). The logistic regression method of analysis is appropriate in this study because the outcome variable, the appropriate treatment (any combination of aspirin, ACE-inhibitors, or beta-blockers: *Yes* or *No*) is dichotomous (Hosmer & Lemsehow, 2000). The Pearson Chi-Square was used to determine frequencies of the variables and the proportion appropriate treatment based on race and the other variables.

### Setting

The proposed study used data from two national representative surveys, NAMCS and the NHAMCS, conducted by the National Center for Health Statistics, Center for Disease Control and Prevention (CDC) during 2002, 2003, 2004, and 2005 (U. S. Department of Health and Human Services). The NAMCS is a survey of physician-based private practices. A small percentage of the care is provided by nurse practitioners and physician assistants. The NHAMCS is a survey of hospital-based outpatient departments

(OPDs) or emergency departments. The basic unit of measure for this study is a face to face visit of an individual receiving care in the NAMCS or in the OPD of NHAMCS. The setting is ambulatory care practice where non-federally employed physicians classified by the American Osteopathic Association and the American Medical Association, provide care in office-based patient care for NAMCS or outpatient departments (OPDs) for NHAMCS of noninstitutional general and short-stay hospitals in the 50 United States and the district of Columbia.

### Population and Sample

A multistage probability sampling method was used by CDC to select the individuals for the original data. In this selection process, by definition, each element in the population has an equal chance of being selected (Polit and Beck, 2004). The selection process involved four stages which included practice sampling units (PSUs), physician practices within the PSUs, patient visits within the practices, and a randomized selection of visits from a one week reporting period for the NAMCS and a four-week reporting period for the NHAMCS. The sampling design for the NHAMCS used a four stage probability design that included hospitals for PSUs, hospitals within PSUs, clinics within hospitals, and patients within clinics. A fixed panel of 600 hospitals was selected; 550 had an emergency department/and or OPD and 50 hospitals had neither emergency departments nor OPDs. To prevent hospitals from participating during the same time period each year, the sample was randomly divided into 16 subsets of approximately

equal size. Each subset was assigned 1 of 16 four-week reporting periods. Therefore, each sample rotates once every survey year and each hospital is included approximately once every 15 months (National Center for Health Statistics, 2005, 2006a,b, 2007).

### Sample Size

The unit of analysis was a single ambulatory care visit. The sample for the study was comprised of all visits by individuals 18 years and older with a diagnosis of CHD selected from three possible diagnoses listed on the patient record form, who were cared for at an office-based practice or an out-patient clinic in the data sets. The sample-set included visits of individuals identified in the data as belonging to either the White or Black race. No other race category was used. The rationale for this designation was based on a pilot study, in which the sample size included all races and ethnicities. Unfortunately there were inadequate sample sizes for the other races including Asian only, Native Hawaiian/other Pacific Islander only, American Indian/Alaska Native only, and more than one race category. In the pilot study there were many empty cells for these categories. The sample size goal for the study was to use all available visits with persons who had CHD. The intent was to have a sample that reflects the actual percentage of Blacks in the U.S. population which is 12% (Mead, Cartwright-Smith, Jones, Ramos, & Siegel, 2008).

## Protection of Human Subjects

The individuals who provided data for this study are protected by strict adherence to procedures to assure confidentiality. The researcher received approval from the Texas Woman's University Institutional Review Board (IRB) and the Texas Tech University Health Sciences Center IRB to conduct the study. The data are from public use files from the Centers for Disease Control and Prevention and do not contain any identifying information. The NAMCS and NHAMCS fall under Title 42, United States Code, Section 242K, which permits data collection for health research. The confidentiality of the data is protected by Title 42, United States Code, and Section 242m(d). Information collected in the surveys is used only for statistical purposes. No information that could identify a person or establishment can be released to anyone -- including the President, Congress, or any court, without the consent of the provider. The Census Bureau staff, who collected the data for NCHS, signed an affidavit making them subject to the Privacy Act, the Public Health Service Act, and other laws that require the data be protected (National Center for Health Statistics [NCHS], 2008).

## Instrument

Given that this study is a secondary analysis of existing data, no instrumentation was used by this researcher. The original data were collected using the patient record form (PRF) prepared and maintained by the National Center for Health Statistics (NCHS). Key features of the tool are described below and a brief discussion of its

reliability and validity is provided. A copy of the patient record form for each year of data used for the study is located in the appendix.

### *Key Features of Data Collection Tools*

The PRF for the NAMCS and the form for the NHAMS are very similar. They both collect information on characteristics of the patient who made the visit, including year and month of visit, age, sex, race ethnicity, and expected source of payment and setting type (office or clinic). Characteristics of the visit are also collected including the reason for the visit as described by the patient, the diagnoses as determined by the physician, tests and procedures ordered, medications prescribed or provided and the disposition of the visit. Data collection is performed by the Physicians, assisted by their staff and U.S. Census Bureau field representatives. Characteristics of the physicians include practice specialty, ownership of practice, hospital ownership. The NHAMCS patient record form contains some variables that are not included on the NAMCS form. Both forms include the geographic region and the Metropolitan service area. The variables used for this study are common to both the NAMCS and the outpatient clinics of the NHAMCS. The data collected using the forms were designed so that data sets across years and both databases can be combined and used in analysis by SPSS and other statistical software.

### *Reliability*

Internal consistency for the NAMC and the NHAMCS out patient form has been estimated over a number of years and population and settings. Most recently in an article

Gottschak and Flocke (2005) evaluated the feasibility of a longer (140 subitems) patient record form versus the current shorter version (70 subitems). A split-panel of convenience-sampled physician providers was randomly divided into two groups. One group was given the longer version and the other panel was given the shorter version. The short form contained write-in items and fit on a single one-sided page. The longer version contained more check boxes and other unique items and required a two-sided page. The response rate was lower for the long form overall and in certain geographic regions. The OPD group was not affected by the length of the form. Despite the number of checked boxes on the long form, there was no difference in the percentage of diagnostic or screening procedures ordered. Overall the cooperation of the providers was higher with the short form than the long form, however; the quality of the data was not affected by form length. Visit time estimates were affected by both the content and the item format. The medication question was the only data item that permitted more write-ins on the long form than the short form. Testing of both forms took place at the same time period. The number of NAMCS physicians on each panel was 941 for the short form and 969 for the long form. Of the physicians providing at least one patient record form, 646 completed 12,872 short forms and 606 completed 12,872 short forms. The unweighted response rate for the short form was 67.7 percent and the long form was 61.2 percent (Gottschalk & Flocke, 2005).



The total hospitals for the NHAMCS was 132 OPDs were in the short form group and 129 in the long form panel. Among OPD clinics providing at least one patient record form, 492 completed 17,236 short forms and 544 completed 16,331 long forms. The response rate was calculated by the product of the response rate for the OPDs and the response rate for the OPD clinics. This rate was 73.5 percent for the short form and 73.9 percent for the long form (Gottschalk & Flocke, 2005). The study confirmed the feasibility of collecting certain items found only on the long form. The overall physician cooperation was more sensitive to form length than was the OPD. The quality of the data was not affected by form length.

*Interrater reliability.* Data on the patient record form for the NAMCS and the NHAMCS are collected by the physicians, assisted by their staff and also by the census representative from CDC. The Census filed representatives instruct the physician and staff on how to use the instrument. The field staff checks the sampled records for completeness and work with the physician office staff to clarify ambiguous entries. All medical and drug coding and keying operations are performed centrally by Constella Group, Inc. and are subject to quality control procedures (NCHS, 2005, 2006, 2007). Keying and coding errors rates are reported at a range of 0-1 percent for various survey items. Item nonresponse rates are generally 5 percent or less for NAMCS data items. Imputations for missing data are performed for patient year of birth, sex, race, and time spent with the physician (NCHS 2005, 2006, 2007). Drug data are coded using a unique

classification system scheme developed by NCHS. Listing of drugs by entry name (the name used by the respondent to record the drug on the PRF) and the generic substance are available. The therapeutic class of drugs is based on the National Drug Code Directory (Food and Drug Administration, 1995; National Drug Code Directory Updates, 2008).

*Measurement error.* Another measure of reliability is an instrument's ability to reflect true scores or the extent to which errors are absent. The NCHS considers an estimate to be reliable if there are at least 30 records and a relative standard error of 30 percent or less (the standard error is no more than 30 percent of the estimate). The standard error of an estimate is primarily a measure of the sampling variability that occurs by chance because only a sample is surveyed, rather than the entire universe. Inferences made on less than 30 records are considered unreliable, regardless of the magnitude of the standard error.

### *Validity*

The NAMCS and the NHAMCS patient record forms have been used for more than a decade by practice-based physicians and evaluated by the NCHS and have demonstrated the instrument validity of the information collected. This is considered a measure of content validity as content validity is a measure of the judgment of experts. In the early testing of the PRF, it was determined that physicians were the most appropriate persons to complete the form during the actual time of making an assessment and providing care.

In 1967 a study was conducted among office-based physician to determine the feasibility of using office based practice as a source for national ambulatory health care information. It was concluded that the information needed to be collected by the physicians themselves on an encounter form at the time of visit (Bryant & Shimizu, 1988). Extensive inconsistencies were found in form, style, content, completeness and legibility. The first phase was carried out to determine whether resident physicians or lay persons should collect the data and the length of the form on the affect of the participation rate by physicians. The nonresponse was 50 percent. The second phase of the study resulted in improvement of the response rate and greater participation because endorsements by the American Medical association and a letter from the Executive Secretary of AMA were sent to all sample physicians indicating full organizational and professional support for the request to participate. The participation rate improved to 80 percent (Bryant & Shimizu, 1988).

Criterion validity has also been established for both the NAMCS and the NHAMCS patient record forms. Both the NAMCS and the NHAMCS survey content and methodology are often copied by other organizations and governments to collect visit data (National Centers for Health Statistics 2005, 2006, 2007).

*Face validity.* These instruments also complement other data systems maintained by the NCHS such as the National Health Interview Survey, the National Health and

Nutrition Examination Survey, the National Nursing Home survey, and the National Hospital discharge Survey to provide a representative picture of health care utilization.

*Convergent validity.* One study specifically set out to determine the validity of the NAMCS compared to a referenced standard. Gilchrist, Stange, Flocke, McCord, and Bourguet (2004) compared the results of direct observation of trained research nurses of the variable time spent with physician to the data reported by physicians using the 1993 patient record form. Office visits of 549 patients representing 30 family physicians in Northeastern Ohio were observed by trained nurses. On two separate days two research nurses visited each participating physician's office and consented patients for the study. A research nurse directly observed visits and completed a check-list including classification of the major reason for the visit, the duration of the visit, and the delivery or nondelivery of specific services using definitions similar to the NAMCS.

The only services for which physicians using the NAMSC form reported higher rate of occurrence than assessed by direct observation was in the provision of weight control advice (6.6% vs. 4.9% respectively) and ordering of mammograms (4.9% vs. 4.6%). Overall, the agreement of physician report with direct observation varied by service with one fourth of the kappas in the very good agreement

The final study presented that supports validity of the NAMCS data is one that the authors compare clinical encounters in primary care networks to those in the NAMCS. As part of the ongoing effort of the Agency for Healthcare Research and Quality (AHRQ) to

foster development and enhancement of the diversity of primary care networks, practice-based research networks (PBRNs). The authors compared data from 20 of the PBRNs with the data NAMCS data. The PBRN instruments were patterned after the NAMCS patient record form. Most of the participating clinicians were physicians (89%) and APNs/NPs, 5%, and physician's assistants were 2%. They compared data collected by 1,491 primary care physicians participating in the 1997-2001 NAMCS. Diagnostic tests and procedures occurred more frequently during the Primary Care Network Survey visits (98 percent for Primary Care Network Survey and 76.4 for NAMCS). Both forms allowed three diagnoses or patient complaints. The percentages of visits with a given category for primary diagnosis rarely differed by more than 2% between the forms. The top 15 diagnostic cluster for encounters were also similar. However, authors reported that more than 90% of the APNs/NPs and physician's assistant visits included counseling services compared to approximately 60% for the other disciplines.

### Summary

The National Ambulatory Medical Care Survey (NAMCS) is the "gold" standard by which other instruments are measured when assessing ambulatory care. The National Hospital Ambulatory Medical Care Survey outpatient department (hospital-based clinic) patient record form was designed to parallel that of NAMCS. These two sources are national representatives of primary care in the U.S. and the criterion by which other data sources for primary care are referenced. This study used the variables that are common to

both patient record forms. Based on the related pilot findings for this study and documentation of other studies, it is determined that the NAMCs and the NHAMCS data are sufficient in both reliability and validity to examine patient care in the ambulatory care setting. The data collected should, therefore, represent data that is reliable and valid.

### Data Collection

A pilot study was conducted using the combined data from the 2002 through 2004 NAMCS and the NHAMCS. The hypotheses originally tested are described in the next section (*Pilot Study*). The pilot provided the opportunity to isolate the data elements and to determine their suitability for the study. The discussion that follows will describe the pilot process and methodology. The benefit of the pilot and adjustments made in the development of the dissertation prospectus will also be discussed.

### Pilot Study

#### *Hypotheses*

In the pilot study the following hypotheses were tested in the:

1. The method of treatment for coronary heart disease will be independent of race and ethnicity for persons 18 years and older. The statistical test was  $\chi^2$ ; alpha was set at .05. The method of treatment for coronary heart disease will independent of gender for persons 18 years and older. The statistical test was  $\chi^2$ ; alpha was set at .05.

2. There will be no interaction of race and ethnicity with geographic region for the treatment of coronary heart disease for persons 18 years and older. The statistical test was logistic regression.
3. There will be no interaction of gender and geographic region for the treatment of coronary heart disease for persons 18 years and older. The statistical test was logistic regression.
4. There will be no interaction of race and ethnicity with type of facility for the treatment of coronary heart disease for persons 18 years and older. The statistical test was logistic regression.
5. There will be no interaction of gender and type of facility for the treatment of coronary heart disease for persons 18 years and older. The statistical test was logistic regression.

### *Treatment of Data*

The total sample for the pilot was 1, 907 visits of persons 18 years and older with the diagnoses of coronary heart disease. The inclusion criteria for this study were visits by individuals aged 18 years and older at which a diagnosis of coronary heart disease, defined here as myocardial infarction, angina pectoris, and ischemic heart disease.

Documentation of any or either of the ICD9-CM codes 410-414 and 414.1-414.9 (includes angina pectoris, 413; myocardial infarction, 410; other forms of ischemic heart disease, 411, 412 and 414.1-414.9) as a primary diagnosis. Up to three diagnoses were

coded for each visit. The patient record form allows for the listing of three diagnoses in three different columns. The pilot data used only the first diagnosis listed on the record form. The rationale for this was to determine whether the data addressed CHD and to what degree. If a plausible sample were available, support for using the database would be enhanced. On the other hand, if the sample size were deemed to be less than adequate, all three diagnoses listings might be needed for the dissertation study.



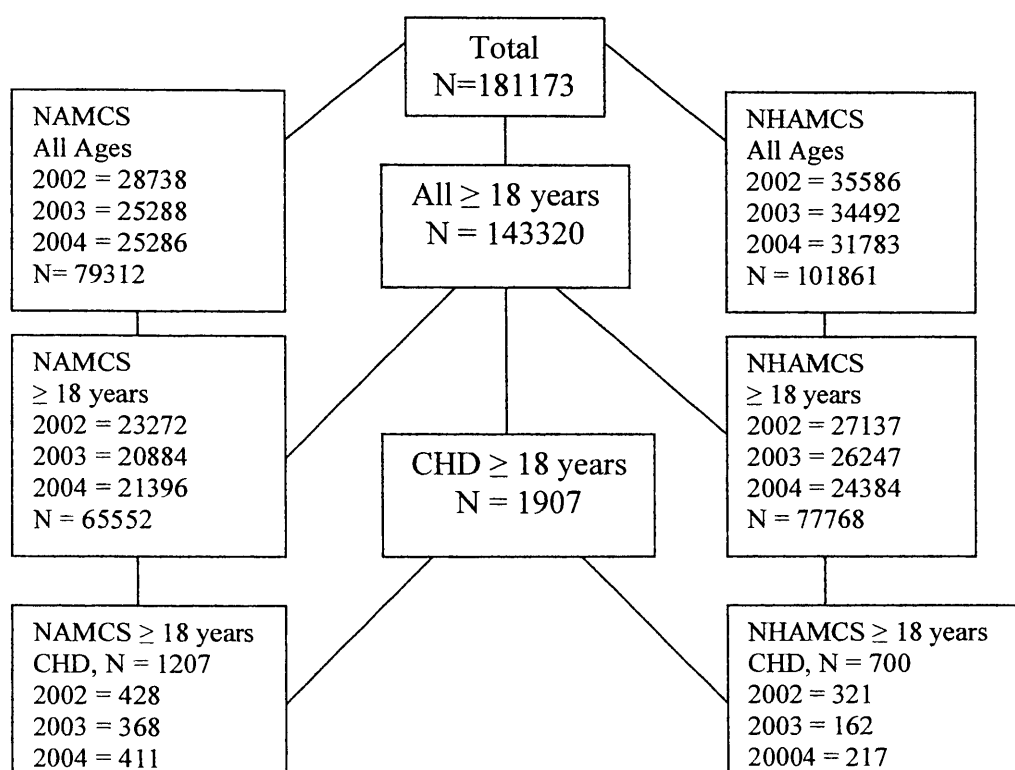


Figure 3. Sample selection for pilot study.

There were six data sets merged for this study: three sets from NAMCS and three sets from NHAMCS, each for years 2002, 2003, and 2004. The sample selection procedure is displayed in Figure 3. The NAMCS, ambulatory care in physician based offices data are depicted in Tables 6 and 7. These tables describe data on race and ethnicity (Table 6) and gender (Table 7). The visits for NHAMCS, ambulatory visits to hospital outpatient departments (OPDs) or hospital-based clinics are described in Tables 9 and 10.

Table 6

*NAMCS Original Data Combined for 2002 Through 2004: Race and Ethnicity*

National Ambulatory Medical Care Survey	2002 Count (%)	2003 Count (%)	2004 Count (%)	Total Count (%)
Race				
White only	25156 (87.5)	22189 (87.7)	21916 (86.7)	69261 (87.3)
Blacks only	2591 (9.0)	2134 (8.4)	2462 (9.7)	7187 (9.0)
Asian only	736 (2.6)	784 (3.1)	677 (2.7)	2197 (2.8)
Native Hawaiian/Other Pacific Islander	103 (.4)	62 (.2)	70 (.3)	235 (.3)
American Indian/Alaska Native only	83 (.3)	60 (.2)	93 (.4)	236 (.3)
More than one race	69 (.2)	59 (.2)	68 (.3)	196 (.3)
Total	28738	25288	25286	79312 (100)
Ethnicity				
Hispanic or Latino	1818 (6.3)	2375 (9.4)	2352 (9.3)	6545 (8.3)
Not Hispanic or Latino	21024 (73.2)	22913 (90.6)	22934 (90.7)	66871 (84.3)
Blank	5896 (20.5)			5896 (7.4)
Total	28738	25288	25286	79312 (100)

Table 7

*NAMCS Original Data Combined for 2002 Through 2004: Gender*

NAMCS	2002	2003	2004	Total
Female	16358 (56.9)	14217 (56.2)	14282 (56.5)	44857 (56.6)
Male	12380 (43.1)	11071 (43.8)	11004 (43.5)	34455 (43.4)
Total	28738	25288	25286	79312 (100)

Table 8

*NHAMCS OPDs Original Data Combined for 2002 Through 2004: Race and Ethnicity*

National Hospital Ambulatory Medical Care Survey OutPatient Departments (clinics)	2002 Count (%)	2003 Count (%)	2004 Count (%)	Total (%)
Race				
White only	25379 (71.3)	24976(72.4)	22646 (71.3)	73001 (71.7)
Blacks only	8606 (24.2)	8056 (23.4)	7463 (23.5)	24125 (23.7)
Asian only	1111 (3.1)	1000 (2.9)	1188 (3.7)	3299 (3.2)
Native Hawaiian/Other Pacific Islander	224 (.6)	140 (.4)	109 (.3)	473 (.5)
American Indian/Alaska Native only	169 (.5)	145 (.4)	150 (.5)	464 (.5)
More than one race	97 (.3)	175 (.5)	227 (.7)	499 (.5)
Total	35586	34492	31783	101861(100)
Ethnicity				
Hispanic or Latino	5591 (15.7)	6176 (17.9)	6312 (19.9)	18079 (17.7)
Not Hispanic or Latino	25280	28316 (82.1)	25471 (80.1)	79067 (77.6)
Blank	4715			4715 (4.6)
Total	35586	34492	31783	101861(100)

Table 9

*NHAMCS Original Data Combined for 2002 Through 2004: Gender*

NHAMCS OPDs	2002 Count (percent)	2003 Count (percent)	2004 Count (percent)	Total
Female	22503 (63.2)	21147 (61.3)	19728 (62.1)	63378 (62.2)
Male	13083 (36.8)	13345 (38.7)	12055 (37.9)	38483 (37.8)
Total	35586	34492	31783	101861 (100)

The data showed that the visits in the office based practices (NAMCS) differed in demographics from those made in hospital based clinics (NHAMCS). The proportion of visits for Black persons were higher in the outpatient clinics compared to Black persons in office-based practices. The proportion of female visit rates were also higher in the hospital based clinics compared to the office-based practices. The proportion of visits was higher for White persons in office-based practices than outpatient clinics.

After the recoded data for NAMCS and the NHAMCS were merged, the pilot study population of persons 18 years of age and older with CHD totaled 1,907 visits. A total of 1,207 were made in the office-based setting (NAMCS) and 700 visits were made in the hospital based clinics (NHAMCS). The demographics of these two datasets are described in Tables 10 and 11. In this data set visits made by males outnumbered those made by females by two to one, the exact opposite of the demographics of the data in the original dataset before the extraction of those visits of persons with coronary heart disease.

Table 10

*Pilot Dataset: Combined 2002 Through 2004 Data from Each of NAMCS and NHAMCS  
OPDs Patients 18 Years and Older with Diagnosis of CHD*

Pilot dataset	Count	Percent
Female	696	36.5
Male	1211	63.5
Total	1907	100

Note: Only one diagnosis per visit (out of three available) that corresponded to CHD extracted for pilot study.

Table 11

*Pilot Data: Visits by Race and Ethnicity to Office or Clinic 2002 – 2004*

National Ambulatory Medical Care Survey Office-based visits and National Hospital Ambulatory Care Survey Outpatient Departments Clinic Visits, Persons 18 years and older with Coronary Heart Disease, combined for 2002 through 2004	Count (% of total visits)	Office (% of visits within race)	Clinic (% of visits within race)	Total (total visits by race)
Race				
White only	1616(89.1)	1076(66.6)	540(33.4)	1616
Blacks only	205 (10.7)	86 (42.0)	119(58.0)	205
Asian only	64 (3.4)	36 (56.3)	28 (43.8)	64
Native Hawaiian/Other Pacific Islander	7 (.4)	2 (28.6)	5 (71.4)	7
American Indian/Alaska Native only	12 (.6)	7 (58.3)	5 (41.7)	12
More than one race	3 (.2)	0 (0)	3 (100)	3
Total	1907	1207		1907
Ethnicity				
Hispanic or Latino	111(5.8)	44 (39.6)	67 (60.4)	111
Not Hispanic or Latino	1722	Not Specified	Not Specified	
Blank	74	Not Specified	Not Specified	
Total	1907			

*Data Collection and Data Extraction*

The original data collection for both the NAMCS and the NHAMCS was processed by the United States Bureau of Census. The actual data collection was performed by the physician as assisted by the office or clinic staff based on instruction by the Census field representatives. The physician and staff collected data one week for the office based practices and four weeks for the hospital based clinics. Confidentiality of the

data of patients and physicians is protected and maintained by the Centers for Disease Control and Prevention (CDC) in compliance with the Public Health Service Act, Title 42, United States Code 242m, Section 308(d) (Niska et al., 2007). Under this act no information that could identify a person or establishment can be released to anyone (including the President, congress or any court) without the consent of the provider (Niska et al. 2007).

The following procedure for extracting and treatment of the data for the pilot was followed. The researcher attended a data conference in Washington, D.C., conducted by the CDC and the National Health Statistics Center. Shortly thereafter, a proposal for a pilot study was submitted the Texas Woman's IRB in Denton, Texas. Upon approval from the IRB, the following steps were followed to extract and prepare the data:

1. A detailed procedure for downloading the public access data file to SPSS was written
2. The data files for NAMCS and NHAMCS and the corresponding documentation manuals were downloaded.
3. The age variable was filtered to list only cases for visits of persons 18 years and older. The original data included visits of persons less than one year to 100 years of age.
4. The original variable *diagnosis 1* was recoded to 1= codes 410-414 and 414.1-414.9 and all other diagnoses = 0. Up to three diagnoses were coded in sequence

for the original data. Only the first diagnosis for each visit was recoded for the pilot study. The pilot data was coded to search for the codes corresponding to CHD that were listed as diagnosis one, out of three available.

5. Aspirin was recoded as gen 1 (generic name drug 1) = 50410 = Aspirin; all else = 0. The drugs mentioned in the data were classified according to generic names and a corresponding number, classification name and a corresponding number, and an ingredient name with a corresponding number. It was determined that the generic name would be used for aspirin. The rationale was that few if any other drugs would replicate aspirin as a generic name. The classification codes for drugs in the dataset were based on the standard drug classifications used in the *National Drug Code Directory*, 1995 edition. It was determined that the drug classification code would be used for ACE-inhibitors and beta-blockers. The rationale for this decision was that since there were innumerable generic names for these drugs, it would be more efficient to use classification identifiers rather than generic codes for fear of missing any of these type drugs. To extract the beta-blockers the NDC (National Drug Code) for drug one variable was recoded to New NDC 1 = ACE inhibitors = 0514; NDC 1 = New NDC 2 = beta-blockers = 0512 = 1. In the dataset there were up to eight drugs listed. For the pilot only those drugs listed as the first drug for each visit that corresponded to aspirin, ACE-inhibitors, and beta-blockers were used for the pilot. A new code was



created, *Treatment* for any combination of the drugs prescribed: 1 = Treatment; 0 = No treatment.

6. The race variable was recoded as race 1= White and 2= Blacks, and 0 = others. The number of visits for the other race category were too small to make a difference in the analysis.
7. All cases that were not the diagnosis coded for CHD were deleted from the data set. The smoking cessation variable was already in usable form. The steps were followed systematically for each data set.
8. A unique identifier was entered for each variable in each data set. This was necessary in order to merge the six files together.
9. Frequencies were run on the new data to confirm that all the variables were retained appropriately. Table 8 describes the variables and recodes of the data used for the pilot study.

### *Findings*

The unit of measure for the data set was a face to face visit to the provider made by an individual with a primary diagnosis of CHD. The number of visits by persons 18 years and older who had a primary diagnosis of CHD was 1,907. Since this was a retrospective study, there was no attrition rate. Eighty-four percent ( $N=1616$ ) were White; 10.7% ( $N=205$ ) were Black; 4.5% ( $N=86$ ) were grouped as other, and 5.8% ( $N=111$ ) were Hispanic. The sample was 63.5% ( $N = 1211$ ) male and 36.5% ( $N = 696$ ) were female. In

the original dataset women made up 60% ( $N=108235$ ) and men made up 40% ( $N=72938$ ) of the visits. The age range for persons in all visits was 20 years of age to 100 years of age. The mean age was 66.93 years. In the age range of 45 to 64 years of age, the proportion of visits made by Black persons was higher, 46.3% ( $N=95$ ) compared to visits by White persons, 35.5% ( $N=573$ ). More women than men were in the 75 years and older age group with women representing 38.1% ( $N=265$ ) and men, 27.3% ( $N=331$ ) in this group. In the 75 years and older age group, visits by Whites, 32.8% ( $N=530$ ) outnumbered visits by Blacks, 21% ( $N=43$ ).

*Hypothesis 1.* The method of treatment for coronary heart disease will be independent of race and ethnicity for persons 18 years and older. The statistical test was  $\chi^2$ ;  $\alpha = .05$ . Seven percent (7.3%,  $N=139$ ) of the study sample were prescribed aspirin. The method of treatment for CHD with aspirin was similar between Blacks and Whites. A higher proportion of Blacks received aspirin, 10.7% ( $N=22$ ), compared to Whites 6.7% ( $N=108$ ), and other at 10.5% ( $N=9$ ), but the difference did not reach statistical significance,  $\chi^2 (2, N=139) = 5.757, p=.056$ . Hispanics or Latinos received aspirin at a rate of 8.1% ( $N=9$ ). Seventy-four were missing data for this field.

Blacks received Beta-blockers and/or ACE-inhibitors at a significantly higher rate 18% ( $N=37$ ) than Whites, 12% ( $N=194$ ),  $\chi^2 (2, N=243) = 6.095, p=.05$ . The group *Other* received ACE-inhibitors and/or Beta-blockers at a rate of 14% ( $N=12$ ).

There was support for an effect of race on treatment of CHD with beta-blockers and/or ACE-inhibitors, with Blacks receiving more treatment with these medications than Whites. Hypothesis one, was therefore rejected.

*Hypothesis 2.* The method of treatment for coronary heart disease will be independent of gender for persons 18 years and older. The statistical test was  $\chi^2$ ; alpha = .05. There was no significant difference in the prescribing of aspirin, beta-blockers or ACE-inhibitors between men and women. More men (13.6%,  $N=165$ ) used tobacco than women (10.5%,  $N = 73$ ). This difference was not statistically significant. However, the method of treatment for CHD and gender showed a significant difference in the treatment of smoking cessation counseling. Men (6%,  $N = 73$ ) were counseled to stop smoking at a significantly higher rate than women (2.7%,  $N = 19$ ),  $\chi^2 (1, N = 1907) = 10.471, p = .001$ . Therefore, hypothesis two was rejected.

*Hypothesis 3.* There will be no interaction of race and ethnicity with geographic region for the treatment of coronary heart disease for persons 18 years and older. The statistical test was logistic regression. The logistic regression results showed that Blacks in the Northeast were more likely to receive beta-blockers and/or ACE-inhibitors prescribed significantly more beta-blockers and/or ACE-inhibitors (Odds Ratio [OR], 2.68; 95% Confidence Interval [CI], 1.395 – 5.163;  $p < 0.003$ ), than Whites in the Northeast. Logistic regression also showed that Hispanics were more likely to receive beta-blockers and/or ACE-inhibitors in the South than in each of the other regions (OR, 2.9; 95% CI, 1.166 –

7.202);  $p = .02$ . The hypothesis that there will be no interaction of region and treatment was, therefore, rejected.

*Hypothesis 4.* There will be no interaction of gender and geographic region for the treatment of coronary heart disease for persons 18 years and older. The statistical test was logistic regression. There was no significant interaction of gender and geographic region except in the treatment of smoking cessation. In the Northeast men were more likely to be counseled for smoking cessation than women (OR, 1.8; 95% CI, 1.075 – 3.162;  $p = .03$ ). The hypothesis for there will be no interaction of gender and region on treatment was, therefore, rejected.

*Hypothesis 5.* There will be no interaction of race and ethnicity with type of facility for the treatment of coronary heart disease for persons 18 years and older. The statistical test was logistic regression. The logistic regression results showed support for the variables race and type of facility to be predictors of the receipt of aspirin in the treatment of CHD. Blacks were more likely to receive aspirin in the hospital-based clinic compared to the office-based practice (OR, 1.9; 95% CI, 1.038 – 3.52;  $p = .04$ ). A contrary finding was Whites were 2.3 times more likely to receive Beta-blockers and/or ACE-inhibitors in the office setting than in the hospital-based clinic. This was significant at the .05 level. There was also a significant interaction of race and metropolitan statistical area (MSA). Blacks were more likely to receive beta-blockers and/or ACE-inhibitors in the MSA than the non-MSA (OR, 4.509; 95% CI, 1.99 to 16.964;  $p = .01$ ). The results also

showed some support for interaction of race and type of facility for treatment of CHD by smoking cessation counseling. The results indicate that Blacks are more likely to receive smoking cessation counseling in facilities in MSAs than facilities in non-MSAs (OR, 5.92; 95% CI, 1.197 – 29.30;  $P=.03$ ). The hypothesis that there will be no interaction of treatment and types of practice (office or clinic) and facilities was, therefore, rejected.

*Hypothesis 6.* There will be no interaction of gender and type of facility for the treatment of coronary heart disease for persons 18 years and older. The statistical test was logistic regression. The logistic regression results showed gender and type of facility as significant predictors of a person to receive beta-blockers and smoking cessation. The results indicated men were less likely to receive beta-blockers and/or ACE-inhibitors in the office based practice than females (OR, .70; 95% CI, .493 - .992;  $p=.045$ ). The logistic results indicate that males are 1.8 times more likely than females to receive smoking cessation counseling in the office based practice setting. The 95% CI was 1.45 to 2.801,  $p$  value of .011.

### Conclusions and Adjustments for Final Data

It was determined from the pilot study that the sample size should be larger. In the pilot data analysis, for the variable race and ethnicity, there were cells with  $< 5$ . It was therefore determined to add year 2005 to the dataset in order to increase the sample size and to drop the ethnicity variable since there were not enough numbers for comparison. Another decision was made to include the medications from all options listed and to use

all three diagnosis options from the patient record form instead of the one listing used in the pilot. This would enhance greater frequencies of listings for the medications as well as the number of visits of individuals with CHD. These actions would necessitate going to the Institutional Review Board (IRB) for additional approval to access the 2005 data sets.

### Treatment of Data

Approval to conduct the study was obtained from the Texas Woman's University's Institutional Review Board (IRB) and the Texas Tech University Health Sciences Center IRB. The data was downloaded from the public use site to SPSS software version 15. Diagnosis codes for CHD were extracted using the *International Classification of Diseases, Ninth Revision* (ICD-9) codes. The generic codes for aspirin and drug classification codes for beta-blockers, and ACE-inhibitors will be extracted and recoded as appropriate.

The following variables were identified and recoded as displayed in Appendix A: characteristics of the patient: age, gender, race, insurance status; characteristics of the practice: OPD, office; system characteristics: geographic region and metropolitan statistical area; and outcome variable: patients receiving any one or a combination of aspirin, beta-blockers, or ACE-inhibitors. The data from each year, 2002, 2003, 2004, and 2005 were merged into one data set. Statistical analysis was conducted as described in manuscript two (chapter 4).

## CHAPTER IV

### EFFECT OF RACE ON THE MANAGEMENT OF CORONARY HEART DISEASE IN AMBULATORY CARE SETTINGS: DOES RACE DETERMINE CARE?

#### Abstract

The purpose of this study was to examine the effect of race as a predictor in the treatment of heart disease. The study measured the effect of race on the evidence-based recommendations regarding aspirin, beta-blockers, and ACE-inhibitors in the management of coronary heart disease in ambulatory care, using secondary data analysis of the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey. Location and type of facility were also examined as possible predictors of care. Although disparities in hospital-based studies comparing Blacks and Whites have been well documented, little is known about race and coronary care in ambulatory care settings. This study showed Blacks received higher proportions of the evidence-based medications than Whites. The implications may mean racial/ethnic disparities of care favor better treatment for Blacks in ambulatory settings and Blacks receive low cost and efficient treatment. However; unlike Whites, they may not be subsequently referred for cardiac catheterization and angioplasty.

## Effect of Race on the Management of Coronary Heart Disease in Ambulatory Care Settings: Does Race Determine Care?

Coronary heart disease (CHD) remains the leading cause of death in the United States (U. S). Black Americans bear a greater burden of death from cardiovascular disease than any other racial or ethnic group. The CHD death rates in 2004, per 100,000 people were 194.4 for White males, 222.2 for Black males, 115.4 for White females, and 148.6 for Black females (Minino, Heron, Murphy & Kochanek, 2007).

Despite improved rates for living longer in the U. S., high life expectancy for Blacks still trail that of Whites. In 1960 Black men had a life expectancy of 61 years compared to 67 years for White men; in 1996 Blacks had a life expectancy of 66 compared to White men's 74 years (Minino, Heron, Murphy, & Kochanek, 2007). In 2003 and 2004 the life expectancy for Blacks increased at a higher rate, 0.5 year compared to Whites which decreased by 0.4 year. This made the life expectancy for Blacks 73.1 years still trailing that of Whites, which was 78.3 years (2007). Life expectancy remains higher in Whites than in Blacks by about five years. These trends make appropriate care for Blacks an urgent goal for all.

The Institute of Medicine report *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* substantiated that racial and ethnic disparities exist in the delivery of health care and are not associated solely with insurance, socioeconomic factors, or patient preferences (Smedley, Stith, & Nelson, 2003). Although the disparities



in care delivery among Blacks are well documented, it is not clear why they exist. This study will help answer that question.

Many studies suggest poorer health care quality and variation in treatment for Blacks when compared to Whites. For example, researchers using standardized patients and vignettes reported that Black women compared to Black men and White men and women, were less likely to be referred for cardiac catheterization, despite identical clinical presentations (Schulman, Berlin, Harless, Kerner, Sistrunk, et al., 1999). Similarly, authors using a hospital based National Registry of Myocardial Infarction, reported persistent racial differences in the use of reperfusion therapy and coronary angiography for patients with similar clinical features (Vaccarino, Rathore, Wenger, Frederick, Abramsom, et al., 2005). Patients were evaluated for the use of treatments for myocardial infarction recommended by the American College of Cardiology-American Heart Association. Measures included reperfusion therapy within 24 hours of admission, administration of aspirin and beta blockers within 24 hours, and coronary angiography during hospitalization. The data were categorized according to characteristics of patients (race, gender, age, clinical features) hospital characteristics (staffed beds >200, teaching, urban, ability to perform specific cardiovascular procedures) and year of treatment (2005).

The researchers used three logistic regression models to predict the likelihood of treatment. Model one consisted of sex (gender), race, year and all two-way and three –

way interactions among sex, race, and year; model two used the data in model one and demographic and clinical features; and model three included the data in model two and additionally included characteristics of the hospitals. The unadjusted analysis (unadjusted for characteristics for patients and hospitals) showed differences were highest between Blacks and Whites for receiving reperfusion therapy and angiography (Vaccarino et al., 2005). The differences were smaller for the rates of usage of aspirin and beta-blockers. The rates for reperfusion for White men were 86.5 %; for White women, 83.3%; for Black men, 80.4%; and Black women, 77.8 percent. These rates were significant at a  $p$  value of  $< 0.001$  (2005). The unadjusted use of beta blockers were 66.6% for White men; 62.9% for White women; 67.8% for Black men; and 64.5% for Black women;  $p < 0.001$ . The unadjusted rates for the use of aspirin were 84.4% for White men; 78.7% for White women; 83.7% for Black men; and 78.4% for Black women;  $p < .001$ . The rates for coronary angiography were 69.1% for White men; 55.9% for White women; 64.0% for Black men; and 55.0% for Black women (2005). After multivariate adjustment for characteristics of patients and hospital characteristics, rates of reperfusion therapy and coronary angiography were lower among Blacks. These hospital based studies consistently showed less treatment for Blacks when compared to Whites, especially for angiography and reperfusion.

Several studies have demonstrated system level problems using hospital data (Barnato, Lucas, Staiger, Wennberg, & Chandra, 2005; Jha, Orav, Li, & Epstein, 2007;

Rathore, Masoudi, Havranek, & Krumholz, 2004; Skinner, Chandra, Staiger, Lee, & McClellan, 2005). Systematic differences in demographic makeup and institutional policies have been examined and some evidence exists that neighborhoods where Blacks live may affect the type of care received by Blacks and ethnic minorities. Using data from the Cooperative Cardiovascular Project (CCP) for approximately 140,000 Medicare beneficiaries treated in the mid 1990s at 4,700 hospitals, researchers examined the within and between hospital effect on the prescription of coronary procedures. They concluded that Blacks were more likely than Whites to be treated in hospitals where effective therapies were less prescribed, coronary procedures were more often used, and 30-day mortality rates were worse. Researchers in a similar study using CCP data found Blacks were disproportionately treated in the Southeast where beta blockers were less often prescribed; coronary angioplasty was more common, and risk-adjusted mortality rates were higher in the Northeast (Rathore et al., 2004). These hospital-based studies suggest racial disparities and variations in quality of care across hospitals and/or regions.

While hospital studies have been the main data source for health disparities research in cardiac care, ambulatory medical care is the predominant method of providing care in the U. S (Middleton & Hing, 2005). Fewer known published studies exist that address the cardiac care of Blacks in ambulatory settings. The use of secondary prevention has been cited as one of the reasons for a decline in coronary heart disease mortality (Ergin, Munter, Sherwin, & He, 2004; Gillum, 1994; Hunink, Goldman,

Tosteson, Mittleman, & Goldman, 1997; McGovern, Pankow, & Shanar, 1996). It therefore seems appropriate that this setting is one to target to improve the life chances for Blacks, who suffer the greatest burden of death from coronary heart disease.

The purpose of this study was to examine the effect of race of patients 18 years and older with coronary heart disease on the provider choice of aspirin, beta-blockers, and angiotensin-converting enzyme – inhibitors (ACE-inhibitors) in ambulatory care in the U. S. The National Ambulatory Medical Care Survey (NAMCS) and the National Hospital Ambulatory Medical Care Survey (NHAMCS) were the databases used for the study. Secondary data analysis was conducted on the combined years of 2002 through 2004 for each database.

## Methods

### *Protection of Human Subjects*

The Institutional Review Boards of both the Texas Woman's University and the Texas Tech University Health Sciences Center independently reviewed the study and determined it to be exempt status due to the use of non-identifiable data. This was because of the use of non-identifiable data.

### *Conceptual Framework*

In a model developed by Jackson (2008) it is theorized that race affects the treatment received for coronary heart disease. In other words, the characteristics of the patient determine the care received. It is further believed that the characteristics of the practice and contextual characteristics influence the way race acts on the care prescribed.

In this study patient characteristics include: race, age, gender, coronary heart disease, and insurance status. Of these factors, it is theorized that race is the most important predictor of care. The characteristics of the practice for this study include whether the care is provided in a private office-based practice or a hospital-based outpatient clinic. The contextual characteristics for the study include the geographic region and the Metropolitan Statistical Area of the United States. It is believed that the practice characteristics (practice type) and the contextual characteristics (location within the universe of healthcare in the US) influence how race affects the care provided. The focus of the study was to test three hypotheses related to the model components: patient characteristics; practice characteristics; and contextual characteristics. Figure 4 depicts the model for the study.

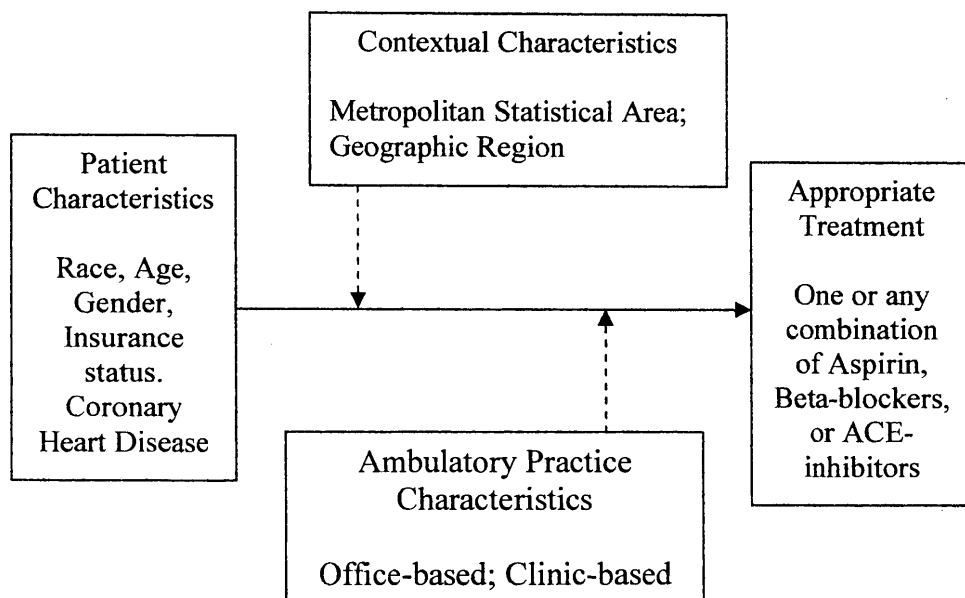


Figure 4. Jackson Primary Care Model (2008)

### *Hypotheses*

The following hypotheses were tested. Hypothesis 1: Race will determine the care persons 18 years and older receive for CHD in ambulatory care settings. 2. Practice characteristics will moderate the effect of the race of persons 18 years and older with CHD on the odds of receiving appropriate treatment. 3. Contextual characteristics will moderate the effect of the race of persons 18 years and older with CHD in ambulatory care settings, on the odds of receiving appropriate treatment. The decision rule was if the predictor variable had a probability of  $p < .05$ , the hypothesis would be accepted or supported.

### *Data Preparation and Design*

This was a retrospective, exploratory design using secondary data analysis from the NAMCS and the Outpatient Department (OPD) component of the NHAMCS. Annual data from NAMCS and the OPD component of the National Hospital Ambulatory Medical Care Survey were combined for years 2002 through 2005. These surveys were conducted annually by the National Center for Health Statistics (NCHS) to assess ambulatory care in office-based practices of physicians and hospital-based clinics of outpatient departments of short-stay hospitals in the United States. The NCHS used a multistage sampling method to select the sample of physicians that participated in the collection of the original data(NCHS, 2004; NCHS, 2005;NCHS, 2006a; NCHS, 2006b; NCHS, 2006c; NCHS, 2006d; NCHS, 2007a, NCHS, 2007b). The selection process involved practice sampling units of geographic locations, physician practices within the practice sampling units, patient visits within the physician practices, and a randomized selection of visits from one week reporting period for the NAMCS and from a four week reporting period for the NHAMCS (NCHS 2004, 2006b, 2006d, 2007b). Standard encounter forms, called patient care records, were completed for each setting. The forms varied slightly between the NAMCS and the NHAMCS. The common elements of the forms included, but not limited to patient demographics, primary source of payment, up to three patient diagnoses, and names and number of medications listed for visit (up to six for 2002, and up to eight for 2003 to 2005).

Each data file was downloaded into SPSS and systematically recoded for the variables of the study. Aspirin was recoded as generic name drug (50410). The drugs mentioned in the data were classified according to generic names and a corresponding number, a classification name and a corresponding number, and an ingredient name with a corresponding number. It was determined that the generic name and ingredient name would be used for aspirin. This method would capture drugs that had aspirin as an ingredient. The classification codes for drugs in the dataset were based on the standard drug classifications used in the *National Drug Code Directory*, 1995 edition (Food and Drug Administration, 1995). It was determined that the drug classification code would be used for beta-blockers (0512) and ACE-inhibitors (0514) instead of generic names. The rationale for this decision was that since there were innumerable generic names for these drugs, it would be more efficient to use classification identifiers rather than generic codes for fear of missing any of these type drugs. In the data the National Drug Code (NDC), 1995 edition was used originally to classify drugs. It is updated annually. To extract the beta-blockers the National Drug Code (NDC) for drug one variable was recoded to New NDC 1 = ACE inhibitors = 0514; NDC 1 = New NDC 2 = beta-blockers = 0512 = 1. The drugs were recoded and grouped into one variable named Appropriate Treatment. Visits by patients with coronary heart disease were identified by the *International Classification of Diseases, Ninth Revision* (ICD-9) codes: angina pectoris=413; MI=410; CIHD (all other forms of ischemic heart disease) =411, 412, and 414.1-414.9 (Public Health Service and Health Care Financing Administration, 1988).



It was determined that comorbidities would not be measured in this study. A major consideration for this decision was elimination of the visits with these diagnoses might reduce the sample size. Another factor was the intent of the study was to compare treatment based on race not utilization patterns of the drugs. This is noted as a very important limitation of the study, as; some reason for not prescribing the drug may be based on contraindicating comorbidities such as, bleeding conditions or asthma.

### *Sample Population*

A total of 4,015 visits of persons 18 years and older with coronary heart disease (CHD) comprised the study dataset of the National Ambulatory Medical Care Survey (NAMCS) and the outpatient component of (OPD) the National Hospital Medical Care Survey (NHMCS) for years 2002 through 2005. Males made up 60% of the overall visits (n = 2413) and 40% were made by females (n = 1602). The age range was 19 years to 100 years and older; the mean age was 68. Slightly more than a third (34.6%, n = 1391) of the sample population was 45 – 64 years of age and one third (33.6%, n = 1350) of the group was 75 years and older. Blacks tended to be younger. In the oldest age group 75 and older Blacks had a smaller proportion than Whites (Blacks = 22.8%; Whites = 35.2%). In the 65 – 74 years group Blacks had a smaller proportion of visits (Blacks = 25.5%; Whites = 28.4%). However Blacks did have the highest proportion of visits in the 19 – 44 (Blacks = 5.6; Whites = 5.6) and the 45 – 64 years of age group (Blacks = 46.2; Whites = 32.9%). Persons in the 19 – 44 years of age group made more visits in the hospital-based clinic compared to the office-based setting. Overall the office was the site

where higher proportions of the evidence-based medication treatment were received (58%) while 48% of visits received the evidence-base medication treatment in the hospital-based clinic. In the total sample, 87% (n = 3493) of visits were made by Whites and 13% (n = 522) were made by Blacks. The predominant payment source for both Whites and Blacks was Medicare (54.6%, n = 2191). Private insurance made up 29% (n = 1168) and Medicaid was 9.3% (n = 375) of the visits. The vast majority of the visits were made to the office-based practice settings, 62.54% (n = 2,511) and 37.45% (n = 1504) was made to the hospital-based clinics. Of those visits made to the office-based practices, 92.1% (n = 2312) were made by Whites and only 8% (n = 199) were made by Blacks. In the hospital-based clinics, Whites made 79% (n = 1181) of the visits; 22% (n= 323) were made by Blacks. In the office-based practice setting 37% of the visits were made in the South; whereas, in the hospital-based clinic setting, most of the visits were made in the Northeast (38.4%). While Medicare was the predominant source of payment for both the office and the clinic, a higher proportion of Medicaid visits were made in the clinic (16.8%) compared to the office (4.9%). The vast majority of visits were made in MSAs in both the office-based practices and the hospital-based clinics. Table 12 displays a summary of the study population sample.

Table 12

*Population Sample Characteristics:**Frequency of Visits*

Patient Characteristics		Practice Characteristics	
Gender		Office	Clinic
Female	1602 ( 40%)	960 (38.2%)	642 (42.7%)
Male	2413 ( 60%)	1551 (61.8%)	862 (57.3%)
Total	4015		
Age			
19-44	148 ( 4%)	71 ( 2.8%)	77 ( 5.1%)
45-64	1391 (34.6%)	759 (30.2%)	632 ( 42 %)
65-74	1126 ( 28 %)	735 (29.3%)	391 ( 26 %)
75 and older	1350 (33.6%)	946 (37.7%)	404 (26.9%)
Total	4015		
Race			
White	3493 ( 87 %)	2312 (92.1%)	1181 (78.5%)
Black	522 ( 13 %)	199 ( 7.9%)	323 (21.5%)
Total	4015		
Insurance Status			
Private Insurance	1168 ( 29 %)	826 (32.9%)	342 (22.7%)
Medicare	2191 (54.6%)	1435 (57.1%)	756 (50.3%)
Medicaid	375 ( 9.4 %)	122 ( 4.9%)	253 (16.8%)
Other	281 ( 7 %)	128 ( 5.1%)	153 (10.2%)
Total	4015		
Contextual Characteristics			
<i>Geographic Region</i>			
Northeast	1115 (27.8%)	537 (21.4%)	578 (38.4%)
Midwest	1003 ( 25 %)	635 (25.3%)	368 (24.5%)
South	1393 (34.7%)	921 (36.7%)	472 (31.4%)
West	504 (12.6%)	418 (16.6%)	86 ( 5.7%)
Total	4015		
<i>Metropolitan Statistical Area</i>			
(MSA)	3502 ( 87 %)	2166 (86.3%)	1336 (88.8%)
Non-MSA	513 (12.8%)	345 (13.7%)	168 (11.2%)
Total	4015		

### *Independent Variable*

The major independent variable was *race*: White or Black. Other co-variants tested were: *patient characteristics*: age, gender, payment type; *practice characteristics*: office-based practice and hospital-based clinic; and *contextual characteristics*: geographic region: Northeast, Midwest, South, and West and MSA or non-MSA.

### *Dependent Variable*

The outcome measured was *evidence-based medication treatment*. The dependent variable represents any one or combination of any of the medications aspirin, beta-blockers and/or ACE-inhibitors prescribed at a visit in ambulatory care and documented on the patient record form.

### *Appropriate Treatment vs. No Treatment*

The analysis was conducted on data describing those visits that received appropriate evidence-based medication treatment compared to those that did not. More than 60% (n = 316) of Blacks received evidence-based medication treatment compared to 50.4% (n = 1830) of Whites. Most visits occurred in the office-based settings (62.3%, n = 2511) compared to 37.54% (n = 1504) that took place in the hospital-based clinic. Approximately 58% of Whites and 55% of Blacks received evidence-based medication treatment in office settings; whereas, approximately 41% of Whites and 64% of Blacks received evidence-based medication treatment in the hospital-based clinic settings. Table 13 summarizes visits by gender, practice setting and treatment.

Table 13

*Treatment by Practice Characteristics*

<i>Practice Characteristics</i>	<i>Treatment Yes Count (%)</i>	<i>Treatment No Count (%)</i>	<i>Total</i>
Office			
White	1347(58.3%)	965 (41.7%)	2312
Black	109 (54.8%)	90 (45.2%)	199
Clinic			
White	483 (40.9%)	698 (59.1%)	1181
Black	207(64.1%)	116 (35.9%)	323

Table 14

*Gender and Treatment*

<i>Gender</i>	<i>Office Treatment Count (%)</i>	<i>Clinic Treatment Count (%)</i>	<i>Total</i>
Male	945 (60.97%)	397 (46.1%)	1342
Female	511 (53.2 %)	293 (45.6%)	804

## Results

Logistic regression using SPSS software package version 15 was used to conduct the analysis for the study.

### *Hypothesis 1*

First the crude odds of the effect of race on the appropriate treatment were estimated using logistic regression. The variable *race* was the single variable entered. The crude odds ratio was 1.394 (95% CI, 1.55 – 1.682,  $p = .001$ ). White was the reference group. Race was a significant predictor of treatment with Blacks 1.39 times more likely to receive evidence-based medication treatment than Whites.

In the next model all of the covariates were entered in order to control for their influence on the effect of patient's race on provider choice of appropriate treatment. The variables entered simultaneously were race, settype (practice characteristics), sex (gender), region, paytype (insurance status), MSA, and age. The Wald Chi-square test showed the following variables had significant predictability for the model: race ( $p < .001$ ), office ( $p < .001$ ), female gender ( $p < .001$ ), and Medicaid ( $p = <.001$ ). Hypothesis 1 was therefore accepted; however, the other variables did contribute to the outcome. Even after adjustment for the other variables, race remained a significant predictor for receiving appropriate evidence-based treatment. Blacks were 1.56 times more likely to receive treatment than Whites. Table 15 shows the crude odds ratio and the adjusted odds ratio of race as a predictor of receiving evidence-based medication treatment. In the next

model all significant variables were placed in the model. This represents the final full model showing all predictors of receiving treatment. (See Table 16).

Table 15

*Hypothesis 1: Race Crude Odds Ratio*

<i>Variable</i>	<i>Crude Odds Ratio</i>	<i>95% Confidence Interval</i>	<i>p</i>
Race			
Black	1.394	1.155 – 1.682	.001
<i>White is the reference group.</i>			

<i>Variable</i>	<i>Adjusted Odds Ratio</i>	<i>95% Confidence Interval</i>	<i>p</i>
Race			
Black	1.569	1.285 – 1.917	<.001
<i>White is reference group.</i>			

Table 16

*Final Full Model: Significant Predictors of Receiving Appropriate Treatment*

<i>Variable</i>	<i>Odds Ratio</i>	<i>95% Confidence Interval</i>	<i>p</i>
<i>Race (Reference group White)</i>			
Black	1.581	1.297 – 1.927	<.001
<i>Practice Characteristics</i>			
<i>(Reference group clinic)</i>			
Office	1.841	1.607 – 2.109	<.001
<i>Patient Characteristics</i>			
<i>(Reference group female)</i>			
<i>Gender</i>			
Male	1.274	1.119 – 1.450	<.001
<i>Insurance Status(Reference group private insurance)</i>			
Other	1.633	1.244 - 2.142	<.001
Medicaid	1.517	1.183 – 1.944	.001
Constant	1.616		.020



## *Hypothesis 2*

The interaction of race with practice characteristics was tested using logistic regression. In this model all variables with significant predictability from the final full model were placed in the equation; then the interaction of race and practice characteristics were added to the model. The logistic regression was then conducted to test the hypothesis 2. The results of this model are shown in Table 17. The results indicate there is a significant interaction of race with practice characteristics: OR .354, 95% CI .240 - .523,  $p < .001$ . Based on this model Blacks are 2.5 times more likely to receive evidence-based medication treatment compared to Whites in this dataset; treatment is 2.10 times more likely to take place in the office-based practice setting than in the hospital-based clinic (95% CI 1.816 – 2.429,  $p < .001$ ); males are more likely to receive appropriate medication treatment than females (OR 1.272, 95% CI 1.117 – 1.449,  $p = < .001$ ) and visits of persons in the *other* insurance status category (self-pay, workman's compensation, no charge and unknown) are 1.6 times (95% CI 1.218 – 2.102,  $p = .001$ ) more likely to receive the medication treatment than persons with private insurance. Persons on Medicaid are also more likely to receive the evidence-based medication treatment than persons with private insurance (OR 1.433, 95% CI 1.116 – 1.841,  $p = .005$ ). Other interactions race\*gender; race\*age; and race\*insurance status were tested in the full model, one interaction at a time and none of these interactions were significant.

Hypothesis 2 that practice characteristics will moderate the effect of the race of persons 18 years and older with CHD on the odds of receiving evidence-based medication treatment was supported by the findings of this interaction model. Therefore, the hypothesis was retained. However other variables are significant predictors of receiving appropriate medication treatment as described above.

In order to examine the significant interaction of race with practice characteristics more fully, a stratification of the practice characteristics (settype variable) was conducted. The variable was split and a logistic regression was conducted on each level, office and clinic. The results are shown in Table 18. The results of this model indicate Blacks are 2.14 times more likely to receive appropriate medication treatment in the clinic compared to the office, where they are 8% less likely to receive appropriate medication treatment. In the clinic type setting, visits in the *other* payment category (self-pay, workman's compensation, no charge, and unknown) are 3.5 times more likely to receive the evidence-based medication treatment and persons on Medicaid are 2.8 times more likely to receive the medication treatment. In the office-based practice there were no significant differences between race and/or insurance status for receiving the evidence-based medication treatment.

Table 17

*Hypothesis 2*

Variable	Odds Ratio	95% confidence Interval	<i>p</i>
<i>Reference group White</i>			
Race			
Black	2.453	1.890 – 3.185	< .001
<i>Reference group clinic</i>			
Practice characteristics			
Office	2.100	1.816 – 2.429	< .001
<i>Reference group private insurance</i>			
Insurance Status			
Other	1.600	1.218 – 2.102	.001
Medicaid	1.433	1.116 – 1.841	.005
Race (Black) * Practice Characteristics	.354	.240 - .523	<.001
(Office)			

Table 18

*Stratification of Practice Characteristics*

<i>Variable</i>	<i>Odds Ratio</i>	<i>95% Confidence Interval</i>	<i>p</i>
Office			
Race			
Black	.920	.686 -1.235	.580
<i>Reference group White</i>			
Gender			
Male	1.350	1.145 – 1.591	< .001
<i>Reference group female</i>			
Clinic			
Race			
Black	2.14	1.646 – 2.805	< .001
<i>Reference group White</i>			
Insurance status			
Other	3.498	2.328 – 5.254	< .001
Medicare	1.610	1.223 – 2.120	.001
Medicaid	2.791	1.959 – 3.975	< .001
<i>Reference group private insurance</i>			

### *Hypothesis 3*

The interaction of race with the contextual characteristics (geographic region or Metropolitan Statistical Area) was tested using logistic regression. The interaction of race and contextual characteristics was placed in the full model. There was no significant interaction of race with the contextual characteristics. It was therefore determined to reject the hypothesis that there is an effect of the contextual characteristics with race that affect the odds of receiving appropriate treatment.

### Discussion

The results from this study support hypothesis one that race is an important predictor of what happens to people when they present for treatment at ambulatory settings. Therefore, hypothesis one is supported. Hypothesis two is also supported that practice characteristics interacts with race to affect the amount of treatment received. In the office setting there is no significant difference in treatment based on race or insurance status, but in the clinic setting, Blacks receive a greater proportion of medication treatment than Whites and the payment method of Medicaid and other type payment raises the odds of more medication treatment. It seems that when evidence-based medications are used for primary and secondary treatment in ambulatory care, Blacks are better served than Whites, especially in hospital-based clinics. That alone could be a source to recommend for improvement in healthcare disparities. However, it could be that Blacks are not being referred for the higher end of treatment, cardiac catheterization and

angioplasty. Literature suggests disparities in these more expensive and invasive types of care still exist.

The findings of this study raise several questions. For example, is the type of provider a factor in the practice characteristics? In this dataset, it was noted that between 1992 to 2002 visits involving of Nurse practitioners and Physician assistants at hospital-based clinics changed increased by 47% (Middleton & Hing, 2005). Based on this dataset more nurse practitioners and physician assistants practice in the hospital-based clinics than in the office setting (2005). This could be a case that these providers adhere more to the cardiology practice guidelines than providers in the office-based practice setting. Are the findings of more evidence-based medication treatment in the clinic setting related to cost? The study shows that insurance status has a significant impact on treatment in the clinic whereas there were no significant differences of medication treatment in the office-based practice setting. Maybe the higher proportion of medication treatment in the clinic is related to medications being cheaper than other interventions such cardiac catheterization or angioplasty. The findings that fewer Blacks receive care in the office-based setting may be a factor of lack of access and that hospital-based clinics are more accessible.

Although the evidence-based medications have been shown to decrease mortality and are cost effective, cheaper care may not be the best care for each individual. Standardized care may not be the best matched care for everyone's specific needs; and medication may not be the best treatment option.

Other important areas of concern are referral rates and documentation of patients' preferences. It could mean that some patients are being referred differently based on reasons that are not clinical. It would be helpful to know whether patients are choosing not to have cardiac catheterizations, angioplasty or coronary artery bypass surgery or choosing the aspirin, beta-blockers, and ACE-inhibitors instead. This information may bridge the gap of knowing why the provider made the treatment choices that could add to knowledge of healthcare disparities.

### *Limitations*

There are several important limitations to this study. The data represent visits rather than individual persons; therefore, this cannot be a correlation study. A significant limitation is the fact that comorbidities and reasons for not prescribing the evidence-based medications were not taken into consideration when preparing the dataset. Another limitation is the Black population is only 13% of this data sample; however, that is comparable to that of the general population

Few would argue that opportunities for preventive care activities are more likely to occur earlier in the healthcare system in ambulatory care settings before hospital admissions take place. Prevention could save money and lives, since prevention is associated with longevity in coronary care disease, as pointed out earlier in this article. Ambulatory care is an important site to examine to evaluate health disparities.

## Conclusion

In this study race is an important predictor of receiving appropriate medication treatment in ambulatory care. Blacks receive a higher proportion of evidence-based medication treatment in hospital-based clinics for coronary heart disease than Whites, but not in office-based settings. The odds of receiving the medications double for Blacks treated in the hospital-based clinics compared to the office setting. In the office-based setting there are no significant differences in care received based on race or insurance status.

## *Implications and Recommendations*

Nurses' assessment skills could help determine how well secondary and primary care are being implemented in ambulatory care by asking patients are they taking over-the counter aspirin as well as the other evidence-based prescription medications. At all follow-up visits, persons who have been diagnosed with CHD, could be their own best advocates by discussing with their providers what the standard of care is and what is best for their specific needs. When treatment includes the option of referral that needs to be documented along with whether the patient refused. There needs to be mechanism for knowing whether the provider explained the benefit of each evidence-based treatment choice that includes appropriate medication and/or invasive interventions such as diagnostic angiography and reperfusion. The efficacy of these treatment options need continued research and examination to determine care that matches the individual needs of patients and provide improved quality of life for all.



## CHAPTER V

### SUMMARY OF THE STUDY

The study presented a two-manuscript quantitative research dissertation. The dissertation consisted of five major components: chapter one, manuscript one (chapter 2), chapter three, manuscript two (chapter 4), and chapter five. In this format chapter one provided the study problem, rationale for the study, theoretical framework, assumptions, hypotheses, definition of terms, and limitations of the study. The second component, presented the review of the literature in the form of a publishable manuscript co-authored by the researcher and the members of the dissertation committee. The manuscript was submitted for publication as a research review article in the refereed professional health journal, *Policy, Politics and Nursing Practice*. The manuscript focused on the breadth and depth of the research problem of unequal medical treatment for Blacks compared to Whites in the care of persons with coronary artery disease. Theoretical explanations of the problem from the literature were presented and the model designed by the researcher was also introduced.

Chapter three presented the procedure for collection and treatment of the data in the study. Inherent in this presentation were the tenets of coding and development of a research dataset from public use data using secondary data analysis. The pilot study was also described. Chapter four was presented in the form of a second manuscript that

provided the analysis of the data presented in the study. It too, was submitted for publication to the professional, refereed health journal, *Journal of Health Care for the Poor and Underserved*. Chapter five presents the summary of the study, findings, conclusions, and recommendations for policy makers and providers.

### Summary of the Study

Despite advances in health care and decline in cardiovascular heart disease in the U. S., Blacks suffer a disproportionate death rate from coronary heart disease compared to other groups. This finding raises the issue of health disparities and unequal medical treatment. Landmark reports and several studies have produced convincing evidence that these disparities exist and are associated with poor health and healthcare delivery for Blacks when compared to Whites. The leaders of this country through its agencies such as *Healthy People 2010* have set health imperatives to eliminate healthcare disparities. This is a challenging quest, as the problem is complex and there is no clarity of knowledge of the extent to which race plays in medical treatment. This research study examined the effect of the race of the patient on the healthcare provider's choice in prescribing treatment for coronary heart disease. Its findings may provide some measures to eliminate healthcare disparities.

### *Purpose*

Although the data source for most of the research on health disparities have been hospital-based studies, the predominant source of care in the U.S. is ambulatory care. It is

likely when patients access the healthcare system sooner, hospitalizations may be reduced and premature death from heart disease in all groups may be prevented. The decline in the death caused by heart disease is attributed in part to primary and secondary treatment of coronary heart disease related to the adherence of evidence-based standards of practice (Ergin, Muntner, Sherwin & He, 2004; Gillum, 1994; Hunink, Goldman, Tosteson, Mittleman, & Goldman., 1997; McGovern, Pankow, & Shahar, 1996). Prevention is the key strategy in the reduction of deaths from CHD (Cardiovascular Health Studies Division of Adult and Community Health, 2001). Research has shown adherence to established preventive guidelines is associated with significant reductions in short and long-term mortality in persons with coronary heart disease (Antman, Anbe, Armstrong, Bates, & Green, 2004)

The purpose of the study was to examine the effect of race of patients with CHD on providers' choice of evidenced-based treatment of aspirin, beta-blockers, and ACE-inhibitors in ambulatory care using secondary data analysis from two nationally representative data sources, NAMCS and NHAMCS. The specific aims of the study were to determine whether racial differences in care provided exist in ambulatory care and to determine whether the site and type of facility where the care is provided predict the type of care received.

## *Hypotheses*

Three hypotheses were tested in this study. They were as follows:

1. Race will determine the care persons 18 years of age and older receive for CHD in ambulatory care settings.
2. Practice characteristics (office-based practice; hospital-based clinic) will moderate the effect race of persons 18 years and older with CHD on the odds of receiving appropriate treatment.
3. Contextual characteristics (geographic region; metropolitan statistical area [MSA]) will moderate the effect of the race of persons 18 years and older with CHD in ambulatory care settings, on the odds of receiving appropriate treatment.

## *Variables, Conceptual Framework, Statistical Analysis*

The independent variable was race (White or Black). Other covariants were age, gender, and insurance status (patient characteristics), office-based practice, hospital-based clinic (practice characteristics) and geographic region and MSA, non-MSA (system characteristics). The dependent variable was appropriate treatment, the documentation in the patient record of one or any combination of aspirin, beta-blockers, or ACE-inhibitors.

A conceptual model developed by the researcher guided the testing of these variables. The model proposed that race had a major effect on how providers made treatment choices and that the treatment prescribed was moderated by the influence of practice characteristics and contextual characteristics. The study results support the

model that indicated race determines appropriate treatment in this study. Even after controlling for the other variables: age, gender, insurance status, practice characteristics and contextual characteristics, race still remained a significant predictor of whether a patient received appropriate treatment. Some support for this model is found in the literature as indicated by a study conducted by Jha, Staiger, Lucas, & Chandra (2007).

### Summary of the Findings

#### *Overview of Population Sample*

Of the 4,015 visits for the combined years 2002 – 2005 to the NAMCS (office-based practice) and the NHAMCS (hospital-based clinic) 60% were made by men. This is consistent with the general population where mostly men have heart disease. The youngest age was 19 years and the mean age was 68 years. Thirty-five percent of the sample was in the age group 45 – 64 years of age. Blacks were younger and had a higher proportion of visits made to hospital-based clinics. The age of the persons making visits in this study being younger compared to Whites, is consistent to that of hospital-based studies. The proportion of visits receiving treatment in the office-based practice was about the same for Whites (58.3% received treatment) and Blacks (54.8% received treatment). However, Blacks received a significantly greater proportion of treatment in the hospital-based clinics; 64.1% compared to 40.9% for Whites. There was nothing found in the literature to speculate why this finding occurred. More detail of the characteristics of the office versus the clinic might give insight into this finding. One

explanation could be that more Blacks sought treatment in the clinic versus the office and another could be more nurse practitioners saw patients at the clinic site versus the office site. Nurse practitioners are generally known to practice more holistic care and may have adhered more strictly to the evidence-practice guidelines in this setting.

### *Statistical Analysis and Results*

Three hypotheses were tested in the study using logistic regression. First the crude odds ratio was determined by placing only the variable *race* into the model. The results showed race was a significant predictor of receiving treatment. Next all of the variables, race, patient characteristics (age, gender, insurance status), practice characteristics (office-based practice setting, hospital-based clinic setting), and contextual characteristics (MSA, and geographic region) were placed in the model to control for all the other variables that might effect the odds of receiving the evidence-based medication treatment. The results of this adjusted odds ratio model showed race still remained a significant predictor of receiving the medication treatment. Next all of the significant variables were placed into the model. Logistic regression was conducted on these variables, creating the first full model of the study (shown in Table 16, p. 113). The interaction of race and patient characteristics; race and practice characteristics, and race and contextual characteristics were place into the full model one interaction at a time and tested using logistic regression. The only significant interaction was that of race and practice characteristics. The results of each hypothesis are discussed below.

*Hypothesis 1.* Logistic regression was used to test the three hypotheses of the study. Hypothesis one read: Race will determine the treatment persons 18 years and older with CHD in ambulatory care. The crude odds ratio of race of receiving evidence-based medication treatment was significant. Race remained significant even after controlling for the other variables. Hypothesis one was accepted.

*Hypothesis 2.* Hypothesis two read: Practice characteristics will moderate the effect of the race of persons 18 years and older with CHD on the odds of receiving appropriate treatment. This interaction was significant. Hypothesis two was accepted.

*Hypothesis 3.* Hypothesis three read: contextual characteristics will moderate the effect of the race of persons 18 years and older with CHD in ambulatory care settings, on the odds of receiving appropriate medication treatment. The interaction of race with the contextual characteristics (geographic region or Metropolitan Statistical Area) There was no significant interaction of race with the contextual characteristics.

## Discussion

This study examined the effect of race of patients on the provider choice in the use of aspirin, beta blockers and ACE-inhibitors. The aim of the study was to answer two questions: do racial disparities exist in the treatment of patients with CHD in ambulatory settings? and do the site and regional locations affect the amount of care prescribed? There is no unambiguous answer. In response to the first question, in the office setting in this dataset sample population where Medicare was the major source of payment there

was no significant difference in care prescribed. This could be interpreted as there are no racial disparities in the private office practice setting. This finding is inconsistent with the hospital-based angioplasty and reperfusion literature where disparities still exist. This could be a good thing; however, the answer to the second question makes the first answer suspect. The second question, do site (practice characteristics) and regional differences (contextual characteristics) moderate care? The results of the study indicate that practice characteristics, office-based or clinic-based practices do impact how Blacks receive care. So the answer to this question is *it depends*. If the patient is Black and does not have insurance the odds of receiving evidenced-based medication treatment is doubled. If it is considered that the evidence-based medication treatment is the best option of other treatment choices given, then there are no disparities. However, if there is another treatment option that is a better match for the patient's needs and quality of life, for example, angioplasty and the Black patients are not being referred for that treatment, then there are healthcare disparities. Therefore, there is no clear cut answer to the question of whether there are healthcare disparities in ambulatory care.

The literature reviewed for this study did not include race as a variable in ambulatory care settings in the study of CHD. Therefore there are no similar findings for Blacks compared to Whites in the receipt of higher proportion of evidence-based cardiac medication treatment in hospital-based clinics compared to private office-based settings. Less is known about the care of Blacks with CHD in ambulatory care. This study



implies that Blacks with Medicaid or other forms of payment get more medications, but it is not known what the other treatment options are. Other variables were not explored in this study.

The hospital-based literature discussed in this study indicates that concentration of Black patients is associated with less care. In the dataset for this study there was not a concentration in the office setting and care was essentially the same for Blacks and Whites. However, in the hospital-based setting Blacks received more of the evidence-based medications than the Whites. These findings raise the question of there being another treatment option that Blacks are not subsequently being referred.

There was a significant interaction of race with practice characteristics. Based on the findings of this study Blacks receive a higher proportion of treatment than Whites in the hospital-based clinics. This finding is worth further exploration. It implies that there is something different about the people that seek care in the clinics versus those that seek care in the private office setting. More detailed characteristics of the population are not available in this data. However, it is curious to note that the major source of payment for both groups in the office and in the clinic was Medicare. However, in the clinic practice, Blacks method of payment shifted toward Medicaid (33.4% for Blacks versus 12.2% for Whites). It could be that providers in the hospital-based clinic adhered more to practice guidelines than the providers in private office-based practice. A crosstabs chi-square

showed a significant difference in payment sources between the visits in office and the clinic. This information may be proxy for access and poverty.

The findings from the testing of the hypotheses suggest that race is a factor in providing care in the ambulatory setting, but fewer differences occur in the office-based practice. The interaction of race and practice characteristics seems important. The greatest implication to the researcher is that evidence-based practice guidelines should be followed in all practice sites and the options of care should be given the patients with explicit documentation of the rationale for not following the guidelines and documentation that the patient was informed of the best treatment that matched their healthcare needs. More aggressive monitoring is needed in all practice sites based on the findings of the study and implies. The findings of the study should be viewed with caution, as there are no absolute answers to the problem of health disparities. The significance or lack of a significant finding is no reason not to act in every way possible to treat people with human dignity and right to autonomy in medical care and in every day life. For example, in this study, race was a factor. It is no doubt that it has tremendous power in terms of how it impacts people's lives, but it cannot be examined in isolation from where people live and how they fulfill their role in society at the pleasure of how society entitles them to rights, privileges, and responsibilities.

## Conclusions

Based on the findings from this study, race is a predictor of care of patients with CHD in ambulatory care. Black patients with Medicaid and other types of payment are more likely to receive evidence-based medications in hospital-based clinics compared to Whites treated in the same setting. In contrast, in the private office-based setting there are no differences in care based on race or insurance status. The treatment is essentially the same for patients regardless of race in the office-based setting.

## Recommendations

The major recommendation is to strengthen the importance of continued research to eliminate health disparities. Whether Black or White no differences in the known quality of care should occur. Many Blacks and other racial and ethnic groups in this country are poor; the added stress of poor health partially attributed to them by inadequate medical treatment by their fellow Americans is a devastation this country cannot survive. In order to eliminate healthcare disparities among racial and ethnic groups, the assessment of race must continue to be a requirement in public census data and health document records. It is clear that race matters in medical treatment and as long as race remains consequential for entitlement and represents power and resources in society, it is important to assess race and use this information with discretion and respect to help eliminate disparities (Williams & Jackson, 2000).

It is equally important that researchers continue to develop models with constructs that can operationalize variables that can be observed, documented, and measured in order that mechanisms of occurrence can be explored. For example, the model introduced by the researcher is straight forward. Variables are clearly delineated; however, further development of the model is needed to capture more comprehensively what happens to the patient in the encounter with the provider in ambulatory care and what, if anything is different, when that patient is Black compared to if the patient is White. The variables or constructs may be more relevant and developed more fully when quantitative and qualitative researchers work collaboratively to help eliminate healthcare disparities. Qualitative studies could inform researchers, providers and policy-makers by including patients, nurses, risk managers, physicians, and office and clinic managers as participants in phenomenological studies that capture expressions, perceptions, and themes that could be converted into measurable constructs. These qualitative studies could provide context for quantitative studies that may more specifically measure healthcare and health outcomes.

Missing from the research literature is nurses' perception on what is happening in health disparities. Nurses' patient-centered approach of providing care is pivotal in finding the answer of how to help close the gaps in knowledge and clinical intervention. to prevent health disparities.

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## APPENDIX

### Evidence of Healthcare Disparities in Treatment of Coronary Care

## Appendix A

### *Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Barnato et al (2005). <i>Medical Care</i> 43(4) 308-319	Retrospective observational cohort study using Medicare claims and medical records review. Hypothesis: hospital may mediate the observed relationship between race and treatment and outcomes after AMI using elements of Baron and Kenny's 3 stage regression procedure.	130,709 White and 8,286 Black in 4,690 hospitals.	Reperfusion, aspirin, smoking cessation counseling during hospitalization; prescription of aspirin, ACE-inhibitor, beta- blocker at hospital discharge; cardiac catheterization, percutaneous coronary intervention (PCI), or coronary artery bypass graft (CABG) within 30 days of AMI.	30-day and 1- year mortality	30-day and 1- year mortality		Adjusted for diabetes, HTN, smoking, prior MI, heart failure, PVD, admitted from nursing home facility, dementia, hypotension, carcinogenic shock, received CPR, CHF, using logistic and linear probability models.	85% of all Black AMI patients were admitted to 1000 hospitals. Only 40% of all White AMI patients were treated at these same hospitals. 2,691 hospitals treated no Black patients. Hospital is a mediator of observed racial disparity. Odds ratios less than 1 for all treatments for Black compared to Whites, in all treatments except aspirin and ACE- inhibitors.

## Appendix A (continued)

### *Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Barnhart et al. (2003) <i>Archives of Internal Medicine</i> , 163461-466.	Analysis of the New York State Department of Health Statewide Planning Research Cooperative System (SPARCS) data.	9,138 Whites, 1,873 Blacks, 1,544 Hispanics admitted to the New York city hospitals with AMI in 1996.	Revascularization procedures.	PCT, CABG, hospital death.	Adjusted odds ratio and 95% CI calculated for hospital mortality. Data for race/ethnicity from 2000 census were not available at time of study; therefore age- adjusted rates for hospital mortality per 100 hospitalization s (for each race/ethnic group) were calculated using the NYC 1990 census standard population.	Multiple logistic regression to control for age, sex, insurance. Blacks more likely to lack insurance.	Controlled for by multiple logistic regression	Blacks least likely to undergo any procedure. Overall study population significantly benefited from revascularization. Nonclinical and clinical factors appear to account for Blacks being least likely to be revascularized compared to Hispanics and Whites (15.8% vs. 25.8% and 25.2% respectively; $p < .001$ ). Survival for Blacks and Whites were similar. Hispanics more likely to survive than Whites.

# Appendix A (continued, 2)

## Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Bertoni et al (2005). <i>Diabetes Care</i> . 28(11) 2620-2625.	Retrospective Medicare claims. Cohort study. To determine effects of race and region on cardio-vascular morbidity among elderly Americans with diabetes.	126,153 White and 17,962 Black patients =>65; 1994- 1999 for incident acute MI; ischemic heart disease; stroke; heart failure		Blacks, Whites, sex, region, baseline values for comorbidities (hyper-tension, nephropathy, retinopathy, neuropathy, enrolled in end stage renal disease	Cox proportional hazards regression; adjusting for baseline demographics and comorbidities		Yes (see variables)	Unable to compare Hispanic, Asian, Native American, or other race due in-sufficient numbers. Little difference in incidence of CVD between Whites (4.8/100 person- years) and Blacks with diabetes (4.0/100 person- years). Incidence rate of AMI and IHD lower in the South for Blacks. Increased risk with comorbidities with each outcome.

## Appendix A (continued, 3)

### *Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Caillier, J.G. (2006) <i>Journal of Cultural Diversity</i> 13(4) 202-207.	A retrospective longitudinal, July 1998 to July 2000, data review to determine whether disparities in cardio- vascular disease treatment occurred in three public teaching hospitals in Louisiana when patients presented with ischemic heart disease (IHD) or acute myocardial infarction (AMI). Hypo-thesis: Blacks and females when diagnosed with IHD and MI, would be just as likely to utilize invasive procedures when compared to Whites and males at hospitals that serve majority Black population.	Shared medical systems financial database for in south-eastern Louisiana. Excl uded cases with stroke, cancer Renal failure, psychiatric illness; drug abuse/alcohol; HIV; cirrhosis; dementia; lung disease; CHF. Statistically controlled for diabetes, cigarette addiction. 2,079 cases (1091 Black; 923 White).		Race, gender, treatment, age, marital status, number of comorbidities, diabetes, cigarette addiction.	Multi-nominal logit technique.		Yes (see variables)	Cardiac cath: Blacks had odds ratio .87 compared to Whites; Blacks had lower use of Coronary Artery Bypass Graft Utilization (CABG), odds ratio .63, p=.01. Patients with Medicaid, Medicare, or Free Care were less likely to undergo per- coetaneous trans- luminal coronary angioplasty (PTCA)' whereas uninsured were more likely to have the procedure. Other groups were not statistically significant. No gender disparities shown. Racial disparity shown for CABG surgery.

Appendix A (continued, 4)

*Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Crawford et al.(1994), <i>American Journal of Public Health</i>	Data on medical care, SES, risk factors, income and insurance. Collected in a random sample telephone survey.	Community dwelling Black and White adults born in the US, aged 44 to 75 years; 1988 to 1989; 627 Blacks; 380 Whites.	EKG, treadmill, bicycle exercise test; CABG, angioplasty, cardiac catheterization, cardiac meds ( <i>not listed</i> ), hospitalizations for MI, cardiac referrals, and other heart conditions.	Outcome measures: chest pain, discomfort, pressure, or heaviness.	Multi-variate linear regression; logistic regression.	Race, age, sex, living alone or with someone. SES had little effect on difference in care.		Among those that sought care, Black women had lower average delay time. The only statistically significant adjusted racial difference was for referral to a cardiologist; Blacks had odds ratio of .54 compared to Whites.

Appendix A (continued, 5)

*Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Echols et al (2007). <i>American Journal of Cardiology</i> 99. 315-321.	Subset analysis of the North American cohort from the Superior Yield of the New strategy of Enoxaparin Revascularization and GIIY coprotein IIb/IIIa inhibitors (SYNERGY) trial.	Whites, Blacks, and Hispanics with non-ST- segment elevation (NSTEMI) acute coronary syndrome (ACS).		Primary outcome was a composite end point of all-cause death or MI through 30 days after randomization	Chi-square test for discrete variable. Nonparametric tests to test for differences between groups for continuous variables. Logistic regression for association of race to in- house hospital bleeding. A model for 6- month death created using Cox proportional hazards regression.		Disease severity by number of lesions reported as medians with 25 <sup>th</sup> and 75 <sup>th</sup> percentiles.	No significant differences for use of cardiac catheterization. Blacks less likely to receive percutaneous coronary intervention (46% for Whites, 41% for blacks, and 45% for Hispanics; overall p=0.046); also less likely to receive CABG 20% for Whites, 16% for Blacks, and 22% for Hispanics, overall p=0.044). During hospitalization Black more likely to receive ACE-inhibitor, less likely to receive statins and Plavix (clopidogrel). Rates of receipt of aspirin and beta-blockers were same for Blacks and Whites. In all cases, Hispanics received higher rates of drugs than Blacks or Whites.



## Appendix A (continued, 6)

### *Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Correa-de- Araujo et al. (2006), <i>Women's health Issue</i> , 16. 44-55.	Analysis of data from the national Heart Failure and National Acute Myocardial Infarction in collaboration with CMS and Colorado Foundation for Medical Care to assess the quality of care provided to Medicare population with AMI and CHF and to examine gender differences across racial and ethnic groups.	Medicare patients, men and women during 2000- 2001; all identified hospitalizations within each state for a 6-month period sorted by age, gender, race, and hospital. 750 cases per state, plus Washington D.C. and Puerto Rico.	Aspirin within 24 hours of ad-mission; prescribe aspirin at discharge; beta- blockers within 24 hours of ad-mission; beta-blockers pre- scribed at discharge; patients with left ventricular systolic dysfunction (LVSD) pre-scribed ACE- inhibitor at discharge; smoking cessation counseling. CHF: evaluation of left ventricular ejection fraction; patients with LVSD pre-scribed ACE -inhibitor at discharge				Diabetes, HTN, and end stage renal disease (ESRD).	Differences by race/ethnicity: for patients with AMI, compared to non- Hispanic White women, Hispanics were disadvantaged in receipt of all three drugs: aspirin, beta-blockers, and ACE-inhibitors. Among women with AMI and diabetes, compared with Hispanic Whites, non- Hispanic Black women were significantly more likely to receive beta-blockers and more likely to receive ACE- inhibitors.

Appendix A (continued, 7)

*Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Ho, J. E., et al (2005). <i>Journal of Women's Health</i> 14(2)11 7-127.	Prospective cohort study.	Combined data from 9 US epidemiological studies (Atherosclerosis Risk Heart Study [ARI], Charleston Heart Study, Evans county, Framingham Heart Study [original and offspring cohorts], National Health Examination Follow-up study [NHEFS], Rancho Bernardo Study, San Antonio heart Study, and Tecumseh Community Health Study.		Age-specific CHD mortality rates; male/female CHD mortality.	Pearson's chi- square tests for dichotomized variables. Two-tailed Student's <i>t</i> tests or Wilcoxon rank sum tests for continuous variables. Cox proportional hazards regression models.			CHD mortality rates of White women lagged behind those of White men by 10- 15 years in the younger age groups and by 5-10 years in the older age groups. In Blacks, lag time was 5-10 years in most age groups. Differences in gender gap and lag times between Blacks and Whites were not explained by adjustment for established risk factors, differential time of follow-up or secular trends between study periods.

## Appendix A (continued, 8)

### *Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Iribarren, C et al (2005), <i>Archives of Internal medicine</i> 165. 2105-2113.	Prospective cohort study.	20,263 men and 10,061 women in northern California with AMI between January 1, 1995 and December 31, 2002 who were followed up for a median of 3.5 years. Population ages 30 to 85 years who were hospitalized for AMI in one of 16 northern California Kaiser Permanente hospitals.		AMI recurrence and all-cause mortality.		Multi-variate adjustment for SES	Multi-variate adjustment for comorbidities, medication use, angi- ography and revasculariza- tion procedures	In age-adjusted analyses relative to White men, Black men (hazard ratio [HR], 1.44; 95% CI, 1.26-1.65), Black women (HR, 1.47; 95% CI, 1.26-1.72), and Asian women (HR, 1.37; 95% CI, 1.13-1.65) were at increased risk of AMI recurrence. Multivariate adjustment removed excess risk of AMI in these 3 groups.

Appendix A (continued, 9)

*Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
143 Jha, A. K. et al. (2001), <i>Journal of the American Medical Association</i> , 285(3), 297- 303.	Cohort study of 28,934 White and 7575 black men admitted to 147 VA hospitals for 1 of 6 diagnoses (pneumonia, angina, CHF, chronic obstructive pulmonary disease, diabetes, and chronic renal failure) between October 1, 1995 and September 30, 1996.			30-day mortality among Black compared to White patients. In- hospital mortality; 6- month mortality.	Chi-square tests and nonparametric methods to compare characteristics of Black and White patients. Logistic regression for inpatient mortality and Cox propor- tional hazard models for 30- day and 6- month mortality to estimate the independent association of race with mortality.			In adjusted analysis, Blacks had lower 30-day mortality than White patients for all 6 diagnoses (4.5% vs. 5.8%; Relative Risk (RR), 0.77; 95%CI, 0.69- .0.87; p = .001). Also had lower 6- month mortality (11.7% vs. 14.3%; RR, 0.80; 95% CI, 0.73-0.89; p = .001).

# Appendix A (continued,10)

## Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Jha, A. K. et al (2003). <i>Circulation</i> 108, 1089- 1094.	Secondary analysis of to determine the association of race with the risk of CHD events independent of major cardiovascular risk factors or medical therapies.	2,699 women enrolled in the Heart and Estrogen/progest in Replacement Study (HERS) during an average of 4.1 years of follow- up. Racial groups: self- reported White, Black, Latina, Asian-American, and "other" ethnic groups.	Aspirin, beta- blockers; statins, creatinine clearance.	CHD events, a composite of nonfatal MI and CHD death.	Unpaired t test, chi- squared tests, or Mann- Whitney rank- sum test as appropriate. Kaplan-Meir survival to assess racial differences in event-free survival. Cox pro-port ional hazards models to determine independent associations of race with coronary events.	Multivariate analysis for medication use and lab levels.		At baseline, Black women were less likely to receive aspirin or statins. No racial difference is beta- blockers use. Black women had nonsignificantly higher rates of ACE-inhibitors. Calcium channel blockers more likely to be used by Black women.

Appendix A (continued, 11)

Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Jha, A. K. et al. (2005), <i>New England Journal of Medicine</i> 0353, 683- 691.	Secondary analysis of data for men and women enrolled in Medicare from 1992 to 2001 on annual age-standardized rate for receipt of 9 surgical procedures previously known to have disparities in rates at which they were performed in Black patients and in White patients. Also examined data according to hospital referral region for 3 of the 9 surgeries: CABG, carotid endarterectomy, and total hip replacement.	Black and White men and women aged 65 years and older.			Age or race adjusted rates for each procedure by dividing the number of procedures (numerator) by the total number of patients.			In 1992, the rates of receipt for all procedures were higher among White patients compared to Black patients. The gap increases significantly between 1992 and 2001. In early 1990s Whites had higher rates for CABG, carotid endarterectomy, and total hip replacement. In 2001 the rates of these procedures narrowed between Blacks and Whites. At the end of the study all hospital referral regions showed lower rates for Blacks for the 3 procedures.

Appendix A (continued,12)

*Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Jha, A. K. et al. (2007), <i>Archives of Internal Medicine</i> 167, 1177-1182.	Calculation of 2004 Medicare Data to determine volume and proportion of Black patients discharged. Examined hospitals' structural characteristics and performances according to quality measures for patients with AMI, . CHF, and pneumonia.			Race, diagnosis codes, performance scores for AMI during 2004 and 2005.	ANOVA and chi-square tests. Regression models to using Health Quality Alliance performance scores and proportion of Black patients treated in a hospital.			Hospitals with a high volume of black patients had a slightly lower performance rate on AMI compared to hospitals with low volume of black patients (AMI scores were 89.0 vs. 90.7). This effect disappeared after adjusting for hospital referral region. Location accounted for nearly the entire gap in performance for treatment of AMI between hospitals that cared for large volumes of black patients than those that did not.

Appendix A (continued, 13)

*Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Jha, a. K. et al (2007), <i>American heart Journal</i> , 153, 785-791.	Secondary analysis of data from Cardio- vascular Cooperative project. Examined rates of receipt of 6 treatments using conventional common-effects and race-specific models.	130,709 White and 8,286 Black patients admitted with AMI.	Reperfusion (thrombo-lysis or percutaneous coronary interventions (PCIs), aspirin, beta- blockers, cardiac catheterization, CABG.	Age, hypotension, renal function (creatinine levels), anemia (hematocrit levels), low albumin, high creatinine kinase.	Odds ratio; random- effects models. Race- specific model and common effects models.			Blacks had lower unadjusted rates of perfusion and beta-blocker use. Rates of aspirin about the same between the 2 models for blacks and Whites. The common effects model showed Blacks were less likely to receive 5 out of the 6 measures [all but aspirin] OR 0.64 (95% CI, 0.59- 0.69). The race specific model was comparable, but lower rates for Blacks than the common-effects model.



Appendix A (continued, 14)

*Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Keil, J. E. et al. (1993), <i>New England Journal of Medicine</i> , 329, 73-78.	Secondary data analysis of data collected over 30- year period in the Charleston Heart Study to estimate mortality rates and quantify associations with risk factors assessed at the base-line examination in 1960 and 1961.	653 White men, 333 Black men, 741 White women, and 454 Black women.						No significant racial differences in the rate ratios for death from coronary disease; women had significantly lower death rates than men. For the 30- year period, mortality rates for coronary disease per 1000 person- years were 5.2 for White men, (95 percent, 4.1 to 6.3); 4.6 for Black men (95% CI, 3.0 to 6.2), For White women 1.6 to 2.6 (95% CI, and 3.2 for Black women (2.3 to 4.0 , CI 95%).

## Appendix A (continued, 15)

### *Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Kaul, P. et al. (2005), <i>Circulation</i> , 111, 1284- 1290.	Prospective cohort study to compare 6- month functional status and angina symptoms.	1534 White and 337 Black patients undergoing cardiac catheteri-zation between August 1998 and April 2001.	Revascularization; PCI; CABG.	Health status at baseline and 6-month with Short -form 36 (SF-36) health Survey and the Seattle Angina Questionnaire (SAQ) Angina Frequency Scale.	Chi-square for categorical data; t tests and nonparametric Mann- Whitney tests for continuous variables; logistic regression to examine the association of race and revascular- ization status	Adjustment for baseline functional status and clinical and demo- graphic variable		Compared with Whites, Blacks received fewer coronary revascularization procedures (52.5% vs. 66.0%; $p<0.01$ ). At 6 months Blacks had similar mortality (odds ratio, 1.03; 95% CI, 0.57 to 1.9) but worse scores in 5 SF-36 domains 9physical, social, role physical, role emotional, and mental health function). Blacks had higher rates of angina at 6 months than Whites (34.2% vs. 24.6%; $p<0.01$ ). After adjustment for baseline functional status and clinical and demographic variables, Blacks had significantly worse summary physical component scores, summary mental component scores, and SAQ Angina Frequency Scale scores. However, adjustment for revascularization, differences in physical component summary scores and SAQ scores between Blacks and Whites were no longer significant.

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Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Manhapra, A., et al. (2004), <i>American Heart Journal</i> , 148, 92-98.	Prospective clinical database registry study to examine the relation of age and race on short- term death and to ascertain the factors that may have contributed to differences in mortality rates.	40,903 Blacks and 501,995 Whites with AMI enrolled in the National Registry of Myocardial Infarction-2 in 1482 participating hospitals from June 1994 to March 1998.			Logistic regression.			Blacks younger than 65 years had higher hospital mortality rates compared with Whites hospitalized for AMI, and decreasing age was associated with higher risk of hospital mortality rates compared with Whites.

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Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Metha, R. H. (2006), <i>American Journal of Medicine</i> , 119, 70.e1-70.e8	Analysis of subset of data from 32419 patients with ST- elevation MI who received fibrinolysis.	Patients enrolled in 5 large randomized clinical trials: Global Utilization of Streptokinase and Tissue Plasminogen Activator for Occluded Coronary Arteries (GUSTO) I and III trials, patient with ST- elevation MI from GUSTO IIb, and Assessment of the Safety of a New Thrombolytic (ASSENT) trial- 2 and -3. Included only US born Whites and African Americans for this study.	Drug therapies: aspirin, beta-blockers, calcium channel blockers, ACE- inhibitors, Digitalis, glycoprotein IIb-IIIa antagonist. Procedures: cardiac catheterization, angioplasty, CABG.	Outcome variable: 30- day and 5-year mortality.	Continuous variables reported as medians with interquartile ranges (25 <sup>th</sup> to 75 <sup>th</sup> percentiles and categoric variables were reported as frequencies and percentages. Pearson chi- square of Fisher exact test (when cells had expected counts <5) for categorical/ binary variables.	Adjusted for by using Multi-variate models.		Higher use of ACE- inhibitors (Blacks, 32.6%; Whites: 26.3%) and calcium channel blockers (Blacks, 37.7%; Whites, 34.9%) and lower use of digitalis in Blacks (12.0%; Whites, 17.1%). Rates of PCI significantly lower in Blacks (30.9%, Blacks; 35.8% Whites) more likely to have no significant coronary artery disease. In house complications were either similar or lower in Blacks compared to Whites.

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## Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Popescu, I., et al. (2007), <i>Journal of American medical Association</i> , 297, 2489- 2495.	Retrospective cohort study.	85,069 Black and 1,130,855 White patients with AMI admitted to 4,627 US hospitals.		Transfer to another hospital with revascularizati on services form hospital without same service. Coronary revascularizati on with PCI or CABG within 30 days of admission	Chi-square; Cox proportional hazards models; analysis of Schoenfeld residuals to test for violation of the proportional hazards assumption.		Disease severity adjuste d for.	Black patients admitted to hospitals with or without coronary revascularization services were less likely to receive coronary revascularization (34.3% vs. 50.2% and 18.3%vs.25.9%; p<=.001).
Rathore, S. S. et al. (2004), <i>American Journal of Medicine</i> , 117, 811-822.	Retrospective analysis of medical record data from 138,938 fee-for- service Medicare beneficiaries hospitalized with MI between 1994 and 1996.		Admission-discharge of aspirin and beta- blockers, cardiac procedures (cardiac catheterization, any coronary revasculari- zation) within 60 days of admission.		Chi-square; multivariate logistic regression			Racial differences in the use of some therapies for MI in patients hospitalized between 1994 and 1996 varied by region. No racial differences in 30-day mortality, but 5 year mortality rates were 1.4- fold higher among Blacks than in Whites. Black patients more likely to be treated by a physician who was Black, female, and not board certified. White patients more likely to be treated by cardiologists.

## Appendix A (continued, 19)

### *Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Rodondi, N. (2005), <i>the American Journal of Medicine</i> , 188, 1288.e1- 1288.e9.	Measured regular aspirin use. Examined 10 year coronary heart disease risk by using the Framing	2163 Black and White older adults.		Aspirin use; coronary heart disease risk.	Logistic regression unadjusted associations between aspirin use and categories of coronary heart disease risk.	Education, insurance Family income.	Diabetes.	Regular use of aspirin by older adults with no history of cardiovascular disease has increased in recent years. In multivariate analysis Black race associated with lower aspirin use (odds ratio 0.66, 95% CI, 0.49-.089).
Shahar, E. et al. (1996), <i>American heart Journal</i> , 131, (5), 915- 922.	Atherosclerosis Risk in Communities (ARIC) Study; prospective investigation of atherosclerosis in four US communities: Forsyth county, NC; Jacks, Miss.; eight northwestern suburbs of Minneapolis, Minn; and Washington County, Md.	45 to 64 year olds						Aspirin use was nearly threefold greater in Whites than Blacks. (30% vs. 11%; p=<0.001.

# Appendix A (continued, 20)

## Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Skinner, J. et al. (2005), <i>Circulation</i> , 112, 2634- 2641.	Prospective cohort study for fee-for- service Medicare patients hospitalized for AMI during 1997 to 2001.	1,136,736 patients.		Outcome measures: 90- day and 30-day mortality after AMI for hospitals that dispropor- tionately treat Blacks.	Multivariate logistic regression.			Risk-adjusted mortality after AMI is significant higher in US hospitals that disproportionat- ely serve Blacks.
154 Sonel, A. F., et al. (2005), <i>Circulation</i> , 111, 1225- 1232.	Observational study designed to promote evidence-based treatment of hospitalized patients with high-risk Non- ST-elevation (NSTEMI) acute coronary syndrome (ACS).	5,504 Black and 37,813 White patients in the CRUSADE 9Can Rapid Risk Stratification of Unstable Angina Patients Suppress Adverse Outcomes with Early Implementation of American College of Cardiology/Ameri- can Heart Association Guidelines?)		Race, sex, insurance status, medical history, clinical presentation, acute medi- cations, interventional treatments, discharge therapies, the presence or absence of contra- indications to therapies, and in-hospital outcomes.	Mean or median values to describe continuous variables; Wilcoxon test for continuous variables	Adjusted for.	Adjusted for.	Blacks less likely to carry HMO or private insurance; and more likely receive care in an academic institution and less likely to have a cardiologist. Blacks less likely to receive Plavix.

## Appendix A (continued, 21)

### Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Spertus, J., et al. (2005), <i>Journal of the American College of Cardiology</i> , 46, 1838- 1844.	Prospective registry study to compare health status outcomes of Whites and Blacks one year after an acute coronary syndrome (ACS).	1,159 consecutive ACS patients (196 blacks; 963 Whites) treated between February 1, 2000 and October 31, 2001.		One-year health status was quantified with the Seattle Angina Questionnaire (SAQ) and Short Form-12 Physical Component Score (SF-12 PCS).	Multivariate models.	SES adjusted by multi- variate models.		Blacks have more angina (43% vs. 27.1%), worse quality of life (SAQ score = 70.6±28.3 vs. 83.9±20.8), and worse physical function (SF-12 PCS=36.8±12.3 vs. 43.2±11.4; p<0.0001 for all), one year after an ACS than do Whites.
155 Taylor, A. J., et al. (1997), <i>Journal of American College of Cardiology</i> , 30, 901-907.	Retrospective chart abstractions of patients with AMI discharged from military treatment facilities during march to September 1993.	1,208 White and 155 Black, 78 non- Black ethnic origin; mean age 62.4 ± 11.4 years.			Chi-square with Yates corrections. Two tail t tests. Logistic regression. Multi-variate stepwise analysis.			There was a limited relation between ethnicity and the use of invasive cardiac procedures. White patients significantly more likely than Whites to be considered for future cardiac catheterization (OR 1.11, 95% CI, 0.65 to 1.89).



## Appendix A (continued, 22)

### *Evidence of Healthcare Disparities in Treatment of Coronary Heart Disease*

Author/ Journal	Design	Population	Prescribed care	Variables	Statistical analysis	SES	Disease/ Comorbidity	Findings
Vaccarino, V., et al.(2005), <i>New England Journal of Medicine</i> , 353, 671-682	Analysis of national Registry of MI. to examine sex and racial differences in the treatment of patients who were considered to be ideal candidates for certain treatments and in deaths among hospitalized with MI.				Logistic regression.			Rates of reperfusion therapy (for White men, White women, Black men, and Black women: 86.5, 83.3, 80.4, and 77.8 percent, respectively; p<0.001), angioplasty, and in- hospital death after MI, but not for the use of aspirin and beta-blockers, vary according to race and sex, with differences have narrowed in recent years.
Volpp, K. G. (2007), <i>Health Services Research</i> , 42(4) 1613- 1631.	Retrospective observational study of hospitalizations through the VA system nationally.			Outcome variable: all- location mortality	Logistic regression.			Black veterans had significantly lower 30-day mortality than White veterans for six common, high severity conditions, but this was generally limited to veterans over age 65.