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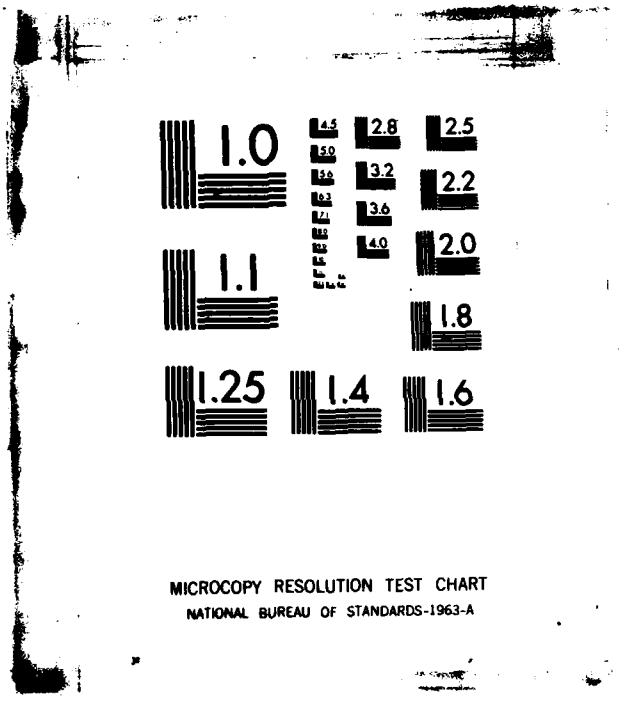
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HEALTH RISKS AMONG ENLISTED MALES IN THE U.S. NAVY: RACE AND ETHNICITY AS CORRELATES OF HOSPITAL ADMISSIONS

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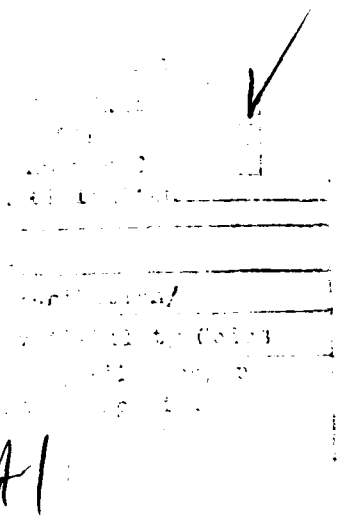

To expedite communication of our research, this is a preprint of a paper submitted to Public Health Reports and should be cited as a personal communication .

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SUMMARY

Problem

Blacks in the United States often are characterized as being at high risk for numerous disorders such as hypertension, diabetes, asthma, schizophrenia, depression, and certain neoplasms. Much of this risk is typically attributed to socioeconomic and sociocultural factors including low socioeconomic status, differential access to health care facilities, and cultural beliefs and practices regarding stress and illness. With the dramatic increase of Blacks in the U.S. Navy in recent years, there is a critical need to assess the health status of this group of enlisted personnel.

Objective

The objective of this study was to determine if there were any significant racial group differences in the health status among enlisted Navy personnel and what, if anything, sociocultural factors contribute to these differences.

Approach

A cross-sectional study of all Black and Caucasian enlisted males in the U.S. Navy between 1974 and 1979 was conducted. Hospitalization rates for these two racial groups were computed for sixteen major ICDA-8 diagnostic categories and several individual diagnoses. Comparisons were made using a risk ratio of Blacks to Caucasians. Hospital admission rates were also computed on the basis of year hospitalized, age, education and occupation.

Results

The data indicate that the health status of Black enlisted males has improved considerably in the past decade, with a reduction in overall hospital admissions from 1,413 per 10,000 men in 1973-1975 to 988.9 per 10,000 men in 1979. Overall hospital admissions rates among Caucasian enlisted males in the same period declined from 1,109 per 10,000 men to 985.8 per 10,000 men. In the six year period, significant differences in hospital admissions rates between Blacks and Caucasians occurred in seven of the sixteen diagnostic categories examined: accidents, poisonings and violence; mental disorders; diseases of the skin and subcutaneous tissue; diseases of the genitourinary system; symptoms and ill-defined conditions; supplementary classifications; and diseases of the musculoskeletal system. In five of these categories, Blacks displayed significantly higher rates of hospital admissions while Caucasians had greater rates of admissions for diseases of the skin and subcutaneous tissue, and accidents, poisonings and violence.

Various demographic, sociocultural and socioeconomic characteristics including age, education, mental group status, and occupation were found to account for part of the elevated risks for different diseases among the various subgroups of each racial group. In most cases, there were no significant differences between the two racial groups once these other characteristics were controlled. Race, however, continued to predict for mental disorders (particularly psychoses), diseases of the genitourinary system (mostly circumcisions), diseases of the skin and subcutaneous tissue, and accidents, poisonings and violence, independent of these other variables. Much of these differences could be

attributed to differential access to modern health care systems prior to enlistment, expectations of Navy life, and culturally-influenced beliefs and practices regarding stress and illness.

Conclusion

The findings suggest that enlistment in the Navy has resulted in certain improvements in the health status of Black male personnel, in contrast to their civilian counterparts. One notable finding was that enlisted men of both races who are unable to meet their expectations in low-status jobs were at great risk for hospitalization. This was particularly true of college-educated Blacks, Caucasian recruits in unspecialized, apprenticeship occupations, and Caucasian hospital corpsmen. The discrepancy between expectations and current status may prove to be a major risk factor underlying the health status and performance of all Navy personnel.

Recommendations

The findings suggest certain revisions in the nature of low-status occupations and the promotion of educational programs dealing with the health risks of certain behavioral traits and lifestyles among enlisted personnel. Further studies involving multivariate analyses and prospective designs of other ethnic groups represented in the U.S. Navy also are recommended.

Health Risks Among Enlisted Males in the U.S. Navy: Race and Ethnicity as Correlates of Hospital Admissions

Blacks are joining the U.S. military in ever increasing numbers. In the last ten years, the percentage of Blacks among U.S. Navy enlisted personnel has increased from 8.2 percent in 1973 to approximately 12 percent today. With this increase, there is a critical need to assess the health risks specific to this racial group in order to provide data for health care personnel and policy-makers alike. This need stems from the fact that Blacks in the general population display a high relative risk for numerous diseases, including sickle cell anemia, hypertension, schizophrenia, accidents, diabetes mellitus, cirrhosis of the liver, infant mortality, homicide, nephritis and nephrosis, congenital anomalies, and certain neoplasms such as cancers of the prostate, esophagus, stomach, pancreas and lung. While genetic factors underlie much of this disease risk, sociocultural factors also are involved in the etiology and distribution of these disorders.

Two general sociocultural factors are often identified as responsible for contravailing patterns of disease risk among Blacks. One factor is the differential access to, and utilization of, health care facilities, which often entails underutilization of existing services or prolonged delays in seeking treatment. This underutilization has the effect of lowering incidence and prevalence rates while increasing the number of severe disease episodes among certain social groups. It has been estimated that between 70 and 90 percent of all self-recognized episodes of sickness among members of all ethnic groups in the United States are managed exclusively outside the formal health care system (1). In all cases of sickness, the "popular" and "folk" sectors (self-treatment, family care, self-help groups, religious practitioners, and so on) provide a substantial portion of health care (2). The choice of treatment is based on a set of cultural traditions regarding the type and severity of the illness and the efficacy of each form of treatment. Differences in utilization of the mainstream health care system based on income, accessibility of medical care, residential segregation, language, and education have also been noted in several studies (3-4). Because assessments of health risks are often obtained by using hospital admissions, a spurious association could be obtained between various diseases and racial or ethnic group status if the racial or ethnic groups under study do not share the same probability of hospital admission with or without the disease (5).

A second sociocultural factor contributing to different health risks among racial or ethnic groups is the stress-related character of many of these disorders. Diseases such as hypertension (6-7), mental disorders (8-9), diabetes (10), asthma (11) and even certain neoplasms (12-13), are believed to be aggravated by social, psychological and environmental stressors. The high rates of stress-related disorders among Blacks in the United States are usually attributed to a disadvantaged position in the social structure and the chronic social stressors associated with that position. Prejudice, discrimination and low socioeconomic status are seen as stressors which place Blacks at higher risk for disease episodes. Several studies have demonstrated a relationship between socioeconomic status (SES) and illness, especially in the case of prostatic cancer (14), hypertension (15-16),

depression (17) and schizophrenia (18) as well as morbidity in general (19). Once socioeconomic status is controlled for, racial distinctions tend to disappear (20).

In addition to low socioeconomic status, culturally-influenced beliefs and practices are also believed to contribute to racial group differences in stress and stress-related illness. Cultural factors may influence the relationship between stress and disease in several ways. For example, the degree of exposure to activities and events viewed as stressful may be affected by the residence patterns, kinship patterns, and religious beliefs of a particular ethnic group. The cognitive appraisal of these events and the degree to which they are considered stressful also are based on cultural patterns of belief and behavior (21). Furthermore, different cultures provide their members with different sets of coping strategies designed to manage particular stress situations and prevent them from resulting in illness. These may include somatization, smoking or drinking, eating, membership in social organizations or kin groups, and so on. Finally, cultural values influence the consequences of stress on individuals in terms of illness behavior. This would include differences in the expression of symptoms such as pain (22-23) and utilization of modes of treatment.

Previous research has indicated that these factors may also contribute to certain patterns in the health status of Blacks in the U.S. Navy. Holberg, Berard and Ernst (24) reported that Black enlisted males had a hospitalization rate of 1,413 per 10,000 population per year compared with a Caucasian rate of 1,109 per 10,000 between 1973 and 1975. Blacks were at highest risk for mental disorders, diseases of the digestive system, diseases of the genitourinary system, diseases of blood and blood-forming organs, diseases of the circulatory system, supplementary classifications, diseases of the musculoskeletal system, and symptoms and ill-defined conditions. Possible explanations for the excess risk included differences in occupation; the variables of age, length of service, paygrade, and General Classification Test scores; and recruitment policies affecting particular racial groups. The results suggest that health status is affected by minority status, despite the fact that all the minority groups do not uniformly display higher rates than Caucasians. On the other hand, a study of drug abuse among Navy enlisted personnel (25) supports the hypothesis that health status is related to culturally-determined beliefs and practices. Research on Black and Caucasian enlisted males found Caucasian users to be expressing new varieties of delinquent or antisocial behavior while Blacks followed long-established cultural patterns of drug use.

All military enlistees are presumed to be physically fit upon entry into the service. If these sociocultural factors are indeed responsible for the high risk for certain diseases among particular ethnic groups in the general population, however, then they might play a role in affecting the health status of Black military personnel. While previous research suggests such a role, because of the lack of adequate controls on possible confounding variables such as age and socioeconomic status, this role remains undefined. We need to know, therefore, if there are any significant racial group differences in health status among U.S. Navy personnel and what, if anything, sociocultural factors contribute to

these differences. This information is necessary to improve the quality of primary care as well as to make necessary changes in policies or procedures which could help to reduce these health risks and improve the overall effectiveness of these military personnel.

In addition to the specific need for an examination of racial differences in health risks among Navy personnel, there are several methodological advantages to a study of this population in comparison with studies of health risks among Blacks and Caucasians in the general population. First, centralized inpatient records exist for all Navy personnel from 1965 through the present. As almost all hospitalizations for Navy personnel during this period occurred in Navy medical facilities, the existing records can be considered fairly complete. Moreover, the potential bias created by differential access to different forms of medical care, a common problem in general population studies, is not a concern in studies of Navy personnel as the same health care system is available to all Navy personnel. Second, the U.S. Navy maintains a complete census count of its personnel. In general population studies, a common source of bias is the frequent underenumeration of minorities (26-27), thus inflating rates of incidence or prevalence. With complete census information, this problem is avoided. Third, with respect to both the number of hospitalizations and the number of Navy personnel at risk, the population sizes are large enough to produce meaningful rates, allowing for the examination of a number of characteristics such as race, age, education, paygrade, and so on.

The object of this paper is to provide a descriptive account of health risks among Black and Caucasian enlisted males in the U.S. Navy. Racial differences in hospital admission rates, controlling for specific variables, will be examined using data from a cross-sectional study of all Black and Caucasian enlisted males in the Navy from 1974 to 1979. There are three specific objectives in this study: (1) the identification of any excess risk for hospital admissions among Black enlisted personnel that might be amenable to medical intervention or changes in Navy policy regarding training or occupation, (2) the development of new hypotheses regarding the role of sociocultural factors in stress-related disorders, and (3) the development of hypotheses suggesting genetic and sociocultural interaction in several diseases.

METHODS

Hospital admission rates were computed for Caucasian and Black enlisted males in the U.S. Navy over the period January 1, 1974 through December 31, 1979. Hospitalization records, originally collected by the Navy Medical Data Services Center in Bethesda, Maryland, were edited and compiled into individual medical histories for research purposes at the Naval Health Research Center, San Diego. The patient population included all active duty Navy Caucasian and Black enlisted males hospitalized in naval medical facilities throughout the world during the 1974-1979 period.

Variables examined in this study include primary diagnosis, age, sex, race, education, length of service, paygrade, occupation, and year hospitalized. Diagnoses were in accordance with the International Classification of Disease Adapted for Use in the United

States, Eighth Revision. Sixteen of the eighteen major diagnostic categories were included in the study. Two categories--complications of pregnancy, childbirth, and the puerperium and certain causes of perinatal morbidity and mortality--were not relevant to the study. Because the number of female enlisted personnel was insufficient to produce meaningful rates in many of the variable-specific categories, only males were examined. Other ethnic groups in the U.S. Navy, including Native Americans, Filipinos, and Asians, are usually grouped into one residual category. Inasmuch as the objective of the study was to examine specific sociocultural factors contributing to health risks, this "Other" category was excluded from analysis.

Hospital admission rates were expressed as the number of hospital admissions per year per 10,000 men. Rates were computed for the sixteen major diagnostic categories as well as individual diagnoses, although only selected diagnoses are reported here.

Population data for the total Navy and for the racial groups under investigation were compiled from data files obtained from the Manpower and Personnel Management Information System (NMPC 15642). As this data base contains the records of over two and one half million enlisted personnel on active-duty during the study period, a random sample was taken to derive estimates of average strength per year. A 10 percent sample was randomly selected of all enlisted males in the service as of December 31 of each year, from December 31, 1973 to December 31, 1979. For each study year, the estimated strength at the beginning of the year (December 31 of the previous year) and the end of the year were multiplied by a factor of ten to derive a 100 percent estimate, summed and divided in half to provide an estimate of the population at mid-year. The mid-year populations for each of the six years were then summed to provide a total strength estimate for the study period. Relevant demographic variables such as age, paygrade, length of service, and education were extracted to produce population estimates for each variable, enabling the calculation of variable-specific rates.

Age-adjusted rates for the diagnostic categories and specific diagnoses were calculated using the direct method. The standard population was comprised of all active-duty male enlisted personnel in the U.S. Navy during the study period. Hospitalization rates also are reported for subgroups within the two racial groups divided on the basis of age, year hospitalized, occupation, and education. Because of the high correlation between age, paygrade and length of service, specific rates for the latter two variables are not reported here. The rates for the groups and subgroups of Blacks and Caucasians were compared to obtain an estimate of relative risk by taking the ratio of rates for Blacks to rates for Caucasians. Levels of significance of these associations were obtained using 95 percent confidence intervals or the standard chi-square technique.

One qualification to this study is the use of hospital admissions as an index of health risk. Because of the possibility of several re-admissions throughout the study period, the rates reported here should not be construed as a measure of incidence. This, in turn, limits the degree to which rate ratios can be interpreted as estimates of relative risk. However, because we are examining a behavioral dimension of health risks in which

hospitalization is represented as a choice influenced by cultural traditions and values, this measure of health risk is to be preferred over incidence or prevalence data.

RESULTS

Hospital Admission Rates

During the study period, 279,265 enlisted males were hospitalized in Navy medical facilities, of which 244,104 were Caucasian and 27,936 were Black. The total population of enlisted males in the U.S. Navy during this same period averaged 447,041 per year. The number of male Caucasians averaged 381,196 per year and the number of male Blacks averaged 38,732 per year.

Table 1 provides a distribution of the percentage of hospital admissions by diagnostic category for the two racial groups. As can be seen from this table, the largest percentage of hospitalizations for both racial groups were in the diagnostic categories of accidents, poisonings, and violence and mental disorders. Analyses of the z scores of the proportion of each diagnostic category to total hospitalizations for the two racial groups indicate that Blacks and Caucasians differ significantly in the distribution of diagnostic

Table 1

Percent of Hospital Admissions by Diagnostic Group and Race, Enlisted Males 1974-1979

Diagnostic Group	Racial Group	
	Caucasians	Blacks
Accidents, Poisonings and Violence	19.7	15.3
Mental Disorders	14.5	14.8
Diseases of the Respiratory System	11.2	9.4
Diseases of the Digestive System	9.8	10.0
Diseases of the Musculoskeletal System and Connective Tissue	8.7	9.2
Infective and Parasitic Diseases	8.3	7.4
Diseases of the Skin and Subcutaneous Tissue	6.4	4.1
Symptoms and Ill-Defined Conditions	4.3	4.9
Diseases of the Genitourinary System	4.2	11.5
Supplementary Classifications	3.1	4.4
Diseases of the Circulatory System	3.0	3.1
Diseases of the Nervous System and Sense Organs	2.9	2.0
Neoplasms	1.6	1.2
Congenital Anomalies	1.2	1.2
Endocrine, Nutritional and Metabolic Diseases	0.7	0.9
Diseases of Blood and Blood-forming Organs	0.3	0.6
TOTAL	99.9	100.0

categories with four exceptions: mental disorders, diseases of the digestive system, diseases of the circulatory system, and congenital anomalies. Hospitalizations for diseases of the genitorurinary system in particular accounted for a significantly higher percentage of total Black hospitalizations than they did for total Caucasian hospitalizations.

Age-Adjusted Admissions: Table 2 contains the age-adjusted admission rates for Black and Caucasian enlisted males as well as estimates of relative risk for Blacks. As this table indicates, the overall hospital admission rate for Blacks (1194.5 per 10,000 population) is 1.1 times higher than the rate for Caucasians (1062.8 per 10,000 population). Although the relative risk is not high, because of the large population, it is significant at the 0.05 level.

Accidents, poisonings and violence comprise the highest rates of hospitalization for both racial groups. Overall, the hospitalization rates among Caucasians are significantly greater than the rates among Blacks. However, no significant difference between the two groups were found for the subcategories of sprains, strains, dislocations, wounds, injuries, contusions, burns and adverse effects.

Table 2

Age-Adjusted Hospital Admission Rates for Enlisted Males by Race
1974-1979
(per 10,000 strength)

Diagnosis	Racial Group								
	Caucasians				Blacks				Relative
	N	Rate	Confidence Limits		N	Rate	Confidence Limits		Risk
			Upper	Lower			Upper	Lower	
Accidents, Poisonings and Violence	48,113	208.3	212.2	204.4	4,274	180.2	194.4	166.0	0.9*
Fractures	15,138	65.7	67.9	63.4	932	40.1	47.2	33.0	0.6*
Sprains, strains, dislocations	10,304	44.7	46.7	42.8	1,171	49.3	56.7	41.9	1.1
Wounds, injuries, contusions	15,798	68.2	70.5	65.9	1,453	61.0	68.9	53.2	0.9
Burns, adverse effects	6,873	29.7	31.3	28.1	719	29.8	37.2	22.5	1.0
Mental Disorders	35,393	154.4	158.2	150.6	4,131	178.9	193.7	164.1	1.2*
Schizophrenia	2,754	11.9	12.8	11.0	677	27.9	34.9	21.0	2.3*
Other psychoses	1,636	7.1	7.9	6.3	357	15.0	18.7	11.3	2.1*
Neuroses	2,833	12.4	13.5	11.2	218	9.1	11.8	6.4	0.7
Personality disorders	7,140	30.6	32.0	29.2	742	29.8	34.1	25.5	1.0
Transient situational disturbance	3,958	17.2	18.4	16.1	478	20.1	24.2	16.1	1.2
Alcoholism	12,984	57.6	60.3	54.8	1,100	53.6	63.7	43.5	0.9
Drug dependence and abuse	2,182	9.3	10.1	8.5	302	12.2	15.0	9.3	1.3
Diseases of the Respiratory System	27,433	118.0	121.2	114.8	2,640	108.8	118.8	99.6	0.9
Pneumonia	6,809	29.1	30.6	27.5	566	23.1	27.0	19.3	0.9*
Acute upper respiratory infection	4,255	18.0	19.1	16.9	479	18.9	22.5	15.3	1.1
Asthma	764	3.3	3.9	2.7	175	7.8	10.9	4.6	2.4*
Diseases of the Digestiv System	23,85[illegible]	104.9	108.8	101.0	2,798	123.1	138.7	107.5	1.2
Disorders of tooth development	[illegible],175	13.3	14.4	12.2	379	15.6	18.9	12.3	1.2
Inguinal hernia	7,502	33.0	35.4	30.5	695	30.3	42.1	18.6	0.9
Ulcers	630	2.8	3.6	2.0	122	5.7	8.2	3.2	2.0
Anal and rectal abcesses	1,253	5.6	6.6	4.6	362	16.2	20.3	12.1	2.9*

Diagnosis	Racial Group								
	Caucasians				Blacks				Relative
	N	Rate	Confidence Limits		N	Rate	Confidence Limits		Risk
			Upper	Lower			Upper	Lower	
Diseases of the Musculo-skeletal System	21,159	92.9	96.2	89.6	2,574	109.9	122.1	97.6	1.2*
Internal derangement of joint	4,882	21.2	22.6	19.9	560	23.1	27.1	19.2	1.1
Displacement of disc	2,098	9.5	10.8	8.1	124	6.3	11.5	1.2	0.7
Other diseases of joint	3,690	16.1	17.3	14.9	497	21.0	25.4	16.7	1.3
Synovitis, bursitis	2,084	9.1	10.2	8.1	243	10.7	14.6	6.9	1.2
Infective and Parasitic Diseases	20,296	87.0	89.6	84.5	2,064	84.9	93.8	76.0	1.0
Diarrheal disease	2,964	12.8	13.8	11.8	259	10.6	13.4	7.9	0.8
Tuberculosis	2,898	12.4	13.5	11.3	266	11.3	16.3	6.3	0.9
Rubella	2,857	12.0	13.0	11.1	122	4.8	6.6	3.0	0.4*
Venereal disease	1,046	4.5	5.2	3.9	299	12.3	15.4	9.1	2.7*
Sarcoidosis	130	0.6	0.8	0.0	136	6.1	9.0	3.1	10.2*
Viral hepatitis	2,584	11.1	12.0	10.3	295	11.9	14.6	9.1	1.1
Diseases of Skin and Subcutaneous Tissue	15,667	67.6	69.9	65.3	1,140	48.6	55.1	42.0	0.7*
Cellulitis	8,635	37.0	38.7	35.3	522	22.0	26.3	17.6	0.6*
Pilonidal cyst	3,234	14.0	15.0	13.0	159	6.8	9.1	4.5	0.5*
Diseases of the Genitourinary System	10,342	45.4	47.9	43.0	3,209	132.8	143.1	122.4	2.9*
Calculus of the kidney or ureter	1,733	7.7	8.8	6.6	82	3.9	6.3	1.6	0.5*
Redundant prepuce and phimosis	2,479	10.8	11.9	9.8	2,091	84.7	91.9	77.4	7.8*
Urchitis and epididytitis	1,834	8.0	8.8	7.1	303	12.5	15.7	9.4	1.6*
Symptoms and Ill-Defined Conditions	10,567	46.2	48.6	43.8	1,368	59.4	69.9	48.9	1.3*
Referable to nervous system	1,818	8.1	9.0	7.2	230	9.5	12.2	6.8	1.2
Referable to cardio-vascular system	1,187	5.2	6.0	4.5	190	8.0	14.0	2.0	1.5
Referable to respiratory system	1,426	7.0	8.3	5.8	156	7.5	11.5	3.5	1.2
Referable to gastro-intestinal tract	1,924	8.4	9.3	7.4	224	9.7	13.1	6.2	1.1
Supplementary Classifications	7,652	33.1	34.9	31.3	1,233	50.2	59.1	41.3	1.5*
Diseases of the Nervous System and Sense Organs	7,035	31.0	33.3	28.7	558	25.4	31.1	19.7	0.8
Neoplasms	3,895	17.3	19.4	15.2	347	16.3	22.8	9.8	0.9
Malignant - testis	277	1.2	1.5	0.9	4	0.2	0.6	0.0	0.2*
Neoplasms - benign	1,297	5.7	6.7	4.7	144	4.7	9.0	3.7	0.8
Hogkins disease	166	0.7	1.0	0.5	7	0.4	1.0	0.0	0.6
Congenital Anomalies	2,982	12.9	14.1	11.8	339	14.1	17.6	10.7	1.1
Endocrine, Nutritional and Metabolic Diseases	1,641	7.3	8.7	5.9	244	12.9	20.5	5.3	1.8
Diabetes	669	3.0	4.1	1.9	142	7.9	15.1	0.7	2.6
Diseases of Blood and Blood-Forming Organs	655	2.8	3.5	2.2	144	6.1	8.8	3.4	2.2
Anemias, hereditary hemolytic	39	0.2	0.3	0.0	65	2.7	4.8	0.6	13.5*
Diseases of the Circulatory System	7,415	33.4	36.6	30.2	872	42.9	55.2	30.6	1.3
Essential benign hypertension	701	3.2	4.3	2.0	174	9.4	16.4	2.4	2.9
Hemorrhoids	1,462	6.6	7.8	5.4	229	10.7	16.4	5.1	1.6
Chronic ischemic heart disease	802	3.7	5.4	2.1	44	2.6	5.7	0.0	0.7
Angina pectoris	203	0.9	1.6	0.3	14	0.7	2.0	0.0	0.7
Myocardial infarction	436	2.0	3.1	0.9	20	1.2	7.0	0.0	0.6
TOTAL	244,104	1062.8	1067.6	1058.0	27,936	1194.5	1203.5	1185.6	1.1*
Average Strength (per year)	381,196				38,732				

* $p < 0.05$

Blacks appear to be at greater risk for hospitalizations diagnosed in the category of mental disorders. Most of this excess risk can be attributed to diagnoses of schizophrenia and other psychotic disorders. No significant difference exists with respect to rates of admission for other mental disorders, however.

Overall, the hospitalization rate for Blacks in the diagnostic category of diseases of the respiratory system is less than the rate for Caucasians, but the difference is not a significant one. Blacks, however, do have a significantly higher risk of hospital admissions for asthma while Caucasians have a greater risk of hospitalization for pneumonia.

No significant difference between the two racial groups was found in hospitalizations for diseases of the digestive system. With respect to individual diagnoses, Blacks were found to have a relative risk of 2.9 for anal and rectal abcesses. Blacks also had twice the rate of hospital admissions for ulcers, but this difference was not statistically significant.

The hospitalization rates for diseases of the musculoskeletal system and connective tissue were also higher for Blacks, accounting for a relative risk of 1.2. No significant difference was found between the two racial groups for any of the individual diagnoses, however.

Caucasian and Black enlisted males were found to be equally at risk for infective and parasitic diseases. With respect to individual diagnoses, however, Caucasians were at significantly greater risk for rubella while Blacks displayed a significantly greater risk for sarcoidosis and venereal diseases. No significant differences were found in hospital admissions between the two groups for tuberculosis or viral hepatitis.

Caucasians were at significantly higher risk for diseases of the skin and subcutaneous tissue. This was especially true with respect to cellulitis and pilonidal cysts. In contrast, Blacks were at significantly higher risk for diseases of the genitourinary system. Most of this excess risk can be attributed to the high number of hospitalizations among Blacks for redundant prepuce and phimosis (circumcision). Blacks also had higher rates for orchitis and epididytitis while Caucasians had a significantly higher risk of hospitalization for calculus of the kidney or ureter.

Blacks were hospitalized at a higher overall rate for symptoms and ill-defined conditions. No significant differences were found with respect to any of the individual diagnoses in this category, however.

Among the remaining diagnostic categories, Blacks displayed higher hospitalization rates for supplementary classifications, endocrine, nutritional and metabolic diseases, diseases of the blood and blood-organs, congenital anomalies, and diseases of the circulatory system. Only in the diagnostic category of supplementary classifications was the hospital admission rate among Blacks significantly different from the rate among Caucasians, however. Within these diagnostic categories, the only individual diagnosis for which

Blacks displayed a significantly higher risk than did Caucasians for hereditary hemolytic anemias which includes sickle cell anemia. Higher hospitalization rates among Blacks were also recorded for hypertension, diabetes and hemorrhoids, but the differences between the two racial groups were not significant.

Thus, a significant difference in the hospital admissions rates between the two racial groups was evident in only seven of the sixteen diagnostic categories examined. Of these seven, Blacks displayed a greater risk in five categories while Caucasians were at a greater risk of hospitalization for diseases of the skin and subcutaneous tissue and accidents, poisonings and violence.

Year Hospitalized: Total admission rates by year of hospitalization were also examined to determine if any trends across time during the 1974-1979 period could be discerned. The results of this analysis are presented in Table 3. Overall, it appears that the health status of Blacks improved as both the rate and risk of hospitalizations, relative to Caucasians, declined throughout the six year period. While Caucasian enlisted males also displayed a decline in hospital admissions, the rate of decline was not as dramatic as it was for their Black counterparts. The year of highest rates of hospital admissions among Blacks was 1974, while among Caucasians, the total hospitalization rate reached a peak in 1977 before beginning to decline. By 1979, however, the total rates among both racial groups were approximately the same.

Table 3

Age-adjusted Hospital Admission Rates and Relative Risk for Enlisted Males by Diagnostic Category, Year of Hospitalization, and Race 1974-1979 (per 10,000 strength)

Year	Racial Group: Caucasians					Racial Group: Blacks					Relative Risk
	Population at Risk	Hospital Admissions	Rate	Confidence Limits Upper	Confidence Limits Lower	Population at Risk	Hospital Admissions	Rate	Confidence Limits Upper	Confidence Limits Lower	
1974	403,910	43,095	1068.1	1093.2	1043.1	39,260	5,297	1346.4	1452.2	1240.6	1.3*
1975	388,920	41,005	1054.3	1078.1	1030.6	36,990	4,492	1212.3	1297.7	1126.9	1.1*
1976	379,620	42,139	1109.4	1133.2	1085.6	35,035	4,387	1247.9	1334.6	1161.3	1.1*
1977	377,325	43,277	1146.8	1170.9	1122.7	37,260	4,818	1286.8	1378.1	1195.4	1.1*
1978	373,390	38,701	1037.0	1059.7	1014.3	40,050	4,611	1152.0	1239.0	1064.9	1.1*
1979	364,010	35,886	987.1	1009.9	964.3	43,795	4,331	989.1	1069.5	908.6	1.0

* $p < 0.05$

Social and Demographic Characteristics

These results indicate that when age is taken into consideration, there is no significant difference between hospitalization rates of Black and Caucasian enlisted males in most of the diagnostic categories and diagnoses examined. It is possible that much of the differences in hospitalization rates which do exist between Black and Caucasian males can be accounted for by other confounding influences such as paygrade, occupation, education,

mental group, and length of service. Comparisons of the means and standard deviations of these variables between hospitalized Blacks and Caucasians were conducted, using t-tests to assess the level of significance. The results are found in Table 4. Blacks were found to differ significantly from Caucasians with respect to each of these variables. The greatest difference ($p \leq .0001$) occurred with respect to mental group where the mean for Blacks was Level III lower (defined by a GCT score of 44-49) while among Caucasians the mean was Level III upper (defined by a GCT score of 50-59).

Table 4

Means and Standard Deviations of Selected Variables for Hospitalized Enlisted Males by Race, 1974-1979

Variable	Racial Group			
	Caucasians		Blacks	
	$\bar{X}$	SD	$\bar{X}$	SD
Age*	23.9	6.6	23.6	5.9
Education*	11.7	1.0	11.8	1.1
Length of Service*	4.5	6.1	3.8	5.5
Paygrade*	3.5	1.9	3.1	1.7
Mental Group**	2.9	1.0	3.9	1.0

* $0.001 \geq p > 0.0001$
** $p \leq 0.0001$

In order to control for these differences among the two groups of hospitalized patients, variable-specific rates for hospital admissions in the seven diagnostic categories displaying significant overall racial differences were examined. The hospital admission rates of Blacks and Caucasians in the various subgroups of age, paygrade, length of service, occupation, and education were compared to determine if the racial differences in the seven diagnostic categories identified above were consistent. Specific rates for each mental group were not calculated because of the high percentage of missing data on this variable. Comparing hospital admission rates between the two racial groups in terms of these variables enabled us to determine: 1) if the health risks for Blacks and Caucasians in the same occupations, paygrades or age groups, or having the same length of service or education, are similar to or different from each other; and 2) if the health risks are related to these variables, especially education, paygrade and occupation--components of socioeconomic status--such that the higher the status the lower the risk.

Age: Of the variables selected for specific examination, three were found to be highly correlated--age, paygrade, and length of service. Although these three variables represent different etiological risk factors, the trends in hospitalization rates across the intervals of each variable are very similar with respect to the different diagnostic categories. Therefore, only the age-specific rates are reported here.

For both Blacks and Caucasians, hospital admissions assumed a U curve across the five age categories, as indicated by Table 5. The youngest and oldest males exhibited the highest rates of hospital admissions. In three of the age groups, Black males, especially those in the 25-29 year old group, were at a higher risk for total hospitalizations than Caucasians in the same age groups. Caucasians under the age of 20, however, displayed a

significantly greater risk for total hospitalizations than Blacks of the same age. No significant racial group difference was observed among those who were 40 years old or older.

Similar patterns of disease risk across the age groups among the two racial groups were observed for five of the seven diagnostic categories. The admissions rates for Black and Caucasian males in the categories of diseases of the skin and subcutaneous tissue, accidents, poisonings and violence, and supplementary classifications declined with age,

Table 5

Age-Specific Hospital Admission Rates and Relative Risk for Enlisted Males by Diagnostic Category and Race 1974-1979 (per 10,000 strength)

	Age Group				
	<20	20-24	25-29	30-39	40+
Mental Disorders					
Blacks	157.3	175.8	208.9	180.8	181.4
Caucasians	192.0	146.2	137.5	148.9	158.2
RR	0.8***	1.2***	1.5***	1.2***	1.1
Diseases of the Genitourinary System					
Blacks	115.6	169.8	122.3	85.9	59.7
Caucasians	36.5	42.6	49.8	54.3	66.8
RR	3.2***	4.0***	2.5***	1.6***	0.9
Diseases of Skin and Subcutaneous Tissue					
Blacks	56.4	48.2	47.9	43.3	39.0
Caucasians	122.6	68.4	42.7	35.8	34.8
RR	0.5***	0.7***	1.1	1.2*	1.1
Diseases of the Musculoskeletal System					
Blacks	78.3	116.0	106.0	123.3	169.9
Caucasians	81.5	90.3	81.5	111.9	154.1
RR	1.0	1.3***	1.3***	1.1***	1.1
Symptoms and Ill-Defined Conditions					
Blacks	70.5	53.6	52.7	58.2	121.7
Caucasians	62.3	39.0	34.3	51.3	83.6
RR	1.1*	1.4***	1.5***	1.1	1.5**
Accidents, Poisoning and Violence					
Blacks	191.8	196.2	178.7	142.1	114.8
Caucasians	280.5	239.0	153.8	127.4	103.8
RR	0.7***	0.8***	1.2***	1.1*	1.1
Supplementary Classifications					
Blacks	111.0	46.6	26.8	19.8	25.2
Caucasians	63.7	27.6	22.7	24.4	25.2
RR	1.7***	1.7**	1.2	0.8	1.0
Total					
Blacks	1322.0	1194.8	1091.9	1110.5	1489.9
Caucasians	1488.3	1008.2	809.8	928.8	1388.1
RR	0.9***	1.2***	1.3***	1.2***	1.1
Population at Risk (per year)					
Blacks	8,062	18,907	5,913	5,124	726
Caucasians	76,524	165,659	61,633	68,370	9,010

* $.05 \geq p > .01$
** $.01 \geq p > .001$
*** $p. < .001$

indicating a lowered risk for hospitalization with increasing age. The opposite pattern was found to be the case for diseases of the musculoskeletal system for both racial groups. Here, the risk for hospitalization increased with age. The youngest and oldest members of both racial groups displayed the highest rates for symptoms and ill-defined conditions.

Divergent patterns in risk of hospitalization were observed in two of the seven diagnostic categories. Young Caucasians (less than 20 years old) appeared to be the highest risk group among all Caucasian males for mental disorders and displayed a significantly higher risk for hospitalization than did Blacks of the same age group. The highest risk age group among Blacks were those in the 25-29 year old category. The trend of hospital admissions among Caucasians assumed a U curve while among Blacks, that curve is inverted.

The two racial groups also diverged with respect to hospitalizations for diseases of the genitourinary system. Blacks in the 20-24 year old group displayed the highest rate of hospital admissions and the risk of hospitalization appeared to decrease with age. Among Caucasians, however, those 40 years or older displayed the highest rates and the risk of hospitalization appeared to increase with age.

Occupation: Adjusting for age (and indirectly, for length of service and paygrade) eliminates the racial differences for health risks for some but not all members of these racial groups. To examine the possible influence of socioeconomic status on these remaining differences, age-adjusted rates were computed for Black and Caucasian enlisted personnel within the eleven major occupational groups and selected individual occupations. As Table 6 indicates, significant racial group differences in total hospitalizations were found in the Administrative and Clerical, Miscellaneous, Aviation, and Medical occupational groups. Blacks in the Administrative and Clerical and Aviation occupational categories were at higher risk for total hospital admissions than Caucasians in the same categories while Caucasians in the Miscellaneous and Medical categories were at higher risk than Blacks. Within these occupational categories, Blacks employed as Yeomen and Storekeepers displayed significantly higher rates of hospital admissions relative to Caucasians in the same occupations while Caucasians employed as Seamen, Firemen, Airmen, and Hospital Corpsmen were at greatest risk relative to Blacks.

Racial differences among Blacks and Caucasians in these six occupations were further examined by comparing the rates of hospital admissions in the seven target diagnostic categories. The results are contained in Table 7. Three of these occupations, seaman, fireman, and airman, are unspecialized occupations usually held by younger personnel with fewer years of service. The other three occupations involve a greater amount of specialization. In the three unspecialized occupations and among hospital corpsmen, Caucasians were at greater risk than Blacks for mental disorders and accidents, poisonings and violence, and diseases of the skin and subcutaneous tissue. Black yeomen and storekeepers displayed a greater risk of hospitalization for mental disorders, diseases of the musculoskeletal system, and accidents, poisonings and violence, than Caucasians in the same

occupations. Blacks in all six occupations also displayed significantly higher hospitalization rates than Caucasians in the same occupations for diseases of the genitourinary system.

Table 6

Age-Adjusted Hospital Admission Rates for Enlisted Males by Race and Occupation 1974-1979 (per 10,000 strength)

Occupational Group	Racial Group						
	Caucasians			Blacks			Relative Risk
	N[a]	Admissions	Rate	N	Admissions	Rate	
DECK	168,343	15,992	951.3	17,460	1,798	1036.8	1.1
Boatswains Mate	43,474	5,737	1311.8	8,031	1,006	1252.6	0.9
ORDNANCE	125,143	9,583	766.4	7,894	609	764.3	1.0
Torpedoman	21,206	1,649	777.1	1,920	112	592.4	0.8
Gunners Mate	38,829	3,557	922.7	3,771	331	851.9	0.9
ELECTRONIC	111,686	6,746	604.2	2,846	251	921.1	1.5
Electronic Tech							
Radar	27,394	76	64.3	677	2	41.0	0.6
PRECISION INSTRUMENTS	3,677	324	876.7	180	18	1429.3	1.6
ADMININSTRATIVE AND CLERICAL	350,820	26,099	755.0	46,140	4,504	988.3	1.3*
Radioman	83,674	5,755	687.1	10,826	850	813.2	1.2
Yeoman	50,486	3,355	667.6	5,649	603	1036.8	1.5*
Mess Management Specialist	33,557	4,302	1423.6	5,546	668	1350.6	0.9
Storekeeper	35,906	2,881	796.2	5,906	650	1124.0	1.4*
MISCELLANEOUS	304,166	65,426	2135.5	57,874	10,006	1759.3	0.8*
Seaman	294,711	64,845	2187.6	56,914	9,923	1770.0	0.8*
ENGINEERING/ HULL	505,757	50,235	994.3	34,063	3,659	1065.8	1.1
Engineman	44,..34	4,101	933.3	2,306	300	1367.4	1.5
Boiler Tech	58,663	6,449	1100.0	4,611	548	1150.8	1.0
Machinists Mate	133,131	11,656	878.5	5,323	564	1030.6	1.2
Electricians Mate	60,034	5,159	873.1	2,631	295	1145.5	1.3
Hull Maintenance Tech	59,100	6,286	1066.5	3,634	466	1286.0	1.2
Fireman	103,714	12,483	1218.6	13,183	1,271	923.8	0.7*
CONSTRUCTION	65,931	5,635	856.8	3,026	283	982.7	1.1
AVIATION	542,306	45,856	845.5	52,663	5,015	985.6	1.2*
Aviation Electronic Tech	58,363	3,899	668.1	1,834	170	929.1	1.4
Aviation Ordnanceman	29,623	2,645	892.4	3,823	283	742.6	0.8
Aviation Structural Mechanic	80,477	6,545	811.2	7,929	663	866.1	1.1
Airman	90,926	10,969	1216.5	18,094	1,897	1004.2	0.8*
MEDICAL	102,360	16,819	1638.7	11,383	1,547	1351.0	0.8*
DENTAL	14,083	1,387	981.9	1,980	268	1360.0	1.4

* $p. < 0.05$

a. Ns represent total strength estimates, i.e., sums of strengths over the six year period.

Table 7

Hospital Admission Rates for Enlisted Males
by Race, Occupation and Diagnostic Category
1974-1979
(per 10,000 strength)

	Occupation					
	Unspecialized			Specialized		
	Seaman	Fireman	Airman	Yeoman	Store-keeper	Hospital Corpsman
Mental Disorders						
Blacks	244.6	172.2	188.4	216.0	138.8	223.1
Caucasians	280.9	236.6	241.5	101.4	127.5	255.4
RR	0.9*	0.7*	0.8*	2.1*	1.1	0.9
Diseases of the Genitourinary System						
Blacks	151.1	147.2	168.6	139.8	135.4	136.2
Caucasians	46.6	39.9	51.5	46.1	46.2	78.8
RR	3.2*	3.7*	3.3*	3.0*	2.9*	1.7*
Diseases of Skin and Subcutaneous Tissue						
Blacks	71.5	34.1	44.2	35.4	44.0	39.5
Caucasians	208.6	67.2	66.6	37.6	40.9	68.1
RR	0.3*	0.5*	0.7*	0.9	1.1	0.6*
Diseases of the Musculoskeletal System						
Blacks	118.2	97.8	97.2	100.9	154.0	126.5
Caucasians	114.0	86.8	86.1	60.2	83.5	154.2
RR	1.0	1.1	1.1	1.7*	1.8*	0.8
Symptoms and Ill-Defined Conditions						
Blacks	90.1	39.4	57.5	38.9	38.9	71.2
Caucasians	81.4	51.7	61.5	31.1	36.8	77.7
RR	1.1	0.8	0.9	1.2	1.1	0.9
Accidents, Poisonings and Violence						
Blacks	228.8	168.4	187.9	154.0	194.7	192.4
Caucasians	318.6	328.8	330.7	100.4	148.2	251.3
RR	0.7*	0.5*	0.6*	1.5*	1.3	0.8*
Supplementary Classifications						
Blacks	173.8	9.9	9.3	19.5	13.3	25.5
Caucasians	149.1	8.2	14.1	16.2	5.6	30.1
RR	1.2*	1.2	0.7	1.2	2.4	0.8

* $p < 0.05$

Education: Table 8 provides a comparison of age-adjusted hospital admission rates and an assessment of relative risk for Black and Caucasian enlisted males in four different educational categories: those with eight years or less of formal schooling, those with 9 to 11 years of school, high school graduates, and those with one or more years of college. Among Caucasians, there appears to be an inverse relationship between hospital admissions and education. However, the pattern among Blacks assumes more of a U-curve, with the least and most educated individuals of this racial group displaying the highest rates. Moreover, college-educated Blacks are at greatest risk for hospital admissions relative to Caucasians with the same level of education--that is, the greater the educational level among Blacks, the higher the risk for hospital admissions relative to Caucasians with the same levels of education. Among those with 8 years or less of education, however, there is no significant difference between the two racial groups, indicating that, for these individuals, race does not predict for hospital admissions independent of age and education.

Table 8

Age-Adjusted Hospital Admission Rates and Relative Risk for Enlisted Males
by Diagnostic Category, Education, and Race
1974-1979
(per 10,000 strength)

	Level of Education											
	8th Grade or less			9th-11th grades			High School graduate			College		
	Rate	C.L. Upper	C.L. Lower	Rate	C.L. Upper	C.L. Lower	Rate	C.L. Upper	C.L. Lower	Rate	C.L. Upper	C.L. Lower
Mental Disorders												
Blacks	208.5	372.7	44.3	216.5	250.2	182.9	163.1	178.3	147.9	197.7	243.7	151.6
Caucasians	270.9	323.0	218.9	251.3	263.0	239.5	136.2	140.4	132.0	127.2	137.7	116.8
RR	0.8			0.9			1.2*			1.5*		
Diseases of the Genitourinary System												
Blacks	99.0	199.3	0	125.7	146.7	104.8	132.4	144.3	120.5	131.0	165.5	96.5
Caucasians	73.5	100.6	46.4	51.0	57.0	45.0	44.0	46.6	41.4	46.6	52.9	40.4
RR	1.3			2.5*			3.0*			2.8*		
Diseases of Skin and Subcutaneous Tissue												
Blacks	40.7	105.0	0	56.9	73.7	40.0	45.6	53.4	37.8	47.2	70.5	23.9
Caucasians	50.2	71.9	28.4	92.5	98.7	86.4	63.2	65.8	60.5	59.6	67.9	51.3
RR	0.8			0.6*			0.7*			0.8		
Diseases of the Musculoskeletal System												
Blacks	146.2	272.7	19.7	113.7	137.3	90.0	108.3	121.7	94.8	118.4	159.0	77.7
Caucasians	129.0	164.8	93.2	101.4	109.7	92.3	93.2	96.9	89.4	81.5	90.0	80.0
RR	1.1			1.1			1.2			1.4		
Symptoms and Ill-Defined Conditions												
Blacks	74.6	170.7	0	77.9	105.5	50.4	54.9	64.4	45.4	50.3	76.3	24.3
Caucasians	68.4	94.4	42.5	60.9	67.3	54.5	44.2	46.9	41.5	36.3	42.6	30.1
RR	1.1			1.3			1.2			1.4		
Accidents, Poisoning and Violence												
Blacks	159.2	288.4	30.0	208.0	238.2	177.8	171.2	185.6	156.8	169.9	208.8	130.9
Caucasians	243.3	292.1	194.4	309.0	320.2	297.7	194.4	198.9	189.8	144.6	155.1	134.0
RR	0.6			0.7*			0.9*			1.2		
Supplementary Classifications												
Blacks	35.7	95.3	0	54.3	68.1	40.7	45.6	53.0	38.1	64.9	91.1	38.8
Caucasians	26.7	43.3	10.1	37.2	41.2	33.2	31.6	33.7	29.6	37.5	44.2	30.7
RR	1.3			1.5			1.4*			1.7		
Total Hospitalizations												
Blacks	1223.0	1573.3	872.7	1134.6	1181.4	1087.8	1130.7	1169.4	1092.0	1210.9	1324.8	1096.9
Caucasians	1398.9	1509.7	1288.1	1460.2	1486.7	1433.7	1001.9	1013.2	990.6	906.2	934.6	877.8
RR	0.9			0.8*			1.1*			1.3*		
Population at Risk (per year)												
Blacks	286			2,387			27,108			3,951		
Caucasians	3,126			60,883			274,915			42,272		

* $p < 0.05$

When the seven disease categories were examined, it is apparent that age and education account for all of the racial differences in hospitalizations for diseases of the musculoskeletal system and symptoms and ill-defined conditions across the four educational levels. In the two disease categories where Caucasians were found to be at greater risk, diseases of skin and subcutaneous tissue, and accidents, poisonings and violence, racial

differences were eliminated among those with 8 years or less of schooling and among those with one or more years of college. In the category of mental disorders, Caucasians with 8 years or less of schooling displayed the highest rates but college-educated Blacks were at greatest risk for hospitalization relative to Caucasians at the same age and educational levels. Racial differences among those with less than 12 years of education are eliminated. For diseases of the genitourinary system, racial differences in hospitalization rates are eliminated among those with 8 or fewer years of education. In the category of supplementary classifications, significant racial group differences persist only among high school graduates.

DISCUSSION

Before attempting to interpret these results, several limitations to the study should be noted. First, this study is cross-sectional and hence is subject to the limitations associated with this design. Such a design provides only estimates of relative risk and not a direct estimate of probability because only hospitalizations which occurred while the subjects were in the Navy can be observed. Hospital admissions prior to or subsequent to the period of enlistment are not included. Second, although each of the potential confounding variables may be examined independently or in limited combinations, an assessment of the contribution of each social and demographic characteristic to the overall risk for hospitalization requires more sophisticated techniques such as multiple regression analyses. As the purpose of the study was to provide a descriptive account of the racial differences in hospital admission rates, such techniques were not utilized. Third, the use of overall hospitalizations or hospital admissions by diagnostic categories in the examination of potential confounding factors is at once too general and too complex to provide an complete understanding of specific associations between race and specific diagnoses. Rather, the data presented here provide only a broad overview of the relationship between race and hospital admissions and the effects of a limited number of social and demographic charactertistics on this relationship. Finally, while we have compared the health risks of two different racial groups represented in the U.S. Navy, our results are confounded by the fact that these two racial groups include more than two ethnic groups. Although it is a common practice in epidemiologic investigations to equate race and ethnicity, it is crucial to keep in mind that they are not isomorphic. Both racial groups include individuals with different beliefs and practices regarding illness behavior, health care, and stress. To group them together because of racial similarity provides an incomplete picture of the etiologic factors behind hospital admissions.

Keeping these limitations in mind, our results indicate that the health status of Black enlisted males in the U.S. Navy has improved considerably over the past decade, as evidenced by two particular indicators. First, the overall rate of hospital admissions among Black males during the six year period of the study is lower than the rate reported by Hoiberg et al. (24) for the period 1973-1975 (1194.5 and 1413 per 10,000 men, respectively). Second, as indicated by Table 3, the rate of total Black hospital admissions as well as the risk for hospitalization relative to Caucasians have both declined over the

six year period of the study, and suggest that there are no significant differences between the two groups with respect to overall hospitalizations. The decline in hospital admissions could be attributed to several different factors but four different possibilities stand out as worthy of note: 1) improvements in the health status of Blacks in the general population, 2) improvements in the health status of the segment of the Black population enlisting into the military, 3) greater selectivity of recruiters and 4) improvements in health care for all Navy personnel. The data presented here are insufficient to adequately explore the first possibility. The decline in the rate of hospital admissions for both Blacks and Caucasians over the six year period and the same U-curve in the age-specific rates would support the fourth hypothesis. The fact that young Black recruits are healthier than young Caucasian recruits, as indicated by the rates for age and length of service, provides support for the second and third hypotheses.

Despite the improvements in health status made by both racial groups, however, significant differences in health risks among members of the two groups were found in seven diagnostic categories. In the six year period, Blacks displayed a significantly higher risk than Caucasians for hospital admissions in the diagnostic categories of mental disorders, diseases of the genitourinary system, diseases of the musculoskeletal system, symptoms and ill-defined conditions, and supplementary classifications. Caucasian males displayed a higher risk for diseases of the skin and subcutaneous tissue, and accidents, poisonings and violence.

When specific subgroups of the two racial groups were examined, Blacks and Caucasians who were less than 20 years of age and 40 years and older, who were E1s, who had served in the Navy for less than one year, who were classified as seamen, and who had between nine and eleven years of education, displayed the highest rates of hospital admission in their respective categories. However, relative to Caucasians in the same categories, Blacks who were 25 to 29 years of age, E5s, had served in the Navy for 3 to 6 years, were classified as yeomen or storekeepers, and had one or more years of college, were at greatest risk for hospital admissions.

Although it is impossible within the confines of this discussion to provide explanations for the patterns observed in each diagnostic category, a few tentative explanations exist for the differences observed between Blacks and Caucasians. The reduction in difference between the two racial groups resulting from controlling for age and, indirectly, length of service and paygrade, indicates that these three variables may account for a large part of the overall differences in hospital admission rates. When age is controlled, the risk of hospital admissions among Blacks 40 years and older is eliminated. On the other hand, Blacks in the 25-29 and 30-39 age groups become at risk for accidents, poisonings and violence; and those in the 30-39 age group become at risk for diseases of the skin and subcutaneous tissue. Despite these variations in the health risks of individual subgroups of Blacks and Caucasians, the excess risk of total hospital admissions among Blacks remains after age and, indirectly, paygrade and length of service have been taken into consideration. However, multivariate regression analyses are necessary to determine

exactly how much of the difference, both in overall hospitalizations and in hospitalizations in each diagnostic category, is accounted for by a combination of these three variables.

Occupation is another possible explanation for the overall differences between the two racial groups. If the differences in age-adjusted hospitalization rates are a product of differences in socioeconomic status, as measured by occupation, then controlling for this status would presumably eliminate the remaining differences. This result would also lend support to the minority status theory (28) which attributes differences in health risks to differences in socioeconomic status. Previous research has shown that the two racial groups are disproportionately represented in various Navy occupational categories (24) and that unspecialized and "blue collar" occupations have significantly higher hospitalization rates than specialized, "white collar" occupations (29). The fact that significant differences remain after occupation has been controlled for, however, indicates that race predicts hospital admissions independent of occupation for the majority of the members of both racial groups. Those occupational groups in which Caucasians are at greatest risk relative to Blacks are predominately unspecialized (i.e., seamen, firemen, airmen).

Education may also be employed as an index of socioeconomic status and used to explain the differences between the two racial groups. Unlike occupation or paygrade, education provides an index of socioeconomic status prior to entry into the military and a more accurate reflection of the social and environmental agents leading to cultural patterns of stress behavior. The hospitalization rates of Caucasian males confirm this hypothesis by demonstrating an inverse relationship between education and health risks. Moreover, in all disease categories but accidents, poisonings and violence, controlling for age and education eliminates differences in health risks between Blacks and Caucasians with 8 years or less of formal education. In the categories of diseases of the skin and subcutaneous tissue, diseases of the musculoskeletal system, symptoms and ill-defined conditions, accidents, poisonings and violence, and supplementary classifications, differences between college-educated Blacks and Caucasians are eliminated. This evidence would appear to support the minority status hypothesis.

However, our results raise the question of why college-educated Blacks have such high rates and are at such great risk for hospital admissions, relative to college-educated Caucasians. If education is a measure of socioeconomic status, then these findings are in direct opposition to the minority status theory which posits an inverse linear relationship between disease and education among Blacks and throw into doubt the assertion that the high risk for illness among Blacks is due to confounding by socioeconomic status.

A possible explanation for this discrepancy is that college-educated Blacks may have greater expectations of upward mobility than their Caucasian counterparts or Blacks with less education. Possessing a college education is normally an indicator of such mobility in American society and especially so among Blacks who have traditionally occupied the lower levels of the socioeconomic scale. In addition, college-educated Blacks who enlist in the Navy may be frustrated by their inability to utilize this resource for upward

mobility because of the lack of employment opportunities in civilian life. Even though Black and Caucasian college-educated males have similar experiences in the Navy, the gap between expectations and capabilities may be greater for Blacks than Caucasians. The greater the gap, the greater the risk for disease because of the stress generated by the gap. This would tie in with Fried's (30) argument that stress may result from frustrated attempts at upward mobility. The fact that college-educated Blacks are particularly at risk for the diagnostic categories of mental disorders and accidents, poisonings and violence, both of which may be viewed as stress-related, would support this hypothesis.

Further support for the status-stress hypothesis is provided by the risk of hospitalization among Caucasian males in unspecialized occupations such as seamen and airmen or employed as hospital corpsman. Jones and his associates (31) reported that Black sailors tended to have more positive attitudes toward the Navy than were found for their Caucasian counterparts and that such differences were due to lowered expectations rather than differences in perceived work conditions. A study by Booth and Newman (32) concluded that Blacks who had lower aptitude and motivation scores when they entered paramedic training in the Navy tended to perform as well if not better than did the Caucasian trainees. The authors concluded that minorities either seem to have met or surpassed their expectations of the work situation while Caucasians were experiencing status discrepancies leading them to feel less fulfilled as corpsmen, thus accounting for lower rates of job survival. Such status discrepancy might also account for the higher rate of hospitalization among Caucasian hospital corpsmen than among Black corpsmen.

While education, occupation and paygrade provide indices of socioeconomic status with which to examine the minority status hypothesis in accounting for racial group differences, the breakdown of hospital admissions by diagnostic groups and the examination of specific diagnoses provide a basis for examining the role of genetic and cultural factors. Among Blacks, the risk for certain diseases such as sickle cell anemia has an obvious genetic component and can be explained in these terms. In the seven diagnostic categories where significant racial group differences were found, the risk for hospital admissions can be attributed to the two categories of sociocultural components listed above. For example, the practice of not circumcising male Black infants represents a combination of cultural beliefs and practices, and the difficulty of access to adequate medical facilities for many Black Americans. The high rates for supplementary classifications, usually hospital admissions for observation, also reflect the improved access to health care provided to Blacks by the Navy. This is suggested by the fact that racial group differences disappear when socioeconomic status, measured by education, is taken into consideration. This would correspond with the findings of studies in the general population which demonstrate a correlation between socioeconomic status and modern health care utilization.

The high rates of hospital admissions among Blacks for mental disorders such as schizophrenia and other psychoses, diseases of the musculoskeletal system, asthma, and anal and rectal abcesses and the high risk among Caucasians for diseases of the skin and

subcutaneous tissue and accidents, poisonings and violence, may provide some indication of the interaction between genetic predisposition and cultural beliefs and practices involving perception and response to stress. Adebimpe (33) argues, for example, that the risk among Blacks for diagnoses of schizophrenia and other psychoses may be due to cultural differences between patient and physician. Culturally-patterned responses to stress include many of the symptoms which underly a diagnoses of schizophrenia. The high risk of hospitalization among Blacks for symptoms and ill-defined conditions may reflect the cultural pattern of coping with stress through somatization (27). Other stress-related disorders may indicate a particular combination of dietary preference, environmental exposure, and genetic predisposition which differs among Blacks and Caucasians (34). The pattern of hospitalization for these seven disease categories also reveals significant racial group differences in the factors which precipitate stress-related disorders. The highest rates among both Blacks and Caucasians appear among recruits who are exposed to a new social environment, a phenomenon observed among recruits in other branches of the service as well (35-36). However, this environment appears to adversely affect Caucasians to a much greater degree than it does Black males. This difference may be due to the greater discrepancy between expectations and capabilities among Caucasians or the greater ability of Blacks to adjust to the rigidly structured environment. This might account for the higher risk among Caucasians for such stress-related problems as mental disorders and accidents, poisonings and violence, and diseases of the skin and subcutaneous tissue at this time in their enlistment when most are initially placed in unspecialized occupations. In turn, Blacks appear to be at greater risk for hospitalization for stress-related problems after having been in the Navy for a few years, perhaps reflecting their frustration at not having met increased expectations.

CONCLUSION

The results from this study indicate that the health status of Black males in the U.S. Navy has improved considerably in the past decade such that, by 1979, there were no significant racial differences in overall hospital admission rates. Significant racial group differences where found, however, in the risk of hospitalization in seven of the sixteen diagnostic categories examined. When the potential confounding variables of age, length of service, paygrade, occupation, and education are taken into consideration, differences in health risks are eliminated for many, but not all, of the members of these two racial groups. Caucasian recruits who are less than 20 years of age, have served in the Navy for less than one year, and are E1s or E2s, and college-educated Blacks who are between the ages of 25 and 29 and E5s appear to be particularly high risk groups.

In an attempt to provide an explanation for the differences in health risks, two sets of sociocultural factors were considered. Analyses of the data presented lent support to the importance of minority status and cultural orientations toward stress and health care. While controlling for education appears to suggest that socioeconomic status accounts for much of the difference in health risks among Blacks and Caucasians, the pattern of racial differences in certain occupations and the observed relationship between education and

hospitalizations among Blacks both suggest otherwise. Differences in the type of stress-related illnesses exhibited by these two groups also suggest a combination of genetic predisposition and cultural patterns of response to stress in a uniform environment.

Based on this study, five suggestions can be made. First, further study should be conducted to understand why Caucasian recruits are at greater risk for hospital admission than Black recruits. Previous research (31, 37) has indicated that expectations and perceptions are important predictors of effectiveness in the Navy. The results presented here suggest that expectations and perceptions of Navy recruits vary with race and education and may account for differences in hospital admissions rates. Perhaps the answer lies in redefining the objectives of the unspecialized occupations such that recruit expectations are met. Second, it would appear that an expansion of opportunities for particular high-risk groups such as college-educated Blacks may help to reduce the discrepancy between expectations and capabilities in the Navy, thus also reducing the number of hospital admissions. Third, greater awareness among enlisted personnel as to the potential health risks of culturally-influenced stress-coping strategies may help to reduce the risk for particular stress-related disorders. Fourth, more detailed research needs to be conducted to provide an understanding as to why the variations in hospitalization by diagnostic categories between Blacks and Caucasian males assume the patterns observed in this study. Why, for example, are Caucasians generally at higher risk for accidental injuries while Blacks have a higher risk for musculoskeletal diseases. Finally, inasmuch as the two racial groups potentially represent more than two different ethnic groups, an adequate examination of these two theoretical orientations requires a prospective study of two or more ethnic groups (such as Filipinos, Puerto Ricans, Mexican-Americans, and so on).

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With the increase in minority enlistments in recent years, it is necessary for clinicians and policymakers to determine whether a significant difference in health risks by race exists for U.S. Navy personnel. To assess this risk, hospital admissions among Black and Caucasian enlisted males in the Navy between 1974 and 1979 were examined in a cross-sectional study. Age-adjusted rates for racial subgroups by year hospitalized, occupation, and education were calculated. Results indicate that the health status of Blacks has consistently improved such

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that, by 1979, there were no significant racial differences in total hospitalization rates. Significant racial group differences were discovered, however, in seven major diagnostic categories. Blacks were at greater risk of hospitalization for mental disorders, diseases of the musculoskeletal system, diseases of the genitourinary system, symptoms and ill-defined conditions, and supplementary classifications. Caucasians, on the other hand, were found to be at risk for diseases of the skin and subcutaneous tissue, and accidents, poisonings and violence. These patterns of disease risk were attributed to differences in age, occupation, education, access to health care prior to entrance into the service, and cultural patterns relating to expectations, job satisfaction, and perception of stress.

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