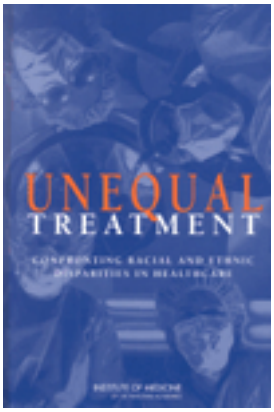

Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care (with CD)

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B

Literature Review

The study committee conducted an extensive review of literature on racial and ethnic disparities in healthcare (discussed in Chapter 1). In this appendix, summary tables of this literature are presented, along with criteria used in the conduct of this review.

To assess the evidence regarding racial and ethnic differences in health care, the committee conducted literature searches via PUBMED and MEDLINE databases to identify studies examining racial and ethnic differences in medical care for a variety of disease categories and clinical services. Searches were performed using combinations of following keywords:

- Race, racial, ethnicity, ethnic, minority/ies, groups, African American, Black, American Indian, Alaska Native, Native American, Asian, Pacific Islander, Hispanic, Latino.
- Differences, disparities, care.
- Cardiac, coronary, cancer, asthma, HIV, AIDS, pediatric, children, mental health, psychiatric, eye, ophthalmic, glaucoma, emergency, diabetes, renal, gall bladder, ICU, peripheral vascular, transplant, organ, cesarean, prenatal, hip, hypertension, injury, surgery/surgical, knee, pain, procedure, treatment, diagnostic.

This search yielded over 600 citations. To further examine this evidence base and address the study charge that called for an analysis of "the

extent of racial and ethnic differences in health care that are not otherwise attributable to known factors such as access to care," only studies that provided some measure of control or adjustment for racial and ethnic differences in insurance status (e.g., ability to pay/insurance coverage or comorbidities) were included in the literature review. Other "threshold" criteria included:

- Publication in past 10 years (1992-2002; this criterion was established because more recent studies tend to employ more rigorous research methods and present a more accurate assessment of contemporary patterns of variation in care);
- Publication in peer-reviewed journals;
- Elimination of studies focused on racial and ethnic differences in health status (except as it is affected by the quality of health care) and health care access, as well as publications that were editorials, letters, published in a foreign language, were non-empirical, or studies that controlled for race or ethnicity; and
- Inclusion only of studies whose primary purpose was to examine variation in medical care by race and ethnicity, contained original findings, and met generally established principles of scientific research (e.g., studies that stated a clear research question, provided a detailed description of data sources, collection, and analysis methods, included samples large enough to permit statistical analysis, and employed appropriate statistical measures).

In addition, to ensure the comprehensiveness of the review, the committee examined the reference lists of major review papers that summarize this literature (e.g., van Ryn, 2002; Geiger, this volume; Kressin and Petersen, 2001; Bonham, 2001; Sheifer, Escarce, and Schulman, 2000; Mayberry, Mili, and Ofili, 2000; Ford and Cooper, 1995). Articles not originally identified in the initial search were retrieved and analyzed for appropriateness of inclusion in the committee's review. Finally, to ensure that the committee's search was not limited to studies with "positive" findings of racial and ethnic differences in care, searches were conducted for studies that attempted to assess variations in care by patient socioeconomic status and geographic region. These studies were included if the researchers assessed racial or ethnic differences in care while controlling, as noted above, for patient access-related factors.

To assess the quality of this evidence base, the committee ranked studies on several criteria:

- Adequacy of control for insurance status (studies of patients covered under the same health system or insurance plan were considered to be more rigorous than studies that merely assessed the availability of health insurance among the study population);
- Use of appropriate indicators for patient socioeconomic status (e.g., studies that measured patients' level of income, education, or other indicators of socioeconomic status);
- Analysis of clinical data, as opposed to administrative claims data (see limitations of administrative claims data noted below);
- Prospective or retrospective data collection (prospective studies were considered to be more rigorous than retrospective analyses);
- Appropriate control for patient co-morbid conditions;
- Appropriate control for racial differences in disease severity or stage of illness at presentation;
- Assessment of patients' appropriateness for procedures (e.g., studies that provide primary diagnosis and include well-defined measures of disease status, as in studies of cardiovascular care that assess racial differences in care following angiography) or that compare rates of service use relative to standardized, widely-accepted clinical guidelines; and
- Assessment of racial differences in rates of refusal or patient preferences for non-invasive treatment.

Studies that met the committee's "threshold" criteria are summarized in Table B-1.

As a "second level" analysis of the quality of evidence regarding racial and ethnic disparities in cardiovascular care, the committee identified a subset of studies that permit a more detailed analysis of the relationship between patient race or ethnicity and quality of care, while considering potential confounding variables such as clinical differences in presentation and disease severity. Several criteria were established to identify these studies, using generally accepted criteria of research rigor and quality. To begin, the committee identified only studies using clinical, as opposed to administrative data, for the reasons cited above. Secondly, the committee identified studies that provided appropriate controls for likely confounding variables, and/or employed other rigorous research methods. These

criteria included the use of adequate control or adjustment for racial and ethnic differences in insurance status; prospective, rather than retrospective data collection; adjustment for racial and ethnic differences in co-morbid conditions; adjustment for racial and ethnic differences in disease severity; comparison of rates of cardiovascular services relative to measures of appropriateness; and assessment of patient outcomes.

Several caveats should be noted in undertaking this approach. One, studies using clinical data allow researchers to better assess whether disparities in care exist and are significant after potential confounding factors such as clinical variation and the appropriateness of intervention are taken into account, but these studies often are limited to small patient samples in one or only a few clinical settings, therefore sacrificing statistical power and potentially underestimating the role of institutional variables as contributing to healthcare disparities. Second, assessments of racial and ethnic differences in patients' clinical outcomes following intervention must be made with caution. Patients' outcomes following medical intervention reflect a wide range of factors, some of which are unrelated to the intervention itself (e.g., the degree of social support available to patients following treatment) and may vary systematically by race or ethnicity. In addition, a finding of no racial or ethnic differences in patient outcomes (e.g., survival) despite disparate rates of treatment should not be interpreted as demonstrating that disparities in the use of medical intervention are inconsequential. In such instances, researchers should ask whether equivalent rates of intervention might be associated with better patient outcomes among minorities. Finally, this second level of analysis should not be interpreted as suggesting that the larger literature presented above is insufficient to draw conclusions regarding disparities in healthcare. Almost all of the individual studies reviewed earlier possess limitations, but the collective body of this evidence is robust.

Despite these caveats, this second review afforded an opportunity to assess whether racial and ethnic disparities in care remain when racial differences in clinical presentation and other potentially confounding variables are controlled. Studies were considered in this second review only if they met four of six criteria noted above, in addition to the "threshold" criteria that studies employ clinical databases. Thirteen studies were identified through this process (see Table B-2). Of these, only two (Leape et al., 1999; Carlisle et al., 1999) found no evidence of racial and ethnic disparities in care after adjustment for racial and ethnic differences in insurance status, co-morbid factors, disease severity, and other potential confounder

as noted above. The remaining studies found racial and ethnic disparities in one or more cardiac procedures, following multivariate analysis. Almost all studies found that adjustment for one or more confounding factors reduced the magnitude of unadjusted racial and ethnic differences in care. Among the five studies that collected data prospectively, however, all found racial and ethnic disparities remained after adjustment for confounding factors.

TABLE B-1 Summary of Selected Literature—Racial and Ethnic Disparities in Health Care

Analgesia

Source	Procedure/Illness	Sample	Analyses
Todd, Deaton, D'Adamo, and Goe, 2000	Assessed racial differences in receipt of analgesia among patients seen for extremity fractures in emergency departments.	Retrospective cohort study of 217 patients (127 African American, 90 white) seen in an emergency department in an urban hospital.	
Bernabei, Gambassi, Lapane et al., 1998	Assessed adequacy of pain management among elderly and minority cancer patients admitted to nursing homes.	13,625 cancer patients (12,038 white, 1,041 African American, 163 Hispanic, 107 Asian, 276 American Indian) discharged from hospitals to any of 1,492 Medicare-certified/Medicaid-certified nursing homes in five states.	

Analyses	Findings	Limitations
Multiple logistic regressions to predict use of analgesia by race, controlling for time since injury, total time in the emergency department, payer status, and need for fracture reduction.	Nearly three-fourths of white patients (74%) received analgesia, compared to 57% of African American patients. The crude risk of receiving no analgesia was 66% higher for black patients than white. After controlling for covariates, whites remained significantly more likely to receive analgesia (risk ratio = 1.7, 95% CI 1.1 to 2.3).	-Moderate sample size. -Racial/ethnic groups other than white and African American not sampled. -One site sampled. -Retrospective study. -Other relevant confounds such as alcohol and drug use not considered. -Few racial/ethnic minority physicians in sample.
Logistic regression to predict unresolved daily pain, adjusting for gender, cognitive status, communication skills, and indicators of disease severity (e.g., explicit terminal prognosis), being bedridden, number of diagnoses, and use of other medications.	More than a quarter of patients in daily pain (26%), as assessed by self-report and independent raters, received no pain medication. After adjustment, African Americans had 63% greater probability of being untreated for pain relative to whites (odds ratio = 1.63, 95% CI 1.18 to 2.26). Older age, low cognitive performance, and increased number of other medications were also associated with failure to receive any analgesic agent.	-Small numbers in racial/ethnic groups. -Retrospective, cross-sectional study. -Data set not specifically focused on pain. -Pain assessed by observational evaluation. -Family members involved in collection of information to varying degrees. -No data regarding analgesic dose or frequency of administration.

TABLE B-1 Continued

Analgesia

Source	Procedure/Illness	Sample	Analyses
Cleeland, Gronin, Baez et al., 1997	Assessed adequacy of pain management among minority patients receiving care in settings that primarily serve minorities vs. patients who receive care in settings where few minority patients are treated.	281 minority outpatients (106 African American, 94 Hispanic, 16 other minority) with recurrent or metastatic cancer at 9 university cancer centers, 17 community hospitals and practices, and 4 centers that primarily treat minority patients.	
Ng, Dimsdale, Rollnik, and Shapiro, 1996	Assessed racial/ethnic differences in physicians prescription of patient-controlled analgesia for post-operative pain.	454 (314 white, 37 Asian, 73 Hispanic, 30 African American) consecutive patients receiving patient-controlled analgesia in post-operative period.	

Analyses	Findings	Limitations
Compared treatment of pain among this sample with a larger, primarily white sample from a previous study where participants were treated in settings where fewer than 10% of patients were ethnic minorities. Pain assessed by independent ratings of patients and physicians. Adequacy of analgesia estimated by widely accepted measure of treatment of pain.	Sixty-five percent of patients who reported pain received inadequate pain medication. Patients treated in settings where the patient population was primarily black or Hispanic and those who were treated at university centers were more likely to receive inadequate analgesia (77%) than those who received treatment in settings where patient population was primarily white (52%; $p < 0.003$). In addition, minority patients were more likely to be undermedicated for pain than white patients (65% vs. 50%; $p < 0.001$), and were more likely to have the severity of their pain underestimated by physicians.	-Data regarding race/ethnicity not available for comparison group. -Data collected immediately after data on the nonminority comparison group collected. -No data collected on ability to pay.
Analysis of variance and post-hoc LSD-tests using ethnicity as independent variable. Dependent variables include amount of narcotic prescribed and amount of narcotic self-administered.	No significant differences found in patient rating of pain or amount of analgesia self-administered. Significant differences in the amount of narcotic prescribed among Asians, blacks, Hispanics, and whites ($F = 7.352$; $p < 0.01$). Whites and African Americans were prescribed more narcotic than Hispanics and Asians. After adjustment for age, gender, preoperative use of narcotics, health insurance, and pain site, ethnicity persisted as independent predictor of amount of narcotic prescribed.	-Relatively small numbers of African Americans and Asians. -Sample located at one site. -Retrospective study. -Analyses did not control for patient size or primary language.

TABLE B-1 Continued

Analgesia

Source	Procedure/Illness	Sample	Analyses
Todd, Lee, and Hoffman, 1994	Assessed racial/ethnic differences in physician's perceptions of pain in patients with isolated extremity trauma.	Prospective study of 207 patients (138 white, 69 Hispanic) admitted to ED at UCLA Medical Center between 1992-1993.	
Todd, Samaroo, and Hoffman, 1993	Assessed ethnic differences in receipt of emergency department analgesia for isolated long-bone fractures.	139 patients (108 white, 31 Hispanic) admitted to emergency department at UCLA. Patients with recorded alcohol or drug use excluded.	

Analyses	Findings	Limitations
Analysis of Covariance to evaluate influence of confounding variables on the relationship between ethnicity and differences in patient and physician pain assessment. Independent variables included occupational injury, injury location, patient pain assessment, physician sex, injury type, insurance status, and patient ethnicity.	No differences found between non-Hispanic and Hispanic patients in patient pain assessment, physician pain assessment, or disparity between patient and physician pain assessment. Differences remained non-significant after controlling for confounds.	-Patients enrolled study primarily in early evening and weekends. -Moderate samples size. -Racial groups other than Hispanic and white not sampled. -Single site sampled.
Logistic regression to evaluate independent influence of race/ethnicity on probability of analgesic administration. Independent variables included race/ethnicity, gender, language, insurance status, occupational injury, fracture reduction, time of presentation, total time in ED, hospital admission.	55% of Hispanic patients and 26% of white patients received no analgesic (crude relative risk = 2.12, 95% CI 1.35 to 3.32, $p = 0.003$). After simultaneously controlling for covariates Hispanic ethnicity was strongest predictor of no analgesia (odds ratio = 7.46, 95% CI 2.22 to 25.04, $p < 0.01$).	-Retrospective study. -No control for covariates such as precise injury, presence of translators. -Single site. -Small sample size. -Small number of Hispanics in sample. -Racial/ethnic groups other than white and Hispanic not sampled.

TABLE B-1 Continued

Asthma

Source	Procedure/Illness	Sample	Analyses
Krishnan et al., 2001	Race/ethnicity and gender differences in consistency of care with national asthma guidelines within managed care organizations.	5,062 patients (4,328 white, 734 African-American) who participated in the Outcomes Management System Asthma Study between 9/93 and 12/93.	
Zoratti, Havstad, Rodriguez et al., 1998	Assessed racial/ethnic differences in treatment for asthma in a managed care setting.	464 African-American and 1,609 white patients treated for asthma in a Southeast Michigan managed care system (27 ambulatory care clinics).	

Analyses	Findings	Limitations
Multivariate logistic regression to determine whether race/ethnicity and sex were associated with five indicators of National Asthma Education and Prevention Program (NAEPP) guidelines (medication, self-management education, control of factors related to asthma severity, periodic assessment, and asthma specialist care).	After controlling for age, education, employment, and symptom frequency there were no significant race/ethnicity or sex differences in the use of medication regimen consistent with NAEPP recommendations for patients with moderate or more severe asthma.	-Results may not apply to patients with mild asthma. -Bias in self-report data. -Racial/ethnic groups other than white and African-American not sampled.
Regression analysis to predict use of services, adjusting for age, gender, marital status, and income (as assessed by average income of patients' community of residence).	African-American patients were more likely than whites to access care in emergency rooms ($p < 0.001$), were hospitalized more often ($p = 0.023$), and were less likely to be seen by an asthma specialist ($p = 0.027$), after controlling for income, marital status, gender, and age. Among only low-income patients, African Americans were more likely to be treated in emergency rooms than whites, although no significant differences were found in access to specialty care and hospitalization rates. After adjusting for age, gender, marital status and income, African Americans were more likely to use oral corticosteroids ($p = 0.026$) and were less likely to use inhaled anticholinergic medications ($p = 0.016$).	-Racial/ethnic groups other than African American and white not assessed. -Use of administrative database. -Retrospective cross-sectional study. -Number prescriptions filled used as estimate of actual use. -No adjustment for co-morbidities.

TABLE B-1 Continued

Cancer

Source	Procedure/Illness	Sample	Analyses
Elston Lafata, Cole Johnson, Ben-Menachem, Morlock et al., 2001	Assessed sociodemographic differences in the receipt of colorectal cancer surveillance care.	251 patients (157 white, 94 minority [largely African American]) treated for colorectal cancer in a managed care organization.	
Farley, Hines, Taylor et al., 2001	Racial differences in cervical cancer survival in military health system.	Retrospective examination of 1,553 patient records (65% white, 10% African-American, 8% Filipino, 4% Korean, remaining percentages Japanese, Hawaiian, Indian, Asian, Pacific Islander, unknown, or other) from the Automated Central Tumor Registry for the U.S. Military Health Care System between 1988 and 1999. Patients included were diagnosed with invasive cervical carcinoma.	
Merrill, Merrill, and Mayer, 2000	Receipt of surgery or radiation therapy among white and African-American women with cervical cancer.	Data from 8,119 patients (86% white, 14% African-American) with invasive cervical cancer, as obtained from 11 tumor registries in Surveillance, Epidemiology, and End Results (SEER) program.	

Analyses	Findings	Limitations
Kaplan-Meier survival analysis to determine cumulative incidence of service receipt; Cox Proportional Hazard models to quantify the effects of baseline clinical and sociodemographic characteristics on risk of service receipt. Analyses adjusted for age, race, gender, site and stage of original disease, type of treatment, comorbidity index, estimated income.	Within 18 months of treatment, over half of the total cohort received a colon examination (55%), nearly three-fourths had received carcinoembryonic antigen (CEA) testing, and nearly six in ten (59%) received metastatic disease testing. Whites were more likely than African Americans, however, to receive CEA testing (RR = 1.47, 95% CI 1.12 to 2.14) and displayed a slight but non-significant trend toward higher rates of colonic examination (RR = 1.43, 95% CI 0.94 to 2.18).	-Racial/ethnic groups other than African American and white not examined. -Retrospective study. -Use of claims data.
Survival analysis performed with Kaplan-Meier survival curves and log rank tests to determine significant differences. Cox proportional hazards regression to assess factors influencing survival. Data regarding age at diagnosis, histology, grade, stage, SES, treatment modality obtained.	No significant difference between the distribution of age, stage, grade or histology between African Americans and whites. No difference between these groups found in type of treatment. Differences in five- and 10-year survival rates were also not statistically significant.	-Small numbers in racial/ethnic minority groups. -Retrospective study. -Administrative data.
Logistic regression to predict receipt of therapy after adjusting for stage and grade of cancer, patient age, nodal status, histology, and presence of multiple cancer primaries.	Overall, 8.03% of whites and 11.64% of blacks did not receive either radiation therapy or surgery. For both blacks and whites, the odds of not receiving treatment increased with older age and distant and unstaged disease (vs. localized disease). Blacks were more likely to be diagnosed unstaged and were less likely to have localized disease; once stage was accounted for, racial differences in treatment status became insignificant. Among those not treated, blacks were more likely to have treatment not recommended than whites (53.68% vs. 40.32 %). Of those cases not	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -No controls for hospital characteristics, appropriateness, SES.

TABLE B-1 Continued

Cancer

Source	Procedure/Illness	Sample	Analyses
Bach, Cramer, Warren, and Begg, 1999	Early stage lung cancer.	10,984 patients (10,124 white, 860 African Americans) age 65 and older with resectable stage I or stage II non-small-cell lung cancer. Patients resided in one of 10 study areas of the Surveillance, Epidemiology, and End Results (SEER) program.	
McMahon, Wolfe, Huan et al., 1999	Assessed use of diagnostic and screening procedures among Medicare Part B eligible population.	All Medicare Part B transactions in the state of Michigan from 1986 to 1989 in which procedures were used to diagnose colorectal disease.	
Dominitz, Samsa, Landsman, and Provenzale, 1998	Assessed racial/ethnic differences in receipt of treatment and survival among patients with colorectal cancer in Veterans Administration (VA) health system.	3,176 patients (17.9% African American) with a new diagnosis of colorectal cancer.	

Analyses	Findings	Limitations
	receiving therapy, few were due to patient refusal (3.76% among whites, 5.88% among blacks).	
Kaplan-Meier method used for constructing survival curves with log-rank statistic used for comparisons. Cox proportional-hazards method used to adjust for confounding variables. Analyses controlled for sex, income, age, stage of disease, type of Medicaid insurance, and comorbidity.	*Rate of surgery:* 64% for black patients vs. 76.7% for white patients ($p < 0.001$). *Five-year survival rate:* 26.4% for black patients vs. 34.1% for white patients ($p < 0.001$). However, there was a nonsignificant difference in survival rates b/w black and white patients who underwent surgery and similar rates for those who did not. This suggests that lower survival rates among black patients is largely explained by the lower rate of surgical treatment.	-Relatively small sample of African Americans. -Racial/ethnic groups other than white and African American not examined. -Retrospective study. -Administrative data.
Series of stepwise logistic regression analyses to predict association between procedure utilization and patient sociodemographic characteristics and residence characteristics.	Assessed contribution of patient age, sex, race, urbanicity of patients' community, per capita income of community, education level of community, and availability of physicians, internists, and gastroenterologists per 100,000 population to prediction of diagnostic procedures. African Americans were more likely than whites to receive barium enema only (odds ratio = 1.38, 95% CI 1.34 to 1.41), were less likely to receive a combination of barium enema and sigmoidoscopy (odds ratio = 0.80, 95% CI 0.78 to 0.83), and were less likely to receive any colonoscopy (odds ratio = 0.83, 95% CI 0.81 to 0.85).	-Racial/ethnic groups other than white and African American not examined. -Administrative data. -Retrospective study.
Logistic regression to predict likelihood of surgical resection, chemotherapy, or radiation therapy, after adjusting for patient demographic characteristics, comorbidities, distant metastases, and tumor location.	No significant racial differences found in rates of receipt of surgical resection (70% among blacks, 73% among whites; odds ratio = 0.92, 95% CI 0.74 to 1.15), chemotherapy (23% for both blacks and whites; odds ratio = 0.99, 95% CI 0.78 to 1.24), or radiation therapy (17% among blacks, 16% among whites; odds ratio = 1.10, 95% CI 0.85 to 1.43). Five-year relative survival rates were similar for black and white patients (42% vs. 39% respectively, $p = 0.16$).	-Racial/ethnic groups other than African American and white not assessed. -Administrative data. -Lack of data on SES.

TABLE B-1 Continued

Cancer

Source	Procedure/Illness	Sample	Analyses
Howard, Penchansky, and Brown, 1998	Assessed racial/ethnic differences in survival of breast cancer.	246 women (89 African American, 157 white) who sought care for breast cancer in one of three health maintenance organizations (HMOs).	
Ball and Elixhauser, 1996	Colorectal cancer.	20,634 discharges b/w 1980 and 1987 from 500 acute care hospitals in the U.S.	
Imperato, Nenner, and Will, 1996	Assessed variation by race/ethnicity in rates of radical prostatectomy among male	Pattern analysis of 4,154 Medicare claims for radical prostatectomy to treat pros-	

Analyses	Findings	Limitations
Logistic regression to predict stage of disease at time of diagnosis and Cox survival analysis to assess determinants of survival.	No significant racial differences were found in stage of disease, utilization of health services before diagnosis of breast cancer, or receipt of breast examination. African-American patients were more likely to die than whites (30% vs. 18%, $p < 0.04$) and experienced shorter average survival (1.63 years vs. 2.77 years, $p < 0.024$). Two percent of whites and eight percent of African Americans missed two or more appointments following diagnosis; after adjusting for the number of appointments made, African Americans were more likely than whites to miss appointments. Missed appointments and stage of diagnosis were strongly associated with survival, and reduced the impact of race on survival.	-Relatively small sample. -Racial/ethnic groups other than African American and white not examined. -Retrospective review.
Logistic regression to predict diagnostic subgroups, procedure types, in-hospital mortality. Semilogaraithmic ordinary least squares regression for length of stay. *Covariates:* patient demographics, insurance status, clinical factors, and provider characteristics.	Black and white rates of inpatient mortality were equivalent only for the most severely ill. Otherwise, odds of inpatient mortality were 59% to 98% higher for black patients (odds ratio = 1.59 to 1.982, $p < 0.05$ to $p < 0.01$). Procedure type was equivalent only for the sickest patients. Black patients with primary tumor and no evidence of oncologic sequelae were 41% less likely than whites to receive a major colorectal therapeutic procedure (odds ratio = 0.59, $p < 0.001$). When metastasis was recorded black patients with primary tumor were 27% less likely to received a major colorectal therapeutic procedure (odds ratio = 0.726, $p < 0.05$).	-Racial/ethnic groups other than African American and white not examined. -Use of discharge data. -Retrospective study.
Pattern analysis of rates of prostatectomy, relative to incidence of prostate cancer	Rates of radical prostatectomy were lower among African Americans than among whites (b/w ratio ranged from	-Rates for racial/ethnic groups other than white and

TABLE B-1 Continued

Cancer

Source	Procedure/Illness	Sample	Analyses
	Medicare patients in New York state.	tate cancer between 1991 and 1993.	
Harlan, Brawley, Pommerenke et al., 1995	Assessed variations in the use of radical prostatectomy and radiation to treat prostate cancer by geographic area, age, and race/ethnicity.	Data for 67,693 men (9.4% African American) with localized and regional cancer, as obtained from Surveillance, Epidemiology, and End Results (SEER) program database between 1984 and 1991.	
Optenberg, Thompson, Friedrichs et al., 1995	Assessed long-term survival of black and white prostate cancer patients in Department of Defense (DoD) medical facilities.	1,606 prostate cancer patients (7.5% African American, 92.5% white) who were active duty personnel, dependents, or retirees eligible for care in the military medical system.	

Analyses	Findings	Limitations
and Medicare claims for both black and white males.	0.59 in 1991 to 0.86 in 1993; no confidence intervals provided).	African American not examined. -Retrospective study. -Administrative data. -Analyses did not control for income/SES, comorbidities or other potential confounds.
Chi-square test of association between race and receipt of treatment. Tests for trends calculated using Mantel-Haenszel test.	Black men aged 50 to 69 years were less likely than similarly aged white men to receive prostatectomy. For black and white men aged 70 to 79 years, rates of protatectomy were similar in 1984, but became significantly divergent by 1991, as a larger proportion of white men received the procedure ($p < 0.01$). In 1991, a significantly higher proportion of black men aged 50 to 59 years received radiation. For all age groups in 1991, twice as many blacks as whites (12.5% vs. 6.6%) received no treatment.	-Racial/ethnic groups other than white and African American not examined. -Administrative data. -Retrospective study. -Adjustment not made for comorbidities, SES or other potential confounds.
Multiple life-table regression analysis to determine if stage and grade of cancer, wait time, age or race affect patient survival. Cox proportional hazard function used to compute mortality risk ratios for black and white patients.	Blacks presented at a significantly higher stage of cancer development than whites (26.4% of blacks presenting with distant metastases compared to 12.3% of whites, $p < 0.001$), and demonstrated a greater percentage of recurrence (30.6% vs. 21.4%, $p = 0.02$). There were no significant racial differences in wait time to receive treatment, and no significant differences were found in the type of treatment when stratified by stage of presentation. Overall, stage, grade, and age were found to affect survival, but not race. When analyzed by stage, blacks demonstrated longer survival for distant metastatic disease (mortality risk ratio = 0.644, 95% CI 0.396 to 1.036).	-Racial/ethnic groups other than white and African American not examined. -Administrative data. -Retrospective study.

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
Petersen et al., 2002	Assessed racial differences in treatment for AMI.	Analysis of 606 black and 4,005 white VA patients with diagnosed AMI discharged from one of 81 VA hospitals.	
Bell and Hudson, 2001	Racial and gender differences in emergency room treatment of chest pain.	Analysis of 379 records of patients (229 white, 150 African American) presenting to ER with chest pain during one calendar year at two county hospitals in North Carolina.	
Okelo et al., 2001	Rates of recommendation for coronary revascularization when race/ethnicity were unknown by physicians.	Data reviewed for 938 consecutive cardiac catheterizations in 882 patients (26.5% African American, 73.5% white) performed between 1993 and 1995. Cardiologists and cardiothoracic surgeons provided with all clinical and angiographic data without racial identifiers and were asked for revascularization recommendations.	

Analyses	Findings	Limitations
Logistic regression to assess use of guideline-based medications, invasive cardiac procedures, and all-cause mortality at 30 days, 1 year, and 3 years.	No differences between African-American and white patients in receipt of beta blockers, but African Amercans were more likely to receive aspirin and were less likely to receive thrombolytic therapy at time of arrival and were less likely to receive bypass surgery, even when only high-risk coronary anatomic subgroups were assessed. No racial differences found in rates of refusal of invasive treatment.	-Racial/ethnic groups other than white and African American not examined. -Retrospective data collection. -Physician, hospital characteristics not assessed.
Logistic regression to assess whether treadmill testing, cardiac catheterization (CC), and echocardiogram (Echo) were recommended or performed. Analysis of covariance to assess wait time to first EKG. Models tested main effects of clinic, gender, race, and insurance, and interactions between gender and race and between insurance and race. Number of cardiovascular related co-morbid conditions also included in models.	*Treadmill:* no significant differences. *CC:* Whites more likely to receive cardiac catheterization (adjusted odds ratio = 2.8317, 95% CI 1.7833 to 4.4963). *Echo:* African Americans more likely to receive Echo (adjusted odds ratio = 0.5927, 95% CI 0.377 to 0.931). *Time to first EKG:* African-American patients waited longer than whites for EKG.	-Racial/ethnic groups other than white and African American not examined. -Relatively small sample. -Retrospective. -Results from diagnostic procedures (e.g., treadmill stress tests) that may have explained variance in CC not available.
Revascularization recommendations compared between African-American and white patients and correlated with clinical data. Logistic regression analyses performed for CABG and PTCA. Independent variables included age, African-American ethnicity, co-morbid disease, LV dysfunction, number of coronary arteries with significant stenosis, and involvement of specific arteries.	After adjustments, African Americans more likely to have a recommendation for PTCA (odds ratio = 1.42, 95% CI 0.96 to 2.11, p = 0 .08) and less likely to have recommendation for CABG (odds ratio = 0.59, 95% CI 0.37 to 0.94, p = 0.02).	-Racial/ethnic groups other than African American and white not examined. -Physician, hospital characteristics not assessed.

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
Schneider, Leape, Weissman et al., 2001	Assess whether racial differences in cardiac revascularization are due to "overuse" of the procedure in white patients.	Stratified weighted random sample of 3,960 Medicare beneficiaries in 173 hospitals (in five states) who underwent coronary angiography in 1991 and 1992.	
Watson, Stein, Dwamera et al., 2001	Influence of race and gender on use of invasive procedures in patients with acute myocardial infarction (AMI).	Prospective study of 838 patients (443 white men, 264 white women, 79 African-American men, 49 African-American women) with AMI seen between January 1994 and April 1995 in five community hospitals in Michigan.	
Canto, Allison, Kiefe et al., 2000	Reperfusion therapy for acute myocardial infarction (AMI).	26,575 Medicare patients (25,044 white, 1,531 African American) meeting eligibility criteria for reperfusion therapy.	

Analyses	Findings	Limitations
RAND criteria used to determine proportion of coronary artery bypass graft (CABG) and percutaneous transluminal coronary angioplasty (PTCA) procedures that were appropriate, uncertain, or inappropriate. Multivariable logistic regression analysis to assess odds of receiving inappropriate PTCA or inappropriate CABG surgery. Analyses controlled for age, income, clinical characteristics, and state procedure performed.	Rates of inappropriate PTCA ranged from 4% to 24% among study states, and 0% to 14% for CABG surgery. White men had significantly higher adjusted odds than African American men of receiving inappropriate PTCA (odds ratio = 2.42, 95% CI 1.02 to 5.76). No significant differences were found among white women, African-American women, and African-American men. Adjusting for between-hospital effect of race and gender somewhat reduced higher odds of inappropriate PTCA among white men. Inappropriate CABG surgery did not differ by race.	-Retrospective study examining medical record and claims data. -Racial/ethnic groups other than African American not examined.
Multiple logistic regression to identify predictors of cardiac catheterization (CC). Of those undergoing CC, analyses to predict coronary artery bypass grafting (CABG), percutaneous transluminal coronary angioplasty (PTCA), or atherectomy. Analyses adjusted for age, hospital of admission, insurance, severity of AMI, and comorbidity. Coronary artery anatomy added as covariate in analyses conducted among patients receiving CC.	Rate of being offered CC (with white men as reference group), was 0.88 (95% CI 0.60 to 1.29, $p = 0.502$) for white women, 0.79 (95% CI 0.41 to 1.5, $p = 0.465$) for black men, and 1.14 (95% CI 0.53 to 2.45, $p = 0.733$) for black women. For those receiving CC, the rate of being offered angioplasty was 1.22 (95% CI 0.75 to 1.98, $p = 0.416$) for white women, 0.61 (95% CI 0.29 to 1.28, $p = 0.192$) for black men, and 0.4 (95% CI 0.14 to 1.13, $p = 0.084$) for black women. The rate of being offered CABG was 0.47 (95% CI 0.24 to 0.89, $p = 0.021$) for white women, 0.36 (95% CI 0.12 to 1.06, $p = 0.065$) for black men, and 0.37 (95% CI 0.11 to 1.28, $p = 0.118$) for black women.	-Racial/ethnic groups other than African American and white not examined. -Small sample of African Americans. -Single geographic location. -No controls for appropriateness or SES.
Bivariate and multivariate analyses of prevalence ratios to predict use of reperfusion therapy by race and gender. Statistical adjustments for age, medical history, clinical	White men were most likely to receive reperfusion therapy (59%), followed by white women (56%), black men (50%), and black women (44%). Prevalence ratios (after statistical adjustment):	-Study excluded patients who were not white or African American. -No controls for socioeconomic status.

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
Carlisle, Leape, Bickel, Bell et al., 1999	Underuse and overuse of diagnostic testing for coronary artery disease.	356 patients (43% white, 27% African American, 19% Latino, 9% Asian or Pacific Islander) presenting to ER in one of five Los Angeles area hospitals. Patients completed questionnaire asking whether they had received diagnostic testing for coronary artery disease. Patient medical records were also reviewed.	
Daumit, Hermann, Coresh, and Powe, 1999	Ethnic differences in use of cardiovascular procedures in patients with end-stage renal disease as they transition to Medicare health insurance.	4,987 patients (3,152 white, 1,835 African American) with end-state renal disease from 303 dialysis facilities between 1986 and 1987. Patients were followed for up to seven years. Data obtained from the Case Mix Severity Study of the US Renal Data System.	

Analyses	Findings	Limitations
presentation, and hospital characteristics. Logistic regression to assess whether education, insurance status, gender, age, and race/ethnicity were independent predictors of underuse or overuse.	WW/WM – 1.00 (95% CI 0.98 to 1.03); BW/BM – 1.00 (95% CI 0.89 to 1.13); BW/WM – 0.90 (95% CI 0.82 to 0.98); BM/M – 0.85 (95% CI 0.78 to 0.93). Only level of education was associated with underuse, or inappropriate use of diagnostic testing. Underuse more likely to occur among patients without a college education (odds ratio = 2.2, 95% CI 1.0 to 4.4).	-Retrospective cohort study. -Study limited to patients presenting to ER. -Approximately 50% of potential subjects did not respond or could not be contacted. -Issues of colinearity among education, insurance, and race/ethnicity.
Logistic regression to assess effect of race on receipt of a cardiovascular procedure at baseline. Covariates include age, type insurance at baseline, type of employment, employment status, marital status, region of country, coronary artery disease, history of smoking, cholesterol level, triglyceride level, history diabetes, obesity, cerebrovascular disease, congestive heart failure, history malignant condition, low serum albumin level, and type of dialysis. Logistic regression also used to identify receipt of procedure during follow-up. Cox proportional hazards model used to assess time to receipt of procedure during follow-up for white compared to African American patients.	After adjustment, odds of having a cardiac procedure at baseline were nearly three times greater for white patients than for African-American patients (odds ratio = 2.92, 95% CI 2.04 to 4.18). During follow-up white patients were 1.4 times more likely to have a procedure (adjusted relative risk = 1.41, 95% CI 1.13 to 1.77). In patients with Medicare before end-stage renal disease, the baseline difference in procedure use was eliminated over follow up (odds ratio = 1.05, 95% CI 0.56 to 1.6). Among patients who already had Medicare at baseline, the adjusted odds ratio of procedure use for white compared to African-American patients was 3.0. At follow-up, no difference between ethnic groups seen in procedures after hospitalization for myocardial infarction or coronary disease.	-No controls for hospital characteristics and availability of procedures. -Data obtained from administrative records. -Racial/ethnic groups other than white and African American not included.

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
Gregory, Rhoads, Wilson et al., 1999	Assess racial differences in rates of cardiac procedures, relative to availability of hospital-based invasive cardiac services.	13,690 New Jersey residents (1,217 African American, 12,473 white) hospitalized with a primary diagnosis of AMI.	
Hannan, van Ryn, Burke et al., 1999	Coronary artery bypass graft (CABG) surgery.	1,261 post-angiography patients (680 white non-Hispanic, 314 African American, 267 white Hispanic), stratified by race and gender, who would benefit from CABG in New York state, according to RAND appropriateness and necessity criteria. Patients identified and tracked for three months Data obtained from clinical data, telephone and mail surveys of patients and physicians, and information from NY Cardiac Surgery Reporting System.	
Leape, Hilborne, Bell et al., 1999	Assessed use of CABG or PCTA for patients for whom revascularization procedures	631 patients (44% white, 27% African American, 29% Hispanic) at 13 New York City	

Analyses	Findings	Limitations
Logistic regression to predict receipt of catheterization and PTCA/CABG, after controlling for patient clinical and demographic factors and availability of cardiac procedures in hospital where patients were first admitted.	For all patients, the likelihood of receiving catherterization within 90 days of AMI was significantly greater among those hospitalized in facilities that provided cardiac services. Blacks were less likely to receive catheterization than whites (b/w odds ratio = 0.74 for those younger than age 65 [95% CI 0.61 to 0.90], 0.68 for those age 65 years and older [95% CI 0.56 to 0.83]) controlling for age, sex, health insurance status (for those younger than age 65), anatomic location of primary infarct, co-morbidities, and the availability of cardiac services. Similarly, blacks were less likely than whites to receive revascularization procedures within 90 days of admission (b/w odds ratio = 0.63 for those younger than age 65 [95% CI 0.52 to 0.76], 0.69 for those age 65 years and older [95% CI 0.54 to 0.86]), controlling for patient demographic and clinical factors and availability of cardiac services.	-Ethnic/racial groups other than African American and white not examined. -Retrospective cohort study. -Use of hospital records. -No controls for SES.
Stepwise logistic regression to predict use of CABG within three months. Statistical adjustments for age, gender, vessels diseased, risk status (low, medium, high), type of insurance, and other clinical characteristics.	African-American and Hispanic patients were significantly less likely to undergo CABG than white non-Hispanics. Odds ratios: white/African-American – 0.64 (95% CI 0.47 to 0.87); white/Hispanic – 0.60 (95% CI 0.43 to 0.84).	-Results may not be representative of NYS (in terms of access by race/ethnicity and gender in the state). -No controls for SES.
Logistic regression to assess	No significant variations found in rates of revascularization among African-American patients, (72%), Hispanic patients (67%) and white patients (75%).	-Moderate sample size.

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
	were deemed clinically necessary.	hospitals who met RAND criteria for necessary revascularization. Data obtained by hospital record review.	
Scirica, Moliterno, Every, Anderson et al., 1999	Racial/ethnic differences in care of patients with unstable angina.	2,948 (77% white, 14% black, 4% Hispanic, 1% Asian, 3% unknown race/ethnicity) consecutive patients with unstable angina admitted to 35 U.S. hospitals in 1996 (GUARANTEE registry). Medical records were reviewed and questionnaire was completed for each patient.	
Canto, Herman, Williams, Sanderson et al., 1998	Racial/ethnic differences in presenting characteristics, treatment, and outcomes in patients with myocardial infarction.	275,046 consecutive AMI patients (86% white, 3% Hispanic, 1% Asian and Pacific Islander, < 1% Native American) enrolled in the National Registry of Myocardial Infarction 2 from 1994 to 1996. African-American patients not included in analyses.	

Analyses	Findings	Limitations
probability that a patient would receive revascularization as a function of demographic characteristics and type of hospital.	Rates of revascularization were significantly lower, however, among hospitals that did not provide revascularization services (and therefore had to refer patients to other hospitals) than those that did provide revascularization (59% to 76%, difference = 17% [95% CI 8% to 35%]).	-Retrospective study. -Data obtained by record review. -No controls for SES.
Logistic regression to assess independent contribution of demographic, insurance, and clinical factors in distinguishing white from nonwhite patients.	Nonwhites had higher incidence of hypertension and diabetes. Cardiac catheterization was performed less often in nonwhites as compared to whites (36% vs. 53%, $p = 0.001$). In patients meeting criteria for appropriate catheterization (by AHRQ guidelines), fewer nonwhites underwent the procedure (44% vs. 61%, $p = 0.001$) and among these fewer nonwhites had significant coronary stenosis (72% vs. 90%, $p = 0.001$). Angioplasty and CABG received equally often in white and nonwhite patients, among those catheterized who had indications for revascularization.	-Relatively small number of minorities. -Collapse of minorities into one category. -No controls for SES.
Logistic regression to assess factors predicting acute reperfusion strategies, invasive cardiac procedures, and mortality. Variables include demographics, medical history, cardiac risk factors, chest pain, symptom onset to hospital arrival, Killip class, pulse, systolic blood pressure, electrocardiogram, and hospital characteristics.	Hispanics were as likely as whites to receive thrombolytic therapy. Asian and Pacific Islanders were less likely to receive this therapy (odds ratio = 0.84, 95% CI 0.72 to 0.99). Native Americans more likely than whites to receive thrombolytic therapy (odds ratio = 1.18, 95% CI 0.90 to 1.54). All minority groups as likely as whites to receive coronary arteriography. Hispanics were as likely as whites to undergo revascularization procedures, however Asian and Pacific Islanders were less likely to undergo angioplasty (odds ratio = 0.82, 95% CI 0.64 to 1.04) and more likely to have bypass surgery (odds ratio = 1.23, 95% CI 0.96 to 1.57). Native Americans were less likely to undergo both angioplasty	-NRMI-2 not randomized sample of patients. -No available information on SES. -Retrospective study.

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
Taylor, Canto, Sanderson, Rogers, and Hilbe, 1998	Racial/ethnic differences in management and outcome in patients with Acute Myocardial Infarction (AMI).	Patients from National Registry of Myocardial Infarction 2 (NRMI-2). 275,046 patients included (86% white, 6% black).	
Laouri, Kravitz, French et al., 1997	Assessed use of CABG and/or PTCA for patients for whom procedures are deemed clinically necessary following coronary angiography.	671 patients (55% white, 21% Latino, 12% African-American) at six hospitals (four public and two academically affiliated private hospitals) who met explicit clinical criteria for coronary revascularization. Data abstracted from medical records and from patient interviews.	
Peterson, Shaw, DeLong et al., 1997	Assessed racial/ethnic differences in use of coronary angioplasty and bypass surgery among patients with	Prospective study of 12,402 white and African-American patients at Duke University Medical Center (10.3% Afri-	

Analyses	Findings	Limitations
	(odds ratio = 0.72, 95% CI 0.50 to 1.05) and bypass surgery (odds ratio = 0.63, 95% CI 0.38 to 1.04) than whites. Mortality similar among whites, Hispanics, Asian and Pacific Islanders, and Native Americans.	
Logistic regression to assess variables independently predicting utilization of acute reperfusion strategies, invasive cardiac procedures, and mortality. Variables included age, race, sex, payer status, history, chest pain, ST elevation, MI location and type, symptom onset to hospital arrival, Killip class, pulse, systolic BP, contraindications to thrombolysis, census region, and hospital characteristics.	Black patients were less likely to receive intravenous thrombolytic therapy (odds ratio = 0.76, 95% CI 0.71 to 0.80), coronary arteriography (odds ratio = 0.85, 95% CI 0.77 to 0.95), and coronary artery bypass surgery (odds ratio = 0.66, 95% CI 0.58 to 0.75). No significant differences were found in hospital mortality.	-NRMI-2 not randomized sample of patients. -No available information on SES. -Retrospective study.
Assessed underuse of coronary revascularization relative to RAND/UCLA criteria for necessity of revascularization procedure. Logistic regression analyses evaluated the effect of gender, ethnicity and type of hospital on CABG or PCTA, or any revascularization, controlling for age, clinical presentation, angiographic findings, and ejection fraction.	African Americans were significantly less likely than whites to undergo necessary CABG (b/w odds ratio = 0.49, 95% CI 0.23 to 0.99), and were less likely to undergo necessary PTCA (odds ratio = 0.20, 95% CI 0.06 to 0.72). Patients at public hospitals were less likely to undergo PTCA than those at private hospitals (odds ratio = 0.10, 95% CI 0.02 to 0.44).	-Moderate sample size. -Retrospective study. -No controls for SES, or hospital characteristics.
Logistic regression models to predict the likelihood that a patient would undergo angioplasty or	African Americans were 13% less likely than whites to undergo angioplasty (odds ratio = 0.87, 95% CI 0.73 to 1.03) and 32% less likely to	-Racial/ethnic groups other than white and African

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
	documented coronary disease. Also assessed whether differences were associated with differences in survival rates.	can American) with documented coronary disease.	
Ramsey et al., 1997	Assessed gender and ethnic differences in receipt of percutaneous transluminal coronary angioplasty (PTCA) and aortocoronary bypass surgery (ACBS).	1,228 Mexican-American and white patients hospitalized for myocardial infarction (MI). Data collection part of Corpus Christi Heart Project.	
Sedlis, Fisher, Tice et al., 1998	Assessed racial differences in receipt of cardiac procedures in a VA hospital.	1,474 white and 322 African-American patients who had undergone catheterization and were likely candidates for surgery or angioplasty.	
Taylor, Meyer, Morse, and Pearson, 1997	Assessed rates of cardiovascular procedures by race in	Abstracted chart reviews from 1,441 patients (1,208 white, 155 African American,	

Analyses	Findings	Limitations
bypass surgery. Extension of life associated with bypass surgery calculated by use of proportional-hazards regression model. Risk ratios for black and whites compared after adjusting for base-line prognostic factors. Independent variables included age, sex, severity of disease, other clinical and co-morbid factors, and insurance.	undergo bypass surgery (odds ratio = 0.68, 95% CI 0.56 to 0.82). Racial differences were more marked among patients with severe disease (48% of African Americans with severe coronary disease underwent surgery vs. 65% of whites, $p < 0.001$). Analysis of survival benefit of surgery also revealed racial differences; among patients expected to survive more than one year, 42% of African Americans underwent surgery, compared to 61% of whites ($p < 0.001$). Finally, the adjusted five-year mortality rate among patients revealed that African-American patients were 18% more likely than whites to die (odds ratio = 1.18, 95% CI 1.05 to 1.32).	American not examined. -Single site. -No information about patient preferences. -No controls for SES.
Logistic regression to predict receipt of services, after adjusting for age, sex, previous diagnosis of coronary heart disease, MI, diabetes mellitus, hypertension, occurrence of congestive heart failure during MI, location and type of MI.	Among only patients who had received catheterization to determine extent of disease, Mexican Americans were less likely to receive PTCA, but not ACBS, than whites after adjusting for clinical and demographic characteristics (odds ratio = 0.65, 95% CI 0.43 to 0.99).	-Single geographic location. -No controls for SES, hospital characteristics.
Analyses were generated from surgical referral conference at VA hospital between 1988 and 1996. Racial differences in conference recommendation and patient compliance with recommendations were analyzed using Fisher's exact test.	Therapeutic cardiac procedures (surgery or PTCA) were offered more frequently for white patients (72.9%) than African-American patients (64.3%; odds ratio = 1.497, $p = 0.0022$). This difference could not be explained by simple clinical differences between the two groups. African-American patients, however, were more likely than whites to refuse invasive procedures (odds ratio = 2.026, 95% CI 1.311 to 3.130).	-Racial/ethnic groups other than African American and white not examined. -Single site. -Potential confounds such as SES not assessed.
Logistic regression to assess	No differences found in rates of catheterization procedures between white and "nonwhite" patients during AMI	-Retrospective study. -Potential con-

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
	military health services system.	78 other) with principle or secondary diagnosis of AMI in 125 military hospitals.	
Weitzman, Cooper, Chambless et al., 1997	Assessed rates of performance of cardiac procedures in relation to gender, race, and geographic location.	5,462 patients (815 of these African-American) in four states (North Carolina, Mississippi, Maryland, and Minnesota) hospitalized for myocardial infarction (MI).	
Allison, Kiefe, Centor et al., 1996	Assess variations in use of medications among African-American and white Medicare patients hospitalized with Acute Myocardial Infarction (AMI).	Retrospective medical record review of 4,052 patients (3,542 white, 510 African American) hospitalized in all acute care hospitals in Alabama with principle discharge diagnosis of AMI.	

Analyses	Findings	Limitations
differences by patient race in rates of catheterization or revascularization procedures, controlling for age, gender, cardiovascular risk factors, and clinical data relevant to admission for AMI.	admission (odds ratio = 0.96, 95% CI 0.69 to 1.34) or between white and black patients (odds ratio = 1.19, 95% CI 0.80 to 1.78). Similarly, no differences were found in rates of revascularization (PTCA or CABG) between white and "nonwhite" patients (odds ratio = 0.90, 95% CI 0.59 to 1.39) or between white and black patients (odds ratio = 1.11, 95% CI 0.65 to 1.89). No differences were found in mortality or rates of readmission within 180 days following initial discharge. However, white patients were significantly more likely than nonwhite patients to be considered for future catheterization (odds ratio = 1.77, 95% CI 1.20 to 2.61).	founds such as SES, disease severity, appropriateness not assessed.
Logistic regression to estimate odds of having diagnostic and therapeutic procedures performed during an MI event by race, gender, and type of hospital.	After controlling for severity of MI and co-morbid conditions, blacks admitted to teaching hospitals were significantly less likely to receive PTCA (b/w odds ratio = 0.4, 95% CI 0.2 to 0.6), CABG (b/w odds ratio = 0.4, 95% CI 0.2 to 0.9) or thrombolytic therapy (b/w odds ratio = 0.5, 95% CI 0.3 to 0.8). Similarly, blacks admitted to non-teaching hospitals were significantly less likely to receive PTCA (b/w odds ratio = 0.5, 95% CI 0.3 to 0.7), CABG (b/w odd ratio = 0.3, 95% CI 0.2 to 0.6) or thrombolytic therapy (b/w odds ratio = 0.5, 95% CI 0.3 to 0.7).	-Racial/ethnic groups other than African American and white not assessed. -Potential confounds such as SES, co-morbidities, appropriateness not assessed.
Logistic regression to assess rate of receipt of thrombolysis, beta-andrenergic blockade and aspirin, controlling for patient age, gender, clinical factors, severity of illness, algorithm-determined candidacy for therapy, and hospital characteristics	After controlling for patient appropriateness for therapy, age, gender, clinical characteristics, and hospital characteristics, white patients were more likely to receive thrombolytics than black patients (odds ratio = 0.51, 95% CI 0.38 to 0.78). No differences were found in receipt of beta-blockers (odds ratio = 1.18, 95% CI 0.91 to 1.53)	-Racial/ethnic groups other than white and African American not examined. -Relatively small sample of African Americans. -Retrospective study. -Data obtained

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
Herholz et al., 1996	Assessed gender and ethnic differences in receipt of cardiovascular medications on discharge from hospital following myocardial infarction (MI).	Discharge data for 982 patients hospitalized for definite or possible MI; data are from the Corpus Christi Heart Project.	
Blustein, Arons, and Shea, 1995	Assessed variations by race, payor, and gender in process of care leading up to revascularization procedures for patients with cardiovascular disease.	5,857 non-Medicare (less than 65 years of age) patients admitted to hospitals in California with a principal diagnosis of acute myocardial infarction (AMI).	
Carlisle et al., 1995	Assessed use of coronary artery angiography, bypass graft surgery, and angioplasty among Los Angeles	131,408 patients (89,781 white, 16,509 African American, 19,218 Latino, and 5,900 Asian) discharged from L.A. County	

Analyses	Findings	Limitations
(e.g., rural vs. urban, teaching vs. non-teaching).	or aspirin (odds ratio = 1.00, 95% CI 0.81 to 1.24) by patient race.	through record review. -No controls for SES.
Logit regression to predict receipt of medications by gender and ethnicity, after adjusting for age, diagnosis of diabetes mellitus, hypertension, congestive heart failure, serum cholesterol level, and cigarette smoking.	Mexican Americans received fewer medications than whites (odds ratio = 0.62, 95% CI 0.33 to 1.15), even after adjusting for clinical and demographic characteristics. Mexican Americans were less likely to receive almost all major medications, especially antiarrhythmics, anticoagulants, and lipid-lowering therapy.	-Single geographic region. -No controls for SES, hospital characteristics, appropriateness.
Series of chi square and regression analyses to determine likelihood of receipt of services during prehospital, intrahospital (duration of initial hospitalization), interhospital, and posthospital (readmission for revascularization following initial hospitalization) phases. African-American and Hispanic patients grouped together as "minority" due to small numbers.	Authors found differences in likelihood of receipt of procedures during nearly every phase of treatment for different racial and payor groups. Whites, those with private insurance, and those with more severe heart disease were more likely to gain initial admittance to hospitals providing revascularization services. Once hospitalized, whites, males, those with private insurance, and those with more severe disease were more likely to actually receive revascularization. These same patterns were observed among those patients not initially admitted to hospitals offering revascularization but who later received revascularization upon re-admittance or transfer. In logistic regression analyses to assess odds of receiving revascularization during any admission, whites were more likely to receive revascularization (odds ratio = 1.49 [no CI reported]), as were the privately insured.	-Relatively small number of minorities. -Administrative data, lack of clinical detail. -Retrospective study.
Series of logistic regression models to assess relationship between use of invasive procedures and ethnicity, controlling for primary	African Americans were less likely than whites to receive bypass graft (odds ratio = 0.62, 95% CI 0.56 to 0.69) and angioplasty (odds ratio = 0.80, 95% CI 0.72 to 0.88). Latinos	-Retrospective. -Administrative records used. -Proxy used for co-morbidity and income.

TABLE B-1 Continued

Cardiovascular Disease

Source	Procedure/Illness	Sample	Analyses
	County residents with possible ischemic heart disease.	hospitals following angiography, CABG, or angioplasty. National Hospital Discharge Survey records of 10,348 patients (9,289 white, 159 African American) hospitalized with AMI.	
Giles et al., 1995	Assessed race and sex differences in rate of receipt of catheterization, PTCA, or coronary artery bypass surgery (CABS).		
Maynard, Every, Martin, and Weaver, 1995	Implications of less intensive use of revascularization in black patients on long-term survival.	420 black and 10,834 patients hospitalized for acute myocardial infarction in metropolitan Seattle from 1988 to 1994.	

Analyses	Findings	Limitations
diagnosis, age, gender, insurance type, income (proxy), co-morbidities, and differences among hospitals in volume of invasive procedures.	were less likely to receive angiography (odds ratio = 0.90, 95% CI 0.85 to 0.95). Asian Americans did not differ from whites in invasive cardiac procedure rates, although all three ethnic groups were less likely to receive procedures than whites when hospital procedure volume was not controlled.	
Logistic regression analysis adjusting for age, type of health insurance, hospital size and type, region, in-hospital mortality, and hospital transfer rates to assess differences in rates of procedures by race. Analyses also performed to match individuals admitted to the same hospital and who did not undergo a procedure. Analyses limited to procedures occurring during initial hospitalization.	Significant differences by race and gender were found after statistical adjustment and patient matching procedure. With white males as the referent, black men were less likely to receive catherterization (odds ratio = 0.67, 95% CI 0.51 to 0.87) or CABS (odds ratio = 0.63, 95% CI 0.44 to 0.90), while black women were less like to receive catheterization (odds ratio = 0.50, 95% CI 0.37 to 0.68), PTCA (odds ratio = 0.42, 95% CI 0.23 to 0.76) or CABS (odds ratio = 0.37, 95% CI 0.22 to 0.62). Among only those patients who underwent catheterization (and therefore had access to a cardiologist), black women were less likely to receive subsequent PTCA or CABS.	-Administrative data. -Retrospective. -No controls for SES. -May only be able to generalize to patients with more severe disease.
Logistic regression to assess racial differences in age-adjusted hospital mortality and use of revascularization. Log rank statistic used to determine differences in survival.	No significant differences found in proportion of black and white patients receiving thrombolytic therapy or cardiac catheterization. After adjusting for use of cardiac catheterization, percent professionals in census block, history of prior coronary surgery, history of angina, use of thrombolytic therapy, sex, and history of congestive heart failure, black patients 40% less likely to undergo revascularization (odds ratio = 0.60, 95% CI 0.45 to 0.81, $p = 0.0008$). After adjustment race was not associated with long-term survival.	-Relatively small sample of African-American patients. -Racial/ethnic groups other than African American and white not assessed. -SES estimated by census blocks.

TABLE B-1 Continued

Analgesia

Source	Procedure/Illness	Sample	Analyses
Peterson, Wright, Daley, and Thibault, 1994	Racial differences in procedure use and survival following acute myocardial infarction (AMI) within Department of Veterans Affairs.	33,641 (29,119 white, 4,522 African American) male veterans discharged with diagnosis of AMI from January 1988 to December 1990.	
Ayanian, Udvarhelyi, Gatsonis et al., 1993	Assessed racial differences in rates of coronary revascularization following angiography and relationship of these differences to hospital characteristics.	27,485 Medicare Part A enrollees (26,389 white, 1,096 African American) who underwent inpatient coronary angiography in 1987.	
Whittle, Conigliaro, Good, and Lofgren, 1993	Racial differences in use of cardiovascular procedures in Department of Veterans Affairs.	Retrospective study of 428,300 male veterans (74,570 African American, 353,730 white) discharged from VA hospitals with diagnoses of cardiovascular disease or chest pain between 1987 and 1991.	

Analyses	Findings	Limitations
Logistic regression to assess effect of race on use of cardiac catheterization, coronary angioplasty, coronary bypass surgery, and overall coronary revascularization. Likelihood ratios calculated for 30-day, 1-year, and 2-year survival. Analyses adjust for age, cardiac complications, number of secondary diagnoses, previous hospitalization, hospital location, on-site availability of cardiac catheterization and bypass surgery, and year of admission.	After adjustment, as compared to white patient, African Americans 33% less likely to undergo cardiac catheterizations within 90 days of AMI (odds ratio = 0.67, 95% CI 0.62 to 0.72); 54% less likely to undergo coronary bypass surgery within 90 days of AMI (odds ratio = 0.46, 95% CI 0.40 to 0.53), and 42% less likely to undergo angioplasty within 90 days of AMI (odds ratio = 0.58, 95% CI 0.48 to 0.66). The black/white ratio for any cardiac revascularization procedure within 90 days of AMI was 0.46 (95% CI 0.41 to 0.52). African Americans more likely to survive 30 days following AMI compared to whites (adjusted odds ratio = 1.18, 95% CI 1.07 to 1.31). No differences found between races for 1 or 2-year survival rates.	-Racial ethnic groups other than white and African American not included. -Administrative database. -Retrospective study. -No controls for SES.
Logistic regression analyses to predict revascularization, controlling for age, sex, region, Medicaid eligibility, principal diagnosis, secondary diagnoses, and hospital characteristics.	African Americans were less likely than whites to receive a revascularization procedure (w/b adjusted odds ratio = 1.78, 95% CI 1.56 to 2.03). Greater use of revascularization occurred in public, private, teaching, nonteaching, and urban/suburban hospitals, and in hospitals where revascularization procedures were available, as well as in hospitals where such procedures were not available, after controlling for patient demographic and clinical factors. No significant black/white differences in rates of revascularization were found in rural hospitals.	-Racial/ethnic groups other than African American and white not examined. -Relatively small sample of African-American patients. -Administrative data set. -Retrospective study.
Logistic regression to assess association or race with use of procedures controlling for diagnosis, region, age, co-morbidity, marital status, year of diagnosis, whether CABG performed at hospital where diagnosis made.	After adjustment, white patients more likely than African American patients to undergo cardiac catheterization (odds ratio = 1.38, 95% CI 1.34 to 1.42), angioplasty (odds ratio = 1.50, 95% CI 1.38 to 1.64), and CABG (odds ratio = 2.22, 95% CI 2.09 to 2.36).	-Racial/ethnic groups other than African American not examined. -Retrospective study of administrative data set. -No controls for admission practices.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Cardiovascular Disease			
Cerebrovascular Disease			
Mitchell, Ballard, Matchar et al., 2000	Assessed rates of tests and treatment for cerebrovascular disease: noninvasive cerebrovascular tests, cerebral angiography, carotid endarterectomy, anticoagulant therapy, and probability of receiving care from a neurologist.	Inpatient hospital records of 17,437 Medicare patients (15,929 white and 1,508 African American) with a principal diagnosis of transient ischemic attack (TIA).	
Oddone, Horner, Sloane et al., 1999	Racial differences in use of carotid artery imaging in Veterans Affairs Medical Centers.	803 patients (389 African American, 414 white) hospitalized in one of four VA Medical Centers between April 1991 and January 1995	

Analyses	Findings	Limitations
Computed state age- and sex-adjusted rates of CABG for whites and African Americans and evaluated relative to need for care (as indicated by myocardial infarction rate) and supply of physicians (as indicated by the number of thoracic surgeons and cardiologists per 10,000 persons).	Nationally, CABG rate was 27.1 per 10,000 for whites, 7.6 per 10,000 for African Americans. Racial differences were greater in the Southeast, particularly in non-metropolitan areas. Correlation of CABG rates was significantly associated with the density of thoracic surgeons and location in the Southeast for whites, but physician availability and location was not correlated with CAGB rates for African Americans.	-Some veterans in study obtained care outside of VA. -Administrative data set. -Racial/ethnic groups other than white and African American not examined. -Retrospective study. -Limited information on demographic factors.
Logistic regression adjusting for comorbid illness (including hypertension and prior history of stroke), ability to pay (proxy based on dual Medicaid-Medicare eligibility and area of residence), and other clinical and demographic variables.	After adjusting for patient, illness, and provider characteristics, African Americans were 83% as likely as whites to receive noninvasive cerebrovascular testing (95% CI 0.73 to 0.93). Among those receiving noninvasive testing, African Americans were 54% as likely to receive cerebral angiography (95% CI 0.36 to 0.80), and among those receiving angiography, the odds of African Americans receiving carotid endarterectomy was 0.27 (95% CI 0.09 to 0.78). African Americans were 62% as likely to receive anticoagulant therapy, but this difference not statistically significant given small number of African-American subjects. African-American patients were 21% less likely to receive care from a neurologist (95% CI 0.69 to 0.90).	-Racial/ethnic groups other than African American and white not examined. -Retrospective study. -Administrative data.
Logistic regression to determine adjusted odds ratios for receiving any carotid artery imaging. Models adjust for age, comorbidity,	African American patients were less likely to have an imaging study of their carotid arteries (22% vs. 45%, p = 0.001). Race remained an independent predictor of imaging after adjusting	-Retrospective study reviewing medical records. -Very small number of African Ameri-

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Cerebrovascular Disease			
		with ICD-9 diagnoses of either transient ischemic attack, ischemic stroke, or amaurosis fugax. Record review of clinical data.	
Children's Health Care			
Weech-Maldonado et al., 2001	Parents' ratings and reports of pediatric care under Medicaid Managed Care by race, ethnicity, and primary language.	Reponses for over 9,000 children (842 Hispanic, 1,344 African American, 131 Asian, 330 American Indian, 6,329 white, 111 other) from the National Consumer Assessment of Health Plans Benchmarking Database 1.0 Data from 33 HMOs from Arkansas, Kansas, Minnesota, Oklahoma, Vermont, and Washington state.	

Analyses	Findings	Limitations
linical presentation, anticipated operative risk, and hospital.	for clinical factors (odds ratio = 1.50, 95% CI 1.06 to 2.13). Whites were significantly more likely to be assessed as appropriate candidates for surgery using RAND criteria (18% vs. 4%, $p = 0.001$) because of higher prevalence of significant carotid artery stenosis. RR of carotid endarterectomy for whites compared to African Americans was 1.34 (95% CI 0.70 to 2.53).	cans received procedure. -Study limited to hospitalized patients. -No controls for SES.
Ordinary least squares regression to assess the effect of race/ethnicity, Hispanic language, and Asian language on ratings and reports of care, controlling for parent age, gender, education, and child's health status. Care domains examined include doctor/nurse rating, health care rating, health plan rating, timeliness of care, provider communication, staff helpfulness, and plan service.	Compared with whites, Asian/other reported worse care across several domains [getting needed care ($\beta = -8.11$, $p < 0.05$), timeliness of care ($\beta = -18.65$, $p < 0.001$), provider communication ($\beta = -17.19$, $p < 0.001$), staff helpfulness ($\beta = -20.10$, $p < 0.001$), plan service ($\beta = -10.95$, $p < 0.001$)]. English-speaking Asian parents did not differ significantly from whites on any reports of care. Spanish-speaking Hispanic parents reported more negative care than whites on timeliness of care ($\beta = -9.24$, $p < 0.01$), provider communication ($\beta = -4.37$, $p < 0.05$) staff helpfulness ($\beta = -6.09$, $p < 0.05$), and plan service ($\beta = -6.93$, $p < 0.001$). English-speaking Hispanic parents did not differ from whites on any reports of care. African-American parents scored lower than whites on reports of getting needed care ($\beta = -3.52$, $p < 0.05$), timeliness of care ($\beta = -4.53$, $p < 0.01$), and plan service ($\beta = -4.29$, $p < 0.001$). American Indians had worse reports of care than whites for getting needed care ($\beta = -9.12$, $p < 0.05$), timeliness of care ($\beta = -3.52$, $p < 0.01$), provider communication ($\beta = -3.27$, $p < 0.05$), and plan service ($\beta = -4.12$, $p < 0.01$).	-No controls for other SES characteristics such as income, occupation -No examination of clinical meaningfulness of differences in reports and ratings of care. -Mail and telephone surveys, data did not identify surveys administered in English vs. Spanish.

TABLE B-1 Continued

Children's Health Care

Source	Procedure/Illness	Sample	Analyses
Furth et al., 2000	Access to kidney transplant list.	3,284 patients < 20 years of age (1,122 black, 2,162 white) with ESRD who had first dialysis between January 1, 1988, and December 31, 1993.	
Hampers et al., 1999	Assess whether language barriers between patients and physicians were associated with differences in diagnostic testing and length of stay.	Prospective investigation of 2,467 patient visits to Emergency Department between September and December 1997 (413 white, 557 African American, 1,284 Hispanic, 124 other, 89 NA). 286 families did not speak English, representing a language barrier for the physician in 209 cases.	
Zito, Safer, dosReis, and Riddle, 1998	Psychotropic medication use.	99,217 African-American (60,868) and white (38,349) youths ages five through 14, who were Medicaid recipients in the state of Maryland seen in ambulatory settings.	
Hahn, 1995	Use of prescription medications.	Two samples of children: 1) ages one to five (n = 1,347), and 2) ages 6 to 17 (n = 2,155) who had at least one ambula-	

Analyses	Findings	Limitations
Cox proportional hazard analysis to examine independent effect of race on the time from first dialysis for ESRD until first activation on cadaveric transplant waitlist for index transplant controlling for confounding factors (age, gender, cause of ESRD, SES, incident year of ESRD, ESRD network, facility characteristics).	Controlling for confounders, black patients were 12% less likely than white patients to be activated on the kidney transplant wait list (relative hazard = 0.88, 95% CI 0.79 to 0.97). In addition, after controlling for confounders, the relative hazard for black patients in the lowest SES quartile being activated on the wait list was 0.84 (95% CI 0.70 to 1.01) compared to relative hazard of 1.0 (95% CI 0.8 to 1.3) for black patients in the highest SES quartile.	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -Potential confounds such as co-morbidities, appropriateness not examined.
Mann-Whitney U tests used to compare total charges among groups. Analysis of covariance used to assess predictors of total charges and length of ED stay. Race/ethnicity, insurance status, provider training, patient care setting, and triage category, patient age, patient vital signs, included in models to isolate effect of language barrier.	The presence of a language barrier accounted for a $38 increase in charges for testing ($F = 14.1$, $p < 0.001$) and 20 minute longer ED stay ($F = 9.1$, $p = 0.003$).	-No independent or family verification of language barrier. -No full control for complexity of cases -No controls for use of professional interpreter or ad hoc interpreter -Single site
Logistic regression to estimate the probability of psychotropic medication use as a function of race and region. The effect of race controlling for region and interaction of race and region were analyzed.	Caucasians were twice as likely to receive psychotropic prescriptions compared with African Americans after adjusting for geographic region (odds ratio = 1.97, 95% CI 1.84 to 2.12). The interaction of race and region was significant ($\chi^2 = 23.3$, df = 7, $p < 0.001$), such that the odds of receiving psychotropic medications differed by geographic region (range 1.23 to 2.60).	-Racial/ethnic groups other than African American and white not examined. -One geographic location. -Administrative data. -Retrospective study. -Potential confounds such as income, service use, and provider specialties not assessed.
Logistic and multiple regression used to assess the probability of receiving a prescription medication and	*For children ages one to five:* 1) Black children (odds ratio = 0.532) were half as likely to receive prescription medication compared with white	-Administrative data.

TABLE B-1 Continued

Children's Health Care

Source	Procedure/Illness	Sample	Analyses
		tory care visit in 1987. Data were obtained from the Household Component of the National Medical Expenditure Survey (NMES).	

Analyses	Findings	Limitations
	children (odds ratio = 1.0) ($p < 0.001$). Adding health factors to the model did not change relationships. However, addition number of physician visits reduced differences, such that they were no longer significant. There was no difference in the probability of receiving medication for Hispanic children compared with white children. 2) After controlling for age, maternal education, insurance, poverty status, source of care, geographic location, health status, # bed days, # reduced activity days, and physician visits, black children received the fewest number of medications. The average number of medications for black children was 86.5% compared to that of white children, while Hispanic children averaged 94.1% compared to that of white children. *For children ages six to 17:* 1) Black (odds ratio = 0.536) and Hispanic (odds ratio = 0.621) children were less likely to receive any prescription medication compared to white (odds ratio = 1.0) children. The addition of health factors, and number of physician visits did not change these relationships (odds ratio = 0.601, $p < 0.001$, odds ratio = 0.697, $p < 0.01$ respectively). 2) After controlling for age, maternal education, insurance, poverty status, source of care, geographic location, health status, # bed days, # reduced activity days, and physician visits, black children received the fewest number of medications. The average number of medications for black children was 89.7% compared to that of white children, and 92.1% for Hispanic children compared to that of white children.	

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Diabetes			
Chin, Zhang, and Merrell, 1998	Assessed quality of care and resource utilization among African-American and white patients with diabetes.	1,376 African-American and white Medicare beneficiaries with diabetes (14% African Americans).	
Emergency Services			
Lowe et al., 2001	Assessed racial differences in denial of authorization for emergency department (ED) care by managed care gatekeepers.	15,578 African-American and white patients who sought care in an urban hospital emergency department.	
Baker, Stevens, and Brook, 1996	Assessed racial differences in emergency department use.	1,049 patients (295 African American, 237 white, 517 Hispanic) registered for non-emergency medical problems in the Harbor-UCLA Medical Center Emergency Department.	

Analyses	Findings	Limitations
Linear and logistic regression to assess independent contribution of race to health status, quality of care, and resource utilization, controlling for sex, education, and age. Measures included patient survey, ADA and RAND criteria for quality of care, and Medicare reimbursement.	African-American patients were less likely to have measurement of glycosylated hemoglobin (adjusted odds ratio = 0.65, 95% CI 0.48 to 0.88) lipid testing (odds ratio = 0.66, 95% CI 0.48 to 0.89), ophthalmological visits (odds ratio = 0.72, 95% CI 0.56 to 0.93), and influenza vaccinations (odds ratio = 0.26, 95% CI 0.19 to 0.36). African-American patients were more likely to use the ED (39% vs. 29%, $p < 0.01$) and had fewer physician visits (8.4 vs. 9.7 visits per year, $p < 0.05$). In addition, African-American patients had higher reimbursement for home health services, however, once adjusting for case-mix variables race was not associated.	-Racial/ethnic groups other than African American and white not examined. -Confounds such as hospital characteristics, appropriateness, and comorbidities not examined.
Multiple logistic regression to assess racial differences in authorization for emergency department services.	After adjusting for patients' age, gender, day, and time of ED visit, type of Managed Care Organization (MCO) and triage category, African Americans were more likely to be denied authorization for care (odds ratio = 1.52, 95% CI 1.18 to 1.94). Patients who were covered by a Medicaid MCO (odds ratio = 1.50, 95% CI 1.19 to 1.90) or those covered with MCOs with mixed Medicaid and commercial patient populations (odds ratio = 2.05, 95% CI 1.41 to 2.98) were more likely than those covered by purely commercial MCOs to be denied authorization for care.	-Racial groups other than African American and white not assessed. -Single site.
Logistic regression to assess independent effect of race/ethnicity on ED use.	19% of African Americans, 13.2% of whites and 11.3% of Hispanic patients reported two or more previous ED visits (in preceding three months) ($p = 0.01$ across groups) (unadjusted odds ratio 1.82 for	-Sample obtained at one site, selective enrollment. -Cross-sectional survey.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Emergency Services			
Eye Care			
Devgan, Yu, Kim, and Coleman, 2000	Surgical treatment of glaucoma in African-American Medicare beneficiaries.	Retrospective cohort analysis of 30,495 African-American and 160,792 white patients over 65 years of age undergoing argon laser trabeculoplasty or trabeculectomy surgery between 1991 and 1994.	
Wang, Javitt, and Tielsch, 1997	Glaucoma and cataract treatment.	642,048 Medicare beneficiaries (606,069 white, 35,979 black) age 65 and older who used eye care services. Patients with physician-diagnosed glaucoma or cataract who underwent surgical treatment.	

Analyses	Findings	Limitations
	African Americans compared with Hispanics). After adjusting for age, insurance status, regular source of care, and transportation difficulties, ethnicity was not significantly associated with two or more ED visits in the preceding three months (adjusted odds ratio for Hispanics compared with African Americans 1.48, 95% CI 0.95 to 2.3 and adjusted odds ratio for Hispanics compared with whites was 1.22, 95% CI 0.74 to 2.00).	
Age and sex adjusted rates of argon laser trabeculoplasty and trabeculectomy surgery were obtained and compared with surgery rates expected based on disease prevalence.	For each age and age-sex subgroup, the rate of surgical procedures is higher in African Americans compared to whites. The age-sex-adjusted rate ratio was 2.14 (95% CI 2.11 to 2.16). Assuming treatment should be performed in proportion to age-race prevalence, African Americans underwent glaucoma surgery at 47% below expected rate (expected rate: 5.52 procedures per 1,000 person-year of enrollment, adjusted rate: 2.95 procedures per 100 person-year enrollment).	-Administrative data base. -Data does not contain information on beneficiaries who may be enrolled in HMOs or VA hospitals. -Racial/ethnic groups other than African American and white not analyzed.
Black-white relative risk of having a physician-diagnosed condition and surgical treatment were compared to the expected value based on population survey data for each specific disease.	Black patients used eye care services at two-thirds the rate of white patients (age gender adjusted RR = 0.67, 95% CI 0.66 to 0.68). Black women were 73% as likely to use services as white women, while black men were 56% as likely to use services. Among users of eye care services, black patients were 2.2 times more likely than whites to be diagnosed with glaucoma, after adjusting for age and gender (RR = 2.17, 95% CI 2.12 to 2.22). In addition, among users of eye care services, blacks had lower than expected rates of treatment for glaucoma (observed RR = 3.2, 95% CI	-Administrative database. -Differential presentation for care based on severity can not be ruled out. -Other clinical confounds may exist.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Eye Care			
Gallbladder Disease			
Arozullah, Ferreira, Bennett et al., 1999	Racial variation in rate of adoption of laparoscopic cholecystectomy procedure in Department of Veterans Affairs Medical System. Mortality and length of hospital stay also examined.	16,181 patients (14,249 Caucasian and 1,932 African American) diagnosed with gall bladder or biliary disease who underwent either open cholecystectomy or laparoscopic cholecystectomy. Data were collected through: a) record review of claims files, and b) prospectively compiled clinical data from records and interview, for the year before the new procedure was introduced and the first four years of use of the procedure (1991-1995).	

Analyses	Findings	Limitations
	3.1 to 3.4 vs. expected RR of 4.3, 95% CI 3.5 to 5.4), but a higher treatment rate for cataract (RR = 1.2, 95% CI 1.2 to 1.3). Among patients with physician diagnosed glaucoma and cataract, black patients were more likely to undergo surgical treatment for these diagnoses than white patients (RR = 1.5 for glaucoma, 95% CI 1.4 to 1.5; RR = 1.2 for cataract, 95% CI 1.2 to 1.3).	
Modified multiple logistic regression model to predict the use of laparoscopic versus open cholecystectomy. Predictors included race, age, marital status, hospital geographic location, co-morbid illnesses, and year of surgery. To examine mortality and length of stay, multiple logistic regression equations used. Predictors included age, gender, marital status, coexisting medical condition, geographic region, year of care, and type of cholecystectomy.	*Claims data* indicate that after controlling for confounding variables, African-American patients who underwent cholecystectomy were 25% less likely as white patients to undergo the laparoscopic procedure (adjusted odds ratio = 0.74, 95% CI 0.66 to 0.83). The shortening of postoperative length of hospital stay (from 9 to < 4.5 days with new procedure) occurred in the first year for white patients and in the fourth year for African-American patients ($p < 0.001$). *Clinical data* indicate that after adjustment, African-American patients were 0.68 times as likely to undergo the laparoscopic procedure (95% CI 0.55 to 0.84).	-Administrative data set. -Racial/ethnic groups other than African American not examined.

TABLE B-1 Continued

HIV/AIDS

Source	Procedure/Illness	Sample	Analyses
Shapiro, Morton, McCaffrey et al., 1999	Assessed racial/ethnic, gender, and other sociodemographic variations in care (number of care-seeking visits and use of protease inhibitors [PI] or nonnucleoside reverse transcriptase inhibitors [NNRTI]) for persons infected with HIV.	Multistage probability sample of 2,846 individuals, including African-American and Hispanic patients, using data from the HIV Costs and Services Utilization Study.	
Bennett, Horner, Weinstein et al., 1995	Assessed quality of care for pneumocyctis carinii pneumonia (PCP) among white, Hispanic and African-American patients with HIV receiving care in either Veterans Administration (VA) hospitals or non-VA systems.	Retrospective chart review of a cohort of 627 VA patients and 1,547 non-VA patients with treated or cytologically confirmed PCP who were hospitalized from 1987 to 1990.	
Moore, Stanton, Gopalan, and Chaisson, 1994	Assessed use of antiretroviral drugs and prophylactic therapy to treat pneumocyctis carinii pneumonia (PCP) in an urban population infected with HIV.	838 African-American, Hispanic, and white patients presenting at an urban HIV clinic from March 1990 through December 1992. Data obtained through interview and record review with six-month follow-up.	

Analyses	Findings	Limitations
Logistic regression to predict use of PI and NNRTI, prophylaxis against pneumocyctis carinii pneumonia (PCP), use of antiretroviral medication, hospitalizations, ambulatory visits, and emergency department visits.	Adjusting for insurance status, CD4 cell count, sex, age, method of exposure to HIV, and region of country, African-American and Hispanic patients were 24% less likely than whites to receive PI or NNRTI at initial assessment, although this disparity declined to 8% at the final assessment stage, a difference that remained statistically significant ($p = 0.016$). On average, blacks waited 13.5 months to receive these medications, compared to 10.6 months for whites ($p < 0.001$).	-Potential confounds such as co-morbidities, SES not assessed.
Logistic regression to predict diagnostic procedures (use and timing of bronchoscopy) and use and timing of PCP medications, controlling for insurance status, age, sex, risk group status, severity of PCP illness at admission, use of medications prior to admission, type of hospital, and hospital volume of patients with AIDS.	For all patients, regardless of the type of hospital in which they were treated, use of anti-PCP medications was initiated within two days of admission for 70% to 77% of patients. Approximately 60% of patients underwent a bronchoscopy at some point during hospitalization. Black and Hispanic patients at non-VA hospitals were more likely to die during hospitalization, and were less likely to undergo bronchoscopy in the first two days of admission. No racial differences were found in use of bronchoscopy, receipt of anti-PCP medications within two days of admission, or mortality in VA hospitals.	-Retrospective study. -No controls for SES, co-morbidities.
Logistic regression to predict receipt of antiviral agents or PCP prophylaxis, adjusting for patient income, insurance status, mode of HIV transmission, and place of residence.	No racial differences were found in the stage of HIV disease at the time of presentation. However, 63% of eligible whites, but only 48% of eligible blacks received antiretroviral therapy, and PCP prophylaxis was received by 82% of eligible whites and only 58% of eligible blacks. African-American patients were significantly less likely than whites to receive antiretroviral therapy (odds ratio = 0.59, 95% CI 0.38 to 0.93) or PCP prophylaxis (odds ratio = 0.27, 95% CI 0.13 to 0.56). Whites were more likely to report a usual source of care (59%) than African Americans (34%, $p < 0.001$).	-Single site. -Confounds such as comorbidities not assessed.

TABLE B-1 Continued

Maternal and Infant Health

Source	Procedure/Illness	Sample	Analyses
Aron, Gordon, DiGiuseppe et al., 2000	Cesarean delivery rates.	25,697 women (19,996 white, 5,701 nonwhite) with no prior history of cesarean delivery admitted to 21 northeast Ohio hospitals from January 1993 through June 1995. Data were obtained from Cleveland Health Quality Choice.	
Barfield, Wise, Rust et al., 1996	Civilian vs. military outcomes in prenatal care utilization, birth weight distribution, and fetal and neonatal mortality rates.	2,171,147 births for African-American and white mothers [79,154 in military hospitals (16.2% AA), 2,091,993 in civilian hospitals (9.5% AA)] recorded from 1981 to 1985 in the Maternal and Child Health database compiled by the Community and Organization Research Institute of the University of California – Santa Barbara.	

Analyses	Findings	Limitations
Nested (to account for clustering of patients in individual hospitals and provide more robust estimates of variance of group effects) logistic regression used to yield odds ratios for cesarean delivery in non-white patients relative to whites and for patients with government insurance or who were uninsured relative to patients with commercial insurance. Analyses were adjusted for 39 risk factors.	Overall rates of cesarean delivery were similar in white and nonwhite (over 90% African-American) patients. After adjusting for clinical risk factors, non-white women were more likely to deliver via cesarean (odds ratio = 1.34, 95% CI 1.14 to 1.57, $p < 0.001$). Analysis also indicated that insurance status independently influences use of cesarean delivery.	-Results may reflect regional characteristics. -Retrospective study. -No assessment of appropriateness or necessity of cesarean.
Relative risks and Mantel-Haenszel Chi-square analyses for stratified comparisons were calculated.	*Prenatal care utilization:* utilization was lower for black patients than white patients in both military (RR = 0.79, 95% CI 0.75 to 0.82) and civilian (RR = 0.51, 95% CI 0.50 to 0.52) populations. However, the magnitude of the disparity was lower in the military population ($p < 0.001$). *Birth weight:* for military and civilian groups black patients had higher rates of very low birth weight and moderately low birth weight, however, rates were significantly lower in the military group. For example in the very low-birth-weight category, the rate for black births was lower that the rate for black civilian births (RR = 0.68, 95% CI 0.56 to 0.82). For white patients the military rates of very low birth weight (RR = 0.75, 95% CI 0.65 to 0.87) were also significantly lower than their civilian counterparts. *Fetal and neonatal mortality:* For military and civilian groups, mortality was significantly higher for black patients. While fetal mortality rates for white	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -Observational study, no control for insurance in civilian group, SES, co-morbidities.

TABLE B-1 Continued

Maternal and Infant Health

Source	Procedure/Illness	Sample	Analyses
Braveman, Egerter, Edmonston, and Verdon, 1995	Cesarean delivery rates.	217,461 singleton first live births (15,529 African American, 19,142 foreign-born Asian, 62,303 foreign-born Latina, 26,802 U.S.-born Latina, 93,685 white) among women in California in 1991.	
Brett, Schoendorf, and Kiely, 1994	Use of prenatal care technologies (ultrasonography, tocolysis, amniocentesis).	Births among non-Hispanic black and non-Hispanic white women in 1990 (3.1 million available for ultrasonography, 3.2 million for tocolysis, 37,000 for amniocentesis). Data were obtained from the National Center for Health Statistics.	

Analyses	Findings	Limitations
	patients were similar for military and civilian groups, rates for black military groups were significantly lower than their civilian counterparts (RR = 0.80, 95% CI 0.65 to 0.99).	
Multiple logistic regression to determine adjusted odds ratios of cesarean delivery by race/ethnicity.	After adjusting for covariates (insurance, personal, community, medical, and hospital characteristics), African-American women were 24% more likely to undergo cesarean than whites (adjusted odds ratio = 1.24, 95% CI 1.18 to 1.31). U.S.-born Latinas were also at an elevated risk compared to whites (adjusted odds ratio = 1.07, 95% CI 1.03 to 1.12). Among women residing in 25% or more non-English speaking communities, who delivered high-birth weight babies or who gave birth at for-profit hospitals, cesarean delivery was more likely among nonwhites and was over 40% more likely among black women than white women (odds ratio = 1.51, 95% CI 1.20 to 1.89; odds ratio = 1.42, 95% CI 1.21 to 1.67; odds ratio = 1.42, 95% CI 1.20 to 1.68, respectively).	-Data collected in single region. -Retrospective study.
Logistic regression was used to estimate likelihood of tocolysis and Mantel-Haenszel to estimate use of ultrasonography and amniocentesis. Confounders controlled for include: maternal age, education, marital status, location of residence, birth order, timing of first prenatal care visit, and plural births.	Amniocentesis was used substantially less frequently by black women (adjusted RR = 0.58, 95% CI 0.56 to 0.60). Ultrasonography was received by black women slightly less frequently than white women (adjusted RR = 0.88, 95% CI 0.87 to 0.88). Black women with singleton births were slightly more likely to receive tocolysis than white women (adjusted RR = 1.06, 95% CI 1.04 to 1.09), although the risk of idiopathic pre-term delivery is estimated to be three times higher in black women. Women with plural births received tocolysis two thirds as often as white women (adjusted RR = 0.69, 95% CI 0.62 to 0.75).	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -No controls for hospital characteristics, many prenatal care details (e.g., time of procedure), regional differences in practices, appropriateness of procedure.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Maternal and Infant Health			
Kogan, Kotelchuck, Alexander, and Johnson, 1994	Self-reported receipt of prenatal care advice from providers.	8,310 women (6,782 white non-Hispanic and 1,532 black women) who participated in the 1988 National Maternal and Infant Health Survey conducted by the National Center for Health Statistics.	
Mental Health			
Kales, Blow, Bingham et al., 2000	Impact of race on mental health care utilization among veterans.	Retrospective study of 23,718 patients (859 Hispanic, 3,529 African American, 19,330 white) age 60 and older hospitalized for psychiatric diagnoses treated in Department of Veterans Affairs inpatient facilities in 1994.	
Melfi, Groghan, Hanna, and Robinson, 2000	Antidepressant treatment.	13,065 Medicaid patients diagnosed with depression treated between 1989-1994.	

Analyses	Findings	Limitations
Logistic regression to assess contribution of race to mothers' report of receipt of advice or instructions during any of their prenatal visits on: breast-feeding, alcohol consumption, tobacco, and use of illegal drugs. Analyses controlled for age, marital status.	After adjustment for covariates, more white women reported receiving advice for alcohol (odds ratio = 1.29, 95% CI 1.10 to 1.51) and smoking cessation (odds ratio = 1.20, 95% CI 1.01 to 1.39). Breast-feeding promotion just missed significance with a trend toward more advice for white women. A significant interaction between race and marital status emerged, such that black single women were 1.4 times more likely than single white women to not receive advice on drug cessation, while there were no racial differences among married women.	-Racial/ethnic groups other than African American and white not examined. -Data self-report.
ANCOVA to test for group differences in inpatient psychiatric variables. Covariates included age, medical co-morbidity, psychiatric co-morbidity, and survival months. Analyses also performed for outpatient variable (outpatient visits).	After adjustment, African-American patients had significantly fewer outpatient psychiatric visits (least-squares means: H = 15.9 visits, AA = 15.3 visits, W = 22.3 visits, W > AA, $p < 0.02$). Similarly, African-American patients with substance abuse disorders had significantly more outpatient psychiatric visits than white patients (least-squares means: H = 19.4 visits, AA = 23.2 visits, and W = 13.2 visits, AA > W, $p < 0.0001$). No significant differences found in inpatient care.	-Administrative database. -Potential confounds such as medication dosing/response, treatment compliance, illness course, personal resources not measured. -Relatively few Hispanics in sample.
Bivariate tests between those who did and did not receive antidepressants and between racial categories. Logistic regressions to examine determinants of receiving antidepressants. Covariates included age, gender, Medicaid eligibility status, year of initial depression, if initial care received	44% of whites and 27.8% blacks received antidepressant treatment within 30 days of 1st indicator of depression ($p < 0.001$). Whites were more likely to receive antidepressants than black patients (odds ratio = 0.495, 95% CI 0.458 to 0.536, $p = 0.0001$) and other/unknown racial category patients (odds ratio = 0.749, 95% CI 0.627 to 0.880, p = 0.0006). Blacks were less likely than whites to	-Racial/ethnic groups other than African Americans and whites not assessed. -Administrative database. -Retrospective study.

TABLE B-1 Continued

Mental Health

Source	Procedure/Illness	Sample	Analyses
Segal, Bola, and Watson, 1996	Prescription of antipsychotic medications by physicians in psychiatric emergency services.	442 patients (256 white, 107 African American, 47 Hispanic, 10 Asian, 22 "other") seen in psychiatric emergency rooms. Data were obtained through observation of evaluations and record review. Evaluators were primarily psychiatrists (80%) and white (88%).	
Chung, Mahler, and Kakuma, 1995	Inpatient psychiatric treatment.	164 adults (76 African American, 88 white) admitted to acute inpatient setting with Axis I diagnosis of major mood or psychotic disorders.	

Analyses	Findings	Limitations
from mental health provider, number of comorbid conditions.	receive SSRIs (odds ratio = 0.844, 95% CI 0.743 to 0.959, $p = 0.0093$) when prior clinical research suggests that blacks are more susceptible than whites to side effects of Tricyclics and therefore should be more likely to receive SSRIs.	-Information not available on severity of depressive disorder.
Analysis of covariance models constructed using least-squares regression or logistic regression to assess the influence of race on five prescription practice indicators. Models controlled for presence of psychotic disorder, severity of disturbance (GAS score), dangerousness, psychiatric history, if physical restraints used, hours spent in the emergency service, clinician's efforts to engage patient in treatment, if optimum time was spent on the evaluation.	More psychiatric medications were prescribed to African Americans than other patients ($\beta = 0.99$, $p < 0.005$). African-American patients received more oral doses ($\beta = 1.21$, $p = 0.02$) and injections ($\beta = 0.54$, $p = 0.04$) of antipsychotic medications. The 24-hour dosage of antipsychotic medication given to African Americans was significantly higher than for other patients ($\beta = 862$, $p < 0.001$). The tendency to overmedicate African-American patients was lower when clinician's efforts to engage the patients in treatment were rated as being higher. Models predicting number of medications, number of oral and injected antipsychotic and 24-hour dosage became non-significant.	-Small number of minorities. -Sites all urban public hospitals in single geographic area. -No controls for SES, hospital characteristics.
ANOVA and Logistic regression to assess effects of race, diagnosis (psychotic vs. nonpsychotic), and socioeconomic status (insurance status) on treatment. Data were obtained through record review.	After controlling for diagnosis and SES, African-American patients had shorter length of stay ($F = 9.12$, $df = 1, 150$, $p = 0.003$). In addition, white patients were 3.8 times more likely than African-American patients to be on one-to-one observational status (95% CI 1.6 to 8.9). Analysis of interactions indicated that among high SES patients, African Americans were 3.5 times more likely to receive urine drug screens, regardless of diagnosis ($n = 109$, 95% CI 1.2 to 10.1).	-Relatively small sample. -Single site. -Retrospective study. -No assessment of diagnostic validity between the two groups.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Mental Health			
Padgett, Patrick, Burns, and Schlesinger, 1994	Use of inpatient mental health services.	7,768 persons insured by Blue Cross and Blue Shield Association's Federal Employees Plan in 1983, who had at least one inpatient psychiatric day and random sample of 5,000 nonusers of mental health services.	
Peripheral Vascular Disease			
Guadagnoli, Ayanian, Gibbons et al., 1995	Amputation and leg-sparing surgery for peripheral vascular disease of the lower extremities.	19,236 Medicare patients who underwent amputation or leg-sparing surgery at 3,313 hospitals in the U.S.	

Analyses	Findings	Limitations
Logistic regression developed for each ethnic group to predict probability of at least one day of psychiatric hospitalization and number of inpatient days. Predictors included predisposing factors (education, family size, percentage of county black, Hispanic, or white), enabling factors (region of country, salary, high or low option selected for insurance coverage), and need factors (annual medical expenses, family's annual medical expenses, other family member receipt of inpatient psychiatric care.	No significant differences were found among blacks, whites and Hispanics in the probability of a psychiatric hospitalization or in number of inpatient psychiatric days.	-Administrative data. -Retrospective study. -No assessment of diagnostic validity.
Logistic regression to assess odds of amputation and surgery for black relative to white patients, controlling for case-mix, region, and hospital characteristics.	Black patients were more likely to undergo all forms of amputation than were white patients (unadjusted odds ratio = 1.47 to 2.24). White patients were twice (unadjusted odds ratio = 0.51) as likely to undergo lower-extremity arterial revascularization and almost three times (unadjusted odds ratio = 0.35) more likely to undergo angioplasty than black patients. Among patients with diabetes, black patients were 58% more likely than white patients to undergo above the knee amputation (adjusted odds ratio = 1.58, 95% CI 1.32 to 1.90). Black patients who did not have diabetes were twice as likely to undergo the procedure (adjusted odds ratio = 2.13, 95% CI 1.87 to 2.41).	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -No controls for potential confounds such as SES, disease severity, appropriateness.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Peripheral Vascular Disease			
Pharmacy			
Morrison, Wallenstein, Natale et al., 2000	Differences in white and nonwhite neighborhoods in pharmacy stocking of opioid analgesics.	Random sample of 30% (347) of New York City pharmacies. Pharmacists surveyed via telephone.	
Physician Perceptions			
Thamer, Hwang, Fink et al., 2001	Racial and gender differences in nephrologists recommendations for renal transplantation using hypothetical patient scenarios.	271 nephrologists (72% white, 14% Asian, 5% African American) surveyed as part of the Choices for Health Outcomes in Caring for ESRD (CHOICE) Study. Survey administered between	

	Analyses	Findings	Limitations
		Among patients with diabetes, blacks were 48% and 32% less likely to undergo percutaneous transluminal angioplasty (adjusted odds ratio = 0.52, 95% CI 0.40-0.67) and lower-extremity bypass surgery (adjusted odds ratio = 0.68, 95% CI 0.59 to 0.79), respectively. Among those who did not have diabetes, black patients were 71% less likely to undergo angioplasty (adjusted odds ratio = 0.29, 95% CI 0.23 to 0.37) and 44% less likely to undergo lower-extremity bypass surgery (adjusted odds ratio = 0.56, 95% CI 0.50 to 0.63).	
	Generalized linear model to assess relationship between racial/ethnic composition of neighborhoods and opioid supplies of pharmacies. Analyses controlled for proportion of elderly persons at census-block level and crime rates at the precinct level.	Overall, two-thirds of pharmacies that did not carry any opioids were in predominantly nonwhite neighborhoods. After adjustment pharmacies in predominantly nonwhite neighborhoods (< 40% of residents white) were significantly less likely to have adequate opioid supplies than were pharmacies in predominantly white neighborhoods (at least 80% residents white) (odds ratio = 0.15, 95% CI 0.07 to 0.31). Among 176 pharmacies with inadequate stock, reasons were as follows: 54%—little demand for medications, 44%—concern about disposal, 20%—fear of fraud and illicit drug use, 19% —fear of robbery, 7%—other (e.g., problems with reimbursement).	-No controls for differences in pharmacy supplies across neighborhoods. -Sample from one site. -Possible reporting errors by pharmacists. -Pharmacists only questioned about opioids recommended as appropriate first-line medications.
	Scenarios presented patient's age, race (white, African American, Asian), gender, living situation, treatment compliance, diabetic status, residual renal function status, HIV	Asian males less likely than white males to be recommended for transplantation (odds ratio = 0.46, (95% CI 0.24 to 0.91). Females were less likely than males to be recommended (adjusted odds ratio = 0.41, 95% CI 0.21 to 0.79). No differences between African-American and white patients were found.	-Survey data in lieu of treatment data. -Potential bias in response rate. -No controls for patient SES.

TABLE B-1 Continued

Physician Perceptions

Source	Procedure/Illness	Sample	Analyses
		June 1997 to June 1998. Response rate 53%.	
Weisse, Sorum, Sanders, and Syat, 2001	Racial and gender differences in pain management.	111 surveyed primary care physicians from Northeast regions of U.S. who were presented vignettes depicting patients with medical complaints, two painful (kidney stone, back pain) and one control (sinusitis). Race and gender of fictitious patients varied. Questions following vignettes assessed physicians' aggressiveness in treating symptoms.	
	Effect of race and SES on		

Analyses	Findings	Limitations
status, weight, and cardiac ejection fraction. Responding physicians asked if they would recommend transplantation given presence of certain criteria. Multiple logistic regression to assess independent effect of nephrologist and patient factors on decision to recommend transplantation. Analyses adjust for patient and neurologist demographics, clinical characteristics, nephrologist training, and organizational affiliations.		
Analysis of variance to assess impact of patient gender and race on treatment decision (hydrocodone dosage). Physician age and years in practice included as covariates.	*Kidney stone pain:* Decision to treat with hydrocodone did not vary by race. Among physicians who opted to treat with medication, dose of hydrocodone selected did not differ by patient race (white = 308 mg, African American = 271 mg), patient gender, or physician gender. Interaction between physician gender and patient race was found ($F_{1,85} = 9.65$, $p = 0.003$). Male physicians prescribed higher doses to white patients than to African Americans, while female physicians prescribed higher doses to African-American patients. *Back pain:* Decision to treat with hydrocodone did not vary by race. Similarly, dose selected did not differ by patient race (white 188 = mg, African American = 233 mg), patient gender, or physician gender. No interactions were observed. *Sinus Infection:* Decision to treat with antibiotic did not differ by patient race or gender. White patients were prescribed a longer course of antibiotics (X = 13.7 vs. 9.2 days, $F_{1,87} = 4.90$,	-Small sample size. -Convenience sample. -Physicians in Northeast, limiting generalizability. -Approximately 50% of solicited physicians participated. -No controls for physician prescribing habits. -Racial/ethnic groups other than white and African American not investigated. -Few racial/ethnic minority physicians in sample.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Physician Perceptions			
van Ryn and Burke, 2000	physician perceptions of patients.	618 patient encounters at eight New York state hospitals.	
	Assessed physicians' recommendations for managing chest pain, using vignettes of "patients" that varied only in gender and ethnicity.		
Patients Perceptions			
Doescher et al., 2000	Racial and ethnic differences in patients' perceptions of their physicians (trust and satisfaction).	32,929 patients surveyed through the Community Tracking Survey, a nationally representative sample surveyed 1996-1997.	

Analyses	Findings	Limitations
	$p = 0.03$) and were prescribed refills more often ($X_1^2 = 107$ vs. 4.05, $p = 0.04$).	
Logistic regression used to regress physician perception variables on patient race and SES, controlling for each other and patient age, sex, sickness, depression, mastery, social assertiveness, as well as physician age, sex, race, and specialty.	Black patients rated less positively than white patients on several dimensions including physicians' assessment of patient intelligence (odds ratio = 0.51, $p \leq 0.01$), feelings of affiliation toward the patient (odds ratio = 0.68, $p \leq 0$ .05) and beliefs about patient's likelihood of risk behavior (odds ratio = 0.58, $p \leq 0.02$) and adherence with medical advice (odds ratio = 0.62, $p \leq 0.01$).	-Potential for social desirability in responses. -Finding limited to one state and narrow sample of patients. -Use of single-item measures. -Differences in care not measured.
Logistic regression analysis to assess the effects of "patient" race and gender, while controlling for physicians' assessment of the probability of coronary	Physicians were less likely to recommend cardiac catheterization for women than men (odds ratio = 0.60, 95% CI 0.4 to 0.9) and African Americans than whites (odds ratio = 0.60, 95% CI 0.4 to 0.9). Analysis of race-sex interaction revealed that African-American women were significantly less likely to be referred for catheterization than white men (odds ratio = 0.4, 95% CI 0.2 to 0.7).	-Representativeness of sample: participants recruited at national meeting. -Hospital characteristics where physician's practiced unknown. -Underemphasis of subgroup analysis.
Analyses adjusted for socioeconomic factors.	After adjustment, patients from minority groups reported less positive perceptions of physicians than white patients on both scales.	-Racial/ethnic subgroups not assessed. -Physician race/ethnicity or other characteristics not assessed. -Potential for response bias.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Radiographs			
Selim, Gincke, Ren, Deyo et al., 2001	Racial and ethnic differences in use of lumbar spine radiographs.	401 patients (315 white, 22 African American, 4 nonwhite Hispanic, 1 "other") with low back pain (LBP) receiving ambulatory care services in VA clinics in Boston area. Patients completed Medical Outcome Study Short Form Health Survey (SF-36), LBP questionnaire, comorbidity index, and straight leg raising (SLR) test.	
Rehabilitative Services			
Harada, Chun, Chui, and Pakalniskis, 2000	Assessed sociodemographic and clinical characteristics associated with use of physical therapy (PT) in acute hospitals, skilled nursing facilities, or both.	Records of 187,900 hip fracture patients (94% white, 4% African American, 3% "other") derived from Medicare administrative databases.	
Horner, Hoenig, Sloane et al., 1997	Assessed racial differences in utilization of inpatient rehabilitative services among elderly stroke patients.	2,497 African-American and white Medicare patients hospitalized following stroke at any of 297 acute-care hospitals in five states.	

Analyses	Findings	Limitations
Logistic regression to assess race, age, education, income, comorbidities, pain intensity, radiating leg pain, SLR, 2 summary scores from the SF-36 (physical component summary, mental component summary) as predictors of obtaining lumbar spine radiographs during 12 months of follow-up.	At higher levels of back pain, nonwhite patients received more spine films than did white patients (74% vs. 50%, $p < 0.01$). Among patients with positive straight leg raising test, nonwhite patients had more spine films than white patients (23% vs. 11%, $p < 0.01$). After controlling for clinical characteristics, race was no longer an independent predictor of lumbar spine radiograph use.	-Relatively small sample. -Small number of African-American and Hispanic participants. -Potential bias in self-report data. -Nonwhite patients combined in analyses. -Generalizability of population—elderly male veterans in Boston area.
Logistic regression to predict PT by pattern of use. Independent variables included age, gender, comorbidity index, surgery type, fracture type, urinary incontinence, and hospital characteristics.	African-American patients were less likely than whites to receive acute physical therapy only (b/w odds ratio = 0.81, 95% CI 0.73 to 0.89), were less likely to receive therapy in both acute care and skilled nursing facilities (b/w odds ratio = 0.70, 95% CI 0.65 to 0.76), and were more likely to receive no physical therapy at all (b/w odds ratio = 1.30, 95% CI 1.18 to 1.43).	-Relatively few minority patients. -Administrative data. -Retrospective study. -Analysis limited to acute hospitalization.
Logistic regression to predict utilization of physical and occupational therapy by race.	After adjusting for clinical and socioeconomic factors associated with use of physical and occupational therapy, no racial differences were found in the likelihood of use of therapy (RR = 1.06, 95% CI 0.89 to 1.27) or time to initiate therapy (African Americans = 6.6 days, whites = 7.4, $p = 0.42$). Similarly, no racial differences were found in length of physical or occupational therapy in days or as a proportion of hospital stay.	-Administrative data. -Retrospective study.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Rehabilitative Services			
Hoenig, Rubenstein, and Kahn, 1996	Racial and other sociodemographic and geographic differences in use of physical and occupational therapy in elderly Medicare patients with acute hip fracture.	2,762 African-American and white Medicare patients (9% African American) treated in 297 randomly-selected hospitals from five states.	
Renal Care and Transplantation			
Ayanian, Cleary, Weissman, and Epstein, 1999	Effect of patient preferences on access to renal transplantation.	1,392 patients (384 African-American women, 354 white women, 337 African-American men, 317 white men) with end-stage renal disease who had recently begun to receive maintenance treatment with dialysis in Southern California, Alabama, Michigan, and the mid-Atlantic region of the U.S.	

	Analyses	Findings	Limitations
	Multivariate logistic regression to predict utilization of physical or occupational therapy by race, socio-demographic variables, severity of hip fracture, geographic region, and other factors. Data obtained through record review.	After controlling for clinical factors, African-American patients (odds ratio = 1.56, 95% CI 1.04 to 2.34) and dual eligible Medicare/Medicaid patients (odds ratio = 1.36, 95% CI 1.05 to 1.76) were less likely to receive high-intensity physical or occupational therapy. No racial differences were found in time to initiation of therapy.	-Small number African Americans. -Retrospective study.
	Measures included interviews and data from the renal networks and the United Network for Organ Sharing. Logistic regression to estimate: 1) the adjusted relative odds of referral for evaluation at a transplant center; and 2) placement on a waiting list for a transplant or receipt of transplant within 18 months after start of dialysis, for African-American and white men and women. Analyses control for patient preference and expectations, perceptions of care, region, age, education, income, insurance, employment, marital status, car ownership, type facility, cause of renal failure, health status, and co-morbidities.	African-American patients were slightly less likely than white patients to report wanting a kidney transplant (76.3% African-American women vs. 79% of white women, $p = 0.13$; 80.7% African-American men vs. 85.5% white men, $p = 0.04$). However, compared to preferences, African-American patients were much less likely than white patients to have been referred to a transplant center for evaluation (50.5% of African-American women vs. 70.7% of white women; and 53.9% for African-American men vs. 76.2% for white men; $p < 0.001$ for each comparison), and to have been placed on a waiting list or to have received a transplant within 18 months after initiating dialysis (31.9% African-American women vs. 56.5% for white women, and 35.3% for African-American men vs. 60.6% for white men, $p < 0.001$ for each comparison).	-Racial/ethnic groups other than African American and white not examined. -Potential bias in patient recall.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Renal Care and Transplantation			
Kasiske, London, and Ellison, 1998	Racial/ethnic differences in early placement on kidney transplantation waiting list.	41,596 patients registered with 238 UNOS centers on the national OPTN kidney and kidney-pancreas waiting list between April 1, 1994, and June 30, 1996.	
Barker-Cummings, McClellan, Soucie, and Krisher, 1995	Use of peritoneal dialysis as initial treatment for end-stage renal disease (ESRD).	10,726 patents who began treatment for end-stage renal disease at dialysis centers in North Carolina, South Carolina, and Georgia and who reported to ESRD Network between January 1, 1989, and December 31, 1991.	
Use of services and procedures—General			
Jha, Shlipak, Hosmer et al., 2001	Hospital mortality.	39,190 male patients (28,934 white and 7,575 black) admitted to 147 VA hospitals nation-wide for one of six diagnoses (pneumonia, angina, congestive heart failure, chronic obstructive pulmonary disease, diabetes, chronic renal failure).	

Analyses	Findings	Limitations
Logistic regression to assess patient and center characteristics on listing before dialysis or registration after being placed on maintenance dialysis.	White patients more likely to be placed on waiting list before vs. after initiating maintenance dialysis than non-white patients. Independent predictors of listing before dialysis included being African American (odds ratio = 0.465, $p < 0.001$, reference: white), Hispanic (odds ratio = 0.588, $p < 0.001$, reference: white) and Asian/other (odds ratio = 0.548, $p < 0.001$, reference: white), in addition to factors including age, prior transplant, level of education, employment status, insurance status, receiving insulin, listed for kidney-pancreas vs. kidney only, and listed in a center with high volume.	-Retrospective study utilizing administrative data. -Analyses did not include measures for hospital characteristics of appropriateness.
Logistic regression (backward stepwise procedure) to assess relationship between ethnicity and initial dialysis modality, controlling for patient characteristics.	African Americans were 57% less likely than whites to be initially treated with peritoneal dialysis (odds ratio = 0.43, 95% CI 0.39 to 0.47). After controlling for confounding characteristics (age, education, social support, home ownership, functional status, albumin level, hypertension, history of MI, peripheral neuropathy, and comorbid diabetes) the odds ratio of initial treatment for African Americans compared with whites was 0.45 (95% CI 0.38 to 0.52).	-Racial/ethnic groups other than African American and white not assessed. -Potential confounds such as hospital characteristics, appropriateness not examined.
Principle outcome was mortality at 30 days. Secondary outcomes were in-hospital and 60-day mortality. Analysis included logistic regression for inpatient mortality and Cox Proportional hazard models for 30-day and 6-month mortality to estimate the	Mortality at 30 days was 4.5% in black patients and 5.8% in white patients (RR = 0.77, 95% CI 0.69 to 0.87, $p = 0.001$). Mortality for black patients was lower for each of the six diagnoses. Adjustments for patient and hospital characteristics had a small effect (RR = 0.75, 95% CI 0.66 to 0.85, $p < 0.001$). Black patients also had lower in-hospital and 6-month mortality.	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -Confounders such as illness severity,

TABLE B-1 Continued

Use of services and procedures—General

Source	Procedure/Illness	Sample	Analyses
Tai-Seale, Freund, and LoSasso, 2001	Effect of mandatory enrollment in managed care (MC) on service use among African American compared to white Medicaid beneficiaries.	Data from Medicaid eligibility, claims, and MC encounter data from two counties in one state where one county implemented "freedom-of-choice" waiver enrolling its Medicaid beneficiaries in MC, and one county not involved in the waiver. In the waiver county, 3,490 adults and 3,414 children from pre-period (12 months prior to enrollment); 4,082 adults and 3,834 children in post-period. In non-waiver county, 2,087 adults and 2,093 children in pre-period and 1,200 adults and 1,200 children in post-period. Approximately half sample in each group was African American.	
Andrews and Elixhauser, 2000	Ethnic differences in receipt of major therapeutic procedures during hospitalization.	Data from 1.7 million (88% white, 12% Hispanic) hospital discharges. Data from 1993 discharge abstracts from Healthcare Cost and Utilization Project State Inpatient Database for California, Florida, and New York.	
Weinick, Zuvekas, and Cohn, 2000	Racial and ethnic magnitude of disparities in use of health care services from 1977 to 1996.	Data from three national databases (1977 National Medical Care Expenditure Survey, 1987 National Medical Expenditure Survey, 1996 Medical Expenditure Panel Survey).	

Analyses	Findings	Limitations
independent association of race with mortality.		admissions practices not assessed.
Count data models adjusted for nonrandom selection within difference-in difference (DD) econometric approaches. Services assessed include physician visits, emergency department visits, and inpatient admissions. Difference-in difference method used to identify the program effect of mandatory enrollment in managed care on use of services.	African-American beneficiaries had fewer visits to physicians than white beneficiaries after mandatory enrollment. This held for both adults (DD = -1.937, $p < 0.01$) and children (DD = -0.813, $p < 0.01$). No differences found for inpatient admissions. African-American children had a significant increase in use of emergency rooms (DD = 0.116, $p < 0.01$). In analyses controlling for racial differences in trends of service use that were unrelated to managed care, but may have biased difference-in-difference estimates, results indicate that African-American adults (DD = -2.463, $p < 0.01$) and children (DD = -1.098, $p < 0.01$) had lower levels of relative service use. Increases in emergency department visits for African-American children not evident. Decrease inpatient service use found for African-American adults (DD = -0.039, $p < 0.05$).	-Racial/ethnic groups other than African American and white not assessed. -Use of administrative data. -Using different samples in pre- and post-waiver periods. -Data from two counties in one state. -Disproportional enrollment of African Americans in HMOs.
Logistic regression to assess effect of ethnicity on likelihood of receiving therapeutic procedure for 63 conditions. Analyses controlled for age, gender, disease severity, health insurance, income of patient's community, and hospital characteristics.	Hispanics less likely than non-Hispanics to receive major procedures for 38% of 63 conditions and more likely to receive procedures for 6.3% of conditions.	-Administrative database. -Data could not examine differences between Hispanic subgroups.
Outcomes analyzed included usual source of care, probability of having at least one ambulatory care (AC) visit, and average number of visits for those indicating AC services. Other variables	In 1996, blacks were 2.1 percentage points more likely than whites to lack a usual source of care ($p < 0.10$) and Hispanics were 9.9 percentage points more likely than whites to lack a usual source of care ($p < 0.001$). Disparities increased from 1977 to 1996,	-Administrative data bases. -Retrospective study. -Need and appropriateness of services not examined.

TABLE B-1 Continued

Use of services and procedures—General

Source	Procedure/Illness	Sample	Analyses
White-Means, 2000	Use of services (paid caregiver, therapist, mental health, dentist, foot doctor, optometrist, chiropractor, ER visit, doctor visits, prescription medications) by disabled elderly.	Data are from the National Long Term Care Survey. 527 black and 4,007 white disabled elderly Medicare recipients.	
Khandker and Simoni-Wastila, 1998	Prescription drug utilization.	487,922 black and 341,274 white Georgia Medicaid enrollees in 1992. 76% of black and 84% of white enrollees received prescriptions through Medicaid on an outpatient basis.	
Harris, Andrews, and Elixhauser, 1997	Influence of race (African American and white) and gender on likelihood of hav-	Discharge abstract data on 1,727,086 discharges (87.9% white, 12.1% African American, 63.6% female, 36.4%	

Analyses	Findings	Limitations
examined included insurance coverage, family income, age, sex, marital status, education, health status, region of country, and residence in or outside of metropolitan area. Used regression-based difference-indifference approach to examine change in disparities over time, controlling for variables listed above.	particularly among Hispanics. Adjusted analyses indicate that the disparity for Hispanics increased by 6.5 percentage points ($p < 0.01$). The disparity for blacks decreased 3.2 percentage points ($p < 0.05$) during this time period. 50-75% of disparities would remain if disparities in income and insurance coverage were eliminated.	
Regression analysis to estimate relative influence of health conditions and financial resources on racial patterns of community long-term care services. Models include measures of medical conditions and disabilities, income, insurance status, regional and rural residence, whether unpaid caregivers provide in-home services, and sociodemographic characteristics (gender, education).	Given similar medical conditions, black patients are less likely to use services, particularly prescription medications and physician services. Black patients who live in rural areas, small cities, and western states or who have more joint and breathing problems are more likely to use services. Differences in personal attributes (i.e., income, health) do not fully explain racial differences in use of prescriptions and physician services.	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study.
Model estimating black-white differences in use and level of use of prescription drugs controlling for age, sex, and Medicaid eligibility characteristics.	Black children used 2.7 fewer prescriptions compared to white children. Black adults used 4.9 fewer prescriptions, and black elders used 6.3 fewer prescriptions than white elders (all significant at the 99% level). White Medicaid enrollees had higher use and spending than black enrollees across most high-volume therapeutic drug categories.	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -SES and clinical factors not examined as potential confounds.
Logistic regression to assess independent effect of race and gender on likelihood of having a major procedure	African Americans were less likely than whites to receive major therapeutic procedures in 37 of 77 (48.1%) conditions. They were more likely	-Racial/ethnic groups other than white and African

TABLE B-1 Continued

Use of services and procedures—General

Source	Procedure/Illness	Sample	Analyses
	ing a major therapeutic or diagnostic procedure.	male) from the Hospital Cost and Utilization Project (HCUP-2) for 1986. Hospitals include national sample of 469 facilities.	
Giacomini, 1996	Gender and ethnic differences in hospital-based procedure utilization.	Retrospective analysis of data on 7,249 hospital discharges in California between 1989 and 1990.	

Analyses	Findings	Limitations
(identified using ICD-9-CM codes). Analyses controlled for influence of personal (age, expected pay source, indicators of clinical condition) and hospital-level characteristics (e.g., bed size, public ownership, teaching hospital, urban location).	than whites to receive a major therapeutic procedure in 9.1% of conditions. There was no significant difference in 42.8% of disease categories (alpha = 0.05). Similarly, African Americans were less likely to receive a major diagnostic, without therapeutic, procedure in 20.8% of conditions, more likely to receive diagnostic procedure in 13% of disease categories. There were no significant differences between races in 66.2% of categories. Females were less likely than males to receive major therapeutic procedures for 32 of 62 (52%) conditions. Females were less likely to receive a major diagnostic, without therapeutic, procedure in 26% of conditions. Patterns emerged with respect to conditions for which there were race and gender differences. For example, African Americans had lower rates than whites and women had lower rates than men for many trauma categories.	American not examined. -Retrospective study. -Administrative data.
Logistic regression to estimate likelihood of obtaining procedure as function of ethnicity and gender. Analyses controlled for insurance status, age, principal diagnosis, and number of co-morbidities. Odds ratios calculated for following procedures: heart transplant, kidney transplant, extracorporeal shockwave lithotripsy, hip replacement, carotid endarterectomy, CABG, PTCA, pace-	White patients were more likely than African Americans to receive kidney transplantation (odds ratio = 3.05, 95% CI 2.27 to 4.17), defibrillator implant (odds ratio = 2.86, 95% CI 1.28 to 6.25), CABG (odds ratio = 2.44, 95% CI 2.08 to 2.78), endarterectomy (odds ratio = 2.27, 95% CI 1.41 to 3.70), and angioplasty (odds ratio = 2.00, 95% CI 1.79 to 2.22). Whites were more likely than Latino patients to receive angioplasty (odds ratio = 1.72, 95% CI 1.56 to 2.22), kidney transplantation (odds ratio = 1.58, 95% CI 1.20 to 2.08), and CABG	-Administrative data. -Retrospective study. -Potential confounds including measures of SES, appropriateness of services, hospital characteristics not assessed.

TABLE B-1 Continued

Use of services and procedures—General

Source	Procedure/Illness	Sample	Analyses
Gornick, Eggers, Reilly et al., 1996	Assessed racial differences in mortality and use of services among a Medicare population.	26.3 million Medicare beneficiaries (24.2 million whites, 2.1 million African Americans) aged 65 years or older.	
Phillips, Hamel, Teno et al., 1996	Assessed racial differences in use of: operation, dialysis, pulmonary artery catheterization, endoscopy, bronchoscopy, and hospital charges.	9,105 hospitalized adults (79% white, 16% African American, 3% Hispanic, 1% Asian) in five geographically diverse teaching hospitals, with one of nine illnesses associated with average 6-month mortality of 50%. Data collected through chart review and interviews with patients and physicians.	

Analyses	Findings	Limitations
maker implant, and automatic cardioverter-defibrillator implant.	(odds ratio = 1.49, 95% CI 1.35 to 1.67). Whites were more likely than Asian patients to receive endarterectomy (odds ratio = 2.08, 95% CI 1.18 to 3.85) and angioplasty (odds ratio = 1.30, 95% CI 1.15 to 1.47). Asians were more likely than whites to receive hip replacement (odds ratio = 0.47, 95% CI 0.29 to 0.77). Males' odds of receiving most procedures exceeded those of females.	
Multiple regression to predict utilization rates by race-specific median income, age, gender, and interaction of race and income.	B/w differences found in: *mortality*: 1.19 men ($p < 0.001$), 1.16 women ($p < 0.001$) *hospital discharges:* 1.14, $p < 0.001$ *ambulatory care visits:* 0.89, $p < 0.001$ *bilateral orchiectomy:* 2.45, $p < 0.001$ *amputations of lower limbs:* 3.64, $p < 0.001$ Adjusting for differences in income reduced differences, but not significantly.	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -Factors such as clinical, hospital characteristics not assessed as potential confounds.
Logistic regression to assess independent effect of race on procedure use, controlling for age, gender, education, income, type insurance, severity of illness, functional status, study site, and other confounding variables	Black patients utilized significantly fewer resources than patients of other races (odds ratio = 0.70, 95% CI 0.6 to 0.81). The median adjusted difference in hospital cost was $2,805 lower for black patients (95% CI $1,672 to $3,883 less). Results remained significant after adjusting for physician's perceptions of patients' prognosis.	-Highly selective sample. -Data on SES variables not available for all subjects.

TABLE B-1 Continued

Source	Procedure/Illness	Sample	Analyses
Use of services and procedures—General			
Wilson, May, and Kelly, 1994	Assessed racial differences in receipt of total knee arthroplasty among older adults with osteoarthritis.	Records of nearly 300,000 Medicare recipients who underwent total knee arthroplasty between 1980 and 1988.	
Escarce, Epstein, Colby, and Schwartz et al., 1993	Racial differences in use of medical procedures among Medicare enrollees.	1986 physician claims data for 1,204,022 Medicare enrollees (1,109,954 whites and 94,068 African Americans). Individuals enrolled in HMOs excluded.	
Vaccination			
Schneider et al., 2001	Magnitude of racial differences in influenza vaccination in managed care vs. fee-for-service insurance.	Data from 1996 Medicare Current Beneficiary Survey. 13,674 Medicare beneficiaries (12,414 white, 1,260 African American).	

Analyses	Findings	Limitations
Natural logarithm transformation method to estimate confidence intervals for white-to-black ratios of rates of total knee replacement.	The prevalence of symptomatic osteoarthritis of the knee was lower among whites than blacks, although this difference was non-significant. African Americans, however, were less likely than whites to receive total knee arthroplasty (odds ratios ranged from 1.5 to 2.0 for women, 3.0 to 5.1 for men). This disparity persisted at each of five levels of income strata.	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study. -Clinical, SES, hospital factors, appropriateness not explored as confounds.
Mantel-Haenszel method to calculate white-black relative risks, adjusting for age and sex.	Whites more likely than African Americans to receive 23 of 32 services (white-black RR > 1.0, $p < 0.05$). For example, whites were 1.5 to 2.0 times as likely to receive eight of the study services, 2.0 to 3.0 times as likely to receive three of the services, and more than 3.0 times as likely to receive coronary bypass, coronary angioplasty, and carotid endarterectomy. African Americans were more likely than whites to receive seven services (white-black RR < 1.0, $p < 0.05$). For example, African Americans more than 1.5 times as likely to receive laser trabeculoplasty, glaucoma surgery, and retinal photocoagulation.	-Racial/ethnic groups other than African American and white not assessed. -Administrative data. -Retrospective study. -Potential confounds such as SES and clinical and hospital characteristics not assessed.
Percentage of respondents (adjusting for SES, clinical comorbidities, and care-seeking attitudes) who received vaccination and magnitude of racial disparity in vaccination was calculated, comparing patients with managed care.	Both whites and African Americans had higher rates of vaccination under managed care, however racial disparity was not reduced under managed care. After adjustment, the racial disparity in fee for service was 24.9% (95% CI 19.6% to 30.1%). The disparity in managed care was 18.6% (95% CI 9.8% to 27.4%). Both disparities were statistically significant, however the	-Racial/ethnic groups other than African American and white not examined. -Potential bias in self-report data.

TABLE B-1 Continued

Use of services and procedures—General

Source	Procedure/Illness	Sample	Analyses
Women's Health			
Brown, Perez-Stable, Whitaker, Posner et al., 1999	Hormone Replacement Therapy (HRT).	8,986 women (50% white, 20.2% Asian, 14.7% African American, 8.6% Latina, 6.3% Soviet immigrant) seen in the general internal medicine, family medicine, and gynecology practices at UCSF between January 1, 1992, and November 30, 1995.	
Marsh, Brett, and Miller, 1999	Hormone replacement therapy (HRT).	25,203 sampled visits made by women (age 45-64, 16.4% by black and 83.6% by white women). Data were obtained from the National Health Care survey.	

Analyses	Findings	Limitations
and those with fee-for-service insurance.	absolute percentage point difference in racial disparity between the managed care and fee-for-service groups (6.3%, 95% CI -4.6% to 17.2%) was not.	
Logistic regression was used to calculate odds of prescribing HRT for each ethnic group using whites as the reference group. Predictor variables were age, income, and clinical diagnosis.	Compared to white women, all other groups were less likely to be prescribed HRT after adjusting for age, income, diabetes, hypertension, CHD, and osteoporosis. Asians (odds ratio = 0.56, 95% CI 0.49 to 0.64), African Americans (odds ratio = 0.70, 95% CI 0.60 to 0.81)), Latinas (odds ratio = 0.70, 95% CI 0.58 to 0.84), and Soviet immigrants (odds ratio = 0.14, 95% CI 0.10 to 0.20) were each less likely to receive a prescription for HRT than were white women. Women with osteoporosis were also more likely to receive HRT.	-Single site. -Retrospective review. -Data not available on variables such as education, menopausal symptoms, hysterectomy status, etc. -Physician recommendations or patient characteristics not assessed.
Logistic regression used to examine whether any previously identified racial differences in HRT could be attributed to known confounders (age, source of payment for visit, drugs other than HRT, whether physician had previously seen patient, physician or clinic specialty type, site of care, region of practice, obesity, duration of visit, physician sex).	While physician visit rates were equal for black and white women, the rate of visits per year in which HRT was prescribed to white women (odds ratio = 0.38, 95% CI 0.32 to 0.45) was more than twice the rate for black women (odds ratio = 0.17, 95% CI 0.12 to 0.23) in this age group.	-Racial/ethnic groups other than African American and white not examined. -Retrospective study. -Limited information on patient characteristics.

TABLE B-1 Continued

Women's Health

Source	Procedure/Illness	Sample	Analyses
Burns, McCarthy, Freund, Marwill et al., 1996	Mammography.	3,187,116 women (7% black, 93% white) ages 65 and older receiving Medicare who resided in one of the following states, Alabama, Arizona, Connecticut, Georgia, Kansas, New Jersey, Oklahoma, Pennsylvania, Oregon, or Washington. Women had received bilateral mammography. Data were obtained from HCFA database for 1990.	

Analyses	Findings	Limitations
Logistic regression to predict mammography use according to age, number of primary care visits, income, state of residence for black and white women in each state.	In every state, at each primary care visit level (one, two, or three or more visits) black women had mammography less often than white women (even across income levels). Age, income, and state adjusted logistic models reveal that among white women, primary care use has a significant effect on use of mammography: *for one visit* odds ratio = 2.73, 95% CI 2.70 to 2.77, *for two visits* odds ratio = 3.98, 95% CI 3.93 to 4.03, *for three or more visits* odds ratio = 4.62, CI 4.58 to 4.67. Results for black women reveal an analogous, but weaker effect: *for one visit* odds ratio = 1.77, CI 1.67 to 1.87, *for two visits* odds ratio = 2.49, CI 2.36 to 2.63, *for three or more visits* odds ratio = 3.15, CI 3.04 to 3.25.	-Racial/ethnic groups other than African American and white not examined. -Administrative data. -Retrospective study.

TABLE B-2 Selected Studies Exerting Control Over Key Clinical Characteristics

Author	Year	Type of Data	Insurance	Prospective/ Retrospective	Adjust for: Comorbidities?	Disease Severity
Petersen et al.	2002	Clinical	VA healthcare system	Retrospective	Yes	
Conigliaro et al.	2000	Clinical	VA healthcare system	Retrospective	Yes	
Carlisle et al.	1999	Clinical records and ED logs	Statistical adjustment for type of insurance	Retrospective	No	
Daumit et al.	1999	Clinical	ESRD Medicare	Prospective	Yes	
Hannan et al.	1999	Clinical	Statistical adjustment for type of insurance	Prospective	Yes	
Leape et al.	1999	Clinical and laboratory data from medical records	Statistical adjustment for type of insurance	Retrospective	No	
Scirica et al.	1999	Clinical	Statistical adjustment for type of insurance	Prospective	Yes	
Canto et al.	1998	Clinical	Statistical adjustment for payor status	Retrospective	Yes	

just for: morbidities?	Disease Severity	Approriateness	Assessed Outcomes?	Find Disparities?
	Yes	Yes	Yes – no overall differences in mortality found.	Yes, black patients with AMI were equally likely as whites to receive beta-blockers, more likely than whites to receive aspirin, but were less likely to receive thrombolytic therapy at time of arrival and were less likely to receive bypass surgery, even when only high-risk coronary anatomic subgroups were assessed. No racial differences in refusal rates for invasive treatment.
	Yes	Yes	No	Yes, especially when CABG was deemed "necessary."
	No	Yes	No	No, only lack of post-high school education was significant predictor of underuse.
	Yes	Yes	Yes	Yes, but diminished with insurance eligibility.
	Yes	Yes	No	Yes, African-American patients less like to undergo CABG than whites, considering RAND criteria.
	Yes	Yes	No	No significant racial or ethnic differences after accounting for hospital type and necessity of revascularization.
	No	Yes	No	Yes, among patients meeting criteria for appropriate catheterization, fewer nonwhites received catheterization.
	Yes	No	Yes	Non-African-American minorities less likely to receive beta-blocker TX at discharge, but as likely to receive intravenous thrombolytic therapy (except Asian/Pacific Islanders) and undergo coronary arteriography and revascularization procedures as whites. No differences in hospital mortality.

TABLE B-2 Continued

Author	Year	Type of Data	Insurance	Prospective/ Retrospective	Adjust for: Comorbidities?	Disease Severity
Taylor et al.	1998	Clinical	Statistical adjustment for payor status	Retrospective	Yes	
Laouri et al.	1997	Clinical and laboratory data from medical records	Not assessed, but patients sampled from both public (where patients are likely insured) and private hospitals (patients likely uninsured).	Retrospective with patient follow-up	Yes	
Maynard et al.	1997	Clinical	Statistical adjustment for payment by Medicaid	Prospective	Yes	
Peterson et al.	1997	Clinical data	Statistical adjustment for type of insurance	Prospective	Yes	
Taylor et al.	1997	Clinical data	Statistical adjustment for payment type of insurance	Prospective	Yes	

just for: morbidities?	Disease Severity	Approriateness	Assessed Outcomes?	Find Disparities?
	Yes	No	Yes	Yes, African Americans less likely to receive intravenous thrombolytic therapy, coronary arteriography, and CABG than whites. No differences in hospital mortality.
	Yes	Yes	No	Yes, significant underuse of revascularization procedures among African Americans and patients at public hospitals.
	Yes	No	Yes	Despite less intensive use of revascularization procedures in African Americans, long-term survival after AMI was similar to whites.
	Yes	Yes	Yes	African Americans less likely than whites to receive bypass surgery, but no differences found in angioplasty. Differences in treatment most pronounced among patients with severe disease. Differences in treatment associated with lower survival among African Americans.
	Yes	Yes	Yes	African Americans less likely than whites to receive bypass surgery, but no differences found in angioplasaty. Differences in treatment most pronounced among patients with severe disease. Differences in treatment associated with lower survival among African Americans.