Disparity in Health Services and Outcomes for Persons With Hip Fracture and Lower Extremity Joint Replacement

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OBJECTIVE. Examine disparity in health services and outcomes for adults with a hip fracture or lower extremity joint replacement.

MATERIALS AND METHODS. This study examined 28,522 patient records including 12,328 (mean age 76.6 years) with hip fracture and 16,194 (mean age 71.8 years) with joint replacement.

RESULTS. Non-Hispanic white and black patients were significantly \( P < 0.05 \) more likely to be discharged home alone and responsible for their own care than were Asian or Hispanic patients. Sixty-four percent of Hispanic patients received inpatient rehabilitation after hip fracture and 36% after hip or knee arthroplasty. In contrast, 58% of non-Hispanic white persons, 67% of black persons, and 56% of Asian persons received inpatient medical rehabilitation after hip or knee joint replacement.

CONCLUSION. Disparity in outcomes appeared to be related to family structure and social support.

Key words: Health Assessment; ethnic disparity; service delivery. (Med Care 2003;41:232–241)

The Institute of Medicine reports that 49 million Americans have at least one chronic or disabling condition limiting their participation in work, leisure, and social activities.\(^1\) For older Americans, hip fracture and lower extremity joint pain caused by osteoarthritis are among the most common reasons for disability and reduced participation in normal social and leisure activities.\(^2\)–\(^5\) More than 375,000 older adults in the United States experience a hip fracture each year\(^2\) and it is one of the most common causes of acute hospitalization.\(^3\)–\(^5\) Approximately 600,000 older adults undergo a total hip or knee joint arthroplasty each year in the United States.\(^6\) Although the pathology and morbidity of hip fracture and lower extremity joint arthroplasty are different, they have many similarities in postsurgical management and rehabilitation.\(^7\)–\(^8\) Residual disability in terms of impaired gait and limitations in activities of daily living are also similar.\(^9\)

Substantial clinical and basic biomedical research exist on the various surgical and acute care services provided to persons experiencing a hip fracture or lower extremity joint replacement.\(^10\) In contrast, little information is available regarding postacute rehabilitation health services and outcomes based on race or ethnicity for this population.\(^11\),\(^12\) Escalante et al\(^13\) recently reported that

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Hispanic persons with Medicare receive total hip replacements at lower rates than do non-Hispanic persons, and that the difference is not explained by lack of health insurance. The study reported by Escalante et al.\textsuperscript{13} is an illustration of the under utilization of total hip replacement in a large well defined Hispanic sample. Other investigators have also reported under utilization of lower extremity joint replacement in minority populations.\textsuperscript{14,15} To our knowledge, there has not been a systematic investigation of ethnic differences in rehabilitation services or outcomes after lower extremity joint replacement or hip fracture.

The purpose of this investigation was to explore rehabilitation health services received and outcomes attained by older adults who experienced a hip fracture or lower extremity joint replacement. We selected patients with hip fracture and lower extremity joint replacement for the following reasons: (1) they represent the second largest group of patients receiving inpatient medical rehabilitation services (numbering approximately one million per year);\textsuperscript{16,17} (2) the general expectation is that most patients admitted from home will be discharged back to their homes; and (3) we had access to a national database with detailed demographic and functional status information on persons experiencing a hip fracture or lower extremity joint replacement.\textsuperscript{17}

**Materials and Methods**

**Source of Data**

Data were analyzed from 189 hospitals in 46 states contributing to the Uniform Data System for Medical Rehabilitation (UDSMR) and the National FollowUp Services (NFS). The UDSMR is the largest national registry of standardized information on medical rehabilitation patients in the United States and includes more than 4 million patient records.\textsuperscript{16,17} At the time of this study more than 850 rehabilitation centers and hospitals were using the UDSMR data service, representing approximately 70% of all comprehensive medical rehabilitation facilities in the United States. Detailed information on the UDSMR is available at the Web site: http://www.udsmr.org.

The UDSMR collects information on demographic variables, diagnoses (ICD-9 codes), facility characteristics, patient prehospital living arrangements, marital status, predisability employment status, length of stay (LOS), source of payment, hospital charges, and discharge setting.\textsuperscript{16} Performance on a standardized measure of basic daily living skills, the FIM instrument is also included in the database.\textsuperscript{16,17} The FIM instrument is an 18-item assessment measuring: self-care, sphincter control, transfers, mobility, communication, and social cognition. The interrater reliability of fully accredited subscriber facilities (see description below) has been demonstrated (ICC = 0.96 for total FIM scores with Kappa values from 0.53–0.69 for individual items).\textsuperscript{18} Detailed information regarding reliability and validity have been reported by several independent researchers.\textsuperscript{17–21} Investigations using Rasch analysis have examined the scaling properties, precision, unidimensionality, weighting, and fit of the FIM items and subscales.\textsuperscript{16,17} The sensitivity of the FIM instrument has also been investigated. For example, Dahmer et al.\textsuperscript{18} examined 309 people with traumatic brain injury (TBI) admitted to five TBI Model System hospitals in the United States. The average admission FIM score was 59 with a 95% CI of \( \pm 3.20 \). The average discharge FIM score was 100 with a 95% CI of \( \pm 2.80 \). The results of this, and other investigations, indicate that the FIM is sensitive to changes in functional skills that occur during rehabilitation.\textsuperscript{18–21}

Facilities contributing to the UDSMR follow a standard protocol for collecting and submitting information included in the database.\textsuperscript{17} Using the UDSMR protocol, the FIM instrument is administered to persons receiving inpatient medical rehabilitation within 72 hours of both admission and discharge. Follow-up data are collected by telephone interview 80 to 180 days after discharge by the National FollowUp Services. Follow-up information is aggregated with the complete UDSMR patient record. A summary of the national data set for the United States is published annually and provides benchmarks for rehabilitation outcomes.\textsuperscript{22}

A credentialing process has been developed to ensure complete and reliable submission of facility data.\textsuperscript{16,17} Phase I involves the training and credentialing of clinical staff in administering the FIM instrument. Phase II involves a technical review of 6 months of facility data for errors or incomplete records, coding inconsistencies, and significant variations (> 2 SD) from the profile of other similar providers. The coding accuracy of accredited facilities is excellent with percentage agreement values of greater than 90% for FIM instrument items and variables included in this analysis.\textsuperscript{17,22}
The National FollowUp Service collects information within 80 to 180 days after discharge.\textsuperscript{23,24} Nurses trained in administering and interpreting the FIM instrument interview the discharged patients (or a proxy) over the phone. The interview process is described in detail in other publications.\textsuperscript{19,25} The interrater reliability and stability of the information collected using phone interviews in previous research ranged from 0.79 to 0.99 using the intraclass correlation approach.\textsuperscript{25,32}

**Validity of the Data Set.** Information in the Uniform Data System for Medical Rehabilitation was used to predict LOS and develop the basis for a case-mix adjusted prospective payment system in medical rehabilitation.\textsuperscript{26–28} The system has been extensively reviewed by the Centers for Medicare and Medicaid Services (CMS) (formerly HCFA) and is referred to as Function Related Groups (FRGs).\textsuperscript{29,30} FRGs were developed as the inpatient maternal rehabilitation analog to Diagnostic Related Groups. Length of stay is used as a proxy measure for cost in Function Related Groups.\textsuperscript{30}


In examining the validity and accuracy of the FRG system, the CMS compared the Uniform Data System for Medical Rehabilitation database with the Medicare Annual Provider Review (MedPAR) file and the Health Care Provider Cost Report Information System (HCRIS) and concluded that the UDSMR data are representative of Medicare rehabilitation cases across the United States. Information regarding the representativeness of the UDSMR database is described in technical reports produced for CMS.\textsuperscript{29,30}

**Study Population**

Complete admission, discharge, and follow-up information was available for 34,104 patients with hip fracture or lower extremity joint replacement who received inpatient rehabilitation services from 1994 through the third quarter of 1998. Patient records with ICD-9 codes of 808, 820, 821, V43.64, and V43.65 were eligible for analysis. We excluded patients with missing or out of range data values (n = 1277) and cases with nonspecific impairment codes (n = 141). Nonspecific impairment codes occurred when a facility selected a UDSMR major impairment group code (based on ICD-9 codes) that contained insufficient information to classify the patient’s condition. In addition, we excluded patients who were younger than 50 years of age (n = 102), were readmissions or transfers from another rehabilitation facility (n = 2011), or were admitted for evaluation only (n = 452). We used clinical criteria developed in previous research on Function Related Groups\textsuperscript{26,27} to exclude patients whose rehabilitation stay was atypical including LOS less than 2 days (n = 321) or greater than 365 days (n = 27), logarithm LOS three standard deviations or more above the mean for the impairment category (n = 102), transfer from rehabilitation to an acute care hospital without return to the initial rehabilitation service within 30 days (n = 421), transfer to another facility (n = 241), and death (n = 487). The remaining 28,522 patients comprised the study sample and represented 84% of the usable patient records from the original sample.

**Study Variables.** Variables included in the analysis were self-reported by the patient at admission or were part of the permanent medical record and included ethnicity, living setting, who the person was living with, marital status, age, and gender. Living setting included the following response categories: home, board and care, intermediate care, skilled nursing facility, hospital, rehabilitation facility, and other. This variable was dichotomized to home versus not home in the analyses reported below. The “living with” variable included the following options: alone, family/relatives, friends, attendant, and other. For some analyses, this variable was collapsed to living alone versus not alone. Marital status was coded as never married, married, widowed, separated, or divorced. Ethnicity was recorded by patient self-report and included the following options: white, black, Asian, Native American, Hispanic, and other. The category of Native American included less than 1% of the respondents and was combined with the other category in the analyses presented below.

Previous research using administrative databases, particularly Medicare, has identified potential problems with the ethnic category of Hispanic.\textsuperscript{31} The primary concern is that persons of Hispanic ethnicity are often categorized as white.\textsuperscript{31} To validate the ethnic category of Hispanic in the UDSMR database we cross-referenced the patient self-report of ethnicity with the US Census Bureau’s Spanish surname list.\textsuperscript{32} This list classifies more than 25,000 surnames that included at least one Spanish respondent in the 1990 census. The list classifies surnames into four categories: heavily
Hispanic, intermediate Hispanic, and rarely Hispanic, depending on the percent of householders with each name who identified themselves as Hispanic. For example, 75% of the surveyed householders in the heavily Hispanic category identified themselves as Hispanic. We randomly selected 100 names of patients from the National FollowUp Services/UDSMR database for 1999 to 2001 who identified themselves as Hispanic. These surnames were compared with names in the Spanish surname categories of “heavily” and “intermediate” Hispanic from the US Census Bureau’s Spanish surname list. The categorization was done separately for males and females because women often use their husband’s surname. The analysis included matching surnames from the National FollowUp Services/UDSMR data set with the US Census Bureau’s Spanish surname census list. The percent agreement for males and never married females was 94% and 92%, respectively. The agreement of married Hispanic females was adjusted for the probability of being married to a Hispanic male. A probability of 0.86 was used based on population data available for 1995. With this adjustment, the percent agreement for married females was 0.86. The percent agreement between names in the comparison is consistent with previous research on the Hispanic population validated by the US Census Bureau’s Spanish surname list.

Other variables collected during the inpatient rehabilitation stay included LOS and the FIM instrument admission and discharge scores. Rehabilitation LOS was calculated as the number of medical rehabilitation days. When a patient was transferred to an acute care hospital and returned to the initial rehabilitation service within 30 days, we counted only those days the patient was on the rehabilitation service. Rehabilitation LOS is a skewed variable and was transformed for use in the analyses reported below using a logarithmic transformation procedure (base 10) in SAS.

Variables obtained at discharge and used in the analysis included discharge living setting and whom the patient was living with. At follow-up assessment (3–6 months after discharge) the variables collected were: (1) living setting; (2) who the patient was living with; (3) who was responsible for the patient’s daily care; (4) type of follow-up therapy received (if any); (5) incidence of readmitted to the hospital; (6) any new medical diagnoses; and (7) follow-up FIM instrument scores. Follow-up information, as noted previously, was collected by registered nurses with clinical experience in rehabilitation and training in telephone interviews.

The specific categories for each of the outcome variables are published as part of the FIM assessment protocol and are available from the authors. The statistical consistency of soliciting this information by telephone interview has been established in previous investigations.

Statistical Analysis

We examined demographic and functional status variables for patients using descriptive and univariate statistics for continuous variables and contingency tables $\chi^2$ test for categorical variables. Descriptive statistics were used to examine unadjusted differences in demographic characteristics and outcomes by gender and ethnicity. In several cases, we combined variable categories to create binary outcomes to simplify the analysis, as described in the section labeled study variables. For example, in examining the variable “living with” at 3-to-6-month follow-up, we created the binary variable of living alone versus not living alone.

We used hierarchical linear modeling and quasi-likelihood analysis to assess significant differences in patient outcomes (follow-up living setting, who the person was living with, person responsible for care, functional status at follow-up, hospital readmission, and use of follow-up therapy services) across ethnic groups and gender adjusted for appropriate covariates (age, severity, comorbidity). Severity was adjusted by using the FIM instrument score at admission and comorbidity was controlled by using a count of comorbidities.

Patient outcomes collected from hospitals and rehabilitation facilities in the UDSMR database represent “cluster samples” with patients nested within hospitals, so the observations within the same hospital/facility are potentially correlated. This violates the assumption of independence required in traditional regression analysis. More important, because the dependence of clustered data are ignored, standard errors of the estimates are incorrect and are often underestimated in standard regression. The hierarchical linear model provides a tool for analyzing such clustered data. Let $Y_{ij}$ be the outcome variable of the $j$th patient in the $i$th hospital. Under a hierarchical linear model, $Y_{ij}$ is assumed to be generated from the model $Y_{ij} = b_1 + aX_{ij} + \epsilon_{ij}$. Here $X_{ij}$
represents the covariates associated with the fixed parameter alpha (fixed effect), and the hospital effect (random effect) \( b_i \) and the random disturbances \( e_{i} \) are assumed to have normal distributions. We used several variables in the models and computed multiple models and thus adjustments for multiple comparisons were needed, otherwise, significance may be caused by random occurrences with frequencies higher than the predetermined significance level. Variables were retained only if they were significant at the two sided 0.05 significance level adjusted for multiple comparisons (by the Bonferroni correction).

We also used a quasi-likelihood method applicable to a variety of discrete and continuous data.\(^{34} \) This analysis takes into account patient heterogeneity in admission rates, patient severity, unequally spaced follow-up intervals, and time dependence for some outcomes such as rehospitalization.\(^{34} \) Quasi-likelihood was first proposed by Wedderburn.\(^{35} \) It is a method for regression analysis of data.\(^{34} \) This analysis takes into account patient cable to a variety of discrete and continuous outcomes mean-covariance structure, methods can be developed that are applicable to several types of outcome variables. To apply the quasi-likelihood approach to the analysis of data at two or more time points (admission, discharge, and follow-up), the mean and covariance of the vector of responses, \( y_i \) for the \( i \)th subject must be determined. If \( R_\alpha(\alpha) \) is the \( n_i \times n_i \) “working” correlation matrix for each \( y_i \), then following quasi-likelihood approach (the working covariance matrix for \( y_i \) is given by: \( V_i = A_i^{-1/2} R_\alpha(\alpha) A_i^{-1/2} \)) where \( A_i \) is an \( n_i \times n_i \) diagonal matrix with \( g(\mu_i) \) as the \( j \)th diagonal element. \( R_\alpha(\alpha) \) is the “working” correlation matrix because we do not expect it to be correctly specified. Details regarding the development of this quasi-likelihood approach are provided by Zeger et al.\(^{34} \) All statistical tests and models were developed with Proc Mixed software available from SAS (Version 8.0).\(^{33,36} \)

**Results**

The final sample included 28,522 records for patients with hip fracture or lower extremity joint replacement receiving inpatient medical rehabili-

tation from 1994 through 1998. Descriptive and demographic information for the entire sample appears in Table 1.

Figure 1 shows the percentage of persons receiving rehabilitation services for hip fractures versus lower extremity joint replacement across five ethnic groups. For white persons, black persons, Asian persons, and others, most patients included in the UDSMR database received rehabilitation services for lower extremity joint replacements (combined hip or knee). Percentages ranged from 67% for black persons to 56% for Asian persons. In contrast, most Hispanic patients included in the sample received inpatient rehabilitation services for hip fracture (64%) whereas only 36% of Hispanic patients received rehabilitation for lower extremity joint replacement (\( \chi^2 = 128.4, P < 0.01 \)). We examined this finding further by analyzing potential moderator variables across ethnic groups. The moderator variables included gender, age, and source of primary payment. There was no statistically significant difference in the proportion of males and females across the ethnic groups (\( \chi^2 = 1.8, P = 0.43 \)). There was a statistically significant \( (P < 0.01) \) difference in age across the ethnic groups, with black persons having a younger mean age (69.3 years) than white persons (74.6 years), Asian persons (76.6 years), Hispanic persons (76.5 years), or other (72.2 years). White persons were more likely \((P < 0.05) \) to have a primary payer source of commercial insurance or private pay than the other ethnic groups \((\chi^2 = 21.6, P < 0.05) \). The primary payer options included in the UDSMR database include: Blue Cross, Medicare, Medicaid/Welfare, commercial insurance, HMO, Workers’ Compensation, private pay, unreimbursed, and other. To further examine this variable, we ran the analysis using subjects older than the age of 65 years. Participants older than 65 years are covered by Medicare and represent a more homogeneous group regarding payment for health care services. The patterns related to race and ethnicity, described above, did not change.

The analyses presented below were originally conducted independently for patients with hip fractures, hip replacement, or knee replacement. In those cases where there were no statistically significant differences in outcomes for hip fracture versus hip or knee replacement, we report results for the analyses combined across diagnostic groups.

Most (89% to 93%) patients were discharged home after rehabilitation across all diagnostic groups. The percentage of patients living at home
at follow-up (3 to 6 months) ranged from 95% for black persons to 89% for Hispanic persons. A significant ($P < 0.05$) discrepancy existed across the ethnic groups based on the “living with” variable at discharge and follow-up (Fig. 2). The “living with” variable was dichotomized to include living alone versus living with someone (family/relatives, friends, attendant, or other). White and black patients were significantly ($P < 0.05$) more likely to be living alone than were Asian or Hispanic patients ($\chi^2 = 48.7, P < 0.01$). Only 6% of Asian and 10% of Hispanic patients were living alone at discharge compared with 25% for white persons and 27% for black persons. These percentages did not change appreciably at 3-to-6 month follow-up.

Information was collected at follow-up regarding the individual primarily responsible for performing routine personal care and managing the patient’s environment (eg, providing transportation). The categories for this variable were: 1) own care; 2) unpaid person or family member; 3) paid attendant or paid skilled professional. Figure 3 displays differences in responses across ethnic groups. White persons were more likely ($P < 0.01$) to provide their own care (71%) compared with Hispanic persons (54%). Hispanic persons were the most likely ($P < 0.01$) to have their care provided by an unpaid person or family member (28%) whereas white persons were the least likely to do so (13%) ($\chi^2 = 91.4, P < 0.01$).

Postdischarge therapy services (outpatient or home therapy) were not evenly distributed across ethnic groups. Twenty-three percent of black persons received outpatient or home therapy services compared with only 14% for Asian persons, 16% for white persons and 18% for Hispanic persons ($\chi^2 = 36.6, P < 0.05$).

The rate of rehospitalization at follow-up for the entire sample was 12.4% and was higher for persons with hip fracture (15.2%) than for persons with lower extremity joint replacement (10.9%) ($\chi^2 = 25.6, P < 0.05$). There was a statistically significant ($P < 0.05$) difference in rehospitalization across ethnic groups with white persons having the highest rate of rehospitalization (13.3%) and Hispanic persons the lowest (7.1%). This ethnic difference was more pronounced when gender was included in the analysis. White male patients had the highest rate of rehospitalization (14.2%) and Hispanic male patients the lowest (6.1%). There was a significant ($P < 0.05$) difference between hospital readmission rates for Hispanic males and females, but this difference in gender was not present in the other ethnic groups.

### Table 1. Demographic Characteristics and Descriptive Statistics for Sample From 1994 to 1998

<table>
<thead>
<tr>
<th>Variable</th>
<th>All Patients</th>
<th>Patients With Hip Fracture</th>
<th>Patients With LE Joint Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>28,522</td>
<td>12,328 (43%)</td>
<td>16,194 (57%)</td>
</tr>
<tr>
<td>Gender (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>21,106 (74)</td>
<td>9,246 (75)</td>
<td>11,336 (70)</td>
</tr>
<tr>
<td>Age (y)</td>
<td>74.8</td>
<td>76.6</td>
<td>71.8</td>
</tr>
<tr>
<td>SD</td>
<td>10.4</td>
<td>10.2</td>
<td>7.3</td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>23,958 (84)</td>
<td>10,302 (84)</td>
<td>13,656 (84)</td>
</tr>
<tr>
<td>Black</td>
<td>2,282 (8)</td>
<td>776 (6)</td>
<td>1,506 (9)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1,140 (4)</td>
<td>730 (6)</td>
<td>410 (3)</td>
</tr>
<tr>
<td>Asian</td>
<td>857 (3)</td>
<td>412 (3)</td>
<td>445 (3)</td>
</tr>
<tr>
<td>Other</td>
<td>285 (1)</td>
<td>108 (1)</td>
<td>177 (1)</td>
</tr>
<tr>
<td>LOS (d)</td>
<td>16.4</td>
<td>10.6</td>
<td>13.4</td>
</tr>
<tr>
<td>SD</td>
<td>9.6</td>
<td>10.4</td>
<td>7.5</td>
</tr>
<tr>
<td>FIM Motor</td>
<td>72.7</td>
<td>69.6</td>
<td>76.8</td>
</tr>
<tr>
<td>SD</td>
<td>11.5</td>
<td>11.9</td>
<td>7.1</td>
</tr>
<tr>
<td>FIM Cognitive</td>
<td>18.9</td>
<td>18.1</td>
<td>19.7</td>
</tr>
<tr>
<td>SD</td>
<td>3.4</td>
<td>4.0</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Other includes Native Americans, those of mixed race, and persons who self-reported “other.”

LOS indicates length of stay for inpatient medical rehabilitation in days; FIM, functional independence measure, motor and cognitive subscale scores recorded at discharge from medical rehabilitation.

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**Fig. 1.** Comparison of persons receiving inpatient rehabilitation by ethnic group after hip fracture versus lower extremity (LE) hip or knee joint replacement.
Discussion

In 1998, the federal government adopted a goal of eliminating racial and ethnic disparities in health care by 2010 in six clinical areas. Public Law 106 to 525 was passed in November 2000 authorizing the Minority Health and Health Disparities Research and Education Act, which created a National Center on Minority Health and Health Disparities at the National Institutes of Health. The purpose of the Center is to coordinate research and education efforts designed to improve minority health and reduce disparity in health service delivery.

Despite the fact that approximately 50 million Americans have at least one chronic condition limiting their ability to participate in society, little effort has been devoted to identifying disparities in health services provided to this population. We examined disparity in health services and outcomes for older adults with common orthopedic conditions: hip fracture and lower extremity joint replacement. To our knowledge, this is the first study to examine ethnic disparity in rehabilitation health services and outcomes for a population of disabled older adults. In contrast to previous research in acute-care service delivery, we found no differences between the services provided to white persons versus black persons. This “equity” was limited to a small number of services and a narrow age range, and should not be generalized given the extensive literature on health disparities between black persons and white persons.

Most the discrepancies we found involved Hispanic patients. The most striking discrepancy is the difference in proportion of patients receiving inpatient rehabilitation services for hip fracture versus lower extremity joint replacements. The majority (64%) of Hispanic patients in this sample received inpatient rehabilitation services for hip fracture. Only 36% of Hispanic patients received inpatient rehabilitation treatment for lower extremity joint replacements. In contrast, most patients in other ethnic groups received inpatient rehabilitation services for lower extremity joint replacements (percentages ranged from 56% to 67%).

Existing epidemiological data suggest variation in the incidence of hip fracture by country, region, season, and race. Lauderdale et al reported age adjusted hip fracture rates of 7.3 per 1000 person years for Hispanic females and 3.3 per 1000 person years for Hispanic men. These compared with age adjusted incident rates of 10.1 per 1000 person years for white women and 4.3 per 1000 person years for white men. The hip fracture rates were lowest for black persons with a rate of 4.1 per 1000 person years for black women and 3.1 per 1000 person years for black men. Lauderdale et al’s Hispanic sample included Mexican Americans, Puerto Ricans, and Cubans. They estimated that within the Hispanic ethnic population, the hip fracture incidence was somewhat higher for Mexican Americans. Espino et al examined the incidence of hip fracture in the Hispanic Established Population Epidemiological Study of the Elderly (H-EPESE). The H-EPESE is a longitudinal population study of a weighted probability sample of 3050 Mexican Americans older than 65 years living in five southwestern states. They found the incidence for hip fracture was 9.1 per 1000 person

![Fig. 2. Comparison by race of the percentage of patients discharged home living alone (alone) versus living with family members, friends, attendants, or others (family/friends).](image)

![Fig. 3. Percentage of patients responsible for own care (own care), receiving care from a family member (unpaid family), or receiving care from a paid attendant (paid attendance) after discharge from medical rehabilitation. Comparison presented across ethnic groups.](image)
years in Mexican American women and 4.8 per 1000 person years in men.42

The literature for lower extremity joint replacements also suggests variation in incidence related to gender, region, and race.13–15,45,46 Several studies report that rates for elective total knee arthroplasty and total hip arthroplasty are higher in white persons than black persons or Hispanic persons.13–15,45 In a recent case-control study, Escalante et al13 found the odds of a total hip replacement decreased significantly as the probability of Hispanic ethnicity increased. This finding was not explained by poverty, as reflected in eligibility for Medicaid, or by lack of insurance.13

The existing literature, although not extensive, suggests the incidence of hip fracture is lower for Hispanic persons than white persons, but higher than for black persons. The literature also suggests that the utilization of total knee and hip arthroplasty is lower for Hispanic persons than white persons or non-Hispanic persons. As an extension of previous studies, we found significant differences in patterns of rehabilitation services and outcomes across ethnic groups. Why was the pattern of inpatient rehabilitation services and outcomes different for Hispanic patients compared with non-Hispanic persons? One possible explanation for the difference is variation in physician referral pattern for Hispanic patients. The Uniform Data System for Medical Rehabilitation includes only patients who were referred for inpatient medical rehabilitation, and thus, this question could not be answered using only the UDSMR data. This is, however, an important area for future research to determine how they influence rehabilitation and postacute services. An illustration of the important role such variables play in ethnic variations associated with lower extremity arthroplasty was recently provided by Ang et al.47 They examined ethnic differences in the perception and use of prayer in the treatment of osteoarthritis and its role in patients’ attitude toward joint replacement surgery. Ang et al47 concluded that perceptions of prayer may be an important explanatory variable in the relationship between ethnicity and a patient’s decision regarding lower extremity arthroplasty.

The outcomes associated with living status (alone vs. not alone), responsibility for care, and hospital readmission all appear to be associated with complex family and social network structures. These variables are multifaceted and not the primary focus of the study, but must be examined in future research to determine how they influence rehabilitation and postacute services. An illustration of the important role such variables play in ethnic variations associated with lower extremity arthroplasty was recently provided by Ang et al.47 They examined ethnic differences in the perception and use of prayer in the treatment of osteoarthritis and its role in patients’ attitude toward joint replacement surgery. Ang et al47 concluded that perceptions of prayer may be an important explanatory variable in the relationship between ethnicity and a patient’s decision regarding lower extremity arthroplasty.

The recent census figures suggest a substantial increase in the Hispanic population, particularly older Hispanic adults.48 This is a population for which we have limited information regarding disparities in long-term medical care and rehabilitation health service delivery. More research is urgently needed to begin to identify and understand apparent differences in service delivery and outcomes for this population.

The limitations of this investigation include those associated with analyzing a large data set.49 Much of the information included in the Uniform Data System for Medical Rehabilitation is obtained from existing medical records and self-
report. Ethnicity in our sample was based on self-report. We attempted to validate this information using the US Census Bureau Spanish surname list. We were unable, however, to make distinctions between different groups within the Hispanic population (Puerto Ricans, Cubans, Mexican Americans, etc.). There may be important variation among these groups that we were unable to examine. Another limitation is the lack of information regarding the acute-care period of hospitalization. The Uniform Data System for Medical Rehabilitation includes detailed patient information that begins when a person starts inpatient rehabilitation. Although the data set has been found to be representative of Medicare patients receiving inpatient rehabilitation across the United States, it is not a complete record of all rehabilitation facilities nationally and the representativeness for non-Medicare patients is unknown. The current trend in hospital care is to discharge persons with lower extremity joint replacement or hip fracture to sub-acute rehabilitation units in nursing homes or to discharge patients to home care without a period of traditional inpatient rehabilitation. This is a recent practice and is not a plausible explanation for a difference among ethnic groups for data collected between 1994 and 1998. Despite these limitations, the findings provide information regarding disparities in rehabilitation services and outcomes for a large patient population that has not been previously examined.

References


