Allocation of Rehabilitation Services: Who Gets a Home Evaluation

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OBJECTIVE. The purpose of this study was to (a) identify and describe the subpopulation of rehabilitation inpatients who receive specialized occupational therapy home evaluation services, and (b) examine these data for evidence of inequalities in access to services based on patient gender, race, age, and health insurance status.

METHOD. An archival review was conducted of all inpatient admissions (7,871) to a large urban rehabilitation hospital between January 1, 1994, and December 31, 1998. We had complete data on 7,791 of these patients of whom 6,038 were eligible to receive a home evaluation. Patient demographic data and Functional Independence Measure (FIM) data were obtained in electronic form from the hospital information system.

RESULTS. Analysis showed that 12.4% (749/6038) of eligible inpatients received an in-home evaluation, and those who did were significantly more dependent (as measured by the FIM) than those who did not ($p < 0.0001$). We found no evidence of inequalities in access to this specialized rehabilitation service on the basis of gender, race, age, and type of medical insurance after controlling for level of functional independence.

CONCLUSIONS. This study found no evidence of inequalities in the allocation of home evaluation services. However, it raises the larger question of how we determine whether inequalities exist. A proper assessment of inequalities in service provision requires that we know the principles by which these services should be allocated and have appropriate measures of the application of these principles. For programmatic and policy reasons, more research is needed to develop well-defined principles of resource allocation, and adequate measures of their impact so we can know whether resources and services are distributed in the way we intend.


The United States (U.S.) health care system is the most expensive health care system in the world, with health expenditures in the year 2000 totaling $1.3 trillion, or 13.2% of the gross domestic product, and averaging $4,637 per person (Levit, Smith, Cowan, Lazenby, & Martin, 2002). Despite the huge amount spent on medical care, the U.S. ranks low on many health indicators, such as infant mortality and life expectancy (World Health Organization [WHO], 2000), and there is mounting evidence that the health care system is plagued with serious problems at all levels (Lewin & Altman, 2000; Moss, 2000). One of the most troubling and urgent, according to the Institute of Medicine (IOM) (2002), is the persistence of serious inequalities in access to and utilization of quality health care services.

In their comprehensive review entitled Unequal Treatment, the IOM (2002) states that “racial and ethnic disparities in health care are consistent and extensive across a range of medical conditions and health care services” (p. 62). For example, minorities are less likely than Whites to obtain appropriate cardiac medications or to undergo coronary artery bypass surgery. For other conditions like end-stage renal disease, minorities are less likely to receive peritoneal dialysis and kidney transplantation. Minorities with bone fractures seen in hospital emergency departments are less likely than Whites to receive analgesia. Blacks are more than 1.5 times more
likely than White patients to undergo lower-limb amputation rather than revascularization.

A key factor in these disparities is income inequality (Rylko-Bauer & Farmer, 2002). More than 40 million people in the U.S. are uninsured (defined as not having insurance for the entire year) (IOM, 2002). Minorities make up a disproportionate part of this group: Blacks are twice as likely, and Hispanics are three times as likely, as Whites to be uninsured because of type of employment and lower income. Furthermore, numerous studies have shown that the uninsured and underinsured have reduced access, less appropriate care, poorer health, and are more likely to die prematurely (Kreiger, 1999; Kreiger & Fee, 1996). In their comprehensive review of 279,237 admissions to 100 U.S. hospitals in 1993 and 1994, Bradbury, Golec, and Steen (2001) also showed that the uninsured and publicly insured have shorter lengths of stay in hospital and are discharged from hospital sooner than privately insured patients, even though they are sicker overall.

The problems of access to quality medical care are particularly acute for inner-city residents who are disproportionately minority, older, and female, and thus face financial barriers and a higher incidence and prevalence of illness and death (Gorey, 1999; Whiteis, 2000). Older adults in particular continue to be at increased risk because of ongoing erosion of Medicare benefits. The gaps in what Medicare covers lead to significant out-of-pocket health care costs that disproportionately affect those who are poor (Dunlop, Manheim, Song, & Chang, 2002). Access to quality medical care has also been hampered by tightening state controls on Medicaid spending and the growth of Medicaid managed care (Cunningham, 2002). As Pardes (2000) found, Medicaid managed care has exerted a major influence on teaching hospitals (overwhelmingly located in urban areas), which provide approximately 50% of indigent care nationwide. Facing pressure to increase profits and efficiency, these teaching hospitals are finding it increasingly difficult to provide “charity care.”

To review, the medical literature is replete with studies documenting the depth and complexity of inequalities across a wide range of diagnostic procedures and services. However, investigations of this sort in the field of rehabilitation are recent and therefore notably fewer. Nonetheless, this small body of literature has already shown that patient age, gender, race, and health insurance status are all significant independent predictors of admission to and length of stay in rehabilitation hospital (Angelelli, Wilber, & Myrtle, 2000; Bradbury et al., 2001; Svenson & Spurlock, 2001). To date, however, no study has examined access to or utilization of specialized rehabilitation services that only some inpatients receive after admission to rehabilitation, for example, the occupational therapy home evaluation. Given the overwhelming evidence of strong and persistent inequalities in access to a wide array of procedures and interventions in the medical literature, we ask here whether there is any evidence of such inequalities in the case of the occupational therapy home evaluation.

Study Purpose

The purpose of this study was to (a) identify and describe the rehabilitation inpatients who received specialized occupational therapy home evaluation services, and (b) examine these data for evidence of inequalities in access to services based on patient gender, race, age, and health insurance type. Consistent with the broader health sciences literature that documents the depth and complexity of inequalities across a wide range of diagnostic procedures and services, we hypothesized there would be similar inequalities in the allocation of occupational therapy home evaluations services.

Methods

Study Design

Study results are based on a secondary analysis of 5 years of clinical data (January 1, 1994 to December 31, 1998) at a 94-bed urban rehabilitation hospital affiliated with a large teaching medical center (Rehabilitation Institute of Michigan at the Detroit Medical Center). The data were originally collected for internal program evaluation and national reporting purposes. The data collected were: demographic data, primary and secondary diagnoses, length of hospital stay, health insurance payer, and Functional Independence Measure (FIM) scores for all patients admitted to the rehabilitation hospital during the 5-year study period (N = 7,871), including a variable that indicated whether a patient had received an occupational therapy home evaluation during the study period (n = 750). Each of these study variables are defined and discussed in the section “Measures and Procedures” below. All data were initially collected by the rehabilitation hospital and obtained in electronic format from the hospital information system. Prior to review of the data, the study was approved by the Behavioral Investigation Committee/Institutional Review Board at the authors’ institution.

Measures and Procedures

Patient demographic data consisted of patient age (in years), gender, and race. The rehabilitation hospital assigned patients to six racial categories: White, Black, Asian, Native American, Hispanic, and Other. The health
insurance variable consisted of a single “payer code” assigned by the rehabilitation hospital at admission. The eight-category code identified the source of payment for the inpatient rehabilitation stay: Medicare; Medicaid; Blue Cross/Blue Shield; health maintenance organization (HMO); commercial, automobile, workers’ compensation; or self-pay. Patient diagnosis data were obtained in the form of ICD-9 codes. Primary and secondary diagnoses were included. To simplify the analysis, the investigators assigned all patients to one of five categories on the basis of their ICD-9 codes: (1) spinal cord injury (SCI); (2) cerebral vascular accident (CVA)/stroke; (3) traumatic brain injury (TBI); (4) orthopedic conditions (predominantly fractures, hip and knee replacements, and amputations); and (5) all other conditions that could not be readily classified into one of the other four categories (diagnoses in this category were wide-ranging including patients with cancer, cardiovascular disease, and neurological conditions like multiple sclerosis and Parkinson’s disease).

FIM scores at admission and discharge from the rehabilitation hospital for each patient were also in the dataset obtained from the hospital information system. The FIM is an evaluation of function in 18 activities of daily living (ADL): feeding, grooming, bathing, dressing (upper and lower), toileting, bladder and bowel management, locomotion, stair climbing, transfers (bed–chair, toilet, and tub–shower), comprehension, expression, social interaction, problem solving, and memory (Hamilton, Granger, Sherwin, Zielensky, & Tashman, 1987). Each item is scored from 1 (completely dependent) to 7 (completely independent) using a standardized, performance-based protocol (Hamilton, Laughlin, Granger, & Kaytron, 1991). A total score of 126 means a patient is entirely independent in all items. The FIM is the most widely used instrument in the inpatient rehabilitation setting in the U.S. and has strong psychometric properties (Cohen & Marino, 2000). Validity has been demonstrated with brain-injured patients and stroke patients (Cook, Smith, & Truman, 1994) and for people 80 years of age and older (Pollak, Rheault, & Stoeckler, 1996). The reliability of the FIM is also well established. Ottenbacher, Hsu, Granger, and Fiedler (1996) reported a median interrater reliability for the total FIM of .95 and median test–retest and equivalence reliability values of .95 and .92, respectively. All rehabilitation staff using the FIM to assess patients in this study received ongoing training to ensure optimal standards for FIM administration and scoring.

The final variable in the database identified each patient who had received an occupational therapy home evaluation during the study period. Patients identified as such in the hospital information system database were compared to an independently generated list of patients known to have received an occupational therapy home evaluation in this same time frame. This list was constructed in a previous study that examined the relationship between patient health insurance status and the number and type of home modification and equipment recommendations they receive (Lysack & Neufeld, 2003). This cross-check was a deliberate effort to enhance the reliability of the data.

To measure patient physical function we used a constellation of three variables: FIM score at discharge, rehabilitation diagnosis, and length of hospital stay. Length of hospital stay was highly correlated with FIM score at admission (Pearson \( r = -0.588; p < 0.0001 \)) and therefore we believe length of hospital stay captured, in part, injury severity at admission as well as underlying (but unmeasured) frailty and comorbid conditions (to account for that part of hospital length of stay unexplained by FIM score at admission).

We hypothesized that FIM score at discharge, rehabilitation diagnosis, and length of hospital stay, as measures of physical function, were significantly related to the likelihood of receiving a home evaluation.

Of the 7,871 patients contained in the original hospital dataset, 80 were missing one or more demographic variables or a FIM score, leaving 7,791. Since it was the home evaluation program’s policy at this hospital that patients known to be moving to an institutional setting at discharge (instead of returning home) were not eligible for a home evaluation, a further 1,753 cases were excluded from the study dataset, leaving a total of 6,038 cases for analysis.

Data Analysis

Data were analyzed using the SPSS (version 11.1) statistical software package. Descriptive statistics were used to characterize patient demographics (patient age, gender, and race) diagnosis, health insurance type, patient FIM scores, and overall length of stay in the rehabilitation hospital. Differences in these demographic and FIM variables between those patients receiving an occupational therapy home evaluation and those who did not were examined using the independent samples \( t \) test or a chi-square test as appropriate. Pearson \( r \) correlations were calculated between age, length of stay in rehabilitation, and FIM scores during rehabilitation. A logistic regression model was developed to examine the relationship of the demographic variables, type of health insurance, length of hospital stay, and FIM scores to the likelihood of receiving an occupational therapy home evaluation. Logistic regression is often used when the dependent variable is binary (in our case, received a home evaluation versus did not) and it models the log odds of the dependent variable as a linear function of the independent variables (in our case, demographic variables, type of health insurance, length of hospital stay, and FIM scores). The coefficients, B,
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of the logistic regression model are interpreted as log odds ratios; thus, exp(B) is an odds ratio and can be seen to be the multiplicative increase in the odds of the dependent variable for each increment of the independent variable.

Results

Sample Characteristics

The mean age of the patients in the study was 58.8 years, with ages ranging from 14 to 98 years. Overall, there were more women (54%) in the sample than men (46%). The majority of the patients were Black (76.5%). Most were admitted with some type of orthopedic condition (37%) or had a primary diagnosis of CVA/stroke (23%). The remainder had sustained a TBI (10%) or a SCI (8%), or else had some other type of condition thought remediable with admission to inpatient rehabilitation (22%). The mean length of stay in rehabilitation for the sample was 16.9 days. The insurance payer for more than half of the inpatients in the study was Medicare (50.3%). More details are provided in Table 1.

Who Gets an In-Home Evaluation by an Occupational Therapist?

At the rehabilitation hospital where this study was conducted, each patient’s inpatient occupational therapist had the opportunity to recommend a home evaluation for any patient they believed would benefit from one. No FIM score “cut-point” triggered this evaluation, nor were any standardized tests used as a criterion for the evaluation. Recommendations for a home evaluation were based on each patient’s overall ADL and IADL (instrumental activities of daily living) performance during rehabilitation, particularly in the days leading up to discharge. Thus, the occupational therapist contributed to the decision to do an in-home evaluation but they did not have sole authority to order the evaluation. The final decision for an in-home evaluation rested with the head of the rehabilitation team, the physician responsible for each patient’s care.

About 12 1/2% (749/6038) of all patients in the study received an occupational therapy home evaluation. As Table 1 shows and bivariate analysis confirms, patients who received a home evaluation had significantly lower mean total FIM scores (more severely injured and thus, less functionally independent) at admission and discharge ($t = 21.0; p < 0.0001$ and $t = 15.0; p < 0.0001$, respectively). By comparison, patients for whom it was known that their discharge would be to an institutional setting (and therefore who were not eligible for a home evaluation and thus excluded from this study) had mean FIM scores at admission and discharge of 59.9 and 73.9 respectively, considerably less than the average scores of 77.6 and 99.9, respectively, for those in this study. Figure 1 depicts the distribution of total FIM scores at discharge and the

Table 1. Patient Characteristics ($N = 6,038$)

<table>
<thead>
<tr>
<th>Received Home Evaluation ($n = 749$)</th>
<th>No Home Evaluation ($n = 5,289$)</th>
<th>Total ($N = 6,038$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at admission (mean in years, SD) 54.0 (19.5)</td>
<td>59.5 (18.2)</td>
<td>58.8 (18.4)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>386 (51.5%)</td>
<td>2,402 (45.4%)</td>
</tr>
<tr>
<td>Female</td>
<td>363 (48.5%)</td>
<td>2,887 (54.6%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>573 (76.5%)</td>
<td>4,047 (76.5%)</td>
</tr>
<tr>
<td>White</td>
<td>160 (21.4%)</td>
<td>1,123 (21.2%)</td>
</tr>
<tr>
<td>Other*</td>
<td>16 (2.1%)</td>
<td>119 (2.3%)</td>
</tr>
<tr>
<td>Total FIM at admission (mean score, SD) 64.8 (13.3)</td>
<td>79.5 (8.6)</td>
<td>77.6 (10.2)</td>
</tr>
<tr>
<td>Total FIM at discharge (mean score, SD) 89.8 (18.5)</td>
<td>101.3 (17.7)</td>
<td>99.9 (18.5)</td>
</tr>
<tr>
<td>Length of stay in rehabilitation hospital (mean in days, SD) 27.7 (19.9)</td>
<td>15.4 (17.1)</td>
<td>16.9 (17.9)</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthopedic</td>
<td>162 (21.6%)</td>
<td>2,059 (38.9%)</td>
</tr>
<tr>
<td>Stroke/CVA</td>
<td>244 (32.6%)</td>
<td>1,127 (21.3%)</td>
</tr>
<tr>
<td>TBI</td>
<td>78 (10.4%)</td>
<td>550 (10.4%)</td>
</tr>
<tr>
<td>SCI</td>
<td>161 (21.5%)</td>
<td>296 (5.6%)</td>
</tr>
<tr>
<td>Other</td>
<td>104 (13.9%)</td>
<td>1,257 (23.8%)</td>
</tr>
<tr>
<td>Health Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicare</td>
<td>301 (40.2%)</td>
<td>2,735 (51.7%)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>171 (22.8%)</td>
<td>945 (17.9%)</td>
</tr>
<tr>
<td>Blue Cross/Blue Shield</td>
<td>125 (16.7%)</td>
<td>654 (12.4%)</td>
</tr>
<tr>
<td>Health Maintenance Organization (HMO)</td>
<td>68 (9.1%)</td>
<td>434 (8.2%)</td>
</tr>
<tr>
<td>Commercial</td>
<td>23 (3.1%)</td>
<td>113 (2.1%)</td>
</tr>
<tr>
<td>Catastrophic**</td>
<td>56 (7.5%)</td>
<td>298 (5.6%)</td>
</tr>
<tr>
<td>Self-pay</td>
<td>5 (0.7%)</td>
<td>110 (2.1%)</td>
</tr>
</tbody>
</table>

Note. CVA = Cardiovascular accident; FIM = Functional Independence Measure; SCI = Spinal cord injury; TBI = Traumatic brain injury.

*The rehabilitation hospital assigned patients to six racial categories: White, Black, Asian, Native American, Hispanic, and Other. We combined Asian, Hispanic, and Other into a single category. We do not know whether patients self-identified into these racial categories.

**Catastrophic combines automobile and worker’s compensation insurance.
The percentage of patients receiving a home evaluation at these scores. Given the FIM scoring system, a total score of between 18 and 35 means a patient requires, on average, “total assistance” on each FIM item. Scores between 36 and 53, 54 and 71, and 72, and 89 means a patient requires “maximal assistance,” “moderate assistance,” and “minimal assistance,” respectively. A FIM score between 90 and 107 means a patient requires on average only “setup” for each FIM task, and a score of 108 or higher indicates on average complete independence for each FIM item. As evident from Figure 1, the likelihood of receiving a home evaluation was greater for patients who required “maximal” or “moderate” assistance compared to those who required “total assistance,” “minimal assistance,” or “setup,” or who were “completely independent.”

Beyond FIM scores, patients who received a home evaluation had significantly longer rehabilitation hospital stays ($t = 24.7; p < 0.0001$) than those who did not, and were more likely to have sustained a SCI versus another type of injury ($\chi^2 = 23.7, p < 0.0001$). Figure 2 depicts the distribution of length of rehabilitation stay in days and the percentage of patients who received a home evaluation, and clearly shows that patients with longer lengths of stay had a greater likelihood of receiving a home evaluation. Thus, our three measures of physical function were each significantly related to the probability of receiving a home evaluation.

There were a number of other patient characteristics, namely gender, race, age, and health insurance type that, based on the literature on inequalities in access to medical services, we hypothesized would influence the likelihood of receiving a home evaluation. We observed no racial differences in who received a home evaluation ($\chi^2 = 0.007; p = 0.936$). However, patients who were younger ($t = 7.6; p < 0.0001$), or male ($\chi^2 = 9.9; p = 0.002$), or who had health insurance other than Medicare ($\chi^2 = 34.9; p < 0.0001$) were more likely to receive a home evaluation. The key question, as with FIM score, length of stay, and diagnosis above, was whether the observed differences in allocation of home evaluations by patient gender, age, and insurance type represented “inequalities” or whether they were due to underlying (and explainable) differences in patient injury type and severity.

To answer this question, we formulated a logistic regression model with home evaluation as the dependent
variable and mean total FIM score at discharge, length of rehabilitation hospital stay, injury type, age, gender, race, and insurance type as independent variables. In the logistic regression model injury category and insurance type were dichotomized into SCI versus other diagnoses, and Medicare versus other insurance types with the reference groups being “other diagnoses” and “other insurance types” respectively. (The mean total FIM score at admission was not included in the model because it was highly correlated with length of hospital stay (Pearson $r = -0.588; p < 0.0001$)). As the results of the logistic regression demonstrate (see Table 2), mean total FIM score at discharge (odds ratio = 0.983), length of hospital stay (odds ratio = 1.082), and injury type (odds ratio = 2.248) were significantly and independently related to the likelihood of a home evaluation but age, gender, race, and insurance type were not. Thus, there is no apparent evidence that the observed differences in gender, age, and insurance type reflected an inappropriate allocation of home evaluations.

Next, we examined more closely patient gender, medical insurance, and age to discover with greater precision why differences in these variables were observed.

**Gender and Home Evaluations**

We observed that although the mean total discharge FIM score for the men in our sample was only slightly less than that for the women (99.5 vs. 100.2), the men were considerably younger (54.8 years vs. 62.3 years; $t = 15.9, p < 0.0001$). As well, men were much more likely to have sustained a SCI (chi-square = 67.2; $p < 0.0001$). Patients with a SCI were substantially younger than those with other diagnoses (47.5 years vs. 59.7 years; $t = 13.8, p < 0.0001$), and as noted above, were much more likely to receive a home evaluation. Men also tended to stay in the rehabilitation hospital longer (18.1 days vs. 15.8 days; $t = 8.8, p < 0.0001$) than women, another factor contributing to their increased chance of a home evaluation. After controlling for discharge FIM score, length of stay, and diagnosis type, we found there were no significant gender differences in the likelihood of receiving a home evaluation (logistic regression: Wald = 0.946; $p = 0.331$). Thus, the gender difference observed earlier was mainly due to the fact that men in this sample were more likely to have a SCI and a longer inpatient rehabilitation stay.
Insurance Type and Home Evaluations

Except for those with no insurance at all (self-pay), patients insured under Medicare had a reduced likelihood of receiving a home evaluation compared to those with other types of insurance (see Table 1). But Medicare patients had other relevant characteristics that influenced their probability of receiving a home evaluation. Patients with Medicare as an insurance payer were on average much older than other patients (71.7 years vs. 45.8 years; \( t = 76.2, p < 0.0001 \)) and had lower total mean discharge FIM scores (97.8 vs. 102.0; \( t = 9.4, p < 0.0001 \)). Patients insured by Medicare were also much less likely to have a SCI (chi-square = 79.8; \( p < 0.0001 \)) and tended to have shorter hospital stays \( (t = 11.1; p < 0.0001) \) both of which contributed to a lower probability of receiving a home evaluation. After controlling for total FIM score at discharge, length of stay, and type of injury, we found there was no significant relationship between insurance type and probability of receiving a home evaluation (logistic regression: Wald = 1.7; \( p = 0.19 \)). Thus, insurance type does not appear, in itself, to be significantly related to receiving a home evaluation.

Age and Home Evaluations

As described above, younger patients in this study were more likely to receive a home evaluation than older patients. This result is somewhat counterintuitive given that the older patients in the study had lower levels of functional independence as measured by the FIM score at discharge (Pearson \( r = -0.132 \)). Hence, if all other things were equal, we would expect an older patient to be more likely to receive a home evaluation. One obvious explanation for this age effect is the fact that age is related to diagnosis, and furthermore, that some diagnoses, such as SCI, had higher rates of home evaluations. We also observed that patients with a SCI tended to be younger: those with SCI had a mean age of 47.5 years compared to 63.8 years for those with a stroke. Finally, we noted that younger people tended to stay in rehabilitation longer (Pearson \( r = -0.178 \)). The fact that length of rehabilitation stay is strongly related to the probability of a home evaluation (see Figure 2) also partially accounts for the finding that older patients were less likely to receive home evaluations. After controlling for FIM score at discharge, length of rehabilitation stay, and type of diagnosis, logistic regression analysis showed that age was not significantly related to receiving a home evaluation (Wald = 1.7; \( p = 0.186 \)).

Discussion

The most significant finding of this study was that, after controlling for patient injury type and severity at admission, length of rehabilitation stay, and functional status at discharge, there were no significant differences in the probability of receiving an in-home evaluation on the basis of patient gender, race, insurance status, or age. None of these factors significantly influenced patients’ chances of receiving this specialized occupational therapy service. This finding is in contrast to a substantial literature that suggests that for many medical procedures and services women and minorities, as well as the publicly insured (Medicare and Medicaid patients) are disadvantaged, even after controlling for “objective medical need” (IOM, 2002; Rylko-Bauer & Farmer, 2002).

Second, and as expected, patients with more severe injuries and diminished physical function were more likely to receive a home evaluation. This is consistent with a view (and this home evaluation program’s philosophy in particular) that those who are most “in need” should receive the benefits of specialized services, especially when those benefits are in limited supply (only 12% of inpatients received a home evaluation). In this study, that meant that the bulk of home evaluations targeted patients with the most significant disability, mostly persons with SCI, and others who had relatively long inpatient rehabilitation stays and lower total FIM scores at discharge.

This study raises several important issues. The first is, “How can we determine if inequalities exist?” We might

Table 2. Logistic Regression Model Predicting Home Evaluations (N = 6,038)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Odds Ratio (Exp[Beta])</th>
<th>95% CI for Exp(Beta)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.740</td>
<td>0.175</td>
<td></td>
<td>&lt;0.0005</td>
</tr>
<tr>
<td>FIM total at discharge</td>
<td>-0.017</td>
<td>0.983</td>
<td>(0.979–0.987)</td>
<td>&lt;0.0005</td>
</tr>
<tr>
<td>Length of hospital stay</td>
<td>0.079</td>
<td>1.082</td>
<td>(1.073–1.091)</td>
<td>&lt;0.0005</td>
</tr>
<tr>
<td>SCI versus other diagnoses</td>
<td>0.810</td>
<td>2.248</td>
<td>(1.742–2.900)</td>
<td>&lt;0.0005</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.108</td>
<td>0.898</td>
<td>(0.755–1.071)</td>
<td>0.231</td>
</tr>
<tr>
<td>Age</td>
<td>-0.002</td>
<td>0.998</td>
<td>(0.991–1.004)</td>
<td>0.457</td>
</tr>
<tr>
<td>Medicare versus other types</td>
<td>-0.073</td>
<td>0.929</td>
<td>(0.731–1.181)</td>
<td>0.549</td>
</tr>
<tr>
<td>Race</td>
<td>-0.052</td>
<td>0.950</td>
<td>(0.768–1.174)</td>
<td>0.633</td>
</tr>
</tbody>
</table>

Note. Diagnostic category and insurance type were dichotomized; “other diagnoses” and “other types of insurance” were the respective reference groups. CI = Confidence interval; FIM = Functional Independence Measure; SCI = Spinal cord injury; Dependent variable = home evaluation; Model chi-square = 839; Cox & Snell R-square = 0.130.
answer this question by saying that inequalities exist if services are not allocated on the basis of need. But this leads to the question of how patient “need” is conceptualized. Clearly, at the hospital studied, physical function formed part of the criteria for determining the need for a home evaluation. But this was not the entire story because some patients with high physical function received home evaluations and some with low physical function did not. Thus, it seems likely that other factors, such as whether the patient was going to be living alone or with family, or clinical judgments regarding social or environmental conditions of the patient, or even the potential benefit of the home evaluation to the patient, form part of what is conceptualized as “need.” However, in this study we did not know what these factors or clinical judgments were, how they were determined or measured, or whether the principles they reflect were consistently applied.

The answers to these questions lie beyond the scope of this paper. Still, a clear articulation of the principles of resource allocation is required before we can address the question of whether inequalities in service provision exist, and more generally, whether rehabilitation services are allocated in the way rehabilitation programs intend. We suggest that rehabilitation programs should endeavor to develop clearly defined principles of service allocation and robust measures of these principles. They should also conduct regular reviews of their programs and carefully track the distribution of their services. To not do so risks misidentifying the intended service target, and most importantly, risks overlooking inequalities in services if they are present.

Finally, we observe that rehabilitation programs with well-articulated policies and current knowledge about the recipients of its services will always have an advantage over those without such information. In times of constraint and budgetary cutbacks, for example, rehabilitation programs with the best data about the recipients of their services will be in the strongest position to retain their level of services. In times of greater prosperity, such programs may be at an advantage with respect to program expansion, building on a foundation of knowledge about their primary patient base.

**Study Limitations**

The results of this study are limited in several ways. First, study data were taken from one particular inner-city rehabilitation hospital with a particular case-mix of patients. Thus, the generalizability of the results beyond this setting is unknown. There is a countervailing advantage, however. The hospital and the demographic and functional profile of its inpatients are typical of rehabilitation hospitals located in the core of many large American cities. In this sense, the study provided an ideal opportunity (high percentage of minority and publicly insured patients) to examine the existence of potential inequalities in allocation of rehabilitation services. Replication of this kind of study is needed across a myriad of specialized rehabilitation services including occupational therapy and across diverse rehabilitation settings as well to ascertain whether there are differences in service allocation that cannot be explained on the basis of objective medical need.

The second major limitation of this study focuses on the instruments used to measure physical disability. The FIM, although very widely used and reliable, is insensitive as a measure of functional independence. It fails to capture very real differences between patients who share an identical FIM score, for example, between a wheelchair user and someone who is ambulatory. In a similar vein, length of hospital stay is not a perfect proxy for functional limitations and comorbidities not captured by the FIM and diagnosis type. Thus, there may have been differences in function between patients in this study that went unrecognized. It is therefore possible that in our sample there were smaller-scale inequalities in the allocation of home evaluations but we were unable to detect them because our measures were too crude. We acknowledge this possibility, although we believe the effect, if present, would not have been large.

Finally, we remind the readers that the majority of study data were collected prior to the implementation of the Balanced Budget Act of 1997. As noted elsewhere (Dunlop et al., 2002), this Act “reduced support for indigent hospital care through reductions in Medicare disproportionate share hospital payments” and “constrained the growth of state Medicaid disproportionate hospitals,” which in turn had a negative affect on state Medicaid payment formulas that traditionally favored providers with high indigent costs (including the rehabilitation hospital in this study). Although the Balanced Budget Refinement Act of 1999 reduced these payment effects, the influence of these policies is still being felt in the hospital studied and undoubtedly, across the country. Although these changes were not in effect for the majority of the study period, they could be expected to increase access-related effects beyond those observed in this study.

**Conclusions**

Given the very large sample size in this study, the finding of statistical nonsignificance in allocation of occupational home evaluations by patient gender, age, race, and insurance type (after controlling for injury severity, length of
rehabilitation stay, and diagnostic category), is very meaningful. These data provide no evidence of inappropriate allocation of occupational therapy home evaluation services despite the opposite trend in the broader medical literature. Additional studies are needed in other contexts and with rehabilitation services other than occupational therapy home evaluations to adequately assess whether there are inequalities in access and utilization of other kinds of specialized rehabilitation services, and to determine to what extent these inequalities are contributing to negative health outcomes at the individual patient level. A major contribution of this study is to highlight the actual allocation of one type of rehabilitation service in a large urban hospital. In a broader way, however, this study speaks to the tremendous need for ongoing research to develop well articulated principles and measures of resource allocation. The question of how allocation of limited rehabilitation services (including in-home occupational therapy home evaluations) should be made is neither a small question or easily answered, but the answer has significant implications for rehabilitation practice, policy, and research.▲

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