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Post-Acute Referral Decisions Made by Multidisciplinary Experts Compared to Hospital Clinicians and the Patients' 12-Week Outcomes

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Abstract

Background: Anticipating post-acute needs and making referrals for follow-up care are crucial for quality discharge planning. Several studies reveal serious gaps in quality for these common and important processes.

Objectives: Compare experts' and hospital clinicians' discharge referral decisions for the same elderly patients, and examine 12-week outcomes for patients whom experts identified for referral but were not referred by hospital clinicians to those who experts and clinicians agreed to refer or not.

Design: A comparative, descriptive analysis of referral decisions for 355 elderly patients and their 12-week outcomes.

Subjects: Older adults hospitalized with common medical surgical conditions from 6 hospitals in Northeast United States.

Results: Experts identified 183 additional patients for post-acute referral. Experts were 18 times more likely to refer patients than hospital clinicians. Clinicians referred patients with obvious needs for post acute care, and experts with better information and time to consider the perspectives of other disciplines identified additional patients. These patients demonstrated a rehospitalization rate of 23%, not significantly different than those referred (20%), but nearly 5 times higher than patients not identified for referral. Similar to those who received referrals, they were significantly more likely to rate their health fair or poor and their functional status remained significantly worse at 12 weeks than the no referral group.

Conclusion: Experts identified additional patients in need of post-acute care. Negative outcomes reflect the costly results of this gap in quality and support the need to improve data presentation and referral decision making.

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Keywords

discharge planning; decision making; referral and consultation; decision support systems; clinical

Hospitalization places older adults at risk for declines in health status.[1,2] They often leave the hospital with more medications and poorer function than before admission.[3] In addition, short stays decrease discharge planning and teaching time, potentially decreasing patient and family knowledge concerning care. These and other factors underscore the importance of recognizing and anticipating post-acute needs and to make appropriate referrals for post-acute care by arranging for skilled home care, inpatient or outpatient rehabilitation, or admission to a nursing home.

The process of discharge planning has multiple steps requiring careful, comprehensive assessment to determine the needs of patients, anticipate their future needs, make appropriate referral decisions, and coordinate follow-up services. Short hospital stays, inconsistent assessment criteria, and varying levels of expertise and risk tolerance in decision-making often interfere with discharge planning. As a result, patients leave the hospital with unmet needs,[4] with as many as 26% of patients needing home care going home without it.[5] In addition, several studies show that hospital clinicians do not recognize which patients are appropriate for home care.[6-11] The abilities and needs of patients are frequently missed; especially for living arrangements, home environment, self-care ability, and availability and skill of caregivers.[6] Nurses consistently overestimate patients' functional ability and understanding of treatment plans.[10] Missed referrals also occur because of a process guided by a medical model, as defined by Medicare, which focuses on the functional limitations of patients, requires homebound status, and fails to consider the larger context of patients and their families.[12] These factors result in the discharge of vulnerable elders who, without follow-up care, may go on to experience costly, poor health outcomes.

This article examines the decisions to refer for post-acute services and the 12-week outcomes of hospitalized older adults to illustrate an opportunity to improve quality and cost outcomes by effectively identifying patients needing post-acute referrals. The primary aims are to compare discharge referral decisions of a panel of experts (the gold standard) to hospital clinicians' referral decisions for the same group of elderly patients, and to examine 12-week outcomes for patients who experts identified for referral but were not referred by hospital clinicians (Expert Only Refer), to those who experts and clinicians agreed to refer (Agree to Refer) or agreed not to refer (Agree Not to Refer). These aims are part of a study to develop an expert decision support system for discharge referral decision making [Factors to Support Effective Discharge Decision Making, National Institute for Nursing Research (NINR), RO1-NR007674, 2001–2005].

METHODS

Design

A comparative, descriptive study was conducted using existing and prospectively collected data on 355 hospitalized patients. Case studies, generated from hospital and research records, were judged by a panel of 8 experts to elicit their decisions on the need for a post-acute referral. The experts were blinded to the original decision and to the outcomes. The experts' decisions were compared with the referral decisions of hospital clinicians made during the hospital stay for these same patients. Outcomes 12 weeks after discharge were compared among elderly patients who experts decided to refer but were not referred by hospital clinicians (Expert Only Refer) to those who experts and clinicians agreed to refer (Agree to Refer) or agreed not to

refer (Agree to Not Refer). The study received expedited review and approval from the University Institutional Review Board.

Sample Selection

The minimum number of cases needed was 100 using the standard error associated with the area under the curve statistic. Assuming an anticipated concordance of 0.80, the total number of cases would be 100 (50 referral + 50 nonreferral) for a standard error of 0.045.[13] However, based on pilot work,14 where the majority of patients were referred by experts, we drew a larger sample than projected to assure enough nonreferral types.

The sample for this study came from 2 sources, the control groups from 3 completed clinical trials15-17 (n = 208), and prospectively collected (n = 147). The prior studies were used because they provided a rich database of consistent information describing the characteristics of hospitalized patients, the course of their stay, their outcomes, and they represented usual care in urban, suburban, and rural settings in 6 hospitals. The prospective sample was collected based on experts' suggestions to seek more variety in diagnoses and acuity.

Clinical Trial Sample

Study subjects from the original 3 studies were 65 and older, English-speaking, and scored ≥6 on the Short Portable Mental Status Questionnaire.[19] Subjects had common medical surgical conditions including heart failure, angina, myocardial infarction, valve replacement, coronary artery bypass, respiratory infection, major small or large bowel surgical procedure, or orthopedic procedures of the lower extremities. In addition, patients enrolled in studies 2 and 3 met at least 1 high-risk criteria associated with poor discharge outcomes.[16,17] Subjects were excluded if they had end stage renal failure because they get specialized post-acute services.

A list of subjects was generated from the 3 completed studies (N = 443). Records were chosen using a table of random numbers until we reached 245 records. Thirty-seven records were removed for the following reasons: missing data about the postoperative course or 12-week follow-up (n = 21); subjects withdrew (n = 5) or moved (n = 1); data were not readable (n = 3); the cases did not add anything new (n = 5); or were used to train the medical records abstractors (n = 5). The principal investigator (K.B.) and a nursing graduate student research assistant (RA) read through each randomly chosen record.

Prospectively Collected Sample

Another 147 patients were enrolled and followed for 12 weeks as a purposive convenience sample from a rural community hospital (n = 97) and an urban, academic medical center (n = 50), both sites used in the prior clinical trials. These subjects met the same inclusion criteria except for diagnoses and did not meet the high-risk criteria. The prospective cases had cancer, diabetes, infection, genitourinary conditions, and traumatic injury. Heart failure, myocardial infarction, and angina were excluded because these diagnoses were amply represented in the trials. Data from the clinical trials and the prospective sample were used to generate case studies that were sent to a panel of experts.

The Experts

To gain national and local perspectives, 4 nationally recognized scholars and 4 respected hospital clinicians experienced in discharge planning participated as experts. Decision analysis groups typically consist of 6–12 members.[18] Selection of the national scholars was based on their published record of scholarly work in discharge planning and outcomes research. Two held the academic rank of Professor with PhD, 1 representing nursing, the other social work; another was Associate Professor Medical Doctor; and 1 was President of a national professional

organization and a PhD representing physical therapy. Two were from the east, 1 from the Midwest, and 1 from the west coast. The 4 local clinicians were selected based on recommendations from managers or peers and at least 5 years of experience in the field. Three clinical experts hold masters degrees in their respective fields (nursing, social work, and physical therapy) and one held an MD. They all participate in discharge planning in a large academic medical center.

Data Collection Procedure

Baseline and outcome data were consistently collected by trained nurse RAs across all of the studies and from the prospective subjects during hospitalization and 12 weeks later using valid and reliable research instruments to measure mental status,[19] depression,[20] self-rated health,[21] and functional status[22] directly from the patient. Baseline interviews also collected information on sociodemographics, income, education, adherence behavior, prior equipment and resource use, and availability and willingness of caregivers. In addition, the medical records included history and physical, medications, progress notes, discharge plans, and discharge summaries. The hospital clinicians had access to the medical records for their decision-making. The experts had access to information gleaned from both the medical record and the research records.

The PI trained the RAs to generate the case studies using records not in the sample. A data abstraction form was developed and organized using the 10 conditioning factors outlined by Orem's Self-Care Theory.[23] The case studies contained these factors organized as shown in Table 1. The PI conducted weekly evaluation of the RAs' abstractions.

The case studies were posted on a secure web site in batches of 50. The 8 experts evaluated each case anonymously and independently and provided a yes/no recommendation about a referral. They were instructed to base their decision on clinical need and ignore potential barriers (eg, homebound status or type of insurance). If a referral was recommended, the expert identified the reason and the desired service: home care, inpatient or outpatient rehabilitation, or nursing home. As could be expected, experts disagreed about recommendations to refer and/or the site. A second webpage was used to facilitate consensus on cases with discordant decisions. Using a modified Delphi technique, the experts saw the cases, the decisions reached by each expert, and reasons for or against referral. They were blinded to each other's identity, but able to compare their recommendations and reasons, then vote again trying to reach consensus; however they were not pressured to change their mind.[24] The process of voting-feedback-voting was repeated up to 3 times until a majority consensus was obtained.25 There were 12 cases without consensus after 3 rounds. Consensus was reached on all of them after in-person discussion.

Outcome Measures

Referral decisions, including hospital clinicians' and experts' yes or no recommendations and sites of referral, were collected via patient records. These data were validated by patients' physicians and hospital and home health agency records.

Self-rated health status is the patients' perception of their overall health. It is measured by asking, “How is your overall health now? Is it excellent, good, fair, or poor?”[21]

Functional status was measured by the Enforced Social Dependency Scale.[22] Enforced social dependency means needing help or assistance from others when performing activities or roles that adults can usually do alone. The instrument measures function regarding eating, dressing, walking, traveling, bathing, toileting, home, work, recreational activities, and communication. Scores range from 10 to 51 with higher scores indicating more dependency. The total scale

reliability coefficient was 0.8 with cardiac patients and 1 month test-retest reliability was 0.62.[26] A Cronbach's alpha of 0.92 was reported along with a high correlation between the Enforced Social Dependency Scale and the Sickness Impact Profile.[27]

Resource utilization includes the numbers of unplanned rehospitalizations, acute office or clinic visits, and Emergency Department (ED) use up to 12 weeks after discharge. The 12-week data point was chosen because it is a common data collection point across all 3 studies and it falls within the period when failure of discharge planning becomes evident.[28]

Data Analysis

Frequencies and cross-tabulations compared the referral rates of the experts (gold standard) to hospital clinicians. Two cases were inadvertently not sent to the experts for review. Three other cases were missing decisions from the hospital clinicians. Therefore, the final data set, having both hospital clinician and experts' decisions, decreased from 355 to 350. McNemar's test[29] compared the referral rates of the experts versus the hospital clinicians. A new variable (refergp) was created to compare the differences between the groups (refergp = Agree Not to Refer, Expert Only Refer, and Agree to Refer). Next, bivariate comparison with refergp was conducted using 1-way ANOVA (if variable was normally distributed), Kruskal-Walis test (non-normal continuous distribution), χ^2 test (categorical variable), and odds ratios, as appropriate.[29] Additionally, if the 3 groups were significantly different, pairwise tests, using appropriate adjustments for multiple comparisons, were conducted to determine the significantly different groups. Linear,30 logistic,31 and Poisson32 regression was used to test for differences between the referral groups for each of the 12-week outcomes, as appropriate. Regression analyses were adjusted for age, race, gender, admission medical diagnosis, and original research study. Additionally, admission total function score was adjusted for in the 12-week total function score analysis. Given that the referral decisions were based on patient baseline medical characteristics, other variables were not adjusted for in the 12-week outcome analysis because that would erase the basis of the decisions. Instead, we considered the decision groups as clusters of patients derived from their baseline characteristics.

RESULTS

Sample characteristics are described in Table 2. The experts recommended referrals for 282 (81%) of the cases and did not recommend referrals for 68 (19%). Hospital clinicians recommended 101 referrals (29%) and did not recommend referrals for the remaining 249 cases (71%). Agreement in decisions between experts and hospital clinicians occurred for 165 cases (47%, 66 Do Not Refer + 99 Refer). The experts were 18 times more likely to refer patients for post-acute services than hospital clinicians (OR = 17.8, 95% CI = 4.3–74.4, $P < 0.001$). Despite vast differences in the referral decisions, patients referred by both experts and clinicians (Agree to Refer) varied on only a few characteristics from those referred by expert only (Expert Only Refer). Hospital clinicians were more likely to refer patients who were older (mean age 76.2 vs. 74, $P < 0.001$), had surgery (OR =1.9, 95% CI = 1.1–3.2, $P = 0.025$), had a longer length of stay (mean 9.3 days vs. 6.8 days, $P < 0.001$), or who had lower rates of help being available whenever needed (56.6% vs. 81.6%, $P < 0.001$) than patients referred by experts only (Table 3). These patients were also more likely to report fair or poor health, needed and used more resources including home nursing in the past, and had increased bathing and work/role function deficits than the expert only referral group.

12-Week Outcomes

Ideally, we would compare the outcomes of the expert referral and no-referral separately for those who did and did not receive an actual referral. However, of the 101 who received an actual referral; there were only 2 that received a rating of no-referral from the expert-only

panel. Thus, the analysis compared the 12-week outcomes of the expert-only referral group, to the groups where experts and clinicians agreed on the referral decision.

Resource Utilization at 12 Weeks Postdischarge

Table 4 summarizes the differences between resource utilization outcomes at 12 weeks for the Expert Only Refer group and the other referral groups. Subjects in both the Expert Only Refer (OR = 4.7, 95% CI = 1.6–13.6, $P < 0.009$) and Agree to Refer (OR = 3.9, 95% CI = 1.3–11.9, $P = 0.009$) groups demonstrated an increased risk of a subsequent rehospitalization during the 12-week follow-up compared with the Agree Not to Refer group in unadjusted analyses. In adjusted analysis, the Expert Only Refer group was rehospitalized more often than the Agree to Refer group (23.5% vs. 20.2%, respectively), but differences were not statistically significant.

Patients in the Expert Only Refer group had less acute MD visits during the 12-week period than the Agree to Refer group, but this was not statistically significant (mean 0.9 vs. 1.1, $P = 0.83$). Similar results were found when compared with patients who did not get a referral (mean 0.9 vs. 0.5, $P = 0.083$). In addition, 14.2% of the patients in the Expert Only Refer group used the ED during that same time period compared with 12.2% or 7.7% for the Agree to Refer and Agree Not to Refer groups respectively, although these differences were not statistically significant ($P = 0.392$).

Self-Rated Health and Functional Status at 12 Weeks Postdischarge

Table 4 summarizes the self-rated health and functional status outcomes. For self-rated health status, the Agree to Refer and Expert Only Refer groups rated their health worse than the Agree Not to Refer group ($P = 0.002$). For total function score, all 3 groups were significantly different from each other. The Agree to Refer group (mean = 21.5, SD = 3.0) had worse functional status than the Expert Only Refer group (mean = 18.2, SD = 7.3) ($P = 0.011$) and the Agree Not to Refer group (mean = 12.3, SD = 3.0) ($P < 0.001$). These differences remained statistically significant in the adjusted analyses.

DISCUSSION

This study describes the human and economic impact associated with discharge referral decisions and the opportunity for quality improvement in this area. Experts who reviewed case studies of hospital patients recommended post-acute services for 183 patients who in real life did not receive referrals from hospital clinicians. The experts succeeded in identifying patients who 12 weeks later had a rehospitalization rate of 23% and ER use at 14%. Through better identification of patient needs, perhaps these rates may improve.

Hospital clinicians in this study did adequately identify and refer patients with severe or obvious needs. They were likely to refer patients who were older, had a longer length of stay, did not have help available, and had surgery (therefore had a skilled need for wound care). Other obvious traits were a prior use of post-acute nursing services and deficits in bathing and work/role function. Experts, however, identified patients with additional characteristics who might have benefited from services. They referred patients with worse overall function, more comorbid conditions, worse depression scores, and lower mental status, self-rated health, and quality of life scores than patients not referred. Patients referred by clinicians also had these traits, but except for function and comorbid conditions, this information was not available to the clinicians. Therefore, we can assume this information did not influence their decision-making although other more obvious traits did. Perhaps the availability of higher quality information, measured with standardized instruments, and synthesized in the case studies contributed to differences between experts and clinicians in identifying patients at risk. For

example, experts may have recommended referrals based on information not routinely assessed and documented during hospitalizations including mental status, depression, and self rated health. Additionally, for the hospital clinicians, available information was interspersed throughout the medical record. For the experts it was presented in a case study format. A comprehensive assessment and organized summary of patient status during acute care is needed to support decision-making. Ongoing work by the Centers for Medicare and Medicaid to develop such a tool as part of the Post Acute Care Reform Plan may address this need.[33]

Study findings suggest that many patients may have needed or benefited from a post-acute referral than received it. But, there are several barriers that impede older adults from receiving needed care. These include a lack of time, skill, procedures, and patient assessment information that support accurate discharge referral decision-making.[14,28,34] Baker and Wellman[35] found, in 11 hospitals, that 98% of case managers responsible for discharge planning reported excessive patient loads and responsibilities as job barriers. In this study, the experts had more time and a less stressful environment in which to make their decisions compared with the time and environment afforded to hospital clinicians.[5,28] Furthermore, the experts in this study were instructed to make their referral decisions *based on need* without regard for insurance or Medicare eligibility criteria such as being homebound. The analysis did not show that insurance type or homebound status influenced the decisions for either type of decision maker. In fact, our functional status measure captured only 15% of the Agree to Refer group as being homebound (Table 3). However, telling the experts to ignore homebound status and to focus on clinical need certainly may have influenced their freedom to refer. Therefore, study findings suggest that with higher quality information, time, and freedom to exercise their judgment, clinicians do better in recognizing the needs of elders at discharge.

Study findings were also influenced by the use of a multidisciplinary team of experts. The initial referral decisions made individually by the experts resulted in agreement on only 68 out of 350 cases (19%). It was after the multidisciplinary input provided via online Delphi rounds that experts changed their minds and came to majority or complete agreement. During the Delphi rounds, the experts could see each other's decisions and reasons for the decision, while keeping their identity and area of expertise blinded.[24] Perhaps the perspective from the unique disciplines of social work, nursing, medicine, and physical therapy drew attention to characteristics otherwise not noticed by the individual. Making the perspectives of other disciplines accessible contributed to changes in decisions. A multidisciplinary team more accurately identifies and manages older adults' complex needs resulting in improved care processes and patient outcomes.36 Multidisciplinary discharge planning rounds are highly recommended.34 This is in contrast to the model of discharge planning used by the hospital clinicians in this study. They relied upon individual nurse, social worker, or physician input with varying levels of risk tolerance, assessment and decision-making skill, and knowledge of the benefits of postdischarge care.14,34

Study findings also raise interesting questions about the effectiveness of post-acute services on post acute resource utilization. Patients who received a referral and services were rehospitalized at a rate of 20%, not significantly different than those who were identified by experts as needing services and did not get it (23%). Further study is needed to determine the appropriate level of services essential to address patients' postdischarge needs. Those at lower risk for poor postdischarge outcomes may require only telephone follow-up, whereas those at moderate to high risk may need telehomecare monitoring or transitional care services by advanced practice nurses. Also, in adjusted analysis, referral group no longer influenced rehospitalization, so further research is needed to determine how the control variables of age, gender, race, medical diagnosis, and the characteristics afforded by membership in each study group affect risk of rehospitalization.

Lastly, patients in the Expert Only Refer group were functionally impaired at discharge and remained so at 12 weeks thus increasing their risk for rehospitalization. Wilber et al[37] demonstrated that 65% and 75% of patients used the ED because of a decline in instrumental and physical activities of daily living, respectively. For 88% of this latter group, decreased ability to dress, transfer, and walk resulted in ED use, indicating the importance of providing post-acute services to prevent decline. This also suggests the importance of the input from physical therapy in making discharge decisions.

Limitations

This study was limited to cognitively intact subjects with the medical conditions, treatments, and hospital courses experienced in 6 hospitals in urban, rural, and suburban Southeastern Pennsylvania. The study was limited to the opinion of 8 multidisciplinary discharge planning experts. Other experts may have differing opinions and lower or higher referral thresholds. Further, the sample was largely from existing data from clinical trials when the length of stay was longer than presently and where the patients in 2 out of 3 of the cohorts met high-risk criteria. Perhaps the expert referral rate will be lower in a lower risk sample. Nonetheless, these high-risk individuals did not get post-acute care and their outcomes reflect an opportunity for improvement.

CONCLUSIONS

Study findings suggest that current hospital discharge referral decision-making processes are not adequately identifying patients at risk for poor discharge outcomes. These findings support efforts to develop methods and standards for identifying critical information and assuring multidisciplinary input into assessment and decision making via automated decision support. Equally important is the need to re-examine a stringent Medicare policy that requires homebound status to qualify for home care. This policy excludes access to those who, although not homebound, have complex needs associated with lack of knowledge about the treatment regimen, poor adherence and health behaviors, and a history of multiple hospitalizations and ED use. These barriers strongly influence discharge outcomes and must be addressed.

Decision support combined with improved access might result in substantial improvements in addressing the health needs of a growing population of at-risk elders while achieving health care savings. However, further research is needed to test and refine a decision model that insures accurate identification of the group most at risk. Studies are needed to determine the effect on workflow, workload, referral rates, and patients' outcomes. We also need to increase our understanding of the factors associated with poor discharge outcomes when patients do not receive a referral, and to examine if and how improved access to post-acute care reduces poor discharge outcomes and costs.

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TABLE 1

Data Contained in the Case Studies

Sociodemographic factors:	Age, race, gender
Health state:	Medical diagnosis, comorbid conditions, past medical history, course of the hospitalization, adverse events during hospitalization; admission and discharge medications
Developmental state:	Mental status, education level, self-rated health, functional status, depression scores, language spoken
Health care system factors:	Previous home care use or hospitalization in last 6 mo or 30 d; doctor office or emergency department use, patient or family requests for services
Environmental factors:	Description of the home-location of bathroom and stairs; equipment used, requested or needed
Family system factors:	Marital status, support systems, living arrangements, primary caregiver availability and willingness
Patterns of living:	Substance use, habits, adherence history
Socioeconomic factors:	Insurance and income

TABLE 2

Sociodemographic and Referral Characteristics of the Sample

Variable, Mean ± SD or freq (%)	Sample, N = 348*
Age (yr)	74.3 ± 5.7
Female	188 (54.0%)
Race	
White	256 (73.6%)
Black	90 (25.9%)
Asian or Pacific islands	2 (0.6%)
Income level <20K (INCOMELV)	149 (42.8%)
Education (DMEDUC1)	
Less than high school	104 (30.0%)
Completed high school	115 (33.1%)
Some college/trade school	60 (17.3%)
College graduate	68 (19.6%)
Insurance	
Medicare only	75 (21.5%)
Private/HMO only	50 (14.4%)
Both Medicare and private/HMO	223 (64.1%)
Admission diagnosis	
Circulatory	202 (58.0%)
Digestive	45 (12.9%)
Musculoskeletal/injury	15 (4.3%)
Neoplasm	17 (4.9%)
Neurological	8 (2.3%)
Respiratory	42 (12.1%)
Other	19 (5.5%)
Referral group	
Agree Not to refer	66 (19.0%)
Expert Only Refer	183 (52.6%)
Agree to Refer	99 (28.4%)

*Sample decreased to 350 from 355 because 2 cases were accidentally not sent to the experts and the hospital clinician decision was missing on 3 others. The 2 cases of Clinician Only Refer were not included in the analysis sample.

TABLE 3

Sociodemographic and Health Characteristics of the Sample by Expert/Hospital Decisions

Variable, Mean ± SD or Freq (%)	Expert/Hospital Decisions			P*
	Agree Not to Refer, n = 66	Expert Only Refer, n = 183	Agree to Refer, n = 99	
Age (yr)	72.4 ± 5.0†	74.0 ± 5.7†	76.2 ± 5.7‡§	<0.001
Female	27 (40.9%)	105 (54.7%)	56 (56.6%)	0.059
Race¶	† §	‡	‡	0.007
White	57 (86.4%)	132 (72.1%)	67 (67.7%)	
Black	7 (10.6%)	51 (27.9%)	32 (32.3%)	
Asian or Pacific Islands	2 (3.0%)	0 (0.0%)	0 (0.0%)	
Income level <20K (INCOMELV)	13 (19.7%)†§	89 (48.6%)‡	47 (41.5%)‡	<0.001
Education (DMEDUC1)	† §	‡	‡	0.008
Less than high school	7 (10.6%)	61 (33.3%)	36 (36.7%)	
Completed high school	27 (40.9%)	56 (30.6%)	32 (32.7%)	
Some college/trade school	12 (18.2%)	34 (18.6%)	14 (14.3%)	
College graduate	20 (30.3%)	32 (27.5%)	16 (16.3%)	
Insurance				0.874
Medicare only	13 (19.7%)	38 (20.8%)	24 (24.2%)	
Private/HMO only	9 (13.6%)	29 (15.8%)	12 (12.1%)	
Both Medicare and private/HMO	44 (66.7%)	116 (63.4%)	63 (63.6%)	
Admission diagnosis	† §	‡	‡	<0.001
Circulatory	20 (30.3%)	115 (62.8%)	67 (67.7%)	
Digestive	14 (21.2%)	22 (48.9%)	9 (9.1%)	
Respiratory	13 (19.7%)	20 (10.9%)	9 (9.1%)	
Other	19 (28.8%)	26 (14.2%)	14 (14.1%)	
Total resources needed	0.1 ± 0.3†§	0.5 ± 1.0†‡	0.9 ± 1.2‡§	<0.001
Resource use: Used nursing care before admission	4 (6.1%)	9 (4.9%)†	14 (14.1%)§	0.019
Total resources used [0–5]	0.2 ± 0.6†	0.3 ± 0.7†	0.7 ± 1.1‡§	0.007
Eating function	† §	‡	‡	<0.001
No restriction	33 (50.0%)	47 (25.7%)	32 (32.3%)	
Minor restriction	31 (47.0%)	104 (56.85)	41 (41.4%)	
Occasional/daily help	2 (3.0%)	32 (17.5%)	26 (26.3%)	
Walking function	† §	‡	‡	<0.001
No restriction	41 (62.01%)	41 (22.4%)	20 (20.3%)	
Minor restriction	21 (31.8%)	64 (35.0%)	30 (30.3%)	
Major restriction	4 (6.1%)	78 (42.6%)	49 (49.5%)	
Dressing function	† §	‡	‡	0.001
No restrictions	51 (77.3%)	106 (57.9%)	48 (48.5%)	
Restrictions	15 (22.7%)	77 (42.1%)	51 (51.5%)	
Bathing function	† §	† ‡	‡ §	<0.001
No restriction	59 (89.4%)	110 (60.1%)	45 (45.5%)	

Variable, Mean ± SD or Freq (%)	Expert/Hospital Decisions			P*
	Agree Not to Refer, n = 66	Expert Only Refer, n = 183	Agree to Refer, n = 99	
Minor restriction	6 (9.1%)	31 (16.9%)	12 (12.1%)	
Equipment/daily help	1 (1.5%)	42 (23.0%)	42 (42.4%)	
Toileting function	† §	‡	‡	<0.001
No restriction	52 (78.8%)	80 (43.7%)	32 (32.3%)	
Minor restriction	12 (18.2%)	68 (37.2%)	36 (36.4%)	
Equipment use/incontinent	2 (3.0%)	35 (19.1%)	31 (31.3%)	
Travel function	† §	‡	‡	<0.001
No restriction	56 (84.9%)	83 (45.4%)	45 (45.5%)	
Minor restriction	7 (10.6%)	29 (15.9%)	16 (16.2%)	
Travels freely with help	3 (4.6%)	26 (14.2%)	11 (11.1%)	
Major restrictions	0 (0.0%)	25 (13.7%)	12 (12.1%)	
Homebound	0 (0.0%)	20 (10.9%)	15 (15.2%)	
Activities in home function	† §	‡	‡	<0.001
Usual activity	51 (77.3%)	67 (36.6%)	29 (29.3%)	
Modified activity	14 (21.2%)	64 (35.0%)	30 (30.3%)	
Restricted/no activity	1 (1.5%)	52 (28.4%)	40 (40.4%)	
Work role function	† §	† ‡	‡ §	<0.001
Usual activity	53 (80.3%)	80 (43.7%)	27 (27.3%)	
Modified activity	7 (10.6%)	47 (25.7%)	27 (27.3%)	
Restricted activity	2 (3.0%)	39 (21.3%)	30 (30.3%)	
No activity	4 (6.1%)	17 (9.3%)	15 (15.2%)	
Recreational activities function	† §	‡	‡	<0.001
Usual activity	56 (84.9%)	91 (49.7%)	50 (50.5%)	
Modified activity	10 (15.2%)	49 (26.8%)	22 (22.2%)	
Restricted/no activity	0 (0.0%)	43 (23.5%)	27 (27.3%)	
Total function score [10–51]	12.4 ± 2.7†§	19.1 ± 7.3‡	21.2 ± 8.7‡	<0.001
Total no. of conditions	3.6 ± 2.0†§	5.0 ± 2.3‡	4.9 ± 2.2‡	<0.001
Depression score admission [0–60]	6.7 ± 5.9†§	12.8 ± 10.7‡	12.8 ± 12.4‡	0.001
Imputed depression score admission [0–60]	7.2 ± 5.5†§	13.2 ± 9.3‡	13.6 ± 11.1‡	<0.001
Surgery occurred during admission	16 (24.2%)†	48 (26.2%)†	40 (40.4%)‡§	0.025
Complicated hospital stay	5 (6.1%)†	31 (16.9%)	21 (21.2%)‡	0.031
Length of index stay	4.6 ± 3.4†§	6.8 ± 5.7†‡	9.3 ± 7.4‡§	<0.001
Help is available	65 (98.5%)†	168 (91.8%)	85 (85.7%)‡	0.017
Help available whenever needed	60 (90.9%)†§	131 (81.6%)†‡	56 (56.6%)‡§	<0.001
Subjective health rating	† §	† ‡	‡ §	<0.001
Excellent	23 (34.9%)	10 (5.5%)	9 (9.1%)	
Good	24 (36.4%)	79 (43.2%)	23 (23.2%)	
Fair/poor	19 (28.8%)	94 (51.4%)	67 (67.7%)	
No. prescription medications on discharge	5.2 ± 3.6	5.9 ± 3.2	5.8 ± 3.2	0.246

Variable, Mean ± SD or Freq (%)	Expert/Hospital Decisions			*P*[*]
	Agree Not to Refer, n = 66	Expert Only Refer, n = 183	Agree to Refer, n = 99	
SPMSQ score on admission [0–10]	9.8 ± 0.4[†§]	9.5 ± 0.8[‡]	9.4 ± 0.8[‡]	0.009
Quality of life on admission [0–10]	8.0 ± 2.1[†§]	6.0 ± 2.7[‡]	5.6 ± 3.0[‡]	<0.001
No. health care visits (past 6 mo)	5.1 ± 6.0	6.7 ± 7.0	6.1 ± 8.6	0.111
No. hospital admissions (past 6 mo)	0.5 ± 0.7[†§]	0.9 ± 1.2[‡]	1.0 ± 1.1[‡]	0.003

[*] Test of any differences between the 3 decision groups.

[†] Significantly different from Agree to Refer group.

[‡] Significantly different from Agree Not to Refer group.

[§] Significantly different from Expert Only Refer group.

[¶] Two subjects listed as Asian or Pacific islander excluded from statistical analysis.

TABLE 4

Twelve-Week Resource Utilization, Health Rating, and Functional Outcomes by Expert/Hospital Decision

Variable, Mean ± SD or Freq (%)	Expert/Hospital Decisions			Unadj. P^*	Adj. $P^\dagger$
	Agree Not to Refer, n = 66	Expert Only Refer, n = 183	Agree to Refer, n = 99		
Rehospitalized up to 12 wk	4 (6.2%)‡§	43 (23.5%)¶	20 (20.2%)¶	0.009	0.162
Acute MD visits post DC to 12 wk	0.5 ± 1.1	0.9 ± 1.6	1.1 ± 2.3	0.083	0.502
Used ER between DC and 12 wk	5 (7.7%)	26 (14.2%)	12 (12.2%)	0.392	0.488
Subjective health rating at 12 wk	‡ §	¶	¶	0.002	0.034
Excellent	15 (25.9%)	19 (12.0%)	8 (9.5%)		
Good	35 (60.3%)	77 (48.7%)	42 (51.2%)		
Fair/poor	8 (13.8%)	62 (39.2%)	33 (39.3%)		
Total function score at 12 wk	12.3 ± 3.0‡§	18.2 ± 7.3§¶	21.5 ± 9.3‡¶	<0.001	0.013

*Unadjusted/bivariate test of any differences between the 3 decision groups.

†Test of any differences between the 3 decision groups adjusted for age, race, gender, admission diagnosis, research study, and for total function score at 12 weeks, the admission total function score was added.

‡Significantly different from Expert Only Refer group in unadjusted, and adjusted analyses (if significant).

§Significantly different from Agree to Refer group in unadjusted, and adjusted analyses (if significant).

¶Significantly different from Agree Not to Refer group in unadjusted, and adjusted analyses (if significant).