

## Functional outcomes and rehabilitation: An acute care field study

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**Abstract**—The effectiveness of intervention including occupational therapy in combination with other rehabilitation services was investigated in 193 acute care patients with a variety of diagnostic conditions. The study was conducted in two phases. In both phases, patients who received occupational therapy in conjunction with other services were compared to patients who did not receive occupational therapy. In the first phase, patients (N = 77) were matched according to diagnostic category, age, sex, and severity of impairment. In both phases, outcome measures included length of hospital stay, Barthel Index change scores, and discharge destination. Results revealed statistically significant findings for the measure of discharge destination. Patients who received occupational therapy as part of their rehabilitation program were more likely to be discharged to home environments. This result occurred despite the fact that patients receiving occupational therapy were rated as more severely impaired than patients who did not receive occupational therapy as part of their rehabilitation program.

**Key words:** *measurement, occupational therapy, treatment efficacy.*

### INTRODUCTION

Empirical documentation of the effectiveness of therapeutic interventions is currently a high priority in rehabilitation. Several authorities have argued that the ability to validate positive outcomes will be the *raison d'être* for the rehabilitation disciplines (2,9,14). For example, Fuhrer (3) has asserted that, “The provision of rehabilitation services that are grounded in systematic research is something owed to the persons we serve, and something required if our practice is to be viewed as credible by the informed public” (p. 610).

The slow empirical progress in establishing the effectiveness of rehabilitation programs has been widely discussed in the literature (10). Recently, DeJong (1) argued that part of the difficulty in developing and implementing convincing rehabilitation outcome studies is related to the unit of analysis in rehabilitation investigations. He contends that the unit of analysis in many medical disciplines is a specific organ or body system. As a result, much of the research in these areas is narrowly focused on that unit; for instance, neurology, nephrology, or cardiology. In contrast, the unit of analysis in rehabilitation is the individual: specifically, the

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**Table 1.**  
Summary data for patients in Phase A.

Variable	Received occupational therapy	Did not receive occupational therapy
<b>Gender</b>		
Male	21	10
Female	25	21
<b>Age (years)</b>		
Mean	55.59	50.23
SD	17.96	20.26
<b>Major DRG groups</b>		
Stroke	2	1
Spinal cord	3	6
Arthritis	11	13
Other*	30	11
<b>Length of stay</b>		
Days (mean)	21	15
SD	19	7
<b>Additional services</b>		
P. T.	10 (41.18%)	18 (17.65%)
Speech	42 (61.76)	22 (32.25)
Voc rehab	6 (8.82)	0 (0.00)
Other	9 (13.24)	5 (5.88)

\*Patients in the "other" category include primarily persons with diagnoses of cardiovascular disease, orthopedic dysfunctions, or neurological disorders (MS, etc.).

individual's relationship to the environment. DeJong also notes that the goal of rehabilitation is not to cure a specific organ or body system pathology, but to enhance individual function (1). The practical result of this distinction in unit of analysis and purpose is that rehabilitation outcome studies must operationalize and measure a more complex set of variables.

Despite the difficulties identified by DeJong, some rehabilitation outcome studies have been attempted. The majority of completed studies focus on the rehabilitation of stroke patients. Given the predominance of this diagnostic category, the prevalence of stroke outcome studies is not surprising (8).

Garraway and his colleagues have reported several studies in this area. For example, Garraway, Akhtar, Prescott and Hockey presented the results of a controlled clinical trial exploring stroke rehabilitation (5). Patients in the study were assigned to either a stroke unit or to a standard care medical unit. The outcome of acute rehabilitation was evaluated using an assessment of activities of daily living (ADL). Results from this study indicated that a significantly higher proportion of the patients discharged from the stroke (rehabilitation) unit were independent, when compared with patients discharged from the medical unit.

In a related study, Smith, Garraway, Smith and Akhtar analyzed data from the original trial (13). These authors demonstrated that early presence of rehabilitation therapy, particularly occupational therapy, was positively associated with improved patient performance. In a follow-up investigation to determine whether the initial rehabilitation gains were maintained after discharge, Garraway, Akhtar, Hockey and Prescott found no difference in the functional independence of the stroke unit patients versus the medical unit patients at one year (4).

The series of stroke outcome studies reported by Garraway and associates underscores the importance of early rehabilitation services for patients who had suffered a stroke. The purpose of the present study was to explore further the relationship between the presence of therapeutic intervention and patient performance on rehabilitation outcome measures. Patients in several diagnostic categories were studied. A second purpose of the present investigation, given the failure to maintain initial gains in previous studies (4), was to determine the consistency of patient improvement through planned follow-up procedures.

## METHODS

### Subjects

The study was completed in two phases. Phase A involved 77 subjects from six acute care hospitals located in midwestern United States. The patients were placed in diagnostic categories based on their confirmed medical condition.

In Phase B, 116 patients were evaluated. The patients in Phase B were also recruited from the

**Table 2.**  
Summary data for patients in Phase B.

Variable	Received occupational therapy	Did not receive occupational therapy
<b>Gender</b>		
Male	32	11
Female	54	19
<b>Age (years)</b>		
Mean	65	68.5
SD	12.5	12.25
<b>Major DRG groups</b>		
Hip fracture	17 (22.7)	5 (15.6)
Stroke	33 (44.0)	7 (21.9)
Cardiac	10 (13.3)	10 (31.3)
<b>Length of stay</b>		
Days (mean)	12.014	8.72
SD	6.20	3.61
<b>Level of severity</b>		
Mild	21 (28.38)	22 (59.46)
Moderate	30 (40.54)	12 (32.43)
Severe	23 (31.08)	3 (8.11)

same six hospitals located in the Upper Midwest. All six hospitals provided acute care rehabilitation services for a variety of patients. Descriptive and summary information for the patients in both phases of the study is presented in **Tables 1 and 2**.

### Intervention

The primary purpose of the investigation was to evaluate the effectiveness of rehabilitation services. Specifically, the study was designed to assess the impact of occupational therapy as a rehabilitation service. Occupational therapy was operationally defined as any prescribed intervention provided by a licensed or registered occupational therapist in an acute care hospital setting.

Patients in the treatment condition had to have received at least one-and-one-half hours of occupational therapy over a period of three days during their hospital stay. Some of the patients who

received occupational therapy also were administered other rehabilitation services such as physical therapy, speech therapy, or rehabilitation/vocational counseling. The inability to maintain the integrity of the original independent variable required expanding it to include a combination of occupational therapy and other rehabilitation services.

Whether or not a particular patient received occupational therapy and other rehabilitation services was not manipulated by the investigators. The determination of which patients received occupational therapy, or any other rehabilitation services, was made by the referring physician in each of the hospitals. Thus, some of the patients included in the sample received occupational therapy and other rehabilitation services, and some did not. The treatment and comparison groups in both phases of the study were defined based on whether patients received occupational therapy or did not receive occupational therapy during their hospital stay. (See **Tables 1 and 2**.)

### Outcome measures

Several outcome measures were collected in both phases of the study. The Barthel Index (11) was used to measure functional outcomes. Additional data were collected from the patients' charts on the length of hospital stay, the presence of other rehabilitation services, the number of rehabilitation services treatments and the amount of time spent in therapy. A data discharge form was developed for the study and completed for each patient at the time of discharge. The form included information concerning the patient's discharge destination and listed any services required at discharge. The discharge destination categories for Phase A included home, nursing home, and other. For Phase B, the categories were expanded to include rehabilitation facilities. For each discharge category, supplemental information was included on the form. For example, under *nursing home*, three levels of care were operationally defined. In Level 1 were patients requiring daily skilled nursing care, daily rehabilitation services, and regular observation and assessment by technical and/or professional personnel. Level 2 included patients who had suffered a long-term disability or illness that was relatively stable, and/or patients who were nearing recovery at

discharge. (Patients at Level 2 still required some professional supervision and attention.) At Level 3, patients were physically capable of managing their own needs, and required only occasional assistance with daily activities.

### Procedures

In both phases of the study, a standard screening tool was used to recruit subjects from their respective hospitals. The screening instrument assessed the patient's responsiveness to short-term therapy, and potential for improvement. Potential responsiveness to therapy was defined as a reaction to the presence of the therapists. Subjects also had to correctly follow a simple one-step direction such as "raise your hand." In essence, the screening insured that patients who demonstrated marked disorientation or confusion were not included in the sample.

Therapists who screened patients in the second phase of the study also made judgments regarding their potential for improved discharge destination. This judgment was a simple yes/no determination regarding whether the patient could achieve sufficient change in ADL status to improve his or her discharge destination. The purpose of the screening assessment and potential for improvement measure was to ensure that all patients, regardless of whether or not they received rehabilitation services, were capable of improving as a result of intervention.

In addition to the screening for patient responsiveness to therapy and potential for improvement, all patients were also assigned a ranking for symptom severity. This score reflected the degree of their disability. For the 77 patients in Phase A, the symptom severity score was obtained from the *Clinical Index of Illness Severity* developed by Roueti, Horn, and Kreitzer (12). For the 116 patients in Phase B of the study, the symptom severity was determined by three additional ratings. One was a rating of estimated ADL deficiencies based on the initial screening. A second was the severity of other diseases the patient had, and the extent to which they were controlled while in the hospital. A third rating was the number of complications that developed during the hospitalization. These were measured on a 1-4 (none-to-severe) or 1-3 (none-to-major) scale. The index was simply the sum of the measures on all three scales.

In the A phase of the study, patients who received occupational therapy and rehabilitation services were matched with patients who had not been referred for occupational therapy intervention. Matching was based on the patient's medical diagnosis, sex, age, symptom severity score, and results of the screening evaluation. The matching provided a degree of sample equality in Phase A that did not exist for the Phase B sample.

The Barthel Index was initially administered to each patient as soon as his or her medical condition permitted. A post-test Barthel measure was completed for each patient immediately prior to discharge. The post-test Barthel Index was obtained by a therapist unaware of the initial Barthel score. Examiners were also unaware of whether the patient had received, or had not received, occupational therapy or other rehabilitation services. The final discharge destination and related information on patient status at discharge was also collected by raters who were unaware of the patient's initial performance on the screening and evaluation measures, or the patient's therapy history.

All patients in the sample were evaluated at the beginning of their hospital stay using the measures described above. Patient status was monitored throughout the hospital stay by data coordinators at each hospital. Upon discharge, evaluation information concerning destination, amount and type of services received, and total length of hospital stay was recorded. Follow-up evaluations were conducted on available patients in the B phase one month and three months after hospital discharge, to determine any change in discharge destination or status. The follow-up evaluations consisted of a telephone contact with the patient, and a series of questions related to current residence and function.

### Reliability and data coding

All measures were blindly recorded for the patients in both phases of the study. For example, therapists who screened the patients and evaluated them for responsiveness to therapy were not involved in collecting information related to discharge destination or other outcome measures. Also, as noted above, therapists who collected post-test information on ADL performance using the Barthel Index were unaware of the group membership of any patient or of the patient's original Barthel score.

Interrater reliability of all measures that required judgments on the part of a therapist or examiner was evaluated throughout the study. These reliabilities were obtained by having at least two individuals rate or score the patient on the various tests or evaluation items. For example, interrater reliabilities for the initial screening and potential for improvement decisions were obtained by having two therapists independently evaluate a total of 48 patients for both the A and B phase of the study. All reliabilities were computed using point-to-point percent agreement or product moment correlations. They ranged from 0.87 to 1.00.

In addition to the computation of reliability, training sessions for all data collectors were required. Data collection coordinators were designated at each of the hospital sites. The data collection coordinators reviewed and checked the coding forms that were returned for each patient to help reduce coding and/or clerical errors.

#### Data analysis

Data were initially analyzed to determine if there were differences between patients who received occupational therapy and rehabilitation services versus those who had not. Multiple regression analysis was used to test the relationship between the variables related to intervention and patient performance on the Barthel Index and length of hospital stay. A contingency table analysis was conducted to determine differences in discharge destination for the patients who received rehabilitation services versus those who did not.

## RESULTS

The data collected during Phase A and Phase B of the study were analyzed separately.

#### Phase A results

Multiple regression procedures were used to investigate the relationship between patients' length of hospital stay and relevant therapeutic variables. The analysis revealed that hospital length of stay shared significant variance with numbers of hours of occupational therapy services, number of occupational therapy treatments, and the severity of disability score ( $R^2=0.55$ ,  $p<.05$ ). The number of

hours of occupational therapy and severity of disability were directly related to length of stay (Beta weights = 0.79, [ $p<.05$ ] and 0.20, [ $p<.05$ ] respectively). The number of occupational therapy treatments was inversely related to length of hospital stay (Beta weight =  $-0.41$ ,  $p<.05$ ).

To explore factors associated with functional improvement in patient performance, a change score was constructed using the difference between the initial and final Barthel scores for each patient. The new Barthel change index reflected improvement in functioning evidenced over the period of hospitalization. A regression equation was obtained using the Barthel change index as the outcome variable and the number of hours of occupational therapy, total number of occupational therapy sessions, level of disability, and amount of physical therapy as predictors. The regression value for this equation was not significant. None of the four predictor variables shared significant variance with pre-post-test changes in Barthel scores. There was, however, a significant positive partial correlation between total number of occupational therapy services treatments and the Barthel change score ( $R^2=0.26$ ,  $p<.05$ ).

In addition to analyzing the Barthel change score described above, regression analysis was also performed using only the final Barthel score for each of the patients as an outcome measure. This final Barthel score reflected functional status at the time of discharge, but did not indicate amount of change relative to the pre-test score. The analysis revealed that the final Barthel score shared significant variance with the total number of occupational therapy treatments (Beta weight = 0.45,  $p<.05$ ) and the initial Barthel score (Beta weight = 0.35,  $p<.05$ ). The  $R^2$  for this analysis was 0.32.

A contingency table analysis was conducted to investigate differences in discharge placement for patients in Phase A of the study. Patients were categorized along two levels of the treatment variable, i.e., those who received occupational therapy and rehabilitation services, and those who did not receive occupational therapy services. The discharge factor contained three levels: 1) discharged to home; 2) to nursing home; and, 3) other. A chi-square analysis revealed that significantly more patients who received combined occupational therapy and rehabilitation services were discharged to their homes relative to patients who did not receive

**Table 3.**

Estimate of total help necessary for patients to function outside of the hospital analyzed by diagnostic category.

Diagnostic category		Amount of assistance per week*		
		<1 hr.	1-20 hrs.	>20 hrs.
Cardiac	OT	30	70	0
	No OT	42	41	17
$X^2 = 26.60, p < .05, df = 2$				
Hip fracture	OT	35	65	0
	No OT	0	85	15
$X^2 = 52.66, p < .05, df = 2$				
Stroke	OT	3	79	18
	No OT	29	43	28
$X^2 = 39.91, p < .05, df = 2$				

\*Number in Table represents estimated percentage of patients requiring assistance.

combined rehabilitation services ( $X^2 = 8.89, p < .05$ ). Seventy-five percent of those patients receiving rehabilitation services including occupational therapy were discharged home compared to 55 percent of the patients who did not receive combined services. Ten percent of patients who received occupational therapy and rehabilitation services while in the hospital were discharged to nursing homes, compared with 23 percent of those patients who did not receive combined rehabilitation services and were discharged to a nursing home environment.

### Phase B results

Inspection of **Table 2** indicates that there was considerable difference between the patients who received occupational therapy and rehabilitation services and those who did not receive combined services in terms of diagnostic categories. The difference in diagnostic categories in Phase B reflects the fact that physicians in the six hospitals were more likely to refer patients with specific diagnoses for rehabilitation services that included occupational therapy.

A similar set of regression analyses was computed for the Phase B patients as reported for the Phase A subjects. The first analysis was a regression procedure using length of stay in the hospital as the

outcome variable. No significant relationship was found between any of the predictor variables and length of stay for the Phase B patients. The second analysis involved an investigation of the relationship between functional performance and treatment variables. A Barthel change score, identical to the one developed in Phase A, was used in this analysis. The only significant predictors of the Barthel change index in the Phase B analysis were the severity of disability index and a related score that reflected the amount of residual disability at discharge.

In Phase B, a post-test severity-of-disability rating was obtained prior to discharge. This post-test rating, which was not obtained in Phase A, allowed an additional analysis. Contingency tables were developed using the factor of treatment (combined occupational therapy and rehabilitation services versus no combined rehabilitation services) and severity of disability (none, mild, moderate or severe) for three diagnostic related group (DRG) categories: cardiac, hip fracture, and stroke. Cell sizes for other diagnostic categories were not large enough to include in the chi-square analysis. Chi-square tests revealed that hip fracture patients who received occupational therapy and rehabilitation services had significantly less impairment at the time of post-test, relative to those who did not receive combined rehabilitation services. No statistically

**Table 4.**

Comparison of severity of symptoms for patients receiving occupational therapy and those not receiving therapy.

	Severity of symptoms		
	Mild	Moderate	Severe
No occupational therapy	49%	40%	11%
Received occupational therapy	20%	50%	30%

$X^2 = 22.08, p < .05.$

significant difference was found across the severity of disability scores for the diagnostic categories of cardiac and stroke patients.

In Phase B, information was also collected on the amount of help that would be necessary for the patient to function outside the hospital setting. This judgment was made at the time of discharge. The judgment involved an estimate of the hours per week needed to assist the patient. This information was cross-tabulated as a function of whether patients did or did not receive combined rehabilitation services. As in the previous analysis, the classification was done according to the DRG categories of cardiac, stroke or hip fracture (see **Table 3**). The total help necessary per week was divided into three levels: a) less than one hour; b) between 1 and 20 hours; and, c) greater than 20 hours. A chi-square analysis was computed for patients in each of the three diagnostic categories. The analysis revealed a statistically significant effect for all three diagnostic categories (see **Table 3**). This result suggests that the patients who received combined rehabilitative intervention would require less assistance upon discharge.

The discharge placement of patients in Phase B of the study was investigated using contingency tables similar to those described for Phase A. In the phase B analysis, however, the tables were constructed for the three major DRG categories: cardiac, hip fracture, and stroke. In Phase B, the three levels of the discharge destination factor were home, nursing home, rehabilitation facility and other. The treatment factor contained two levels based on whether or not patients received occupational therapy and rehabilitation services or no combined rehabilitation services. Three chi-square analyses were conducted based on the DRG categories identi-

fied above. The analysis revealed a significant chi-square for the diagnostic category of hip fracture ( $X^2 = 30.32, p < .05, df = 2$ ). The values for the cardiac ( $X^2 = 2.25, p < .15, df = 1$ ) and stroke ( $X^2 = 2.94, p < .30, df = 2$ ) categories were not statistically significant at the  $p < .05$  level. The results for the cardiac and stroke patients, however, were in the anticipated direction.

#### Combined results for Phases A and B

One possible factor related to the finding that patients who received combined rehabilitation services were more likely to be discharged to their home environment versus a nursing home, may be related to the severity of disability. If patients who are initially less disabled in terms of ADL performance are more frequently referred for rehabilitation services including occupational therapy, then this may account for the fact that more patients receiving those services are subsequently referred to home environments. Inspection of the data, however, indicated that patients referred for rehabilitation were more severely ADL-deficient than those not referred for therapy.

Thirty percent of the patients referred for occupational therapy and rehabilitation services were classified as severely disabled in terms of their estimated ADL performance; whereas, only eleven percent of the patients who did not receive combined rehabilitation services were labeled as severely disabled (see **Table 4**).

#### Follow-up results

At one month post-discharge, a follow-up analysis of 89 patients was conducted by phone interview. Follow-up of these patients was to determine their placement status one month following

discharge from the hospital setting. Results indicated that 61 percent of the patients from Phase B, who had received rehabilitation services including occupational therapy, remained in home placements. Sixteen percent were in nursing homes, and seven percent were in rehabilitation hospitals. A chi-square analysis revealed a statistically significant difference in follow-up placement ( $X^2 = 46.93$ ,  $p < .05$ ,  $df = 2$ ) for these subjects.

A second follow-up analysis of twenty randomly-selected patients was conducted to determine their placement status three months following discharge from the hospital. The follow-up contact, which again consisted of a telephone interview, revealed that 30 percent of the patients from Phase B who had received occupational therapy and rehabilitation services remained in home placements. Only 15 percent of the patients not receiving combined rehabilitation services were in home placements at the three-month follow-up. A chi-square analysis revealed a statistically significant difference in follow-up resident status based on whether or not patients had received occupational therapy as a component of their rehabilitation services ( $X^2 = 30.20$ ,  $p < .05$ ,  $df = 2$ ).

## DISCUSSION

The most therapeutically interesting and important finding of this investigation concerned the discharge disposition of patients following hospitalization. In both Phase A and Phase B, patients who received combined rehabilitation services, specifically, occupational therapy, were more likely to be discharged to their home environments rather than to nursing homes or rehabilitation centers. This result occurred despite the fact that patients initially referred to combined rehabilitation services were more severely disabled than those not referred for treatment.

The discharge destination outcome has clear implications related to both functional performance and to the cost-benefit of rehabilitation. The cost savings realized by returning patients to home environments versus placement in nursing home settings should be substantial.

The discharge disposition finding also emphasizes the need for rehabilitation professionals, ad-

ministrators and policy makers not to focus their evaluative efforts on strictly short-term indicators of therapeutic success, such as length of initial hospital stay. DeJong (1) has accurately observed that rehabilitation consumers and policy makers, "Will be increasingly concerned about how an expensive investment in medical rehabilitation can help to avert costs downstream. A significant outcome measure largely ignored by medical rehabilitation is the extent of post-discharge use of health services, particularly inpatient care" (p. 269).

The finding that patients receiving occupational therapy as one of their rehabilitation services are more frequently discharged to home environments, has implications that reverberate beyond the immediate impact on the individual patient. Placement in the home environment allows families to remain intact, permits the patient to participate more fully in family and community activities, and provides the opportunity to maintain a normal pattern and sequence of life activities.

The discharge destination findings are supported by the follow-up results. The overwhelming majority of those patients who received occupational therapy as part of their rehabilitation services in the hospital went home, and were still there after one to three months. This result suggests that rehabilitative intervention continues to exert a positive influence on patient destination even after patients are discharged from the hospital. In contrast, those patients not receiving combined rehabilitation services in the hospital are more frequently discharged to nursing home settings where they may remain for prolonged periods.

While data from this study did not strongly support the assumption that combined rehabilitation services produce an improvement in functional status as measured by change in Barthel scores, there was, nevertheless, some indication in Phase A that therapeutic intervention was associated with functional improvements in ADL. This finding, however, was not supported in Phase B of the study. It is possible that the Barthel Index is not a sensitive enough instrument to measure change in ADL performance in patients over a relatively short period of time. It is also possible that other factors not considered in this investigation may influence the relationship between intervention and functional outcome. For example, Hayes and Carroll recently

reported on the importance of early intervention in the rehabilitation of stroke patients (6). They found that outcomes were significantly improved primarily for patients who began therapy within the first 72 hours of admission. No information was collected in the present investigation on when therapeutic intervention was started in relation to the onset of disability. This is clearly an area in need of further investigation.

## LIMITATIONS AND CONCLUSIONS

The results of this investigation reflect the difficulty of conducting rehabilitation field studies using complex sets of patient variables as the unit of analysis. Since the independent variable in both phases of this study was not manipulated by the investigators, only associational inferences can be drawn between the rehabilitative treatment programs and the various outcome measures. The problem of maintaining the integrity of the independent variable in field studies should be reiterated. Ethical and practical constraints prevented the isolation and controlled manipulation of one single component of the rehabilitative services provided to patients. The possibility of complex treatment interactions and multiple treatment interference could not be eliminated in the present investigation. The difficulties encountered in conducting field studies, however, do not absolve rehabilitation specialists from their responsibility of documenting the usefulness of therapeutic interventions. As Keith has

noted, outcome measurement in rehabilitation is every provider's responsibility (7).

This study represents an initial attempt to address the responsibility of all rehabilitation specialists to provide empirical evidence regarding therapeutic outcomes. Future outcome research should be designed to investigate the nature and type of support services that are required to maintain home placement. Additional studies are also needed to explore the extent to which former rehabilitation patients can live independently and productively in home settings and the degree to which they can maintain home placement and avert medical complications.

The results of this study provide more implications than conclusions. One clear implication is that rehabilitation therapy produces changes that are of social importance and economic interest. We hope that the findings reported here will provide the incentive for future research that will better define how therapeutic intervention can be delivered to rehabilitation consumers.

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