Objective. This study was conducted to identify factors that were significant in predicting occupational therapy treatment choices and discharge outcomes after inpatient rehabilitation for 112 patients who had experienced a cerebrovascular accident.

Method. A retrospective descriptive study was conducted.

Results. According to discriminant function analysis, the cerebrovascular accident disability score (i.e., level of functional disability) during the initial evaluation period was the predictor of discharge outcomes with the most clinical significance. A greater proportion of occupational therapy assessment units was the most influential occupational therapy factor associated with a positive discharge outcome. In one inpatient rehabilitation setting, a greater proportion of occupational therapy intervention for all study subjects was directed at the level of impairment compared to the level of disability.

Conclusion. Shorter inpatient stays, as well as shifts to outpatient rehabilitation, may require occupational therapists to examine whether intervention at the level of impairment or disability yields the best functional outcomes for patients who have sustained a cerebrovascular accident.

Background of CVA Rehabilitation and Discharge Outcomes

CVA is the single most common diagnosis encountered by occupational therapists in the clinic setting (Trombly, 1989). Although a decrease in the prevalence of CVA was noted in the 1970s, this trend reversed in the 1980s (Gar-
rison, 1991). The prevalence of CVA in the general population has increased to 500,000 cases reported annually (Lewis, 1990).

Treatment planning for the patient with a CVA is a complex process. The location of the lesion, the extent of the patient’s impairments, the patient’s social support system, and the availability and quality of staff members and resources are some of the factors that affect the assessment tools and intervention modalities chosen by occupational therapists for patients who have sustained a CVA. Location of the CVA is especially important in directing the course of treatment because it affects both the type of impairment experienced by the patient and the pattern of recovery to be expected. Some generalizations about right versus left CVA can be identified (Garrison, 1991). Left CVA may be accompanied by right hemiplegia, aphasia, and other communication impairments; however, the ability to learn from demonstration and experience may be retained. Right CVA is usually coincident with perceptual–motor problems and loss of visuospatial memory. Patients with a right CVA may show poor insight and judgment and impulsive behavior. Left-sided neglect is also a common impairment for the patient with a right CVA. Awareness of the differences between left CVA and right CVA is seen as necessary to best accommodate the learning differences involved and to provide an effective intervention program.

To categorize the consequences of pathology, such as CVA, and assist in developing a conceptual framework for defining a program philosophy, occupational therapists may apply the World Health Organization’s (WHO) classification model of disability (WHO, 1980). This model describes the consequences of pathology, such as a CVA, in the following hierarchical order: impairment (i.e., sensory, motor, cognitive, psychological, or social deficits), disability (i.e., self-care, work, or leisure task deficits), and handicap (i.e., the contribution of the sociocultural environment and its subsequent effect on role performance) (Holm & Rogers, 1989; Wilkerson, 1991).

Although professionals disagree as to how much the model can be used to organize knowledge for guiding intervention, the model is effective for categorizing the types of interventions provided by occupational therapists (Christiansen, 1991; Holm & Rogers, 1989).

Research is replete with factors that best predict recovery outcomes for patients who have sustained a CVA (Granger, Hamilton, Gresham, & Kramer, 1989; Osher et al., 1988; Wade & Hewer, 1987). The Framingham Study (Kelly-Hayes et al., 1988) is one of the most extensive projects conducted in this area of research. Results from this study indicated that discharge outcome with respect to independent living was determined as much by social factors as by severity of disability. Another extensive study was the Stroke Rehabilitation Outcome Study (SRO) (Granger et al., 1989), whose findings determined that functional performance was a primary indicator of patient outcomes. Numerous other studies concurred with this finding (McCusker et al., 1989; Rondinelli, Murphy, Wilson, & Miller, 1991; Silliman, Wagner, & Fletcher, 1986). Research conducted by Carter, Oliveira, Duponte, and Lynch (1988) assessed both the pretraining cognitive abilities of CVA patients and a cognitive remediation training program to ascertain how each affected functional outcome. Carter et al. (1988) found a positive correlation between initial cognitive skills of the CVA patient and activities of daily living (ADL) functional outcome scores. Furthermore, results indicated that patients receiving remediation training in cognitive skills improved significantly in functional ADL skills. This study supported the premise that intervention at the impairment level (cognitive remediation training) may positively affect functional recovery.

The studies cited above provide empirical evidence to support the validity of using demographic (i.e., social support, living arrangements), diagnostic (i.e., CVA type, CVA severity), and therapy-related (i.e., functional performance) variables to predict discharge outcomes. Consideration of these predictors when developing an intervention program might facilitate a more favorable discharge placement for the patient who has sustained a CVA. This article describes demographic and diagnostic predictor variables and variations in occupational therapy assessment and intervention as they relate to discharge outcome.

Method

Subjects

A retrospective descriptive study that employed data collected from chart reviews and billing statements was conducted. A computer-based file review of all patients treated in one occupational therapy program at a large rehabilitation hospital in the Pacific Northwest was used to determine subject selection. Patients were selected from consecutive cases by admission dates and placed in one of three stratified discharge categories: home alone, home with a significant other, or long-term-care facility. Patients who sustained a CVA and were admitted to the rehabilitation program from November 1990 through June 1991 were included in the study if they met the following criteria as determined by chart review:

1. Primary diagnosis for admission was a single CVA.
2. The following information was available: (a) age, (b) gender, (c) living arrangements and family constellation, (d) type of insurance coverage, (c) lateralized site of CVA, and (f) ADL initial evaluation data.
3. Patient lived at home before hospital admission.

Exclusion criteria for subject selection were as follows:

1. Diagnosis of substance abuse disorder according
to Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1987).
2 Discharge from the hospital against medical advice.

**Predictor Variables**

Thirteen predictor variables were entered into the analyses: six demographic variables (age, gender, marital status, insurance coverage, living situation before CVA, and social support system other than identified significant other living within the region), three diagnostic variables (CVA type, length of hospital stay, CVA disability score), and four occupational therapy factors (billing units for assessment, impairment intervention, disability intervention, and adaptive aids). Derivation of several variables used in the analyses are explained as follows.

**CVA disability score.** Data collected on subjects' level of functional ability during the initial evaluation period were used to assign a CVA disability score. The Occupational Therapy ADL Evaluation Form, administered to the majority of CVA patients by their primary occupational therapist during the initial therapy sessions, was used for this purpose. It addressed three categories of ADLs—transfers, grooming, and dressing—in relation to six levels of physical assistance. Levels of assistance were assigned the following values: 0 = dependent, 1 = maximal assistance, 2 = moderate, 3 = minimal, 4 = supervision, and 5 = independent. The values were tallied for all ADL categories in relation to all ADL categories available for evaluation. The higher the CVA disability score, therefore, the greater the patient's functional independence. When the usual ADL form was not available, alternate ADL assessment forms or progress notes made during the first week of rehabilitation were used. Data from these sources were then transferred onto the ADL forms' corresponding items and scored. The total score on all scored items divided by highest possible score on all scored items yielded a percentage that became each subject's CVA disability score.

**Occupational therapy factors.** Billing statements were divided into four categories of occupational therapy services: assessment, disability intervention, impairment intervention, and adaptive aids. The focus of intervention was subdivided into the two levels of disableness of the WHO model, disability and impairment. Therapy factors were as follows:

1. **Assessment:** screening, patient-related consultation, and evaluations focused on ADLs, sensorimotor skills, cognitive skills, perceptual skills, need for adaptive technology, and reassessment
2. **Disability intervention:** intervention focused on daily living skills, homemaking, child care, job analysis and modification, play and leisure, and intervention aimed at prevention of further disability
3. **Impairment intervention:** intervention focused on reflex integration, range of motion, gross and fine motor coordination, strength and endurance, sensory integration, orientation, concept and comprehension, and cognitive integration
4. **Adaptive aids:** the process of constructing, ordering, fitting, or educating patients in the use of orthotics, prosthetics, equipment, and assistive and adaptive devices.

Finally, a single percentage score was determined for each therapy category in relation to the total number of therapy units. Percentage scores reflected the proportion of therapy received by each subject from the four occupational therapy categories.

**Discharge outcomes.** Discharge placement sites were grouped into the three discharge categories: home alone, home with significant other, and long-term-care facility (LTCF). An inherent problem of retrospective studies is the researcher's inability to gather information that was not available in records reviewed, but that might have significantly affected the patient's outcome scenario. For example, a subject might have been discharged to an LTCF instead of to the family home because the subject's spouse has dementia and the family could not absorb another dependent member. However, the advantage to the descriptive method chosen for this study was that it allowed for analysis of a large CVA patient population that received a wide range of interventions. The precedent for retrospective chart and billing reviews as viable research tools when examining outcome variables has been well established by the Framingham Study (1988) and studies by Rondinelli et al. (1991) and Granger, Hamilton, and Gresham (1988). A substantial amount of data for the present study was gathered from the clearly delineated intervention categories found on the billing statements. Upon being hired, in the setting where this study took place, occupational therapists were instructed in and provided with detailed written guidelines describing the criteria for use of each intervention category included on the billing statements.

**Procedures**

Permission was procured to review billing and chart histories of all patients with CVA admitted to the rehabilitation hospital between November 1990 and June 1991 from the university and hospital research review committees. Checklists were developed and used to gather and verify all data.

**Data Analysis**

Descriptive statistics were calculated to characterize the
sample. A direct discriminant function (DISCRIM) analysis was performed to determine the relationship between the independent predictor variables and the dependent discharge outcomes. The influence of functional disability at the onset of therapy in relation to therapy choices was examined with an analysis of variance (ANOVA). A post hoc Scheffe procedure was performed to further identify significant differences among groups.

**Results**

One hundred twelve subjects met the inclusion and exclusion criteria. Slightly more than half were women, and most were married and living with a significant other before the CVA. The majority could also identify a social support person, living in Washington State, other than a spouse or live-in partner. The mean age of the sample was 67.8 years. Approximately equal numbers of subjects had sustained right and left CVAs and most exhibited a moderate level of disability and were insured through Medicare or Medicaid. The mean length of rehabilitation inpatient stay was 27.4 days. The greatest proportion of occupational therapy units billed for all subjects was for intervention services provided at the impairment level ($M = 56\%$, $SD = 13.4\%$), followed by intervention at the disability level ($M = 28.8\%$, $SD = 11.4\%$), assessment ($M = 12.5\%$, $SD = 8\%$), and therapy for adaptive aids ($M = 2.7\%$, $SD = 2.6\%$). There were no significant differences in discharge outcome based on CVA type ($\chi^2 = 4.38, p = .35$). Most subjects were discharged home with a significant other; the next largest group was those discharged to an LTCF, and the next was those discharged home alone (see Table 1).

As identified by DISCRIM analysis, the demographic variables of living situation before CVA, marital status, and age, along with the diagnostic variable of CVA disability score, made significant contributions to the prediction of discharge outcome ($p \leq .001, .003, .05, .004$, respectively).

**Table 1**

<table>
<thead>
<tr>
<th>Database Collected for Sample (n=112)</th>
<th>Frequency</th>
<th>Percent</th>
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<th>Range</th>
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<td>3.6</td>
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<td>33.9</td>
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<td>With significant other$^a$</td>
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<td>Support$^b$</td>
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<td>29</td>
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<td>Right</td>
<td>51</td>
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<td>Left</td>
<td>54</td>
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<td>Other</td>
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<td>CVA disability score$^c$</td>
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<tr>
<td></td>
<td>62.2%</td>
<td>5%-99%</td>
<td></td>
<td></td>
<td>21.90</td>
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<td>Length of stay (days)</td>
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<td>13.19</td>
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<td>Assessment</td>
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<td>3%-55%</td>
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<td>Disability intervention</td>
<td>28.8%</td>
<td>5%-75%</td>
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<td>Impairment intervention</td>
<td>56.0%</td>
<td>21%-94%</td>
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<tr>
<td>Adaptive aids</td>
<td>2.7%</td>
<td>0%-11%</td>
<td></td>
<td></td>
<td>2.64</td>
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<td><strong>Outcome variables</strong></td>
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<td>Discharge disposition</td>
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<tr>
<td>Home alone</td>
<td>11</td>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With significant other</td>
<td>76</td>
<td>68.0</td>
<td></td>
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</tr>
<tr>
<td>LTCF</td>
<td>25</td>
<td>22.0</td>
<td></td>
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</tr>
</tbody>
</table>

*Note: CVA = cerebrovascular accident, LTCF = long-term care facility.

$^a$significant other refers to spouse or live-in partner.

$^b$Support refers to a friend or family member living in Washington State, other than identified significant other.

$^c$Percent score obtained from Activities of Daily Living Evaluation Form or equivalent as explained in text; scale: 0-99%: 0 = most disabled, 99 = least disabled.

$^d$Percent figured in relation to total time in occupational therapy.
The findings of the study did document the relationship of functional disability at the onset of therapy and discharge outcome; specifically, the more severe the CVA, in regard to functional abilities, the more likely the patient's discharge to an LTCF. These findings are similar to those of Osberg et al. (1988) and Lord and Hall (1986), who found no significant differences in overall functional outcomes for patients who received intervention at what the WHO model designated as the disability level (functional focus) rather than the impairment level (enablers of function).

We also believed that the differential configuration of impairments resulting from CVA type would affect discharge outcome. The CVA type, however, did not significantly affect discharge outcomes in this study. Other studies also found no significant differences in overall functional performance or discharge outcome based on site of CVA (Osberg et al., 1988; Wade & Hewer, 1986).

The primary purpose of this study was to identify demographic, diagnostic, and occupational therapy factors that influenced discharge outcomes of persons who had sustained a CVA. Although the prediction model accurately classified 75% of the discharge outcomes on the basis of data gathered at admission, the predictor variables with the greatest clinical significance (e.g., that could be influenced by occupational therapy services) that was entered into the DISCRIM analysis was the CVA disability score. The CVA disability score scale goes from 0% to 99%, with 0 reflecting most disability and 99 reflecting least disability. Subjects who were discharged home alone had the highest mean CVA disability score (75%), followed by those who were discharged home with a significant other (64%) and those discharged to an LTCF (51%).

To isolate the influence of CVA disability on each of the four therapy factors, subjects' CVA disability scores were divided to yield four groups with equivalent numbers of subjects, by level of severity (Level 1 was the group with the most severe functional disabilities, Level 4 was the group with the least). A one-way ANOVA and a Scheffé procedure were then used to determine the location of significant differences, which indicated that the Level 4 group received significantly more time in assessment than all remaining groups ($p < .01$) (see Table 3 and Figure 1). The Level 1 group received significantly more units of intervention focused on the disability level than did the Level 4 group ($p < .05$). The group with moderate disabilities (Level 3) received more adaptive aid therapy units than did Levels 1 and 2 ($p < .01$). No statistically significant differences were identified among groups for intervention focused on impairment.

Differences across discharge outcomes for the therapy factors of assessment and disability intervention, although not statistically significant, were in a consistent direction. The proportion of therapy time spent on assessment was greater for those discharged to the home alone than for those discharged home with a significant other, which in turn was greater than for those discharged to an LTCF. In contrast, the proportion of time spent on task disabilities was least for those discharged home alone, greater for those discharged home with a significant other, and greatest for those discharged to an LTCF (see Table 4). The proportion of intervention time focused on impairment and adaptive aids, however, showed little variation based on discharge outcome ($\leq 1\%$).

Discussion

The primary purpose of this study was to identify demographic, diagnostic, and occupational therapy factors that influenced discharge outcomes of persons who had sustained a CVA. Although the prediction model accurately classified 75% of the discharge outcomes on the basis of data gathered at admission (e.g., living situation before CVA, marital status, CVA disability score, and age), the only significant variable that could be influenced by the occupational therapy process was a patient's functional deficits at admission, represented by the CVA disability score. We hypothesized that variation in emphasis during assessment and intervention would predict discharge outcome, but that was not the case. The lack of variation found among the proportion of units devoted to a specific category of therapy services, in relation to discharge outcome, however, is consistent with the findings of two other outcome studies. Jongbloed, Stacey, and Bright (1988) and Lord and Hall (1986) also found no significant difference in functional outcomes for patients who received intervention at what the WHO model designated as the disability level (functional focus) rather than the impairment level (enablers of function).

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to those of other studies that determined that functional performance at admission (McCusker et al., 1989; Rondinelli et al., 1991) or discharge (Silliman et al., 1986) was a primary indicator for patient discharge outcome. As a group, subjects in the current study who went home alone had 24% less functional disability at the onset of therapy (as determined by CVA disability score) than the group discharged to LTCFs. The clinical implication of this finding is that patients most at risk for institutionalization can be identified at the onset of therapy, and the protocols of prior patients who were not discharged to LTCFs can be examined to determine what differences in type and number of therapy units may have contributed to differential outcomes.

For example, across the therapy factors of assessment, disability intervention, and adaptive aids, significant variations were noted for patients receiving different CVA disability scores. Subjects with least severe disabilities received a significantly greater proportion of assessment than did subjects with the most severe disabilities. Understandably, these patients would have a wider range of function within deficit areas to assess and therefore would require more time to perform a complete battery of assessments. The reverse could be argued: the more severe the disability, the greater the units of time that should be allotted for completion of an assessment battery due to the severity of deficits.

The significantly fewer units of intervention aimed at the disability level for the least disabled group was unexpected, because we had reasoned that this group would benefit most from intensive therapy focused on compensatory strategies for everyday tasks. The billing units indicated that the opposite occurred: a significantly greater number of therapy units for the group with the most severe disabilities, not the least, were focused at the disability level. The group with moderate disabilities was provided with a greater proportion of therapy time for adaptive aids than the two groups with least severe disabilities ($p < .01$).

Subjects in the group with moderate disabilities were most likely to be discharged home with a significant other. Although these subjects had more functional disabilities than those discharged home alone, the provision of adaptive aids as well as the support of their significant

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Table 4

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Discharge Outcomes</th>
<th>Home Alone</th>
<th>Home With Significant Other</th>
<th>LTCF</th>
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<td>Assessment</td>
<td></td>
<td>15.7</td>
<td>12.7</td>
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<td>Disability</td>
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<td>30.6</td>
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<td>Impairment</td>
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<td>56.0</td>
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<td>Adaptive aids</td>
<td></td>
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<td>2.8</td>
<td>2.6</td>
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</table>

Note: Percentages represent proportion of total therapy units per factor. LTCF = long-term-care facility.

Figure 1. Mean therapy units for each therapy factor by level of cerebrovascular accident disability.
Others were the likely factors that enabled them to return home. Subjects in the group with the most severe disabilities may have been unable to adequately manage adaptive aids, whereas the higher level of functional performance of the group with the least severe disabilities may have made the provision of adaptive aids unnecessary.

The overall proportion of time divided among the four established therapy factors for all subjects in this study was not consistent with a WHO framework for occupational therapy that emphasizes "the provision of occupational therapy services [as a] means of reducing disability and handicap, not of affecting the impairment" (Wilkerson, 1991, p. 6). For subjects in this study, an average of 56% of occupational therapy time was focused on reducing impairment and only 28% on reducing disability. This finding may simply be indicative of a philosophical approach to therapy other than that conceptualized in the WHO model. For example, Dutton (1989) portrayed exercise and functional activity as ends of a continuum, rather than discrete categories of intervention. She stated that intervention at the impairment level could be used advantageously as preparation for functional activity, either within a therapy session or over the recovery period. Similarly, perhaps the findings in the current study reflect trends in inpatient rehabilitation: the patients seen by the occupational therapists in inpatient rehabilitation may have been less able overall to perform functional activities designed to reduce disability, due to the severity of their deficits. For these more medically fragile patients, the occupational therapists in inpatient rehabilitation emphasized intervention at the level of impairment, leaving intervention aimed at reducing functional disabilities to be carried out in outpatient programs, home health programs, or LTCFs.

Limitations and Recommendations

Factors other than focus of therapy and diagnostic characteristics may better explain this study's findings. The demographic characteristics of age, marital status, and living situation before the CVA also entered the prediction model, but their effect could not be analyzed more fully due to the incomplete nature of the data. Data coded to indicate why patients did not return to their prior living situation would greatly enhance future studies. For example, when severity of disability was not the issue, was discharge outcome negatively affected by architectural barriers in the home, lack of formal or informal caregiving, or factors such as overburdening a spouse who was already medically fragile or had dementia?

The use and categorization of billing units may also have imposed limitations on the study. Combining the 26 assessment and therapy billing options into four broad factors may have obscured the distinctions among the specific treatments administered. The billing categories may not have adequately represented the functional components present within a therapy session. For example, a therapist might have checked the strength and endurance item on the billing form (impairment level), when in fact the patient was performing a homemaking task (disability level) designed to improve strength and endurance, and not performing exercises solely focused on remediation of the underlying impairment.

Billing units could be an appropriate data source for future studies examining the type and number of therapy units that contribute to differential discharge outcomes. The requirements by third-party payers to document functional outcomes emanating from occupational therapy services provide a rationale for occupational therapy programs to reexamine their billing systems. Data from billing units that would be effective for research, however, should accurately reflect the exact nature of the assessments and interventions provided if they are to be used for quality improvement studies and to examine the effect of different occupational therapy services on patient progress and discharge outcomes. Such a billing system would be useful for clinical research as well as reimbursement.

Summary

In the present study, 13 predictor variables were analyzed in relation to 3 discharge outcomes. The CVA disability score, which represented the level of functional disability of the patient during the initial evaluation period, was the only predictor of discharge outcomes with clinical significance. The occupational therapy factor most associated with a positive discharge outcome was a greater proportion of therapy units focused on assessment. Using the framework of the World Health Organization model, the findings indicated that for all subjects, regardless of demographic and diagnostic characteristics, a greater proportion of intervention time was directed at the level of impairment (56%) than at the level of disability (28%). With shorter patient stays in inpatient rehabilitation settings and increased emphasis on functional outcomes, this allocation of intervention time may warrant further investigation.

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References


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