Occupational Adaptation Model Versus Biomechanical–Rehabilitation Model in the Treatment of Patients With Hip Fractures

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Key Words: consumer satisfaction • intervention process, occupational therapy • outcome and process assessment (health care)

Objective. This study compared the effectiveness of the Occupational Adaptation frame of reference with the biomechanical–rehabilitation model in the treatment of two groups of 20 patients post–hip fracture.

Method. Using a quasi-experimental design, groups were compared on changes in scores on the Functional Independence Measure (FIM™), a satisfaction questionnaire developed for this study, and discharge environment.

Results. No group differences in FIM changes for the total stay were found. However, average FIM score change per day of hospitalization and overall patient satisfaction were higher in the Occupational Adaptation group. No significant differences in the discharge environment were present.

Conclusion. Both groups benefited from occupational therapy intervention. Occupational Adaptation was associated with a more efficient outcome and greater patient satisfaction.

Persons with hip fractures account for one half of all hospital days for all fractures (Perez, 1994). In the United States, approximately 250,000 people sustain hip fractures each year. Ninety-eight of 100,000 persons sustain hip fractures sometime in their lifetime (Egan, Warren, Hessel, & Gilewich, 1992). Hip fractures typically occur in women 65 years of age and older (Perez, 1994) and result in a major loss of self-care function and independence. Rehabilitation after hip fracture plays an important role in promoting independence in mobility and activities of daily living (ADL) (Perez, 1994). Much of the literature regarding treatment programs for this population (e.g., Rush, 1996; Shelton, 1996; Stinnett, 1996; Thomas, 1996) describes treatments such as education in hip precautions, range of motion (ROM) and strengthening exercises, mobility activities for bed and use of walker, balance training, gait training, ADL, home safety, assistive equipment for ADL, physical agent modalities, and durable medical equipment for home. These authors outlined specific types of treatments offered to patients with hip fracture; however, they did not include reports of therapy effectiveness.

The intent of this study was to determine which frame of reference—biomechanical–rehabilitation versus Occupational Adaptation (Schkade & Schultz, 1992; Schultz & Schkade, 1992)—produces better outcomes after occupational therapy intervention for patients with hip fracture. Outcome measures included effectiveness in...
terms of improvement in functional status, patient satisfaction with the treatment result, and type of discharge environment.

Biomechanical–Rehabilitation Model

The rehabilitation model has typically been used in the treatment of patients with hip fractures in rehabilitation settings. This model begins with evaluating the patient's physical segments, including head, trunk, and extremities, to determine strengths and deficits that affect functional abilities for ADL. The therapist considers the patient's goals in the process; however, the emphasis is on enabling the patient to overcome deficits and build on existing strengths. The environment may be modified or assistive equipment used to promote independence in ADL (Seidel, 1998).

The biomechanical model is commonly seen in conjunction with the rehabilitation model. It incorporates exercise and activity to reduce deficits in the patient's occupational performance components. This model emphasizes the reduction of physical deficits to promote independence in ADL. The biomechanical model includes ROM exercises, strengthening exercises, and mobility activities. In this study, the combined models are referred to as the biomechanical–rehabilitation model.

Occupational Adaptation Model

The Occupational Adaptation model offers an explanation for an adaptation process that proposes occupation both as the means through which adaptation occurs and the end for which functional adaptation is desirable. According to Schkade and Schultz (1992), Occupational Adaptation is a normative process that leads to competence in occupational functioning. Illness or trauma may disrupt this internal process and result in dysadaptive responses to daily occupational challenges. In this model, the therapist's role is to facilitate restoration of a functional internal adaptation process. A patient engaged in personally meaningful occupational activities will most likely experience restoration of a functional adaptation process (Dolecheck & Schkade, 1999). An adaptive response will result in the patient achieving greater relative mastery in his or her occupational activities. Relative mastery is measured by three properties: efficiency, effectiveness, and satisfaction (Schkade & Schultz, 1992). Occupational Adaptation does not exclude biomechanical and rehabilitation principles for therapeutic intervention; however, the primary focus of treatment is placed on the patient's preferred occupational role, involvement in controlling and evaluating the results of the therapy process, and affecting the adaptation outcome (Buddenberg & Schkade, 1998).

A hallmark of the Occupational Adaptation approach to intervention is that the patient evaluates his or her own progress in therapy by self-assessing the properties of relative mastery: efficiency (use of time, energy, resources), effectiveness (extent to which the desired goal was achieved), and satisfaction to self and society (extent to which the patient feels personally satisfied with progress and the satisfaction of others with progress). Relative mastery is a nonstandardized, phenomenological assessment. The patient is involved not only in goal setting, but also in assessing the outcome of intervention as he or she experiences it. Relative mastery is intended to provide the basis for continued self-evaluation after discharge when the patient is confronted with new challenges.

The therapist practicing from an Occupational Adaptation approach conducts whatever evaluations are demanded by the facility documentation requirements. Intervention is planned around occupational readiness (e.g., increasing strength) and occupational activity (patient-selected activity that is personally meaningful).

Clinical studies to date on Occupational Adaptation have demonstrated greater functional independence gains in patients with cerebrovascular accidents (CVAs) (Gibson & Schkade, 1997) and greater performance gains in patients with hip fractures on tasks chosen by patients as important to them (Buddenberg & Schkade, 1998) when compared to primary biomechanical approaches. Dolecheck and Schkade (1999) reported greater dynamic standing balance in patients with stroke engaged in personally meaningful occupation. In three cases of persons with CVA who had been discharged from therapy as having plateaued, these persons made marked gains in functional tasks and improved mobility when Occupational Adaptation intervention was used in the home setting (Johnson & Schkade, 2001).

Three hypotheses were tested in this present study. The first was that patients receiving occupational therapy intervention using an Occupational Adaptation approach would demonstrate greater gains in functional independence outcomes than those treated using the biomechanical–rehabilitation approach. This hypothesis was based on two assumptions of Occupational Adaptation:

1. Occupation provides the means by which human beings adapt to changing needs and conditions, and the desire to participate in occupation is the intrinsic motivational force leading to adaptation (Schkade & Schultz, 1992).

2. For maximal effect on occupational adaptation, the activities, tasks, methods, and techniques of intervention must be centered on occupational activity that promotes satisfaction for the patient and society (Schultz & Schkade, 1992). Schultz and Schkade (1992) further proposed that focus on an occupational role chosen by the patient will lead to greater gains in functional skills than direct training on those skills.

The second hypothesis was that patients in the Occupational Adaptation (OA) group would report greater satisfaction with their occupational therapy intervention than those in the biomechanical–rehabilitation (B/R)
group because of the degree to which they would be included in the therapy process. A third hypothesis was that a greater number of patients in the OA group would be discharged to a community setting as opposed to a more restrictive environment.

Method

Study Design

A quasi-experimental design was chosen for this study. Two convenience samples of patients who had sustained hip fractures received contrasting occupational therapy treatments after surgery. The independent variable was the model used for treatment. The dependent variables included change in patients’ level of independence in ADL as represented by scores on the Functional Independence Measure (FIM™); Granger, Cotter, Brown & Fiedler, 1993), patient satisfaction with the treatment effectiveness, and discharge setting.

Participants

Forty patients in a rehabilitation hospital were selected as participants. Inclusion criteria included (a) man or woman 65 through 85 years of age; (b) either first-time status post–hip replacement or open reduction internal fixation (ORIF); (c) cognitive ability to participate in the therapy process; and (d) willingness to participate in the study. The treating occupational therapist determined the participants’ cognitive ability by assessing short-term memory, long-term memory, and ability to follow instructions and orientation to person, place, and time. Function in these domains was documented in the initial occupational therapy evaluation. Exclusion criteria included major conditions that negatively affected participation in ADL (e.g., Parkinson’s disease, CVA, Alzheimer’s disease). After Institutional Review Board approval for the study, all patients admitted to the rehabilitation center who met the specific criteria during the time of the study were asked to participate. All patients who met the inclusion criteria agreed to participate and signed informed consent forms.

Instruments

The standard initial evaluation in the occupational therapy department was used for both groups for the purposes of facility-specific documentation. The evaluation included history of current condition, medical history, patient goals, precautions, upper-extremity strength status, ADL status, functional mobility status, cognitive status, environmental mobility status, ambulation status, activity tolerance, problem areas, long-term goals, short-term goals, and training areas.

Functional skills were measured with the FIM, which is widely used in rehabilitation settings to assess functional independence in ADL. The FIM assesses bathing; upper-extremity and lower-extremity dressing; transfers to and from bed, chair, wheelchair, toilet, and tub or shower; and locomotion for walking. It uses a 7-point scale to measure disability, ranging from total dependence (1) to complete independence (7). Other data customarily recorded in this facility include demographic information on diagnosis, gender, ethnicity, date of birth, geographic location, family support system, number of clinic visits during stay, length of stay, and placement setting at discharge.

Therapist journals. The treating occupational therapist kept daily journals of treatment sessions for participants in both groups to demonstrate that each model was carried out in a manner consistent with its principles. The first author monitored the journals to verify that the therapist had followed each model’s intervention principles.

Relative mastery scoring. Consistent with the intervention principles of Occupational Adaptation, the participants in the OA group evaluated their progress in terms of relative mastery. A change in relative mastery is one indicator that the patient’s internal adaptation process is being affected. The first author constructed the relative mastery instrument for this study. It was a simple scoring sheet with ratings for efficiency, effectiveness, and satisfaction. Efficiency (task performed with adequate energy level) was rated poor, fair, good, or excellent. Effectiveness (level of assistance required to complete the task) was rated as maximum assistance, moderate assistance, minimum assistance, or no assistance. Satisfaction (patient’s satisfaction with performance of task) was rated as not pleased, slightly pleased, pleased, or very pleased. Relative mastery evaluation was not conducted with the B/R group because it is not a part of the biomechanical–rehabilitation approach to treatment. This approach does not purport to affect the patient’s internal adaptive capacity.

Satisfaction questionnaire. The first author developed a questionnaire to measure patient satisfaction with occupational therapy intervention that was administered to both groups at discharge. The 7-point ordinal scale ranged from very satisfied (1) to not satisfied at all (7). The direction of the scale was intended to prevent any response bias that might be associated with higher or lower numbers. The questionnaire included eight items that addressed satisfaction with overall occupational therapy services, the therapist, activities that the therapist presented, exercises or other procedures, importance of therapeutic areas, level of independence in personally important tasks, energy level for completing tasks, and overall improvement as a result of occupational therapy services. Space was also provided on the questionnaire for the participant to add comments or suggestions. Each participant was asked to complete this questionnaire at time of discharge.
Procedure

Table 1 depicts similarities and differences between the procedures for the B/R and OA groups. Both groups were evaluated with all the customary assessments for patients with hip fractures in the facility. Both groups received the same discharge evaluations and completed a satisfaction questionnaire at discharge.

Because biomechanical–rehabilitation intervention is commonly used in this facility for patients after hip fracture surgery, standard facility protocols were used for the B/R group. These protocols call for education in hip precautions, ADL training, functional mobility, environmental mobility, upper-extremity strengthening, and participation in an exercise group. Although participants were asked about their goals, the focus of treatment tended to be goals the facility traditionally viewed as appropriate for this patient group.

Occupational Adaptation intervention focuses on occupational goals determined by the patient, regardless of diagnosed condition. OA group participants also must evaluate themselves on their perceived progress in addition to whatever evaluations the therapist conducts. Participants in the OA group were allowed to choose the activities on which they would work in addressing their goals.

The treating therapist was the same for both groups. The criteria by which she was selected were certification by the National Board for Certification in Occupational Therapy; licensed in the state of Texas to practice as an occupational therapist; practice experience as an occupational therapist for at least 1 year; knowledge and skill in traditional occupational therapy theory, techniques, methods, and activities, including the biomechanical and rehabilitation approaches; and a known reputation for practicing within American Occupational Therapy Association (AOTA) standards of practice and ethical guidelines. The therapist was not told of the hypotheses.

The first author told her to treat the first group of patients (the B/R group) as she normally did with biomechanical–rehabilitation principles. After discharge of all participants in the B/R group, the therapist treated the next group with Occupational Adaptation principles.

The first 20 patients selected for the study were treated on the basis of the biomechanical–rehabilitation model. Before beginning with this group, the treating therapist received a review of biomechanical and rehabilitation principles, even though she had received prior training on this method and was accustomed to using it in her intervention. After discharge of the first group, she was trained on use of the Occupational Adaptation model, an approach with which she was unfamiliar up to that time. Training consisted of a formal in-service for 4 to 5 hr, including hands-on demonstration and practice. Objectives of the training included understanding of the model’s assumptions, concepts, and principles; demonstration of the model in a clinical setting; and a working knowledge of the model’s terminology. Guidelines for practice were provided to the therapist. The first author provided both the review and the training. As stated earlier, in using an Occupational Adaptation model, the therapist includes biomechanical principles in her intervention as appropriate; however, a patient-selected occupational role guides intervention.

The discharge planning process was conducted in the same manner for both groups: (a) The therapist and participant discussed discharge plans beginning on the first day of evaluation; (b) the therapist provided a weekly summary of the participant’s progress to an interdisciplinary team; and (c) the physician and patient made the decision for discharge and agreed on the discharge date. (The physician was aware of the study but not of which patients were participating. The treating therapist did not make decisions for the discharge date but played a role in discharge planning with the patient and provided the physician with input regarding the patient’s ability for discharge.)

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Model Comparison for Evaluation and Treatment Intervention for Patients With Hip Fracture</th>
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<tbody>
<tr>
<td>Biomechanical–Rehabilitation Model</td>
<td>Occupational Adaptation Model</td>
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<tr>
<td>Occupational therapy initial evaluation.</td>
<td>Occupational therapy initial evaluation.</td>
</tr>
<tr>
<td>FIM™ scores on admission.</td>
<td>FIM scores on admission.</td>
</tr>
<tr>
<td>Discussion of goals with patient.</td>
<td>Completion of initial information form with patient.</td>
</tr>
<tr>
<td></td>
<td>Occupational roles or meaningful activities identified.</td>
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<tr>
<td></td>
<td>Required energy and assist levels for discharge discussed on the basis of patient’s desires and environment situation.</td>
</tr>
<tr>
<td>Training provided in education in hip precautions, activities of daily living (ADL), functional mobility, environmental mobility, upper-extremity strengthening, and so forth.</td>
<td>Training provided for the following for occupational readiness tasks, such as education in hip precautions, ADL, functional mobility, and environmental mobility, and for occupational activities based on patient’s identified roles, such as cooking, household tasks, and car transfers.</td>
</tr>
<tr>
<td>Exercises and activities of the facility protocol for this diagnostic group were used in intervention.</td>
<td>Patient given choice of all tasks and activities and was able to control the therapy process by working on tasks important to him or her. The therapist made suggestions and recommendations as needed.</td>
</tr>
<tr>
<td>Patient given formal weekly feedback on progress before the team staffing.</td>
<td>The patient and therapist rated the patient’s performance of one occupational activity daily. This rating was based on the relative mastery scoring form that included the three areas of efficiency, effectiveness, and satisfaction.</td>
</tr>
<tr>
<td>Informal feedback given during course of intervention and when requested by patient.</td>
<td>Satisfaction questionnaire completed before discharge.</td>
</tr>
<tr>
<td>FIM scores on discharge.</td>
<td>FIM scores on discharge.</td>
</tr>
<tr>
<td>Satisfaction questionnaire completed before discharge.</td>
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*Note: FIM = Functional Independence Measure (FIM™ is a trademark of the Uniform System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.*)
Results

An alpha level of .05 was selected to determine significance for all analyses. One-tailed significance analyses were used for FIM change scores, satisfaction, and discharge environment, as predictions had been made that these measures would favor the OA group. Two-tailed significance tests were used for all other comparisons.

Because samples of convenience were used, t tests were conducted to determine initial equivalence of groups. The following variables were included: gender, impairment mix (hip replacement or hip ORIF), prior living setting, age, and admission FIM score. Analyses indicated that the groups were equivalent on all variables except prior living setting. Eighty-five percent of the B/R group lived in their own homes at the time of hospitalization, whereas 15% lived in the home of a family member. All participants in the OA group lived at home at the time of fracture. None of the 40 participants came from an institutional setting. Impairment mix was evaluated because patients with the ORIF procedure tend to require a longer healing time and usually are non-weight bearing for up to 6 weeks. Impairment mix differences were not significant, thus neither group was predisposed to longer length of stay on the basis of this factor alone. Initial mean FIM scores were 35.25 for the B/R group and 35.65 for the OA group.

Hypothesis 1

As expected, FIM scores of both groups improved over the course of hospitalization. However, the first hypothesis was that the OA group would demonstrate greater gains in FIM scores than the B/R group as measured on admission and at discharge. Overall mean change in the FIM score from admission to discharge was not significant, t(38) = .974, p = .168 (one-tailed) (see Table 2).

Hypothesis 2

The second hypothesis was that OA participants would report more satisfaction with their occupational therapy intervention than the B/R participants. Scores on the eight items of the questionnaire were totaled for the analysis. Overall, OA participants reported significantly more satisfaction with their occupational therapy intervention, compared with their intervention, as predictions had been made that these measures would favor the OA group. Two-tailed significance tests were used for all other comparisons.

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Hypothesis 3

The third hypothesis was that OA participants would be discharged to less restrictive environments compared with B/R participants. Ninety-five percent of the participants in the OA group were discharged to their own homes, and 5% were discharged to family members’ homes. Seventy percent of the B/R participants were discharged to their own homes; 15% were discharged to family members’ homes; and 15% were discharged to acute care or skilled nursing facilities. However, the admission data show that all OA participants were living at home or in a family member’s home, whereas 85% of the B/R participants were living at home and 15% in a family member’s home. Thus, no indication was found that the OA group had better outcomes in terms of discharge environment.

Comparison of Daily Progress

Because OA intervention was predicted to be more effective than B/R intervention, we decided to examine the average FIM score gain per day in addition to the previous analysis of FIM change scores for total stay. This daily change measure would be useful only if a difference in the length of stay between the two groups existed. The first step in this analysis was to compare the mean length of stay. The mean length of stay for the groups narrowly missed significance, t(38) = 1.991, p = .054, with the mean B/R group length of stay 14.2 days and mean OA group length of stay 10.75 days. Thus, the mean length of stay for the OA group was 3.45 days less than the B/R group. (Because no prediction had been made regarding length of stay, the t test was conducted using a two-tailed analysis.) Even though the t test did not reveal a significant difference, length of stay reduced by 3.45 days can have substantial fiscal importance for the facility and a personal and financial impact for the patient and family. Therefore, the mean FIM change per day scores were compared. This measure was significantly higher for the OA group, t(38) = 1.69, p = .049 (one-tailed) (see Table 2).

Discussion

Level of Function

Overall, FIM change scores at discharge in the B/R group and OA group were not significantly different. Both the B/R group and the OA group showed improvement in functional independence over the course of hospitalization.
However, because the FIM score change per day of hospitalization was higher with the OA group, the findings suggest that the OA intervention may be associated with a more efficient outcome with regard to functional independence because the length of stay deemed by the patient and physician to be adequate for discharge was shorter for the OA group.

Results in a quasi-experimental design are subject to validity threats. For example, because the B/R group was treated first in this study, there is the possibility of some historical event occurring between the two interventions that would have produced the group differences. No such event could be identified, however, within either the community or the facility. Some factors may have predisposed the OA group to a shorter length of stay, but no demographic differences at admission suggest such a predisposition. Possibly, the therapist somehow favored the Occupational Adaptation approach, and this preference produced therapist bias in reporting FIM scores. Having the same therapist treat both groups was done to keep the therapist’s personal skills and interaction qualities constant across both groups. The discharge process was the same for both groups. The physician was not aware of which group participants were in, and the physician and participant determined discharge. Nevertheless, possible bias by the treating therapist cannot be ruled out conclusively.

** Satisfaction Questionnaire **

The satisfaction score results strongly suggest that the OA participants experienced more satisfaction than the B/R participants, with total mean satisfaction scores being more positive in the OA group. It should be noted that exercises play an important role in the biomechanical model. One reason for satisfaction being higher in the OA group may be that participants were given an opportunity to select exercises to do. Additionally, the OA group participated in the daily evaluation of performance, using the relative mastery scale. This participation may have increased these participants’ awareness of their performance in tasks, thus leading to a perception of greater independence, energy use, and satisfaction. Overall, the results on the satisfaction questionnaire support the hypothesis that the OA group would report greater satisfaction with therapeutic intervention than the B/R group. Limitations of a researcher-constructed questionnaire that has not been subjected to rigorous reliability and validity studies must be noted when assessing the satisfaction results.

** Discharge Environment **

Evaluating the results of the discharge environment is difficult because the OA and B/R groups came from significantly different premorbid environments. This measure appeared to suggest no advantage for either group.

Conclusions using quasi-experimental designs cannot be drawn without confronting substantial interpretational problems. Interestingly, the results of this study are consistent with other investigations into Occupational Adaptation as an approach to guide intervention with clients in physical dysfunction settings. In another study with patients post–hip fracture, elderly women were rated on the FIM after 10 hr of therapy on a task they had chosen as important to them at admission (Buddenberg & Schkade, 1998). Patients had not received training on the task, but intervention followed either standard facility protocols or OA intervention during which the patients worked on activities they had selected as important to them. The OA group received significantly higher ratings on their performance of the nontrained tasks. This result supported the Occupational Adaptation assumption that intervention based on personally meaningful tasks will lead to greater skill performance on tasks not previously examined in therapy than intervention based on biomechanical principles alone; in other words, the Occupational Adaptation intervention leads to greater generalization of outcomes. The effectiveness of Occupational Adaptation has been reported for patients post-CVA in institutional settings (Dolecheck & Schkade, 1999; Gibson & Schkade, 1997). Nonexperimental designs and small samples limit these studies. Nevertheless, taken as a whole, they suggest that Occupational Adaptation intervention may provide

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<th>Table 3</th>
<th>Measures of Satisfaction With Occupational Therapy at Discharge</th>
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<tr>
<td>Question</td>
<td>Biomechanical–Rehabilitation Model</td>
</tr>
<tr>
<td>1. Overall OT services that you received</td>
<td>1.45</td>
</tr>
<tr>
<td>2. Therapist involved you in the therapy process</td>
<td>1.50</td>
</tr>
<tr>
<td>3. Activities that your therapist presented during therapy</td>
<td>1.55</td>
</tr>
<tr>
<td>4. Exercises or other procedures provided during therapy</td>
<td>1.70</td>
</tr>
<tr>
<td>5. Therapist provided treatment in areas important to you</td>
<td>1.14</td>
</tr>
<tr>
<td>6. Your current level of independence in tasks important to you</td>
<td>1.75</td>
</tr>
<tr>
<td>7. Your current energy level for completing tasks important to you</td>
<td>2.15</td>
</tr>
<tr>
<td>8. Overall, your improvement as a result of OT services</td>
<td>1.40</td>
</tr>
<tr>
<td>Total score</td>
<td>12.95</td>
</tr>
</tbody>
</table>

Note. OT = occupational therapy. 1.00 = very satisfied, 2.00 = satisfied, 3.00 = somewhat satisfied, 4.00 = neutral, 5.00 = somewhat not satisfied, 6.00 = not satisfied, 7.00 = not satisfied at all.

*p < .05. **p < .01.
better results in functional independence gains than intervention with biomechanical–rehabilitation principles alone.

Conclusion
As expected, both the B/R and the OA groups showed improved FIM outcomes. However, in today’s managed care environment, medical decision makers favor approaches that produce the best outcomes in a shorter period with greater patient satisfaction. The Occupational Adaptation model uses a whole-person focus, and identifying what specific factors produced the results in this study is difficult. Was it simply the fact that the OA participants had choice of exercises and activities? Was it the fact that they were asked to reflect daily on their progress with the relative mastery measure? Was it the fact that intervention was focused on personally meaningful roles? Isolating these factors in a true experimental study without violating the principles of Occupational Adaptation intervention is not possible when therapy services are being provided.

As managed care and capitated health care become more prevalent, health care providers must measure their effectiveness. Effectiveness includes measuring functional outcomes and patient satisfaction with outcomes (Wilkerson, 1995). Outcome studies measuring functional outcomes and patient satisfaction will be the basis for determining which services are needed or unnecessary. The recent practice guidelines promulgated by AOTA (Moyers, 1999) call for occupation-based and client-centered intervention. The Occupational Adaptation approach tested in this study provides one framework for offering occupation-based intervention that is client-centered. The results of this study suggest that such occupation-based and client-centered intervention can be efficient, effective, and satisfying.

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References


