Effects of Recreational Therapy on Functional Independence of People Recovering From Stroke

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The purpose of this study was to examine the effects of recreational therapy (RT) on the functional independence of people recovering from stroke. Participants were adolescents and adults (N = 960) receiving recreational therapy and other treatment from an acute care hospital. Dependent variables were change scores (from admission to discharge) on the motor subscale, cognition subscale, and total Functional Independence Measure (FIM). Independent variables were number of treatment units of RT, physical therapy, occupational therapy, speech therapy, and psychological services. Data were analyzed using separate stepwise multiple regressions for each dependent variable. RT was a significant predictor of change scores for all three dependent variables. Results confirm the therapeutic value of RT services in the treatment of stroke.

KEY WORDS: *recreational therapy, stroke, functional independence, FIM, efficacy research*

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Stroke is the leading cause of adult disability and a leading cause of death among Americans (Williams, Weinberger, Harris, Clark, & Biller, 1999). According to the American Stroke Association (n.d.), approximately 700,000 Americans experience a stroke each year, and approximately 157,000 of these people die as a result. Of the more than half-million people annually who survive stroke, various therapeutic interventions are recommended to remediate the cognitive and physical effects. Among the professionals treating people who have experienced stroke are Certified Therapeutic Recreation Specialists (CTRS's).

No data exist confirming the precise number of CTRS's treating people who have experienced stroke. However, stroke occurs most often in older adults (National Stroke Association, 2006), a population served by more than a quarter of CTRS's (NCTRC, n.d.). Thus it can be reasonably assumed that stroke represents a significant number of clients of recreational therapy (RT) services.

Calls for efficacy research in RT are long-standing, and these calls typically include a focus on functional independence. In 1991, Shank and Kinney suggested that RT researchers focus on outcomes that could be appreciated by health care professionals both in and outside of RT. Shank, Kinney, and Coyle (1993) suggested a research agenda for the profession that included a focus on functional abilities. These suggested were further elaborated by Shank, Coyle, Boyd, and Kinney (1996) who recommended that RT researchers place their research within the larger context of rehabilitation and focus at least part of their efforts on the effects of recreational therapy on functional limitations. Carruthers (1997) reported results of a survey of RT practitioners and educators. Results confirmed that survey respondents valued efficacy research related to, among other health care priorities, effects of RT services on independent functioning. Wilhite, Keller, Collins, and Jacobson (1996) investigated the research priorities of recreational therapists and reported that effects of RT on functional independence was among the five highest priorities of RT professionals. Recently, the American Therapeutic Recreation Association (ATRA) published a research agenda identifying five target areas for efficacy research (ATRA, 2004). Two of these areas are directly related to stroke: (a) functional mobility and (b) obesity and active lifestyles. Stroke often negatively affects the functional mobility of people (Green, Forster, Bogle, & Young, 2002), and both obesity (Suk et al., 2003) and physically inactive lifestyles (Sacco et al., 1998) are risk factors for stroke.

To determine effects of an intervention on functional abilities, practitioners and researchers in rehabilitation rely on several different high-quality assessment instruments. One of the more common assessment tools used to evaluate the functional abilities of people who have experienced stroke is the Functional Independence Measure (FIM) (Deutsch, Braun, & Granger, 1997). The FIM is a quantitative assessment instrument that yields cognition, motor and total scores of functional independence of people with a variety of disabilities, illnesses, and conditions. Results of the FIM can be used by practitioners and researchers to demonstrate functional change.

Despite the frequency with which CTRS's treat people who have experienced stroke and the call to relevant efficacy research issued by numerous RT scholars and professional organizations, relatively little research has been done into the effects of RT services on functional skills deficits resulting from stroke. To date, there have been no large-scale studies published describing effects of RT on the functional independence of people who have experienced stroke. However, research in other fields support further investigation of the contribution of RT to the rehabilitation process.

There is a large volume of research into the effects of the rehabilitation following stroke that either directly or indirectly suggests that RT can be an effective contributing intervention. Several researchers have used meta-analyses to summarize known effects. For instance, Ottenbacher and Jannell's (1993) meta-analysis included 36 clinical trials. The researchers concluded that stroke rehabilitation was effective at improving functional performance, particularly when started soon after a stroke occured. Langhorne and Duncan (2001) conducted a meta-analysis of research into models of care following stroke and concluded that when compared to alternate models (e.g., treatment in a general hospital ward), multidisciplinary stroke rehabilitation reduced the risk of mortality, long-term dependence, and institutionalization. Kwakkel et al.'s meta-analysis (2004) of the effects of therapeutic exercise following stroke demonstrated significant improvement in activities of daily living as a result of the intervention.

Several researchers have reported the importance of physically-active recreation in the prevention of stroke. For instance, Lee and Paffenbarger (1998) published the results of the Harvard Alumni Health Study related to physical activity and stroke. Results indicated that physical activities of at least moderate intensity significantly reduced the risk of stroke in men. Activities such as walking and climbing stairs were also significantly related to reduced risk of stroke in men. Similarly, Jakes et al. (2003) reported that participation in physically active recreational activities was significantly negatively correlated with risk of cardiovascular disease, including stroke. Sacco et al. (1998) reported results of the Northern Manhattan Stroke Study and concluded that physically-active recreational activities play a significant role in the prevention of stroke.

Anecdotal evidence and research results from other fields strongly suggest the potential benefits of RT in stroke rehabilitation. However, without research results that support the use of RT in the rehabilitation of stroke, RT practitioners cannot provide evidence-based practice and cannot justify their role in the rehabilitation process. Therefore, the purpose of this study was to determine the effects of RT on functional independence of people recovering from stroke.

Participants

Participants (N = 960) were adolescents and adults who had experienced a stroke and received in-patient treatment over the course of five years from a regional acute care hospital in the southeast United States. Slightly more than half of the participants (52.2%) were female. Age at admission of participants ranged from 13 to 97 with a mean age at admission of 64.68 (SD = 14.243). Most participants (87%) were over the age of 50.

Recreational Therapy

RT is one of several treatments offered to patients in the rehabilitation center of the acute care hospital where data were gathered for this study. Of the 22 CTRSs on staff at the hospital, eight full-time and five part-time CTRSs work in the rehabilitation center. The primary RT interventions used in rehabilitation include: (a) fine and gross motor skill development using crafts, games, and other activities, (b) aquatic therapy (often co-treating with physical therapy), (c) community re-entry, (d) and transfer skills (often co-treating with occupational therapy and physical therapy).

Instrument

The *Functional Independence Measure* (*FIM*) is an 18-item, seven point ordinal scale (e.g., *Total Assistance* to *Complete Independence*) widely used in rehabilitation facilities to determine the highest level of care patients require to achieve a particular functional status (Deutsch, et al., 1997). Dodds, Martin, Stolov, and Deyo (1993) examined Uniform Data System (UDS) data (N = 11,102) and concluded the FIM had high internal consistency (alpha = .93), adequate discriminative validity and was statistically responsive to age, diagnosis, and treatment setting. Interrater reliability has also been found to be particularly high (r = .93) when professionals are credentialed and FIM trained (Deutsch et al.). The FIM yields a total score (range 18–126), a cognition score (range 13–91), and a motor score (range 5–35) and was designed to be used with a wide range of diagnostic groups (Hamilton, Granger, Sherwin, Zielezney, & Tashman, 1987) including people recovering from stroke (Granger, Cotter, Hamilton, Fielder, & Hens, 1993).

Data Collection

Data were collected from existing electronic medical records of a regional acute care hospital in the southeast U.S. To protect anonymity of participants, one of the hospital's medical records managers gathered the data from the hospital's medical records database and assigned an identification number unique to this study to each patient's record. Data gathered included: (a) descriptive items (e.g., age at admission, sex); (b) number of units of treatment (each lasting 15 minutes) received from RT, occupational therapy (OT), physical therapy (PT), speech therapy (ST), and psychology; and (c) pre- and post-test FIM scores. Additionally, mean FIM score change and standard deviation were calculated for total, motor, and cognitive scales. The FIM was administered to participants at admission and then again at discharge.

Data Analysis

Data were analyzed using SPSS v. 13.0. The researchers calculated descriptive statistics, frequencies, and means of number of treatment units of RT, OT, PT, ST, and psychology. Three stepwise multiple regressions were calculated. The seven independent variables for each regression analysis were: (a) number of treatment units of RT, (b) number of treatment units of OT, (c) number of treatment units of PT, (d) number of treatment units of ST, (e) number of treatment units of psychology, (f) age at admission, and (g) pretest FIM scores that corresponded with the dependent variable (total, cognition, or motor). Pre-test FIM score was included as an independent variable because researchers (e.g., Johnston, Wood, & Fiedler, 2003) have demonstrated that level of functioning prior to rehabilitation predicts level of gain made during treatment. Similarly, age at admission was included because researchers have concluded that age significantly affects outcomes of stroke rehabilitation (Ottenbacher & Jannell, 1993). A separate stepwise regression analysis was run for each dependent variable: (a) change in total FIM scores from admission to discharge, (b) change in motor FIM scores from admission to discharge, and (c) change in cognition FIM scores from admission to discharge.

Results

Participants experienced a mean improvement in total FIM scores of 17.626 (SD = 12.565). Most of that change (M = 13.181; SD = 10.146) occurred in the motor FIM score, with a relatively small mean change of 3.148 (SD = 3.540) in cognition FIM scores (see Table 1).

Participants received a mean of 62.32 (SD = 44.843) treatment units of PT; 56.18 (SD = 35.768) treatment units of OT; 31.14 (SD = 26.018) treatment units of RT; 14.65 (SD = 17.069) treatment units of ST; and 0.72 (SD = 5.030) treatment units of psychology (see Table 2).

Regression analysis 1: Change in total FIM scores. The regression model that accounted for the most variance in the dependent variable (adjusted R^2 = .129) included four independent variables: (a) treatment units of RT (B = 0.191), (b) treatment units of PT (B = 0.151), (c) admission total FIM scores (B = 0.124) and (d) age at admission (B = −0.133). The F-test of the model was statistically significant ($F = 36.531$; $p < .000$) (see Table 3).

Regression analysis 2: Change in motor FIM scores. The regression model that accounted for the most variance in the dependent variable (adjusted R^2 = .119) included four independent variables: (a) admission motor FIM scores (B = 0.188), (b) treatment units of RT (B = 0.172), (c) treatment units of PT (B = 0.154), and (d) age at admission (B = −0.115). The F-test of the model was statistically significant ($F = 33.404$; $p < .000$) (see Table 4).

Regression analysis 3: Change in cognition FIM scores. The regression model that accounted for the most variance in the dependent variable (adjusted $R^2 = .264$) included five independent variables: (a) treatment units of RT ($B = 0.121$), (b) treatment units of PT ($B = 0.119$); (c) treatment units of ST ($B = 0.079$), (d) age at admission ($B = -0.079$), and (e) admission cognition FIM scores ($B = -0.381$). The F-test of the model was statistically significant ($F = 65.924$; $p < .000$) (see Table 5).

Discussion

RT is an important part of the treatment of people recovering from stroke. For both motor FIM scores and total FIM scores, number of RT units predicted a statistically significant amount of the improved functional independence from pre-to post-test. Although number of RT units was predictive of cognition FIM score changes, there was relatively little cognitive improvement in the sample overall ($M = 3.148$) compared to relatively large improvement in motor ($M = 13.181$) and total FIM ($M = 17.626$) scores from admission to discharge. Additionally, compared to goals related to motor outcomes, the RT department has relatively few goals focused on cognitive improvement.

These findings strongly support the value of RT in the treatment of people who have experienced stroke. Improved functional independence is an overarching goal of most rehabilitative efforts, and RT appears to have contributed significantly to improved functional independence.

Unfortunately, RT is a covered or reimbursable treatment option in a limited range of settings. Additionally, the amount of contact RT has with patients is often limited compared to other ancillary therapies. This is the case not only in the present study, but elsewhere. For instance, Bode, Heinemann, Semik, & Mallinson (2004) reported that participants in their study spent only 5% of their total rehabilitation hours in RT. By comparison, participants in that study spent 74.4% of their rehabilitation time in PT, OT, and SP. If patients recovering from stroke are denied access to RT services, they will not receive an appropriate and demonstrably effective treatment.

Not only is RT a valuable treatment in a general sense, but these data have predictive value. In the best regression equation for total FIM change scores, the standardized coefficient for number of RT treatment units was 0.191, meaning that for each treatment unit of RT, change in total FIM scores increased 0.191 of a unit. Thus, a patient receiving five treatment units (e.g., one hour and 15 minutes) of RT treatment would have an average corresponding approximate increase of one point change in total FIM score. Similarly, in the regression equation for motor FIM score change, the standardized coefficient for number of treatment units of RT was .172, meaning that for each treatment unit of RT, change in total FIM scores increased .172 of a unit. Thus, a patient receiving six treatment units (e.g., one hour and 30 minutes) of RT treatment would have an average corresponding increase of slightly more than a one point in change in motor FIM score. Fortunately for these patients, they received an average of slightly more than 31 treatment units of RT treatment during their stay at the hospital.

Limitations

The results of this study are limited by a number of factors. Rehabilitation research has been criticized widely (e.g., Whyte & Hart, 2003) for the "black box" nature of findings. In other words, researchers may find significant effects of particular treatment services or interventions, yet the specific agent of change remains unknown. The data presented here are similarly limited. Additionally, despite (a) limiting the analysis to participants who had experienced stroke and (b) including age and pre-treatment level of functioning in the regression equations, most of the variance among participant outcomes remains unexplained. Clearly, there are unknown significant variables affecting the change in participant functioning from admission to discharge, and the variables included in the best models explain only a fraction of the change.

Regression analysis is essentially correlative, so it is inappropriate to discuss these results as causal. The strongest statements that can be made are that a particular independent variable predicted the change in a particular dependent variable.

Conclusions

In the highly competitive health care arena, no profession can rely on anecdotal data and expect to survive. By demonstrating that RT can significantly predict positive change in the functional independence of people recovering from stroke, the results of this relatively large-scale study lend support to the coverage and reimbursement of RT services by third party payers such as Medicare, Medicaid, and private insurance companies. Furthermore, the data suggest that RT services are an essential component of the comprehensive rehabilitation effort for individuals being treated for stroke. However additional research of this type is needed. Researchers and practitioners are encouraged to collaborate to gather similar data across various settings and diagnostic groups.

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