Changes in Health Status for Persons With Wrist or Hand Impairments Receiving Occupational Therapy or Physical Therapy

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Key Words: activities of daily living • outcomes assessment (health care) • quality of life

Objective. The purpose of this study was to describe changes of health status as perceived by clients with hand or wrist impairments who received rehabilitation in acute, orthopedic outpatient facilities from occupational therapy or physical therapy personnel.

Method. One thousand three hundred ninety-nine adults with wrist (n = 692) or hand (n = 707) impairments who were treated between July 1996 and June 1997 were selected from the Focus On Therapeutic Outcomes, Inc. (FOTO) national rehabilitation database. Each client completed a health status questionnaire on intake and discharge. Data consisted of number of outpatient visits, duration of treatment episode, and health status scores for six functional scales. Measures of intensity, global health status, global utilization, and client satisfaction were calculated. Outcomes were evaluated across occupational therapists and physical therapists.

Results. Clients perceived improvement (p < .05) in their health status over the course of therapy. Number of visits and measures of health status and client satisfaction were similar across type of therapist. Episode duration was longer (p < .05) and intensity was less (p < .05) for clients seen by occupational therapists.

Conclusion. Clients receiving rehabilitation in acute orthopedic outpatient centers perceived improvement in their functional abilities and health and well-being (global health status and individual functional scales) over the time during which treatment was provided. Results confirm the responsiveness of the outcomes instrument to clinical change in the clients’ perception of their health status over the course of therapy and support the use of health status as a measure of clinical outcome.


Over the past decade, health care providers, including occupational therapy practitioners, have experienced the effects of federal, state, and private sector reform initiatives, reimbursement restrictions by third-party payers, and increased competition for clients and jobs. There are demands for occupational therapy practitioners to (a) demonstrate cost-effectiveness, quality, and outcomes of their programs; (b) use this information to manage programs effectively; (c) improve services, service delivery, and customer satisfaction; and (d) justify the profession’s existence. As Paul Ellwood stated:

Rehabilitation will be required to prove its value….Outcomes management will be the means used to measure the quality of health care provided by an organization….As health care providers, all of us must demonstrate that what we do is really worthwhile, and we must pro-
Review of the occupational therapy literature did not support Ellwood’s charge. Results revealed anecdotal information to suggest that occupational therapy improves functional and psychosocial outcomes as well as statements indicating the need for outcomes research (Rogers & Holm, 1994). There was little empirical research to validate that occupational therapy improves outcomes or to document the value of occupational therapy. In general, research has used small samples from one clinical facility, has studied the impact of one type of treatment, or has used many different assessments and techniques, making comparisons among results and interpretation difficult (Abel-Moty, Maguire, Kaplan, & Johnson, 1996; Britnell, Madill, Montgomery, & Stewin, 1994; Budge, 1997; Burleigh, Farber, & Gillard, 1998; Fisher, 1994; Harvey, 1993; Kampschroeder, Keough, & Wright, 1998; Soderback et al., 1994).

In response to a series of charges from the Executive Board of the American Occupational Therapy Association (AOTA), AOTA staff members have been engaged in numerous program evaluation and outcomes measurement activities currently organized under a program entitled Centralized Outcome Information Network (COIN). One of the projects within COIN developed relationships with existing database companies to obtain data to assess the value of occupational therapy services with a variety of populations in a variety of settings. Selection of the areas for study has been based on member input and specific criteria developed by AOTA and the American Occupational Therapy Foundation.

One such database deemed appropriate for the evaluation of outcomes in occupational therapy is managed by Focus On Therapeutic Outcomes, Inc. (FOTO) in Knoxville, Tennessee. FOTO quantifies functional outcomes with standardized client self-report health status measures, a practice that offers the advantage of facilitating comparisons across many variables. Health status instruments, which quantify clients’ perceptions of their functional abilities and health and well-being, have been recommended as outcomes tools for effectiveness research studies in rehabilitation (Jette, 1995). To date, health status measures have not been used extensively in occupational therapy outcomes research, except for one study that assessed the efficacy of occupational therapy in a sample of independent-living older adults (Clark et al., 1997). We found no occupational therapy outcomes studies using health status measures for persons with acute musculoskeletal impairments treated in acute orthopedic outpatient facilities.

In response to the AOTA charges, the FOTO data were evaluated to determine their utility in outcomes studies with clients receiving occupational therapy services.

After extensive analyses of the characteristics of the FOTO data, we decided to examine health status changes in clients with wrist or hand impairments who were treated by occupational therapists, occupational therapy assistants, physical therapists, or physical therapist assistants. This choice provided an opportunity to investigate changes in health status for clients commonly seen by occupational therapy and physical therapy practitioners and to compare health status changes across therapy groups.

We believe that the evaluation of health status data collected in a standardized manner represents a measure of clinical quality that can be used by occupational therapists to compare results across studies, independent of payer, treatment, provider, facility, or client. This retrospective study using an existing database represents the first description of health status measures for clients who have been seen by occupational therapists in acute orthopedic outpatient settings.

Method

Design

This study represents a retrospective analysis of an existing national rehabilitation proprietary data set (FOTO). The senior author, who has access to the data as part of his daily responsibilities, performed the statistical analyses. FOTO customers sign a service agreement to allow their data to be studied in a blinded, aggregate manner.

Sample

Electronic outcomes records of 27,535 adults treated in acute, orthopedic outpatient centers between July 1996 and June 1997 comprised the initial data set. Rehabilitation facilities elect to participate in the FOTO database for many reasons, including marketing, business management, identification of clinical strengths and weaknesses, and improvement in client outcomes. The data collection process and types of clients entered into this data set have been described elsewhere (Di Fabio & Boissonnault, 1998; Hart, 2000; Hart & Dobrzynkowsi, 2000a, 2000b; Jette & Delitto, 1997; Jette & Jette, 1996a, 1996b). Briefly, once rehabilitation companies enter a business relationship with FOTO, the companies are instructed to enter data on all eligible clients. There is no measure of compliance. To be eligible, clients must be 14 years of age or older and conversant in English.

Clinicians estimate the proportion of total treatment time over the episode of care a client is treated by a specific professional (e.g., occupational therapist, occupational therapy assistant, physical therapist, physical therapist assistant). Proportion of time is estimated as 0%, 1% to 25%, 26% to 50%, 51% to 75%, and 76% to 100%. For this study, clients were selected for analysis if they had been treated by occupational therapists, occupational therapy assistants, physical therapists, or physical therapist assistants.
tants 76% to 100% of the time and they had impairments of the wrist or hand. The final sample consisted of 1,399 adults with wrist (n = 692) or hand (n = 707) impairments.

Clients were placed into one of two comparison groups: clients who were treated by occupational therapists or occupational therapy assistants (OT/OTA group) 76% to 100% of the time (n = 1,083) or clients who were treated by physical therapists or physical therapist assistants (PT/PTA group) 76% to 100% of the time (n = 316). We tabulated the percent of total treatment time of clients assigned to the comparison groups. Four (4%) clients in the OT/OTA group had sums of total treatment time greater than 100%. No clients in the PT/PTA group had a percent of total treatment time greater than 100%.

Outcome Instrument

Clients completed self-administered questionnaires (Dobryzkowski & Nance, 1997) on admission and discharge that contained health status questions and demographic information. On discharge, clients responded to satisfaction-with-treatment questions, and therapists completed questionnaires containing information such as length of stay, number of visits, and proportion of time patients were assigned to the comparison groups. Four (4%) clients in the OT/OTA group had sums of total treatment time greater than 100%. No clients in the PT/PTA group had a percent of total treatment time greater than 100%.

Included in the client self-report questionnaires are questions from the Medical Outcomes Study Short Form 36 (SF-36; McHorney, Ware, Lu, & Sherbourne, 1994; McHorney, Ware, & Raczek, 1993; Ware & Sherbourne, 1992) and Short Form 12 (SF-12; Ware, Kosinski, & Keller, 1996). Six functional scales were calculated from the questions: physical functioning (SF-36), role physical (SF-12), bodily pain (SF-36), vitality (SF-12), mental health (SF-12), and social functioning (SF-12). Physical functioning refers to performance of several physical activities that are considered normal for people in good physical health (Ware, Snow, Kosinski, & Gandek, 1993). Examples include lifting, carrying, walking, and climbing stairs. Physical functioning differs from role physical, with role physical referring to the ability to perform normal roles of daily life, particularly work-related tasks and leisurely activities.

Reliability and validity estimates on individual scales of the SF-36 and the SF-12 are available. Ranges of several reliability statistics for the SF-36 are as follows: internal consistency, \( \alpha = .62 \) to .96; test–retest correlations, .43 to .90; and alternate form reliability correlation, .92 (Ware et al., 1993). Reliability of the individual scales of the SF-12 ranged from .63 to .91 (Ware et al., 1996). Validity of the SF-36 and SF-12 has been confirmed in many studies (Haley, McHorney, & Ware, 1994; McHorney et al., 1993; Ware et al., 1993; Ware et al., 1996). Functional scales with two or more questions in the FOTO instrument have internal consistency reliability scores ranging from \( \alpha = .63 \) to \( \alpha = .91 \) (Hart & Dobryzkowski, 2000a). The FOTO Physical Functioning scale has good construct validity, uni-dimensionality, and reproducibility across testing times and clients with a variety of impairments (Hart, 2000). These results compared favorably with previously published studies in unidimensionality of the SF-36 Physical Functioning scale for clients with chronic medical and psychiatric conditions (Haley et al., 1994).

Scoring of the client health status responses followed published algorithms, which transform ordinal client responses to interval scores from 0 to 100 (Ware et al., 1993). These transformed response scores were averaged to obtain a single score for each scale. The higher the score, the higher the client’s perception of his or her health and well-being and functional abilities. The transformed scores for the six functional scales on intake were averaged to produce a global health status measure on intake. The same calculation procedure was used to produce a global health status measure on discharge. Each functional scale represents an estimate of the current level of health and well-being and functional ability related to a specific construct. Clinicians did not measure function. The clients provided the estimate of their functional abilities through their responses to the health status questions.

Responsiveness was operationally defined as the ability of the health status measure to detect change over the treatment episode (Kirshner & Guyatt, 1985). To assess responsiveness of the health status measures, the scale scores on intake and discharge were reduced to standardized effect sizes \([\text{discharge – intake}/(\text{standard deviation on intake})]\) (Kazis, Anderson, & Meenan, 1989; Stratford, Binkley, & Riddle, 1996). This calculation produces a standardized unit of change over the episode of care for each functional scale. Episode was operationally defined as the number of days between intake and discharge. Each change score represents a standardized measure of quality. Effect sizes of the individual functional scales were averaged to produce a global outcome index representing the overall unit of functional change per treatment episode. A global utilization index was calculated by dividing the global outcome index by the number of visits and multiplying by 10. The global utilization index represents the overall unit of functional improvement per visit. Both indexes were calculated on a client-by-client basis. Ordinal scores of client satisfaction with treatment responses were transformed into interval (0–100) scores per question and averaged to produce a percent of client satisfaction. A measure for intensity for each client was calculated by dividing the client’s number of visits by the number of calendar days of treatment episode.

Data Analysis

Demographic data were compared between clients receiving occupational therapy and clients receiving physical therapy, using \( t \) tests and chi-square tests for independence to test homogeneity of the provider groups. For significant chi-square tests, standardized deviates \((\text{observed – expected})/\text{standard error of test statistic}\)
ed)/(square root of the expected) were calculated.

Changes in global health status measures and individual functional scale scores across professional groups from intake to discharge were investigated with one-way analyses of covariance (ANCOVAs), with each client’s respective score for intake global health status or individual functional measure on intake as the covariate. Two-way analyses of variance (ANOVAs) were used to assess differences across professional groups for visits, duration, intensity, measure of utilization, and client satisfaction while controlling for intake global health status scores. (The model contained no interaction term.) Because the effects of co-morbid conditions are imbedded in the intake health status and functional scale scores, the ANCOVAs and two-way ANOVAs assisted in controlling for any client-specific differences while assessing differences between groups. One-sample t tests (Ho = 0) with Bonferroni adjustments were used to test responsiveness to change for the standardized effect sizes for the six functional scales and the global outcome index. Significance level for all analyses was set at α = .05.

Nineteen statistical analyses were conducted, consisting of analyses for (a) differences across professional groups on functional scales (6), global health status (1), measure of utilization (1), visits (1), duration (1), intensity (1), and client satisfaction (1) and (b) responsiveness of effect sizes for the six functional scales (6) and global health status (1). Therefore, an increased risk of producing a Type I error (rejecting the null hypothesis of no group difference when in fact the null hypothesis is true) existed. Bonferroni adjustments were used for the t tests, but beyond this correction, no further attempts to reduce experiment-wise error were used (Pocock, Hughes, & Lee, 1987).

Results

Demographic data for all clients are shown in Table 1. Clients treated by 365 therapists working in 211 acute orthopedic outpatient facilities in 32 states representing 7 U.S. regions. Clients received benefits from indemnity insurance (7.8%), Medicare (12.3%), preferred provider organizations (13%), Medicaid (.9%), health maintenance organizations (13.1%), workers’ compensation (46.1%), litigation (.6%), and client self-pay (1.4%). Occupational therapists treated more clients with hand impairments, and physical therapists treated more clients with wrist impairments (χ² = 32.67, df = 1, p < .001). More occupational therapists than physical therapists worked in hospitals (χ² = 38.54, df = 5, p < .001; standardized deviate = −3.1 for physical therapists), and more physical therapists worked in payer-owned clinics (χ² = 38.54, df = 5, p < .001; standardized deviate = −2.3 for occupational therapists, 4.3 for physical therapists). Occupational therapists treated more clients with prior surgical procedures (χ² = 20.28, df = 4, p < .001; standardized deviate = −2.1 for physical therapists seeing clients with one surgical procedure) than did physical therapists. When surgical history was collapsed to none or one or more surgical procedures, clients were 1.8 times more likely to have had surgery if they were seen by an occupational therapist (χ² = 16.4, df = 1, p < .001).

Clients received, on average, 9.5 visits over 35 calendar days. There was no significant difference in number of visits (occupational therapy = 9.6, physical therapy = 9.4) or in client satisfaction (occupational therapy = 95.7, physical therapy = 96.5) across professional groups. Episode duration was longer (occupational therapy = 35.9 calendar days, physical therapy = 32, F = 4.3, p = .04) and intensity was less (occupational therapy = .32 visits/duration, physical therapy = .37, F = 20.4, p < .001) for clients in the OT/OTA group compared with those in the PT/PTA group.

Clients perceived improvement in functional abilities and health and well-being over the course of treatment as measured by global health status effect sizes (global outcome index = 67.6 ± 86.1 [M ± SD], t = 29.3, df = 1398, p < .001) and effect sizes of individual functional scales (t score range = 9.1–27.6, p < .001). The greatest improvements were perceived in physical constructs (t score range = 21.1–27.6) compared with mental constructs (t score range = 9.1–13.8). Effect sizes were as follows: bodily pain = 1.1, physical functioning = .7, role physical = 1.1, vitality = .4, mental health = .5, and social functioning = .4. There were no differences in the improvements (intake to

<table>
<thead>
<tr>
<th>Table 1 Sample Demographics</th>
<th>Treatment Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Occupational Therapy</td>
</tr>
<tr>
<td>Age (year, M ± SD)</td>
<td>45.0 ± 15.8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>392</td>
</tr>
<tr>
<td>Female</td>
<td>689</td>
</tr>
<tr>
<td>Impairmenta</td>
<td></td>
</tr>
<tr>
<td>Wrist</td>
<td>491</td>
</tr>
<tr>
<td>Hand</td>
<td>592</td>
</tr>
<tr>
<td>Geographic region</td>
<td></td>
</tr>
<tr>
<td>Mid-Atlantic</td>
<td>119</td>
</tr>
<tr>
<td>Mountain</td>
<td>201</td>
</tr>
<tr>
<td>New England</td>
<td>36</td>
</tr>
<tr>
<td>North Central</td>
<td>285</td>
</tr>
<tr>
<td>Pacific</td>
<td>159</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>57</td>
</tr>
<tr>
<td>South Central</td>
<td>226</td>
</tr>
<tr>
<td>Clinic typeb</td>
<td></td>
</tr>
<tr>
<td>Payer owned</td>
<td>215</td>
</tr>
<tr>
<td>Hospital</td>
<td>515</td>
</tr>
<tr>
<td>Physician office</td>
<td>23</td>
</tr>
<tr>
<td>Private practice</td>
<td>121</td>
</tr>
<tr>
<td>Corporate</td>
<td>205</td>
</tr>
<tr>
<td>Acuityc</td>
<td>1,399</td>
</tr>
<tr>
<td>Acute (0–21 days)</td>
<td>365</td>
</tr>
<tr>
<td>Subacute (22–90 days)</td>
<td>477</td>
</tr>
<tr>
<td>Chronic (&gt; 90 days)</td>
<td>241</td>
</tr>
<tr>
<td>Surgical historyd</td>
<td>1,391</td>
</tr>
<tr>
<td>None</td>
<td>619</td>
</tr>
<tr>
<td>One</td>
<td>354</td>
</tr>
<tr>
<td>Two</td>
<td>70</td>
</tr>
<tr>
<td>Three</td>
<td>13</td>
</tr>
<tr>
<td>Four or more</td>
<td>21</td>
</tr>
</tbody>
</table>

aNumerical counts unless otherwise stated. bSignificance of χ², p < .05 across provider groups. cAcuity is time from date of onset to initial evaluation.
Discussion

Clients receiving rehabilitation in acute orthopedic outpatient centers perceived improvement in their functional abilities and health and well-being (global health status and individual functional scales) over the time during which treatment was provided. This finding supports the responsiveness of our measure of health status designed to quantify change in functional abilities for clients treated by occupational therapists or physical therapists.

The magnitude of change in health status represented with these data is similar to that reported for clients with other impairments who are receiving physical therapy in acute orthopedic outpatient facilities (Di Fabio & Boissonnault, 1997; Jette & Jette, 1996a, 1996b). No studies were found reporting changes in health status for clients receiving occupational therapy in acute orthopedic outpatient facilities. Our results support reported findings (Di Fabio & Boissonnault, 1998; Hart, 2000; Hart & Dobrzykowski, 2000a, 2000b; Jette & Delitto, 1997; Jette & Jette, 1996a, 1996b), and extend their application to clients with arm and hand impairments receiving occupational therapy or physical therapy. As in these prior studies, clients perceived greater improvement from intake to discharge in the physical component constructs of health and well-being than in the mental health constructs.

Our results demonstrated that there were no significant differences among number of visits, clients’ perceptions of improvement in functional abilities, or client satisfaction across professional groups. Through retrospective power analyses, we found power to be low; therefore, we were unable to determine with confidence whether no true differences existed. Results were influenced by the large variability in the data with respect to the number of visits, client satisfaction, and health status measures. It was estimated that a balanced data set of at least 2,400 clients would have provided adequate power (≥.8) with associated effect size of .25 and α of .05 to allow us to determine statistical differences (Cohen, 1983).

One finding that may deserve further study was the disproportionate number of clients seen by occupational therapists who had surgery. This finding might be related to the fact that more occupational therapists than physical therapists in the study worked in hospitals. Surgical intervention has been shown to positively affect health status outcomes for physical therapy clients with spinal (Jette & Jette, 1996b) and knee (Jette & Jette, 1996a) impairments. Similar effects deserve further study in clients receiving occupational therapy.

Although we report improvement in perceived health status over treatment episode for clients in the study, we have not calculated the minimal detectable change (MDC) or the minimal clinically important difference (MCID) in the dependent variables (Stratford, Binkley, Riddle, & Guyatt, 1998). Calculation of MDC and MCID is necessary before clinicians can determine whether a change in health status is more than statistical error (MDC) or is clinically meaningful (MCID). Because health status measures improved over treatment episodes in this study, our data support further investigation in health status change scores measuring clients’ perceptions of functional change following rehabilitation.

The current health care environment is one of shortened treatment time, decreased number of health care visits, and reduced length of stay. There are no data to con-

Table 2
Efficiency Variables, Health Status, and Effect Sizes by Professional Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Occupational Therapy</th>
<th>Physical Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>1,083</td>
<td>316</td>
</tr>
<tr>
<td>Visits</td>
<td>9.6 (0.2)</td>
<td>9.4 (0.4)</td>
</tr>
<tr>
<td>Duration (calendar days)</td>
<td>35.9 (1.0)</td>
<td>32.0 (1.6)</td>
</tr>
<tr>
<td>Intensity (visits/duration)</td>
<td>0.32 (0.005)</td>
<td>0.37 (0.012)</td>
</tr>
</tbody>
</table>

Note. Values represent M (SE). Health status = average functional scale effect sizes; measure of utilization = [(global health status at discharge)/(visits)] * 10; NA = not available. Health status and the measure of utilization are calculated on a client-by-client basis.

*Two-way analysis of variance controlling for intake global health status measure without interaction term. **Differences were significant (p < .05). ***One-way analysis of covariance with intake score as covariate.
firm the effect of purported reduced visits or duration on outcomes in rehabilitation. We do not know whether it is better to increase duration while decreasing visits or better to decrease intensity of treatment. In our study, duration was longer and intensity was less for clients seen by occupational therapy practitioners, with no difference in improvement in perceived health status across professional groups. Determination of the optimal number of visits, duration, and intensity of treatment for the best outcomes warrants further investigation.

Because health status represents a client’s perception of his or her abilities to function within specific constructs, the effects of the client’s co-morbid conditions are imbedded within the health status measure. Reported functional abilities incorporate the client’s perceived effects of pain and decreased physical and psychosocial functioning related to his or her medical condition. Controlling for health status intake scores produces statistical “risk adjustment” for the effects of client co-morbid conditions, providing a more robust comparison of change in health status measures because one measure of medical severity has been controlled.

According to published criteria (Cohen, 1983), the effect sizes for the physical functioning scales (range = .7–1.14 standardized units) were moderate to large, whereas the mental scales (range = .35–.46 standardized units) were small. These findings support the responsiveness of the FOTO instrument for the collection of health status measures in this client population, confirm the ability to differentiate changes over time, and justify separating changes in physical functioning from the mental health domains.

Interest in measuring generic health status in rehabilitation outcomes has been elucidated (Binkley, Stratford, Lott, & Riddle, 1999; Di Fabio & Boissonnault, 1998; Hart & Dobrzykowski, 2000a, 2000b; Jette & Delitto, 1997; Jette & Jette, 1996a, 1996b). Although some authors (Di Fabio & Boissonnault, 1998; Hart & Dobrzykowski, 2000a, 2000b; Jette, 1995; Jette & Delitto, 1997; Jette & Jette, 1996a, 1996b; Ware et al., 1993) encouraged collection of generic health status measures, others (Binkley et al., 1999) recommended collecting condition-specific client self-report health status measures because they have been reported to be more sensitive to clinical change. Some found limited differences between generic and condition-specific measures (Riddle & Stratford, 1998). Change in health status measures offers a measure of functional improvement, which represents a measure of quality. In the future, if change in client self-report of health status can be related to treatment received, health status, whether measured with generic or condition-specific outcomes tools or a combination of both (Binkley et al., 1999), promises to be an important outcomes measure for therapists.

Because we were able to match clinical outcome with a measure of efficiency (i.e., visits), we were able to perform an introductory evaluation of cost-effectiveness. Using the number of visits and change in global health status, we calculated the global utilization index, which represents the unit of functional improvement per visit. As the managed care philosophy evolves, providers and administrators will need improved ways of assessing the relation between quality (i.e., unit of functional improvement) and utilization of resources (e.g., number of visits). Under capitated contracts, the need to negotiate fees for services becomes less important, but the need to manage costs per visit becomes more important. We expect the quantification of global utilization to become increasingly significant. ▲

Acknowledgment

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References


