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Patient-Centered Evaluation of Outcomes from Rehabilitation for Chronic Disabling Spinal Disorders: The Impact of Personal Goal Achievement on Patient Satisfaction

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Abstract

BACKGROUND CONTEXT—The multiplicity of bio-psychosocial and economic facets of chronic disabling back and/or neck pain complicates treatment outcomes measurement. Our previous work showed that personal functional goal achievement contributed more toward patient satisfaction with outcome than did traditional self-reports of pain and physical function or measured strength, flexibility and endurance among functional restoration program (FRP) graduates with chronic disabling back and/or neck pain.

PURPOSE—The primary goal was to compare the impact on patient satisfaction of *pain and functional goal achievement* versus self-reports of pain and physical function.

STUDY DESIGN/SAMPLE—This was an observational study of all patients with chronic disabling back and/or neck pain completing an FRP between 6/08 and 5/09.

OUTCOME MEASURES—Prior to treatment, participants recorded personal 3-month goals for: pain, work, recreation and activities of daily living. At least 3 months later, all graduates were sent a follow-up survey displaying the patient's pretreatment functional goals and eliciting the patient's

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assessment of functional goal achievement; current pain magnitude, “satisfaction with the overall results for your pain problem;” and responses to the SF-36v2 Physical Functioning subscale (PF-10).

METHODS—Pain goal achievement was calculated as the difference between the pre-treatment pain goal and follow-up pain magnitude. Linear regression was used to evaluate the associations between satisfaction and four variables (follow-up pain; PF-10; pain goal achievement; function goal achievement), individually and then together in a full model.

RESULTS—Of the 82 patients surveyed, 62 responded completely. Mean age was 44 years, with 48% female and 35% on worker’s compensation. The model R^2 combining all four variables explained 0.6033 of the variance in satisfaction. Each variable by itself was significantly related to patient satisfaction at $p < .001$, but the overlap in association was large. The unique contributions (R^2) to the variation in satisfaction were: function goal achievement: 0.0471; PF-10 score: 0.0229; pain magnitude: 0.0178; and pain goal achievement: 0.0020.

CONCLUSIONS—At least 3 months after treatment, function goal achievement had by far the greatest impact on patient satisfaction, followed by PF-10 score, pain magnitude, and finally, pain goal achievement. Functional goal achievement has great potential as a tool for patient-centered treatment decision-making and outcomes measurement for people with chronic disabling back and/or neck pain and their health care providers.

Keywords

goal achievement; functional restoration; rehabilitation; chronic low back pain; patient satisfaction

The modern epidemic of disability from chronic back and neck pain continues, despite dramatic advances in diagnostic and interventional technologies and efforts to improve health care delivery. By any measure, associated costs are escalating while pain and disability remain grave institutional and personal burdens.[1] The critical question is: what value are we getting for all this expense?[2] The multiple bio-psychosocial and economic facets of chronic disabling back and/or neck pain complicate outcomes measurement. Chronic disabling back and/or neck pain includes non-malignant painful back and neck conditions lasting more than 3 months that limit important work, recreation or activities of daily living. Traditional outcome measures include symptom-specific self reports and related questionnaires, physical capacities such as spinal motion and lifting, work and compensation status, and more generic indices of health status and coping. Correlations between these indices of pain, impairment (objective loss of physical function) and disability (loss of capacity for work, recreation or daily activities) are surprisingly weak,[3–7] and the paradigm of finding and fixing the anatomical pain generator so the patient recovers “normal” levels of comfort and function applies only to a small minority of people with chronic disabling back and/or neck pain.[8]

The health value equation has been famously defined as a matter of medical outcomes and customer (patient) satisfaction divided by the cost.[9] This schema has been promoted in many variations as the optimal yardstick for chronic disabling back and/or neck pain outcomes research.[2] Ideally, this value ruler is applied to randomized controlled trials testing prospectively for statistically and clinically significant differences between

treatment-group means. Unfortunately, the body of scientific inquiry aspiring to this rarely-achieved standard has generally revealed only modest and inconsistent group effects,[10] as in recent trials comparing spinal fusion and rehabilitation for people with low back pain. [11–13] This approach, which considers groups of patients to be statistically homogeneous, historically yields results of debatable clinical importance.[14–16] For clinical decision-making in chronic disabling back and/or neck pain, this aggregate evidence may inform policy decisions, but cannot directly inform individual patients who may have widely varying personal values and expectations regarding treatment choices and outcomes. [4, 17, 18] Furthermore, these patients may never know the complex costs of their care and disability that constitute the denominator in the value equation.[19]

Recently, Hazard et al. reported on a more patient-centered method to guide decision making and to assess outcomes for people with chronic disabling back and/or neck pain participating in an intensive multi-disciplinary rehabilitation program known as Functional Restoration (FRP).[20] Individual patient outcomes were measured by asking the patients one year after completing the FRP to what degree they had achieved their self-prioritized pre-treatment functional recovery goals regarding work, recreation and activities of daily living. Of all the pre- and post-treatment and year-end measures of symptoms and physical capacities, this personal functional goal achievement was the strongest unique contributor to patient satisfaction with outcomes.

The purpose of the current study was to better understand the relationships between medical outcomes and customer/patient satisfaction in the value equation numerator. The key question was whether pain goal achievement would add to or even surpass functional goal achievement, pain and physical function in explaining satisfaction with outcome among a new cohort of FRP graduates with chronic disabling back and/or neck pain.

MATERIALS AND METHODS

Patient Selection

This study included patients with chronic disabling back and/or neck pain initially referred from community-based medical practices to practitioners in the Dartmouth-Hitchcock Medical Center's Spine Center. These practitioners in turn had referred the patients to the Center's FRP staff for brief physical performance testing and interviews. Patients were invited to attend the FRP upon meeting these criteria: (1) back and/or neck pain lasting more than 3 months; (2) decision by the patient and provider against (further) surgery; (3) absence of such severe depression, anxiety or psychosis that the patient cannot engage in group/classroom activities; (4) patient and staff agreement that trunk flexibility, lifting and treadmill endurance are insufficient for their stated goals for work, recreation and/or activities of daily living; (5) ability to walk at a level of at least 2 METS on treadmill test; and (6) informed consent. The study was approved and monitored by the Committee for the Protection of Human Subjects at the Dartmouth-Hitchcock Medical Center and Dartmouth College.

Treatment Protocol

The 3-week FRP consisted of thirteen seven-hour treatment days over 3 weeks including 5 hours per day of physical training, and 1.5 hours/day of educational classes and cognitive therapy as described previously. [21] The physical training involved exercises designed to increase flexibility, strength and endurance toward the patient's personal goals in a gym and activity simulation setting. The classes and group and individual counseling sessions addressed fear avoidance behaviors and reviewed relevant anatomy, diagnostics and therapeutics, medications, relaxation techniques, disability laws and community reintegration issues. On admission day all patients completed the following questionnaires: pain visual analogue and rating scales, Oswestry Disability Index,[22] Medical Outcomes Study SF-36,[23] the Center for Epidemiologic Studies Depression Scale,[24, 25] and the Fear Avoidance Beliefs Questionnaire.[26] Each patient completed a worksheet asking them to state their 3-month goals for recovery in the domains of pain, work, recreation and activities of daily living and to score the importance of and likelihood of achieving each goal. Admission physical capacity testing included spinal ranges of motion using inclinometers, Progressive Isoinertial Lifting Evaluation,[27] and treadmill endurance with speed and inclination increased per protocol to patient tolerance or target heart rate ($0.8 \times 220 - \text{age}$). On the second day of the FRP, the program director met with each patient individually to review the patient's test results and stated goals to confirm their accuracy. All questionnaires and physical tests were repeated at the end of the FRP and reviewed again for accuracy with each patient. All test results and written goals were entered into a computer data-base by non-clinical administrative staff.

Recruitment and Follow-up Protocol

At least 3 months (mean 9.5; maximum 15 months) after completing the FRP, a previously tested and reported survey[20] was mailed to all consecutive FRP participants graduating between June, 2008 and May, 2009. Surveys are routinely mailed in batches several months to one year after program completion. Toward the end of the study period, mailings were accelerated to include graduates in the 3–6 month range, as they were at or beyond the 3-month time frame of the original goal-setting questionnaire. Patients who did not reply by mail were solicited for telephonic survey administration. The surveys were individualized per patient using a mail merge feature that inserted each patient's personal functional goals as originally recorded. The survey included: 10-point rating scale for "pain in the past week"; physical functioning sub-scale from the SF-36 (PF-10); work status; compensation status; 10-point rating scale for "overall how satisfied you are with the progress you have made with your pain problem"; the patient's pre-treatment functional goals for work, recreation and activities of daily living (ADL), each followed by 7-point rating scale for how completely the patient had met each goal ("goals met" score); 10-point trade-off rating scale for pain versus function goal importance.

Goal Achievement Scoring

As previously reported,[20] achievement of the work, recreation and ADL goals was scored by combining patient-reported goal importance, rated on a 7 point scale at baseline, and reported level of goal achievement at follow-up, rated on a 10 point scale. The resulting 70

possible combinations were ranked from 0 to 69 with the lowest possible score corresponding to no achievement of a very important goal, and the highest possible score corresponding to complete achievement of a very important goal. These scores were then transformed to range from 0 to 100 by dividing each rank by 69 and then multiplying by 100. For each subject, the 3 domain scores were averaged yielding a composite function goal achievement score. For patients with goals in only 2 domains the score was the average of those scores. An analogous approach was used to score pain goal achievement using the difference between the pre-treatment goal and follow-up pain magnitude as the level of pain goal achievement.

Statistical Analyses

Analysis Plan—Summary statistics and distributions were calculated for all variables. Initial analyses of patient demographics and admission test results were compared between survey completers versus non-completers to evaluate for potential selection bias. Continuous variables were compared using analysis of variance and categorical variables using χ^2 tests.

Simple and multiple linear regression analyses were conducted to evaluate the relationships between patient satisfaction and (1) pain goal achievement, (2) function goal achievement, (3) pain magnitude, and (4) physical function (PF-10) by comparing the amount of satisfaction variance explained by each variable individually, and the unique variance in the multiple regression associated with each variable.

All analyses were computed using SAS (SAS Institute, Cary, NC) version 9.2 running under the Windows XP 64-bit Professional operating system.

RESULTS

Sample and Non-response

Of the 82 patients who completed the FRP between June 2008 and May 2009, 68 responded to the follow-up survey, but only 62 (76%) provided complete responses; by mail or by phone. As Summarized in Table 1, there were no significant differences between the 62 survey completers and the 20 non-completers and non-responders, when type I error was set at .05, with the exception of patient age, where responders were slightly older than those who did respond to the follow-up survey.

Sample demographics—The average age of the survey completers was 44 years and ranged from 18 to 61; 52% of these patients were male and 36% were on workers compensation. The average time to follow-up was 9.5 months and ranged from 3 (corresponding to the time-frame in the pre-treatment goal-setting survey) to 15 months.

Patient Satisfaction—Figure 1 depicts the distribution of patient-reported satisfaction with “the progress you have made with your pain problem” at follow-up for the 62 patients with complete survey responses. There was a broad distribution of satisfaction scores ranging from very satisfied (score = 9) to very dissatisfied (score = 0) with mean score of 5.2.

Relationships Among Goals Achievement, Medical Outcomes, and Patient Satisfaction

Table 2 provides summary statistics for goal achievement, physical function, pain magnitude and patient satisfaction evaluated at follow-up. All scores were scaled so that larger values reflect a better health state or greater satisfaction. Table 3 summarizes the Pearson correlations between all variables and for each variable correlated with the patient satisfaction. The R^2 is also provided to indicate the amount of variance in patient satisfaction explained by each of the other variables. All correlations were positive and statistically significant against the null hypothesis of no correlation (i.e., $H_0: r = 0$) when type I error was set at .01. In contrast to the moderately strong correlations between all other variables, the weakest correlations noted were between work goal achievement and the two pain-related variables: pain magnitude ($r = 0.30$) and pain goal achievement ($r = 0.31$).

Figure 2 summarizes the unique contribution to variation in patient satisfaction made by each of the four variables, pain goal achievement, function goal achievement, PF-10 and pain magnitude. Overall, functional goal achievement accounted for over two times the unique variance more than any of the other three variables, followed by PF-10, pain magnitude, and finally, pain goal achievement. The gain from the 3 variable multiple regression involving pain goal achievement, PF-10, and pain magnitude ($R^2 = .5728$) compared to the 4 variable multiple regression adding function goal achievement ($R^2 = .6033$), was statistically significant ($F_{1,57} = 6.53$, $p < .0145$), reflecting the unique contribution of function goal achievement in explaining variation in satisfaction. None of the unique contributions of the other variables in the model was statistically significant.

Pain versus Function Goal Importance—Responses to the trade-off question regarding patient preference for pain vs. function goal achievement were weakly correlated with satisfaction ($r = .21$, $p < .10$) when asked at the beginning of the program, but somewhat stronger when asked at follow-up, $r = .37$, $p < .004$.

DISCUSSION

This observational cohort study of chronic disabling back and/or neck pain graduates of an FRP program found that functional goal achievement had a greater impact on satisfaction with treatment outcome than did self-reported pain or physical function, as measured by their unique contributions to the explained variance in satisfaction. This study confirmed earlier findings of the relative importance of functional goal achievement. [20] The current study further aimed to assess the role of pain goal achievement by comparing the correlations between pain goal achievement, functional goal achievement, and satisfaction. The study demonstrated that pain goal achievement contributed very little to satisfaction with outcome.

The regression model including function goal achievement, pain goal achievement, and PF-10 was surprisingly powerful in explaining satisfaction, particularly when compared to the low correlations between satisfaction and more traditional outcome measures previously reported for chronic disabling back and/or neck pain patients following rehabilitation.[3] The weak correlations between pain outcome and work goal achievement certainly challenge the logical notion that pain relief is a prerequisite to work.

Patient expectation may be an important factor in goal setting and achievement. The intake goals questionnaire in this study asks the patients to rate “how likely” they think they are to achieve each of their stated goals. They routinely rate all goals “very likely,” explaining in subsequent interviews that they tend to only write in goals that they feel they can achieve.

Patient satisfaction is a complex, multi-faceted outcome measure. [28–31] This study avoided confounding factors such as health care access, provider knowledge and communication skills, etc. by focusing the patient on treatment outcome with the deliberate question asking the patient to, “Check one box to show overall how satisfied you are with the progress you have made with your pain problem.”

How do these findings relate to the value equation:

$$\text{Value} = (\text{medical outcomes} + \text{patient satisfaction}) / \text{cost?}$$

The Back Review Group of the Cochrane Collaboration systematically reviewed published research on rehabilitation for chronic low back pain and concluded: “intensive multi-disciplinary biopsychosocial rehabilitation with functional restoration reduces pain and improves function.”[32] The current study does not address FRP efficacy regarding the medical outcomes as there is no control group. However, an important finding is the wide variation in satisfaction with outcome: some patients were very satisfied, some were not. This study demonstrated, once again, that the degree to which each patient achieved his or her functional recovery goals was an important factor in overall satisfaction.

Functional goal achievement may improve our measurement of value by refining the “medical outcomes” variable, because it includes what is most important to the individual patient. Although functional goal achievement is not a proxy for satisfaction, its impact indicates that pre-treatment functional goal setting may profoundly improve provider-patient treatment decision-making by targeting treatment toward the patient’s priorities.

The primary strength of this study is its presentation of an innovative model for measuring personal goal achievement and a comparison of this model to more traditional self-reports of pain and function in terms of their relative contributions to patient satisfaction. Two weak points that present both challenges and opportunities are the goal achievement scoring and the timing of follow-up. The scoring involves combining the degree of achievement with the importance of the goal to give a score range from low achievement of a very important goal to high achievement of a very important goal and then transforming the raw score to a 0–100 scale. This process may be simplified in the future studies and in clinical use by exclusion of all but the patient’s primary goal and simply scoring the degree of achievement. Timing of outcome measurement is complicated in prospective studies and in clinical care of patients with chronic disabling health conditions that wax and wane over time. This challenge is probably even greater in goal achievement measurement, since in addition to changes in symptoms and functional capacities, the person’s goals and priorities may change. Future studies should test for changes in the goal achievement - patient satisfaction relationship over time.

This study and our earlier research were conducted with chronic disabling back and/or neck pain patients who had elected to participate in a functional rehabilitation program. Future

work should investigate goal elicitation and achievement scoring among other patient populations and treatments such as surgical fusion for degenerative disc disease or arthroplasty for osteoarthritis of the knee. A critical hypothesis for future study: setting pre-treatment goals and measuring their achievement can improve health care value by getting patients the outcome they really care about.

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Figure 1.
Distribution of patient satisfaction with “the progress you have made with your pain problem.”

Figure 2.

Summary of unique variance explained by each variable; common variance; shared variance; and unexplained variation for the multiple linear regression of pain goal achievement, function goal achievement, physical function, and pain magnitude on satisfaction with “the progress you have made with your pain problem.”

Summary of differences in baseline characteristics between those who completed and those who did not respond or fully complete the follow-up survey

Table 1

Variable	Completers N = 62		Non-Completers N = 20		p <
	Mean	Std	Mean	Std	
Age (years)	43.8	9.9	38.0	8.1	0.03
Gender (%Male)	51.6	0.01	65.0	0.02	0.30
Worker's Compensation (% on WC)	35.5	0.01	20.0	0.03	0.20
SF-36 Physical Component Summary Score	32.7	7.2	31.9	7.3	0.65
SF-36 Mental Component Summary Score	45.2	12.4	42.4	12.5	0.39
SF-36 Bodily Pain Scale Score	34.1	6.8	33.1	5.5	0.55
Oswestry Disability Index	37.6	12.5	38.85	12.6	0.72
Fear Avoidance Behavior Questionnaire Score	37.8	13.8	38.7	12.7	0.80

Table 2

Summary statistics for goals achievement, physical function, pain magnitude, and satisfaction

Variable	Short Name	N	Mean	Std
Work Goal Achievement	W_GA	60	42.3	43.9
Recreation Goal Achievement	R_GA	61	47.7	38.4
ADL Goal Achievement	A_GA	61	62.4	38.3
Overall Functional Achievement*	F_GA*	62	51.1	35.4
Pain Goal Achievement	P_GA	62	32.6	29.8
SF-36 PF-10 score	PF	62	63.0	24.9
Pain magnitude	P_Mag	62	4.6	2.4
Patient Satisfaction	Pat_Sat	62	5.2	3.0

All scores were scaled so that larger values reflected better health state

Table 3
Pearson correlations of goals achievement, physical function, pain magnitude and satisfaction

Variable	W_GA	R_GA	ADL_GA	F_GA	P_GA	PF-10	P_Mag	Pat_Sat	R ² **
W_GA	1.00	0.64	0.55	0.85	0.31	0.59	0.30	0.47	0.219
R_GA		1.00	0.75	0.90	0.59	0.70	0.55	0.66	0.440
ADL_GA			1.00	0.87	0.58	0.74	0.64	0.70	0.492
F_GA				1.00	0.55	0.76	0.54	0.70	0.488
P_GA					1.00	0.59	0.71	0.54	0.293
PF-10						1.00	0.72	0.73	0.526
P_Mag							1.00	0.63	0.402
Pat_Sat								1.00	

W_GA work goal achievement; R_GA recreation goal achievement; A_GA ADL goal achievement; F_GA overall functional goal achievement; P_GA pain goal achievement; PF-10 physical function subscale of SF-36; P_Mag pain magnitude; Pat_Sat patient satisfaction with “the progress you have made with your pain problem”

Note: All correlations were greater than 0 when Type I error was set at 0.01. Shaded cells reflect variables included in the multiple regression

** R2 indicates the explained variance in patient satisfaction for each variable