Assessment

NEUROPSYCHOLOGICAL FACTORS AFFECTING PSYCHIATRIC TREATMENT OUTCOMES IN AN MULTIDISCIPLINARY OUTPATIENT PAIN PROGRAM

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Abstract. Neuropsychological factors were studied to assess if they were associated with treatment outcomes in a multidisciplinary pain program (MPP). Psychiatric treatment outcomes were assessed using the SCL 90-R. Intelligence and reading tests were administered to assess neuropsychological functioning. Complete psychological assessments were available at admission and upon discharge for 58 out of 104 consecutive admissions. Forty percent of patients had an eighth-grade reading level or lower, and 11% had a fifth-grade or lower reading level. Nine of 10 scales from the SCL 90-R revealed significant improvement from admission to discharge. At admission 84.7% of pain patients were classified as being "psychiatric cases" while at discharge 64.4% were so classified using SCL 90-R criteria. Vocabulary and abstraction variables differentiated those who showed improvement from admission to discharge on scales measuring the somatization, obsessive-compulsive disorder, depression, anxiety, and psychoticism as detected by the SCL 90-R. The findings of this study have implications for treatment of patients in MPPs, as well as vocational and psychiatric services after discharge.

INTRODUCTION

Studies have demonstrated therapeutic changes in chronic pain patients who participated in multidisciplinary pain programs (MPPs) [1,2]. Flor, Fydrich, and Turk [3] reported on their analysis of the therapeutic effects of chronic pain programs using a technique known as meta analysis. MPPs produced at least twice the improvement of single modality programs (*e.g.*, medical treatment or physical therapy alone). Building upon this, an additional important issue to consider is what patient characteristics might predict outcomes, and how programs might be better designed for individual patients.

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A variety of factors have been used to predict outcomes for MPPs. *Chronicity of pain (i.e.,* how long someone had a pain condition) has been studied as a predictor of MPP outcomes (4,5). Flor, Fydrich, and Turk (3) in their meta analysis of program outcomes report that while *chronicity* and *treatment effect size (i.e.,* the size of the effect of the intervention of the treatment under study) showed a low negative correlation (r = -.31), this relation was not statistically significant. *Compensation status* or *legal status* has been associated with poorer outcomes (6,7). *Age* has also been reported to be associated with poorer outcomes (8). *Personality variables* have been studied with regard to program outcomes with mixed results. Guck *et al.* (9) reported the relation of treatment outcomes to Minnesota Multiphasic Personality Inventory (MMPI) profiles in a comprehensive study of 635 chronic pain patients. Outcome differences were identified among male subgroups, while no differences were found among female subgroups.

The effect of neuropsychological variables on outcomes of MPP is a potentially important area of research. A goal of MPPs is having patients learn new behaviors that decrease pain or increase functional ability. Neuropsychological factors may influence patients' abilities for new learning. No studies were found on neuropsychological factors as predictors of treatment outcomes in a literature search using the MEDLINE© and PSYCHINFO© databases. Kewman *et al.* (10), however, used a neuropsychological instrument to assess musculoskeletal pain patients, excluding those who had recently taken opiate analgesic medications or had prior neuropsychological problems. Thirty-two percent of patients had impairment in at least one neuropsychological domain. Higher levels of pain, disability, and psychological distress were associated with higher levels of neuropsychological impairment. The present article assesses the neuropsychological characteristics of chronic pain patients, specifically whether these factors are predictive of psychiatric treatment outcomes.

METHODOLOGY

Subjects. Patients in an outpatient multidisciplinary pain program that began offering services in November 1993 comprised the subjects. All patients included in this study had a chronic pain condition that had been persistent for six months or more, had failed to respond to previous medical interventions, and were not candidates for surgery. A multidisciplinary team that provided medical, nursing, physical therapy (PT), occupational therapy (OT), and clinical psychology services conducted the treatment. Group counseling and pain educational services were provided for all subjects. Individual and couples counseling was available. Behavioral techniques for pain management were provided through cognitive behavioral, relaxation, and biofeedback therapies. Physical and occupational therapies were designed to meet the specific needs of these subjects. The program lasted 22 days. The time from admission to discharge averaged six weeks.

Demographics and characteristics. All patients had English as their primary language. For those completing the psychological assessment upon admission and discharge (58 of 104 admissions), the mean age was 44; 86% had workers compensation insurance; and 14% had Medicare or private insurance. Forty-three percent were men, and 57% were women.

Not all patients admitted completed the admission and discharge assessments. Some did not complete the admission assessment because they were directly discharged from an inpatient unit to the pain program. Some patients did not complete the discharge assessment because they were discharged before data could be collected, or chose not to complete the discharge assessment.

The sample size, while small, was sufficient to show changes of clinical significance. With a sample size of 35 (smaller than the current sample size), a difference of half a standard deviation (the lower range of what would be of clinical significance) would show statistical significance as well.

MEASURES

All instruments had a mean score (normative) of 50, and

standard deviation of 10, based on the normative populations used. At admission patients completed the following instruments.

The Shipley Institute of Living Scale (11). The Shipley Institute of Living Scale is a measure of vocabulary and abstract reasoning. This instrument was used to provide an estimate of intelligence and correlates significantly with full-scale IQ scores. It provides measures of general neuropsychological functioning. It was normed on mental health populations.

The Reading Scale from the Wide Range Achievement Test-Revised (WRAT-R) (12). The WRAT-R is an educational achievement test measuring word recognition, and is normed on the general population.

Upon admission and discharge the following instrument was completed.

ported in a large number of studies. This tool is not significantly influenced by level of physical illness or disability. If two clinical scale scores or the summary score (Global Severity Index) are greater than or equal to 63, the profile falls in a range identifying a "case" (*e.g.*, an individual with a psychiatric disorder). It was normed on the general population.

RESULTS

Comparison of Shipley and WRAT-R Reading scores. The sample means on the Shipley Abstraction and Vocabulary Scales, and Reading Scale from the WRAT-R for this sample are shown in *Figure 1*. The Shipley was normed on mental health populations, and the WRAT-R was normed on a general nonpatient population. Therefore, these scores are not directly comparable. No previous studies are available on pain patients where these instruments were employed.
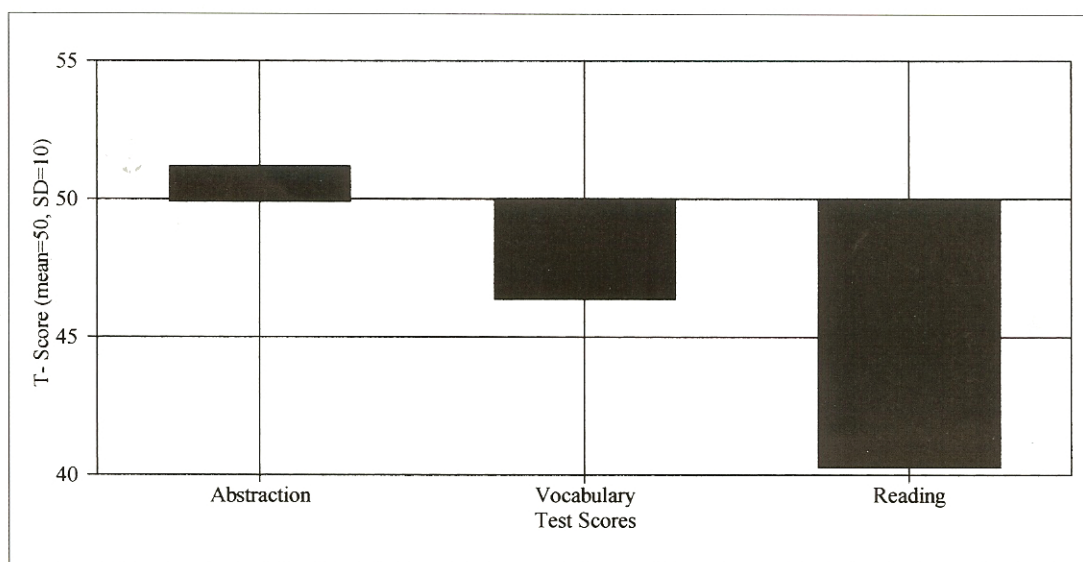

Figure 1. Neuropsychological scores.

The Symptom Checklist 90-R (SCL90-R). The SCL90-R is a self-report inventory of psychiatric symptoms (13) which has nine clinical scales and one summary scale. The reliability and validity of this measure and its sensitivity to therapeutic interventions have been re-

When a one-sample, two-directional T-test was compared with the expected population mean for each test of 50, the Vocabulary ($p = 0.003$, $T = -3.09$) and Reading ($p < 0.001$, $T = -9.5$) scores were significantly below 50; but that was not the case with the Abstraction Scale. The

Vocabulary and Abstraction Scales were also compared to each other using two-tailed paired T-test, and the Abstraction score was statistically significantly higher ($p < 0.001$, T = -4.3).

The WRAT-R mean score of the pain patient sample was almost a standard deviation below the general population mean. The average pain patient had a beginning 10th grade reading level, which fell at the 18th percentile of the general population. Forty percent of patients had an eighth grade reading level or lower; and 11% had a fifth grade or lower reading level.

Comparison of admit to discharge data. A one-tailed paired T-test ($p < 0.05$ for significance) was used to evaluate the statistical significance for changes in a therapeutic direction from admission to discharge on all SCL 90-R variables. Nine of 10 scales from the SCL90-R showed significant improvement from admission to discharge (Table I). With respect to percentage change, the Depression and Paranoid Scales showed the greatest change (11%). Upon admission, 84.7% of pain patients were classified as being a psychiatric "case", while at discharge, 64.4% were so classified. The difference between the two is significant ($p = 0.002$ using a one-directional Wilcoxon signed-rank test for difference in medians).

Relation of neuropsychological factors to treatment outcomes. An analysis of covariance model (14) used difference scores from admission on the SCL 90-R scales as dependent variables. Gender was used as a moderator variable since norms for the SCL 90-R are developed separately for men and women. Neuropsychological variables (the Abstraction and Vocabulary Scales from the Shipley Institute of Living Scale and the Reading Scale from the Wide Range Achievement Test-Revised) were used as covariates to assess if these factors were related to the amount of therapeutic change.

Analyses were statistically significant on four SCL 90-R scales. Higher Vocabulary Scale scores were associated with greater therapeutic change on the Anxiety Scale of the SCL 90-R ($p = 0.032$), and men but not women improved ($p = 0.041$). The average change for men was 0.80 standard deviations, and for women -0.05 standard deviations. Higher Vocabulary scores but lower Abstraction scores were associated with greater change on the Obsessive-Compulsive scale ($p = 0.038$ and 012, respectively), and men but not women improved ($p = 0.013$). The average change for men was 0.69 standard deviations and for women -0.15 standard deviations. Lower Abstraction scores were associated with greater change on the Psychotic Scales ($p = 0.026$), and there was no gender effect. The Paranoid Scale did not show differences related to neuropsychological variables, and men but not women improved ($p = 0.009$). The average change for men was 0.65 standard deviations and for women -0.005 standard deviations.

Table I. Symptom Checklist 90-R pre/post T-test.

Scales	Pre	Post	Percent Change	T value	P-value
Somatic	69.9	66.9	4%	2.65 (N = 58)	.005
Obessive Compulsive	66.6	62.7	6%	2.45 (N = 58)	.009
Interpersonal Sensitivity	61.7	56.1	9%	3.36 (N = 58)	<.001
Depression	68.2	60.7	11%	3.63 (N = 58)	<.001
Anxiety	62.7	57.5	8%	2.72 (N = 58)	.004
Hostility	60.5	57.0	6%	1.73 (N = 58)	.04
Phobic	55.4	52.8	5%	1.43 (N = 58)	.079
Paranoid	58.5	51.9	11%	3.82 (N = 58)	<.001
Psychotic	63.5	57.9	9%	3.28 (N = 58)	<.001
Global Severity Index	67.6	62.9	7%	3.12 (N = 58)	.001

DISCUSSION

The results of this study are consistent with prior research that demonstrated the therapeutic effects of multidisciplinary pain programs. The finding that neuropsycho-

logical characteristics of patients upon admission were associated with treatment outcomes is a new finding not previously reported, to the best of the authors' knowledge. The effect of reading level was controlled in the analysis and was not related to a change in symptoms. Higher Vocabulary scores on the Shipley may have enabled patients to better use verbally sophisticated behavioral interventions such as patient education and cognitive behavioral strategies to reduce anxiety and obsessive compulsive symptoms. These findings also suggest that more complex oral and written interventions may have been less effective for those with lower vocabulary skills. Interventions might be designed which use less verbally sophisticated modalities, and, for example, rely on visually based materials using role playing. For example, Cunningham (15) used videotapes of actors modeling good parenting skills for parents of behavior problem children. This approach showed a greater treatment effect than more conventional verbally based didactic lecture teaching methods.

Those with lower Abstraction scores may have changed more on the Obsessive Compulsive and Psychotic Scales because such patients could improve flexible decision making and planning skills that program staff could teach to patients. Staff could provide helpful advice and problem solving skills for dealing with common problems chronic pain patients face (e.g., marital, sexual, health, pain, psychiatric, financial, and vocational problems).

It remains unclear why men but not women would have changed on some (Anxiety, Obsessive Compulsive, and Paranoid), but not all scales. This "gender effect" was unexpected. The reason for the difference is a matter for future research.

Knowledge of neuropsychological factors can be useful in treatment planning in MPPs. Knowing that a given patient has a fifth grade reading level is essential in providing that patient with appropriate resources. Simplified reading and written assignments and audiotapes can be used. Patients with a reading disability can be given counseling regarding the implications for vocational rehabilitation and informed that many junior colleges have programs designed for reading disabled students. New research has revealed that the underlying language disorder causing a reading deficit is a disorder in phonological processing and is treatable. Up to 80% of those with a reading disorder who receive appropriate treatment can be expected to improve (16). When vocational rehabilitation services are provided, too often routine screening for reading level is omitted because of cost considerations. This may result in workers being referred to rehabilitation programs that do not match their reading or vocabulary levels.

The level of psychiatric morbidity in this population is significant. As noted above, at admission 84.7% of pain patients were classified as being a psychiatric "case", while at discharge, 64.4% were so classified using SCL 90-R criteria. The high level of psychiatric morbidity of chronic pain patients has been noted by France, and Krishna (17). They note, in one study of outpatient chronic pain patients, that 21% were not depressed, 21% had a major depression, 8% had a minor depression, and 51% had intermittent depression. The improvement of patients in the program studied is notable but also indicates a high level of psychiatric morbidy even after MPP treatment. Providing psychiatric care after discharge is an important issue for these patients. Most patients with psychiatric disorders, especially those disorders found in chronic pain patients, can expect improvement with treatment (18). Most patients covered through health insurance or California's Workers' Compensation Program would likely have the cost of psychological services covered.

The present study has several limitations. Psychological test data were available on 58 out of 104 consecutive patient admissions. This may have biased the findings in that patients who had little therapeutic change might not have completed testing at discharge. However, Flor, Fydrich, and Turk (3) report that dropout rates or overall attrition rates were unrelated to treatment effect size and did not appear to bias treatment outcomes.

The association of neuropsychological factors with therapeutic change may have been related to other factors not measured. Also, the association of neuropsychological variables with some treatment outcomes, while suggestive, does not substantiate a causal relationship. A

causal mechanism can only be hypothesized at present. The finding of deficits in reading and vocabulary skills may not be typical of chronic pain patients generally, or even those receiving treatment in MPPs. The present findings would have to be replicated with other samples to assess whether they were unique to this data set or more generalizable to similar settings, populations, and measures.

The present study was limited to the use of one outcome instrument, the SCL 90-R, a measure of psychiatric symptoms. Other measures, for example physical therapy outcomes, would have to be used to see if neuropsychological factors affected these outcomes as well, and not just psychiatric symptoms.

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