

Back Pain

Spine. 1994 Apr 15;19(8):872-80

Measuring residual functional capacity in chronic low back pain patients based on the Dictionary of Occupational Titles.

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STUDY DESIGN. This study designed and tested a functional battery based on the Dictionary of Occupational Titles (DOT). **OBJECTIVES.** Such a battery can be used to measure residual functional capacity (RFC) in chronic pain patients (CPP) and results can be matched against the demand minimum functional capacities (DMFC) of DOT jobs. **SUMMARY OF BACKGROUND DATA.** Physicians have difficulty translating medical impairment into functional limitation and thereby establishing the RFC of CPPs. **METHODS.** The DOT, a USA government publication, provides information about physical demands of every USA job according to 36 factors and subfactors. The authors defined and developed a functional battery based on these factors/subfactors. This battery was tested on 67 consecutive CPPs to determine the percentage of CPPs able to pass specific job factors and the full battery and return to some DOT job, and evaluated the effects of pain on battery performance. The data were factor analyzed.

RESULTS. The battery determined if CPPs could perform DOT job factors and had the necessary RFC to be placed in a DOT job. The vast majority of CPPs could not pass the full battery and the presence of pain and original job classification predicted whether a CPP could perform a job factor. Factor analyses grouped the factors into four independent categories supporting the design of the battery. **CONCLUSION.** The battery can assess whether CPPs are able to return to work.

Cardiac Requirements of Work

Clin Cardiol. 1990 Aug;13(8):555-65

Metabolic equivalents (METs) in exercise testing, exercise prescription, and evaluation of functional capacity.

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One metabolic equivalent (MET) is defined as the amount of oxygen consumed while sitting at rest and is equal to 3.5 ml O₂ per kg body weight x min. The MET concept represents a simple, practical, and easily understood procedure for expressing the energy cost of physical activities as a multiple of the resting metabolic rate. The energy cost of an activity can be determined by dividing the relative oxygen cost of the activity (ml O₂/kg/min) x by 3.5. This article summarizes and presents energy expenditure values for numerous household and recreational activities in both METS and watts units. Also, the intensity levels (in METS) for selected exercise protocols are compared stage by stage. In spite of its limitations, the MET concept provides a convenient method to describe the functional capacity or exercise tolerance of an individual as determined from progressive exercise testing and to define a repertoire of physical activities in which a person may participate safely, without exceeding a prescribed intensity level.

Depression, mild

Arch Fam Med. 1994 Dec;3(12):1081-6

Minor depression and functional impairment.

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OBJECTIVE: To describe a method of assessing minor depression and its effects on functional status, medical co-morbidity, seasonality, and demographic variables. **DESIGN:** A survey administered to a nonrandom sample of 302 patients. **SETTING:** A university-based family practice outpatient center. **PATIENTS:** Patients who were seen for routine ambulatory care were asked to complete the Inventory to Diagnose Depression scale and a modified version of the Dartmouth COOP Functional Assessment Charts, including a measure of seasonality. **MAIN OUTCOME MEASURES:** Six categories of functional impairment were examined across two categories of depression (major and minor) and the nondepressed. Major depression is defined strictly by criteria in the Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition. Minor depression is defined as depressed mood or anhedonia and one other of the nine depression symptoms.

RESULTS: Forty-seven patients (15.6%) had minor depression. Using chi 2 analysis, significant differences were found among the three levels of depression for each functional status category. Logistic regression analysis showed patients with minor depression to have greater odds of more impairment in feelings (odds ratio [OR], 4.01; 95% confidence interval [CI], 1.75 to 9.19), pain (OR, 2.58; 95% CI, 1.18 to 5.63), and social activities (OR, 2.48; 95% CI, 1.19 to 5.17) compared with the nondepressed patient. The cluster of impairment distinguishing minor from major depression differed somewhat, with more impairment in daily activities (OR, 19.6; 95% CI, 3.45 to 112.00) and feelings (OR, 24.4; 95% CI, 1.78 to 333.00) and greater lung disease (OR, 13.7; 95% CI, 2.19 to 80.00) and seasonality (OR, 5.9; 95% CI, 1.10 to 32.1 for highest seasonality) in patients with major depression. **CONCLUSIONS:** There appears to be significant functional disability associated with the presence of minor depression. Seasonality was also

present in those with minor depression, although it was of greater importance among those with major depression. Despite lack of national consensus on the definition of minor depression, limitations owing to sampling method, and statistical modeling, there is evidence that patients with minor depression reveal a different constellation of impairment than do those with major depressive disorder.

Fibromyalgia

Psychosom Med. 1997 Nov-Dec;59(6):565-71

Psychosocial factors in fibromyalgia compared with rheumatoid arthritis: I. Psychiatric diagnoses and functional disability.

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OBJECTIVE: Recent studies of the relationship between fibromyalgia and psychiatric disorders have yielded conflicting findings, and many of these inconsistencies seem to result from methodological differences. **METHOD:** We compared 36 patients with fibromyalgia and 33 patients with rheumatoid arthritis from a tertiary care clinic using physician-administered, structured psychiatric interviews and self-reported measures of illness appraisal, coping, and functional disability.

RESULTS: Patients with fibromyalgia had significantly higher lifetime prevalence rates of mood and anxiety disorders, as well as higher mean numbers of medically unexplained physical symptoms across several organ systems. Ninety percent of the patients with fibromyalgia had a prior psychiatric diagnosis compared with less than half of the patients with rheumatoid arthritis. **CONCLUSIONS:** Despite the absence of organic pathology, the patients with fibromyalgia had equal or greater functional disability and were less well adapted to their illness. Although the pathophysiology of fibromyalgia remains unclear, co-morbid psychiatric disorders and functional disability remain an important focus of treatment in this population.

Multifactorial Article

Trans Assoc Life Insur Med Dir Am. 1991;74:78-91

Ability, disability, and the functional capacity of patients with cardiovascular disease.

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Assessment of functional capacity, of ability and disability among patients with cardiovascular disease raises a number of problems and issues for which there are currently only imperfect or incomplete answers. Emphasis must be placed on the lack of predictable relationship of anatomic abnormality and functional abnormality. For example, the percentage obstruction of the coronary artery documents the anatomic extent of the disease, rather than the limitation of functional capacity; the same lack of predictive value characterizes the decrease in resting ventricular ejection fraction. The response to a challenge of activity or exertion currently appears to offer the optimal method of assessing functional capacity for work, although a brief continuous exercise test may not be the optimal exercise protocol by which to evaluate endurance. As an example, in our laboratory, comparing a low-level continuous exercise test protocol with one with an intermittent exercise design (i.e., periods of exercise alternating with periods at rest), patients typically can perform at least one additional stage of exercise on the discontinuous or intermittent test protocol. This occurred without significant differences in the final heart rate, blood pressure, or rate-pressure product, probably because most patients so tested were limited not by myocardial ischemia but by musculoskeletal problems, fatigue, or dyspnea. An unmet need is a comparison of exercise test protocols for the assessment of functional capacity, possibly the development of new test protocols for patients with limited functional capacity, and the evaluation of the relationship of these test data to eight hours of occupational activity in the workplace setting. It appears logical that a diagnostic exercise test should differ from one designed to determine functional capacity, but the results of a variety of exercise test protocols should be compared with the actual physical activity able to be performed in the workplace, as well as with reported symptoms. It should be defined whether testing is to be performed on optimal medical therapy, which I believe should be the case; or whether the technique used for diagnostic exercise testing, that of the minimal medication possible, is to be employed. Next, the time after surgical intervention or following a prolonged hospitalization at which to test should be delineated in that the deconditioning effect of immobilization may substantially decrease effort tolerance, unrelated to the severity of the underlying cardiovascular disease. Finally, should exercise rehabilitation be recommended or required before testing for cardiovascular impairment; major improvement in functional capacity has occurred in previously sedentary patients with a variety of cardiovascular diseases, including those with important manifestations of myocardial ischemia and ventricular dysfunction.

Pain limitations

J Occup Rehabil. 2001 Jun;11(2):119-32

Functional capacity evaluations in persons with spinal disorders: predicting poor outcomes on the Functional Assessment Screening Test (FAST).

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This study determines how performance on the simple, low exertion Functional Assessment Screening Test (FAST) relates to performance on more extensive physical and psychological testing. One hundred eighty-eight persons with chronic back disability and 17 spine healthy volunteers underwent the FAST (three 2-min static tests [kneeling, stooping, and squatting] and two 5-min tests [repetitive stooping and repetitive twisting while standing]), the Progressive Isoinertial Lifting Evaluation (PILE), trunk extension endurance, submaximal bicycle ergometry, and psychological profiles. All FAST components were completed by 88% of spine healthy subjects, but only by 19.7% (n = 37) of the back patients. Internal consistency for overall test performance was 0.82 (alpha coefficient). Back pain noncompleters had poorer performance on the PILE and trunk extension endurance despite similar cardiovascular fitness and perceived exertion during testing. They had more dysfunctional coping mechanisms, pain avoidance, depression, and self-reported disability. Since performance on nonstrenuous testing is so poor, and psychosocial variables relate strongly to test performance, extensive Functional Capacity Evaluations may not be necessary or valid in assessing the physical performance of this population of chronic back pain patients.

Psychological Factors (interaction of, with other sources of limitation)

J Occup Rehabil. 2003 Dec;13(4):259-76

Psychosocial factors and functional capacity evaluation among persons with chronic pain.

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Psychosocial factors have been found to have a significant impact on functional activity, particularly among persons with chronic pain. While various systems have been developed to assess functional limitations through functional capacity evaluation (FCE), assessment of psychosocial factors that may impact function have been largely ignored. This paper examines the existing literature on psychosocial factors and FCE performance. Given that there are few studies that have directly addressed this issue, the paper also examines psychosocial factors that have been found to influence function in persons with pain. The results of the literature review indicate that few psychosocial factors have been found to be directly associated with FCE and functional measures, although many are related to various measures of disability. The strongest evidence that psychosocial factors are related to functional performance is based on the studies examining the association between functional activity and pain-related fear, self-efficacy, and illness behavior. Psychosocial factors have also been shown to influence measures of sincerity of

effort often obtained during FCE. Proposals for modifying FCE assessment are given based on the available data, as well as suggestions for future research.

J Card Fail. 2000 Dec;6(4):300-5

Depression is common and precludes accurate assessment of functional status in elderly patients with congestive heart failure.

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BACKGROUND: Congestive heart failure (CHF) and depression are independently known to result in physical decline and diminished functional capacity in the general population. The prevalence and relationship of depressive symptoms in CHF to physical limitations has not been objectively examined. **METHODS AND RESULTS:** The Center for Epidemiological Studies Depression Scale (CES-D) was used to ascertain depressive symptoms in 33 elderly ambulatory individuals with CHF. Self-report assessment of functional status, cardiopulmonary exercise testing (CPX), and measurement of energy expenditure by doubly labeled water and Caltrac Accelerometer (Muscle Dynamics, Torrance, CA) were performed. Depressed and nondepressed groups were compared. Forty-two percent of the patients scored in the depressed range (CES-D score of 16 or greater). There were no differences in demographic variables or severity of illness between the depressed and nondepressed patients. Energy expenditure was comparable across groups.

Although obtaining similar maximal heart rate and maximal oxygen consumption (VO₂max) on CPX, the depressed group showed less exertion on exercise testing with a significantly lower respiratory quotient (P = .017).

CONCLUSION: Depressive symptoms were common and unrelated to the severity of CHF. Although depressed individuals tended to report worse physical functioning than nondepressed individuals, objective assessment of energy expenditure was comparable. Depressed patients appear to underestimate their functional ability. Subsequently, inaccurate assessment of functional status may occur.

Chest. 1994 Oct;106(4):996-1001

Nonpharmacologic therapy improves functional and emotional status in congestive heart failure.

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PURPOSE: To compare the effects of a multimodal nonpharmacologic intervention to digoxin and to placebo in patients with congestive heart failure receiving background therapy with angiotensin-converting enzyme inhibitors. **DESIGN:** Randomized, parallel assignment to three treatment groups of 20 patients with congestive heart failure (New York Heart Association Class II and III). **INTERVENTION:** Nonpharmacologic treatment program included the following: (1) graduated exercise training, three to five times per week; (2) structured cognitive therapy and stress management; and (3) dietary intervention aimed at salt reduction and weight reduction in the overweight. Digoxin was titrated to achieve a blood level between 0.8 and 2.0 ng/ml. Placebo and digoxin were administered in a randomized, double-blind fashion.

RESULTS: Echocardiographic ejection fraction improved ($p < 0.05$) in the digitalis group (change = $+4.4 \pm 6.5$) compared with both placebo (change = -3.2 ± 3.9) and nonpharmacologic therapy (change = -3.2 ± 3.9). The nonpharmacologic treatment program was well tolerated by all patients and resulted in significant improvement ($p < 0.05$) in exercise tolerance (digoxin = $+51 \pm 50$ s, placebo = $+91 \pm 76$, nonpharmacologic therapy = $+182 \pm 139$), as well as Beck Depression Inventory score (digoxin = $+1.2 \pm 4.4$, placebo = $+2.0 \pm 4.2$, nonpharmacologic therapy = -5.0 ± 4.2), Hamilton Scale scores of anxiety (digoxin = $+3.0 \pm 6.8$, placebo = $+6.0 \pm 2.6$, nondrug therapy = -5.2 ± 5.4), and depression (digoxin = $+1.0 \pm 4.9$, placebo = $+5.0 \pm 5.0$, nonpharmacologic therapy = -6.6 ± 10.1). In addition, weight loss was significantly greater with nonpharmacologic therapy (digoxin = $+0.32 \pm 1.76$ kg; placebo = -1.35 ± 1.44 kg; nonpharmacologic therapy = -4.37 ± 4.50 kg) compared with both digoxin and placebo. **CONCLUSIONS:** Nonpharmacologic therapy improved functional capacity, body weight, and mood state in patients with congestive heart failure. In contrast, digoxin improved ejection fraction without corresponding changes in exercise tolerance or quality of life.

Chest. 1985 Jan;87(1):35-8

Prevalence of depression and anxiety in patients with COPD. Relationship to functional capacity.

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The objective of this study was twofold: (1) to document the prevalence of depression and anxiety in patients with moderate or severe chronic obstructive pulmonary disease; and (2) to determine whether the presence of depression or anxiety adversely affected the functional capabilities of the patient as reflected by the distance he could walk in 12 minutes. Forty-five patients with an FEV1 less than 1,250 ml underwent pulmonary function testing including spirometry, single breath diffusing capacity, and arterial blood gas determinations. The degree of depression was assessed by the Beck depression inventory, while the degree of anxiety was assessed by the State-Trait anxiety inventory. Forty-two percent of the patients had significant depression, while only 2 percent of the patients had significant anxiety. There was a highly significant correlation between the depression scores and the anxiety scores ($r = 0.81$, p less than 0.001). There was no significant correlation between the level of depression or anxiety and the distance that the patient could walk in 12 minutes. From this study, we conclude that the prevalence of depression in patients with moderate or severe COPD approaches 50 percent while the incidence of anxiety is much lower (2 percent).

Gen Hosp Psychiatry. 1996 Jul;18(4):220-9

The relationship of current psychiatric disorder to functional disability and distress in patients with inflammatory bowel disease.

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Although prior theories about psychiatric disorders causing inflammatory bowel disease (IBD) have largely been discredited, these same disorders have at times been associated with functional gastrointestinal symptoms such as those found in irritable bowel syndrome. Since functional gastrointestinal symptoms can also occur in patients with organic pathology, we hypothesized that a current psychiatric disorder might amplify or produce additional gastrointestinal symptoms in patients with organic gastrointestinal diseases such as IBD, leading to additive functional disability and decreased quality of life. This pilot study evaluated a sequential sample of 40 IBD patients using the NIMH Diagnostic Interview Schedule, structured interviews for functional gastrointestinal symptoms, and prior episodes of emotional, physical, and sexual abuse as well as self-report measures of personality and disability. We compared IBD patients with and without a current psychiatric disorder while controlling for disease severity. Eight patients with major depression were treated with antidepressants. Patients with a current psychiatric disorder had significantly higher 1) mean number of lifetime psychiatric diagnoses, 2) prevalence rates of prior sexual and physical victimization, and, 3) mean numbers of both gastrointestinal and other medically unexplained symptoms despite no differences in severity of IBD. Significant and trend level differences were apparent on several measures of functional disability. A regression analysis showed that number of psychiatric diagnoses, number of functional gastrointestinal symptoms, and dissociation scale scores significantly discriminated the groups. Treatment of current major depression decreased functional disability despite no objective changes in gastrointestinal disease severity. It was concluded that the presence of a current psychiatric disorder appears to alter the perception of disease severity in patients with IBD. Nonrecognition of the psychiatric disorder may lead to unnecessary and aggressive interventions for IBD patients such as medication changes, invasive testing, or surgery. The presence of a current psychiatric illness also appears to be associated with increased functional disability. Psychiatric evaluation and treatment, therefore, have an important role in the ongoing management of IBD patients with distressing gastrointestinal symptoms not directly attributable to their IBD.

J Occup Rehabil. 2001 Sep;11(3):217-32

Unique issues in assessing work function among individuals with psychiatric disabilities.

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With the admission of people who experience psychiatric disabilities in the state-federal vocational rehabilitation system and the Social Security disability rolls in the 1960s, assessment of their capacity to work has been a major concern. Given the rising rates of claims for psychiatric disability in both the public and the private sectors, and the disappointing employment outcomes of people with psychiatric disabilities compared to those with other disabilities, there have been numerous initiatives to accurately assess their employment potential. Historically, such assessment within the Social Security Administration has relied upon evaluation of a person's medical impairment, but numerous studies suggest a weak relationship between measures of psychiatric diagnosis or symptoms and work outcome. Efforts have been undertaken to identify valid and reliable methods of assessing the ability of people with psychiatric disabilities to work. The authors review (a) methods of assessing work function for this population, and (b) the literature on predictors of work functioning and the nature of psychiatric disability, and suggest implications for disability determination policies and for future research.

Psychol Med. 2000 May;30(3):657-68

Current and residual functional disability associated with psychopathology: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS).

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BACKGROUND: Few population studies have investigated the functional disabilities that accompany specific psychiatric diagnoses. This study assesses the nature and strength of current and residual impairments in various functional domains of life. **METHODS:** Data were derived from the Netherlands Mental Health Survey and Incidence Study (NEMESIS), a prospective study in the Dutch general population aged 18 to 64 (N = 7147). Psychiatric diagnoses were based on the Composite International Diagnostic Interview; functional disability was assessed on the basis of the Short-Form-36 and the number of disability days.

RESULTS: Psychopathology was associated with increased disability in social, emotional and physical domains of life. Disability levels varied by psychiatric diagnosis, with mood disorders showing the poorest levels of functioning, especially for vitality and social functioning; alcohol-related disorders were associated with few disabilities. Co-morbidity strongly aggravated the disability. The effect of contextual factors on disability was limited, although somatic ill health,

unemployment and adverse youth history increased the likelihood of functional disability. The findings indicate that psychopathology can also have residual debilitating effects.

CONCLUSIONS: Mental health care providers should be aware that the extent and the type of disability may vary with the different types of disorders and among different groups within the population. Since recovery from functional limitations may not be complete or may take more time than the remission of the psychiatric symptomatology, non-psychiatric follow-up care is needed. The high number of lost work days is relevant from an economic perspective. There is a need for illness-specific disability assessment instruments.

Psychiatric Illnesses, specific considerations

Biol Psychiatry. 2003 Mar 1;53(5):422-30

The relationship of neuropsychological abilities to specific domains of functional capacity in older schizophrenia patients.

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BACKGROUND: This study sought to determine the relative importance of cognitive measures in predicting various domains of everyday functional capacity in older outpatients with schizophrenia. **METHODS:** Ninety-three psychiatry outpatients with diagnoses of schizophrenia and schizoaffective disorders underwent a comprehensive neuropsychiatric evaluation, including neuropsychological testing and clinical ratings of psychopathology. Functional capacity was assessed with the Direct Assessment of Functional Status, a performance measure of basic and instrumental activities of daily living (ADLs/IADLs).

RESULTS: Neuropsychological performance significantly predicted most ADLs/IADLs measured, except simple eating behaviors, time orientation, and grooming. Lower educational level and negative symptoms also were associated with worse functional capacity, whereas positive symptoms and depressed mood were not. Measures of cognitive functioning accounted for more variance in functional capacity than did psychiatric ratings of symptoms, and multiple regression analyses demonstrated that neuropsychological performance was predictive of functional capacity, over and above clinical symptoms. No specific cognitive domains were differentially predictive of specific domains of functional capacity. **CONCLUSIONS:** Neurocognitive abilities were more predictive of functional capacity than level of clinical symptoms; however, these abilities were not specific predictors of functioning. This is consistent with findings of relatively generalized, intercorrelated cognitive impairment in schizophrenia and multiply determined domains of everyday functioning.

Reliability of Capacity Testing

Am J Phys Med Rehabil. 2001 Mar;80(3):162-8

Functional assessment in patients with chronic pain: can physicians predict performance?

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OBJECTIVES: To determine the appropriateness of using physicians to estimate the functional abilities of patients with chronic pain. Specific objectives included the following: (1) to compare the physician's predicted performance on functional assessment with actual performance, and (2) to compare the physician's predicted effort during functional assessment with an objective measure of effort. **DESIGN:** A total of 201 outpatients with chronic pain completed this prospective, multicenter, cohort study. Fifteen physicians, who were trained to administer the standardized evaluation, performed the evaluations and predicted performance and effort on functional assessment. Therapists, blinded to the physician's evaluation, administered a functional assessment (maximal and sustained lifts [n = 3 types]; repetitive activities [n = 4 types]) and a grip dynamometry test (effort measure) on each subject.

RESULTS: Pearson's correlation testing demonstrated significant correlations between the physician's predicted performance and the observed performance for all lifting items and repetitive activities in both men (0.52, 0.50, 0.55) and women (0.36, 0.40, 0.18). Analysis of variance and post hoc t tests showed agreement between the physician's predicted effort and the dynamometry effort measure in only a small subset of patients (men were predicted to put forth absolutely no effort; n = 4). **CONCLUSIONS:** A trained physician, performing a standardized evaluation, can estimate with reasonable accuracy the work-related functional ability in patients with chronic pain. The prediction of effort seems to be more problematic.

Am J Phys Med Rehabil. 2001 Mar;80(3):189-95

Consistency of performance on the functional capacity assessment: static strength and dynamic endurance.

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OBJECTIVE: To explore the degree of consistency in a subject's performance in physical strength and endurance. **DESIGN:** Thirty healthy men, aged 19 to 26 yr, were recruited to participate in protocols to assess static strength and dynamic endurance tests on their upper limbs with the Baltimore Therapeutic Equipment Primus. Retests were conducted 7 days after the initial test.

RESULTS: The intraclass correlation coefficients were 0.71 to 0.97 and 0.32 to 0.90 for static and dynamic endurance strengths, respectively. These results indicated that the consistency of the subjects' performance across occasions was high for testing static strength, although it was more varied for testing endurance strength.

CONCLUSIONS: Higher consistency was observed among subjects in the assessment of static strength than dynamic endurance strength. The range of motion traveled by the limb, speed of performance, and ergonomic design of attachments seemed to confound the subjects' performance on the instrument. Stringent assessment protocols, ergonomically designed hardware, and clear instructions and practice trials before the formal testing were essential to maximize the subjects' consistency of performance. The results of this study were applicable and generalized to other performance-based instruments for physical and functional capacity evaluation and work simulators.

Arthritis Rheum. 2003 Oct 15;49(5):640-7

Concordance of four methods of disability assessment using performance in the home as the criterion method.

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OBJECTIVE: To determine the concordance of 4 methods of disability assessment with the criterion method. Performance testing in the home was selected as the criterion. **METHODS:** The task performance of 57 community-dwelling older women (≥ 70 years) with knee osteoarthritis was examined through self report, proxy report, clinical judgment based on impairment measures, performance testing in an occupational therapy clinic, and performance testing in participants' homes. The 26 tasks represented 4 domains of daily living activities: 5 functional mobility, 3 personal care, 14 cognitively oriented instrumental activities of daily living (IADL), and 4 physically oriented IADL.

RESULTS: In general, self reports and proxy reports had the highest concordance with in-home performance test results. Nonetheless, even for these methods, depending on task domain, the rate of discordance ranged from 31% to 54%, being least in personal care and greatest in the physically oriented IADL. **CONCLUSION:** Disability estimates based on self reports, proxy reports, clinical judgments, and hospital performance-based assessments are not interchangeable with in-home task performance.

Self-Assessment of Ability

J Neural Transm Suppl. 1991;33:105-10

Essential tremor: functional disability vs. subjective impairment.

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78 patients with essential tremor (ET) were investigated to uncover correlation and discrepancies between functional (motor) disabilities and subjective impairment. Various self-rating scales (Zung, v. Zerssen etc.) were used for the assessment of the latter: 2/5 of the patients rated themselves as severely impaired; 1/3 was depressive. Patients who showed nearly the same functional (motor) disability felt very differently subjectively impaired. Semiquantitative clinical scores of action tremor correlated best with the subjective impairment in activities of daily living. Objective measurements of motor disability were performed with the "Motorische Leistungsserie nach Schoppe" (motor performance test) and showed good correlation to the subjective impairment in simple tasks of every day life, such as drinking from a glass, eating soup, and writing. Asking for the subjective impairment in these tasks allows to estimate the objective disability correctly. This may be of value in long-term studies of essential tremor.

J Rheumatol. 1994 Jan;21(1):64-9

Joint impairment is strongly correlated with disability measured by self-report questionnaires. Functional status assessment of individuals with rheumatoid arthritis in a population based series.

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OBJECTIVE. To determine how well self-report functional ability reflects the impairment due to the arthritic process in rheumatoid arthritis (RA) and how much it is affected by other factors of health status. **METHODS.** We examined the relationships between self-report measures such as the Health Assessment Questionnaire (HAQ) and Arthritis Impact Measurement Scales (AIMS) and measures of impairment such as the Keitel function test (KFT), which is intended to reflect the degree of functional limitation of the joints, grip strength and radiological destruction as well as anxiety and depression in a population-based series of RA.

RESULTS. First, the HAQ and AIMS had a high correlation coefficient ($r = 0.89$, $p < 0.0001$). Second, the above measures of impairment were more significant predictors of self-report functional measures than, for example, mental health perceptions. The AIMS scales also correlated well with the corresponding physical function of the KFT. **CONCLUSION.** Patients' self-report functional ability in RA reflects their physical impairment due to the arthritic joint disease and is less influenced by other factors such as emotional adjustment.

Spine. 1999 Nov 1;24(21):2254-60; discussion 2260-1

The relative influence of perceived pain control, anxiety, and functional self efficacy on spinal function among patients with chronic low back pain.

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STUDY DESIGN: A prospective analysis of the relative influence of pain-specific and performance-specific cognitive variables on lifting tasks using empirically derived measures.

OBJECTIVES: To determine the relative contributions of self efficacy expectancies of lifting performance, perceptions of pain control, and anxiety on actual lifting performance.

SUMMARY OF BACKGROUND INFORMATION: Although patients' pain beliefs play an important role in the expression of low back pain, there is little research on the influence of performance-specific cognitions on spinal function. This study extended the scope of recent research, with findings indicating that patients with a stronger functional self efficacy expectancy--the belief that one can perform essential work tasks successfully--achieve higher levels of function than those with a low functional self efficacy expectancy. Moreover, as a performance-specific variable, functional self efficacy expectancy was hypothesized to be a better predictor of lifting than pain-specific cognitions, which presumably influence function in an indirect manner, if at all. METHODS: Before undergoing a standardized, graded lifting assessment, 100 work-disabled patients with chronic back pain rated their confidence to perform load-lifting tasks essential to their job (functional self efficacy expectancy), their ability to control and decrease pain, and psychological distress.

RESULTS: Multiple regression analyses found that functional self efficacy expectancy accurately predicted lifting. It was found to be a better predictor of lifting tasks than either of the perceived pain control measures or psychological distress. CONCLUSION: Data suggest that what patients believed they could achieve accurately determined their actual spinal function, independent of their sense of control over pain or their distress. Approaches to low back disorders emphasizing perceived pain control as a central cognitive determinant of disability were unsupported.

J Occup Rehabil. 2002 Sep;12(3):119-29

Concurrent validity of questionnaire and performance-based disability measurements in patients with chronic nonspecific low back pain.

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This study aimed to investigate the concurrent validity of two approaches to disability measurement in patients with chronic nonspecific low back pain (CLBP). It was hypothesized that if both are measuring the same construct, the instruments would lead to similar disability results and would correlate strongly ($r > 0.75$). The study compared the results of self-reported and performance-based measures of disability in 64 consecutive patients with CLBP. Participants mean age was 38.0 years, the mean duration of the current episode of back pain 9.9 months, and 90% were off work due to CLBP. The self-report measures used were: the Roland Disability Questionnaire (Roland); the Oswestry Disability Questionnaire (Oswestry); and the Quebec Back Pain Disability Questionnaire (Quebec). Performance was measured using the Isernhagen Work Systems Functional Capacity Evaluation (FCE). The mean scores from the self-report measure are as follows: Roland 13.5 (scale 0-24), Oswestry 28.2 (scale 0-100), Quebec 37.8 (scale 0-100) consistent with moderate to severe disability. In contrast the results from the performance-based measures suggested that the subjects should be able to work at a physical intensity level of moderate to heavy. Little to moderate correlation was observed between the self-report and performance-based measures (Spearman rank correlations: Roland-FCE (-0.20), $p > 0.05$; Oswestry-FCE (-0.52), $p < 0.01$; Quebec-FCE (-0.50), $p < 0.01$). Results are interpreted to suggest that both performance-based and self-report measures of disability should be used in order to obtain a comprehensive picture of the disability in patients with CLBP.

Arch Phys Med Rehabil. 1997 Dec;78(12):1358-63

A simulation of hand impairments: effects on upper extremity function and implications toward medical impairment rating and disability determination.

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OBJECTIVES: To determine whether simulation of significant impairment of the hand will have a predictable impact on degree of functional loss at the wrist and hand. **DESIGN:** Single subject repeat measures using before-after trial comparisons and healthy volunteer subjects. **SETTING:** Occupational therapy section of a large academic medical center. **OTHER PARTICIPANTS:** Twenty adult volunteer student subjects from an occupational therapy education (OTE) department were included. All were between ages 18 and 43 years, right hand dominant, and in excellent general health. There were 19 women and 1 man, reflecting gender distribution of the OTE student body. **INTERVENTION:** A simulated fusion of the carpometacarpal (CMC) joint of the thumb was achieved by immobilization in an individually fabricated splint designed to

maximally restrict motion at the first CMC joint. Impairment ratings (baseline vs splinted) according to the AMA Guides were obtained by Greenleaf testing, and upper extremity function was quantitatively assessed before and after splinting. **MAIN OUTCOME MEASURES:** Measures of upper extremity function included grip and pinch strength, wrist torque, and speed of performance on the Valpar Small Tools test, Jebsen Hand Function test, and an exploratory measure, the Functional Life Activity Test (FLAT).

RESULTS: Significant impairments were achieved for all subjects after splinting and according to Greenleaf testing. Splinting resulted in significant reductions in grip and pinch strength, wrist torque, and significant slowing of performance on the Valpar, Jebsen, and FLAT tests. Regressions of degree of impairment on degree of functional loss after splinting, and according to each of the above measures, were not significant. **CONCLUSIONS:** Impairment of the hand was simulated to a mild-to-moderate degree as measured according to the AMA Guides. This imposed significant reductions in motion at key joints of the wrist and hand as well as significant reductions in grip and pinch strength and wrist torque. A corresponding and significant slowing of performance on a variety of measures of upper extremity function of an industrial and nonindustrial nature was also seen. However, and for the first time, correlation and regression reveals that it is not possible to predict degree of functional loss attributable to degree of impairment for the hand. It thus appears that, for mild-to-moderate clinical impairments, the associated impairment rating is a poor estimator of functional loss at the hand and should be used cautiously, if at all, as a criterion for disability determination.

Spine. 2000 Jul 15;25(14):1817-26

Relationship between functional evaluation measures and self-assessment in nonacute low back pain.

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STUDY DESIGN: The correlations between objective biomechanical indicators of function and self-assessment scores were examined retrospectively for 91 subjects with nonacute low back pain. **OBJECTIVES:** To examine the correlation between self-assessment, trunk range of motion (ROM), velocity, and complex mechanical coordination patterns of the spine in nonacute low back pain. **SUMMARY OF BACKGROUND DATA:** In low back pain, there is often little concordance between pain, physical impairment, and disability. Use of range of motion and velocity to enhance objectivity in impairment evaluations has been ineffectual. In this study, two hypotheses were examined: range of motion and velocity are controllable and inherently correlated with self-assessment; complex spinal coordination patterns such as range of lordosis cannot be controlled and are independent of self-assessment. **METHODS:** Self-assessment questionnaires were administered, and indexes of spinal motion and coordination were measured

through skin marker kinematics. The correlation between self-assessments and biomechanical measures was determined.

RESULTS: Self-assessments of function were significantly correlated with parameters prone to regulation: range of motion, velocity, and load lifted. In contrast, little correlation was found with measures of complex spinal coordination less susceptible to conscious or affective regulation, namely, range of lordosis and estimated segmental mobility. This effect was magnified with increased load. Self-assessment scores were significantly poorer among insurance referrals, regardless of functional status. **CONCLUSIONS:** Simple parameters of the functional examination, such as range of motion and velocity, are strongly correlated with cognitive state, and thus the information they supply is less than ideal. Complex spinal coordination is a better indicator of the degree of spinal dysfunction and enhances the process of differentiating between pain, disability, and functional impairment.

J Clin Epidemiol. 1996 Oct;49(10):1103-10

Measuring functional status: cross-sectional and longitudinal associations between performance and self-report (Zutphen Elderly Study 1990-1993).

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We investigated cross-sectional as well as longitudinal associations between performance-based measures of functional status and self-reported measures of functional status. In the Zutphen Elderly Study, 494 men, born between 1900 and 1920, were examined in 1990, of whom 303 were reexamined in 1993. A performance score was constructed on the basis of four tests: standing balance, walking speed, ability to rise from a chair, and external shoulder rotation. Self-reported functional status was based on disabilities in basic activities of daily living, mobility, and instrumental activities of daily living. A hierarchic disability scale was constructed. Cross-sectional correlation coefficients between the performance score and the disability scale were 0.22 in 1990 and 0.39 in 1993. Correlations were highest between the test for walking speed and self-reported mobility and IADL, and between the test for external shoulder rotation and self-reported disabilities in basic activities of daily living. The correlation between the 3-year changes in performance and in self-report was 0.20 ($p < 0.001$). Both performance and self-report at baseline predicted performance and self-report after 3 years. Performance-based measures of functional status are cross-sectionally and longitudinally associated at modest levels with self-reported disabilities. Performance measures and self-reported measures are complementary, but do not measure the same construct.

Simulated Work Situations

Rehabilitation (Stuttg). 2000 Oct;39(5):297-306

[Value of the Susan Isernhagen Evaluation of Functional Capacity Scale in medical and occupational rehabilitation]

[Article in German]

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In Germany, Susan Isernhagen's Functional Capacity Evaluation (FCE) system has increasingly come into use over the last few years at the interface between medical and vocational rehabilitation. With implementation of these work-related tests of functional capacity it is possible to obtain valid statements concerning the further vocational prognosis. Along with evaluative testing by experts from different disciplines, the further steps towards integration occur on a well-founded basis. Therapies may thus be adjusted to the requirements of work, either at the former workplace or a new one, or possibly of a vocational (re-)training measure. Also, it is possible to directly deal with work-related issues in the report given at the end of rehabilitation, to initiate preliminary integrative steps in order to achieve a seamless, job retention-focussed transition back into work life. Work is simulated at different levels of loading capacity, the functional deficits of the rehabilitees are addressed in a specific, job-related manner, so as to enable an early return to work after rehabilitation.

Test-Function correlations

Spine. 2003 Feb 15;28(4):380-4

A comparison of lumbar range of motion and functional ability scores in patients with low back pain: assessment for range of motion validity.

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STUDY DESIGN: A clinical convenience sample of workers with low back problems was tested once for a variety of parameters. **OBJECTIVES:** To quantify the links between lumbar range of motion and scores obtained from functional evaluation tests. **SUMMARY OF BACKGROUND DATA:** Although lumbar range of motion traditionally has been the standard used to determine disability for the purposes of compensation, a concern arises from the fact that a discrete physical impairment associated with low back pain and diminished range of motion often is never found. **METHODS:** This study involved 18 workers with chronic low back pain referred to

a rehabilitation center for determination of compensation and fitness for return to work. Lumbar range of motion was precisely and accurately measured with a three-dimensional lumbar motion instrument. In addition, typical functional tests were performed for each patient. Comparisons were made between all the lumbar range of motion values and each of the functional ability scores.

RESULTS: The most notable finding was the lack of significant correlation between most of the lumbar range of motion values and the functional test scores. Only 9 of a possible 144 correlations were significant. **CONCLUSIONS:** The relation between lumbar range of motion measures and functional ability is weak or nonexistent. This has implications for clinical practice as it relates to disability determination for patients with chronic low back pain, and perhaps for the current impairment guidelines of the American Medical Association.

J Rheumatol. 2001 Nov;28(11):2416-24

Radiographic damage in rheumatoid arthritis correlates with functional disability but not direct medical costs.

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OBJECTIVE: Few longitudinal data exist on the relationship between radiographic damage and self-reported functional disability and direct medical costs in rheumatoid arthritis (RA). We assessed these relationships. **METHODS:** One hundred thirty patients with RA (at time of the first available radiograph, mean age 56.6 yrs, 16.9% male, mean disease duration 16.8 yrs) were followed for up to 13.4 years. Semiannually, they reported on functional disability (0 = no difficulty, 3 = unable to do), global severity (0 = very well, 100 = very poor), pain (0 = no pain, 3 = severe pain), and health services utilization through completion of the Stanford Health Assessment Questionnaire (HAQ). Concurrent hand radiographs were scored for erosions and joint space narrowing using the Genant method and a single score summing both erosions and joint space narrowing for both hands was calculated (0 = no damage, 200 = maximum damage). The univariate association of functional disability, global severity, pain, or direct medical costs with concurrent radiographic damage was assessed through Spearman correlations and hierarchical regression models. The hierarchical models permit exploitation of the between-patient and within-patient variation present in our longitudinal data.

RESULTS: At the time of the first available radiograph, mean (SD) levels of functional disability, global severity, and pain were 1.3 (0.7), 39.4 (21.0), and 1.1 (0.7), respectively. At entry into the study, the average radiograph score was 49.7 and upon leaving the study it was 66.9. Patients were followed an average of 6.7 years, with radiograph scores increasing at an average rate of 2.5 units/yr. The Spearman correlation [95% confidence interval (CI)] between average per-patient radiograph score and average per-patient HAQ disability index, average per-patient global severity, average per-patient pain score, and average per-patient direct medical costs was, respectively, 0.42 (0.26, 0.55), 0.23 (0.06, 0.39), 0.20 (0.03, 0.36), and 0.06 (-0.11,

0.23). The mean slope (95% CI) for disability on radiograph score was 0.0186 (0.0132, 0.0226), for severity on radiographs 0.1889 (0.1295, 0.2498), and for pain on radiographs 0.0057 (0.0027, 0.0084). As an example, over 10 years, a 25 unit (i.e., 50%) increase in radiograph scores would, on average, be associated with a 0.46 unit (i.e., 35%) increase in disability, a 4.72 unit (12%) increase in global severity score, and a 0.14 unit (13%) increase in pain, all expressed on the HAQ scales. There was little association between radiograph score and direct medical costs. **CONCLUSION:** A clinically meaningful association exists between radiographic damage and self-reported functional disability, suggesting that interventions that slow radiographic progression may improve the patient's health status. Such a relationship was not observed between radiographic damage and direct medical costs.

Arthritis Rheum. 2001 Sep;44(9):2009-17

The relationship between disease activity, joint destruction, and functional capacity over the course of rheumatoid arthritis.

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OBJECTIVE: To investigate the relationship between functional capacity, disease activity, and joint destruction over the course of rheumatoid arthritis (RA). **METHODS:** The followup data on 378 patients with early RA (duration <1 year), included in an open, prospective study since 1985 at the Department of Rheumatology of the University Medical Center Nijmegen, were used. Functional capacity, disease activity, and joint destruction were assessed using the Health Assessment Questionnaire disability index (HAQ DI), the Disease Activity Score (DAS), and a modification of the sharp radiographic damage score, respectively. Multiple linear regression was used to model the data collected at 0, 3, 6, and 9 years after study start, to investigate which variables influenced functional capacity during the disease course. A general linear mixed model for longitudinal data, which included the variables identified as significant in the multiple linear regression models and several interaction terms between the variables, was run.

RESULTS: On average, the functional capacity of the patients, as measured by the HAQ DI, worsened over the course of the disease after an initial improvement. After an initial reduction in the extent of disease activity, the mean DAS remained more or less stable over the course of the disease. The mean modified sharp joint damage score worsened over the course of the disease, with a slower progression rate later in the disease. In the multiple linear regression at 0, 3, and 6 years after study start, disease activity was found to be an important factor influencing functional capacity, and at 6 and 9 years, joint damage had an important effect on functional capacity. Furthermore, at 6 and 9 years, there was an interaction effect of joint destruction with disease activity. In the general linear mixed model, disease activity, joint damage, and an interaction effect of disease activity and joint damage were the main factors explaining functional capacity. **CONCLUSION:** The effect of disease activity and joint destruction on functional capacity changes over the course of the disease. In early RA, functional capacity is most associated with disease activity, and in late disease, with joint damage.

J Am Geriatr Soc. 2001 Apr;49(4):398-403

The relationship between body mass index and self-reported functional limitation among older adults: a gender difference.

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OBJECTIVES: To determine whether there is a gender difference in how body mass index (BMI) relates to self-reported functional limitation. Also, to evaluate whether the method of categorizing BMI changes the observed results. **DESIGN:** Cross-sectional cohort study. **SETTING:** Rural Pennsylvania. **PARTICIPANTS:** A total of 7,120 male (n = 3,312) and female (n = 3,808) community-dwelling older adults enrolled in a Medicare managed-risk contract. **MEASUREMENTS:** All subjects completed a modified Level II Nutrition Risk Screen upon enrollment in the health plan. Height and weight were obtained by nursing personnel during an enrollment clinic visit. Subjects who reported 10 or more pounds weight loss in the previous 6 months were excluded. Logistic regression was used to evaluate the relationship between BMI and self-reported functional limitation separately for each sex, adjusting for age, depression, and polypharmacy. Two schemes were used to categorize BMI: equally distributed sex-specific quintiles and arbitrary division based on National Institutes of Health (NIH) Obesity Guidelines.

RESULTS: How BMI relates to functional limitation depends upon both sex and method of categorizing BMI. When BMI was considered in gender-specific quintiles, women in the highest quintile of BMI had increased risk of functional impairment; there was no relationship between BMI and functional limitation for men. When BMI was categorized by the NIH obesity guidelines, both men and women with BMI >40 had significantly increased risk of functional limitation. **CONCLUSIONS:** The mechanisms behind gender discrepancy in self-reported functional limitation remain unclear. Studies may need to consider men and women separately, because how BMI relates to function depends on gender. Further research is needed to evaluate how changes in weight and body composition during middle and old age affect functional status.

Neurology. 2001 Jan 23;56(2):215-9

Concurrent validity of the MS Functional Composite using MRI as a biological disease marker.

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INTRODUCTION: The MS Functional Composite (MSFC), a recently developed outcome measure for MS clinical trials measuring three dimensions (ambulation/leg function, arm/hand function, and cognition), was applied to 134 patients with MS to study the concurrent validity, using MRI measurements as a biological disease marker. The results were compared to correlations between the traditionally applied Expanded Disability Status Scale (EDSS) and MRI measurements in the same patients. **METHODS:** The assessments of MSFC and EDSS were performed in combination with brain MRI. MRI consisted of T1- and T2-weighted images, from which the hypointense and hyperintense lesion loads were quantified. **RESULTS:** The MSFC score ranged from -2.54 to 0.99. The median EDSS was 3.0 (interquartile range [IQR] 1.5 to 6.0). The median T2-weighted lesion load was 8.4 cm³ (IQR 3.4 to 19.8) and the median T1-weighted lesion load was 1.1 cm³ (IQR 0.3 to 3.2). Correlations between the MSFC and both T1 (-0.24) and T2 (-0.25) lesion loads were demonstrated, but not between the EDSS and both MRI parameters.

Significant correlations between MSFC components and T1 and T2 lesion loads existed for cognitive function and arm/hand function, but not for ambulation. If relapse-onset patients (relapsing-remitting and secondary progressive) were combined, the correlation between MSFC and MRI parameters became stronger for both T1 (-0.37) and T2 lesion loads (-0.35).

CONCLUSIONS: The authors present the concurrent validity of the MSFC with a biological disease marker by showing correlations with MRI. Specifically, they demonstrate significant correlations with cognition and arm/hand function assessments, domains that are not well represented in the EDSS.

J Rheumatol. 1999 Aug;26(8):1686-93

Predicting functional status in patients with rheumatoid arthritis.

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OBJECTIVE: To determine whether coping strategies and illness perceptions would be predictive of outcome in a longitudinal study of patients with rheumatoid arthritis (RA).

METHODS: A group of 71 patients with RA was examined on 2 occasions, one year apart. Multiple regressions were used to examine which of the illness perceptions and coping strategies explained variance on the outcome variables: visits to the outpatient clinic, number of hospital admissions, Health Assessment Questionnaire, pain, tiredness, the Hospital Anxiety and Depression Scale.

RESULTS: Belief in adverse consequences of the disease was associated with more visits to the outpatient clinic, more tiredness, and higher anxiety scores. Less perceived control and less expression of emotion were associated with more hospital admissions. High scores on coping involving fostering reassuring thoughts were associated with more functional disability. More passive coping was associated with more functional disability and higher anxiety scores. More perceived symptoms were associated with more pain, more tiredness, and more depression. More

avoidant coping was associated with more tiredness. Belief that the illness will last a long time was associated with higher anxiety scores. CONCLUSION: Our longitudinal data show that, after statistically controlling for the potential effects of intervening medical variables, coping strategies and illness perceptions contribute to health outcome in patients with RA. Implications for patient management are discussed.

Arthritis Care Res. 1998 Oct;11(5):346-55

Predictors of functional disability in patients with rheumatoid arthritis.

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OBJECTIVE: Using the World Health Organization's classification system of the consequences of disease, this study sought to examine the impact of physical and psychological impairment variables, beyond that contributed by social, demographic, and disease variables, on the functional disability of a rheumatoid arthritis (RA) sample. Data collected during an acute episode were used to predict concurrent and future disability status. METHOD: A secondary data analysis of 85 adults hospitalized for exacerbations in arthritis was undertaken. Disability was assessed with the Health Assessment Questionnaire. Physical impairment was measured with the Keitel Function Test and Pain Analog Scales, and psychological impairment was measured with the Center for Epidemiologic Studies Depression Scale and the Perceived Self-Efficacy Scale for People with Arthritis.

RESULTS: Our findings indicated that physical impairment, demographic, and disease variables accounted for 64% of the explained variance in disability during the concurrent episode. Psychological impairment as well as demographic and disease variables accounted for 49% of the explained variance in future disability status. CONCLUSION: The combined influence of demographic characteristics and the consequences of the pathology of RA experienced as physical and psychological impairments contributed differentially to disability during concurrent and future time periods.

Br J Rheumatol. 1996 Aug;35(8):746-51

Correlates of functional disability in early rheumatoid arthritis: a cross-sectional study of 706 patients in four European countries.

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In this cross-sectional study of 706 European patients with rheumatoid arthritis (RA) of < or = 4

yr duration, we examined possible correlates of functional disability assessed by the Health Assessment Questionnaire. First, we examined a subsample of 237 Norwegian patients. The Ritchie index, sex, age, erythrocyte sedimentation rate (ESR) and disease duration correlated significantly with disability, whereas serum rheumatoid factor, hand X-ray changes and educational level did not. Subsequently, we cross-validated these findings in a similar sample of 469 French, Dutch and Northern Irish patients. The results supported the Ritchie index, sex, ESR and disease duration as significant correlates of disability, whereas rheumatoid factor, age and education were not significantly correlated with disability. The correlation between X-ray changes and disability could not be cross-validated. The main findings of this study are that female sex correlates significantly with disability even early in the course of RA, whereas the rheumatoid factor does not.

General

Phys Ther. 1998 Aug;78(8):852-66

A critical review of functional capacity evaluations.

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The role of functional capacity evaluations (FCEs) appears to be increasing as employers and insurers rely more heavily on them for decision making. To meet credibility requirements, and the American Physical Therapy Association's standards for measurement and documentation, all FCE suppliers need to validate and refine their systems. This article provides information that can be used to make informed decisions in the selection of an FCE and in functional assessment practices. Features of well-designed FCEs are discussed. Ten well-known FCE systems are analyzed according to these features and other common characteristics. Current issues such as the qualifications of the evaluators, reliability and validity, length of assessments, projection of endurance to 8-hour workdays, standards of practice, safety protocols, and behavioral assessment and management strategies are discussed.

Clin J Pain. 1999 Jun;15(2):102-10.

Validity of the dictionary of occupational titles residual functional capacity battery.

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BACKGROUND DATA: The Dictionary of Occupational Titles (DOT) is a U.S. government publication that defines each job in the United States according to 20 job factors. Fishbain et al. (Spine 1994;19:872-80) developed a DOT residual functional capacity (RFC) battery whose predictive validity for employment/unemployment had not been tested previously.

OBJECTIVES: The purposes of this study were as follows: (a) to determine whether results of a DOT-RFC battery performed at completion of pain facility treatment predicted employment status at 30 months' follow-up and (b) to determine whether the DOT-RFC battery predicted employment capacity as determined by the DOT employment levels of the chronic pain patients' (CPPs) jobs. **STUDY DESIGN:** This is a prospective low back pain CPP pain facility treatment study using employment status and the DOT occupational levels as outcome measures.

METHODS: One hundred eighty-five consecutive CPPs who fitted the selection criteria completed a DOT-RFC battery at the completion of pain facility treatment and were contacted at 1, 3, 6, 12, 18, 24, and 30 months for determination of their employment status and DOT employment level. Eight DOT job factors plus pain and worker compensation status were found to be significantly different between employed and unemployed CPPs and between those employed in different DOT employment levels. For the 10 variables, stepwise discriminant analysis was used to select final predictor variables. Sensitivity and specificity were calculated along with pain level cutpoints that separated the groups.

RESULTS: The eight DOT job factors found to be statistically significant between groups were the following: stooping, climbing, balancing, crouching, feeling shapes, handling left and right, lifting, carrying, and pain and worker compensation status. In the discriminant analysis, these variables could discriminate between the employed and unemployed categories, with a sensitivity and specificity of approximately 75%. The pain level cutpoint between employed and unemployed was 5.4 on a 10-point scale. **CONCLUSIONS:** We cannot as yet predict DOT-RFC employment levels. However, if a CPP can pass the above eight DOT job factors and has a pain level less than the 5.4 cutpoint, that CPP will have a 75% chance of being employed at 30 months after treatment at the pain facility. Therefore, some DOT-RFC battery job factors demonstrate a predictive validity in the "real work world."

Work 18 (2002) 51-66

Workplace assessments and functional capacity determinations" Current practices of therapists in Australia

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The literature has focused predominantly on functional capacity evaluations and related clinic-based assessments, however, there is little that examines workplace-based assessment approaches. In Australia, rehabilitation of injured workers occurs in the workplace wherever possible, and it is expected that workplace-based services will increase elsewhere in the future. There is a lack of knowledge, however, of therapists' current practices regarding workplace- and clinic-based work-related assessments. OBJECTIVES: The purpose of this study was to understand the current practice of therapists in Australia who are directly involved in conducting work-related assessments. STUDY DESIGN: A naturalistic inquiry approach was utilised for this study. In-depth semi-structured interviews were conducted with 26 occupational therapists and physiotherapists representing a spread of geographical locations, organisations, and experience. FINDINGS: Participants described three major types of work-related assessments - workplace assessments, functional capacity evaluations (job) and functional capacity evaluations (no job). The types, purposes, and characteristics of work-related assessments were described and influences and constraints identified. Participants described using processes, data sources, methods of data collection and analysis consistent with qualitative methods, although some quantitative methods were also employed. CONCLUSION: The findings suggest that the further a work-related assessment moves away from the actual work environment and requirements of a specific job, the greater its level of standardisation and generalisability. Conversely, when work-related assessments occur in the actual work environment, qualitative processes are used, and results are specific and non-generalisable.

Primarily a survey of how FCEs and workplace evaluations are done in Australia. Of interest because it concludes, based on a large sample size in survey, that there appears to be an underlying dichotomy or contradiction in FCE assessments methods and objectives. In the view of the authors, for an FCE to evaluate work suitability for a specific job, it must reflect the requirements of that job closely. However, the more it does so, the more limited in perspective it becomes, and the less it corresponds to the general requirements of work at given exertional and skill levels. As a result, FCEs that evaluate "general" abilities to work fail progressively as measures of ability to measure ability to perform a specific job. Conversely, FCEs that evaluate ability to perform specific jobs well provide progressively less accurate estimate of ability to perform work in general at given exertional or skill levels. This inverse relationship between improvement in estimate of specific work abilities and decline in ability of an FCE to measure general ones (and the converse) is both inversely reciprocal, and proportional. In the author's view, it also is unavoidable in the design of FCEs.

Clin J Pain. 1993 Sep;9(3):168-73

Functional capacity and residual functional capacity and their utility in measuring work capacity.

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OBJECTIVE: The pain physician is often asked to establish the medical impairment of the chronic pain patient (CPP) and from that determination ascertain the work capacity of the CPP. Functional capacity (FC) testing has recently been introduced as a more objective and accurate way of facilitating the determination of work capacity. However, there are conceptual problems with the measurement of FC. These will be reviewed and the relationship of FC to residual functional capacity (RFC) will be determined. Finally, a method for measuring RFC in a job-specific manner will be suggested. **DATA SOURCES:** The literature in reference to the measurement of medical impairment, FC, and RFC was reviewed. **STUDY SELECTION:** Studies appropriate to the objective of this review were selected for inclusion. **CONCLUSIONS:** The FC and RFC are poorly defined. Lack of definition has interfered with design of appropriate test batteries specific to work capacity. To circumvent this problem a job-specific RFC measurement method is suggested. This method is based on the Dictionary of Occupational Titles.