

# The Importance of Exercise and Activity to the Treatment and Prevention of Work-related Musculoskeletal Disorders & Disability

Presented By: Wayne Rath, PT, Dip MDT

This article was written upon request from your President Elect, Joseph Monkofsky, Jr. MD, MPH. Dr. Monkofsky and I have spent a large portion of our professional careers working inside industry attempting to treat and prevent work-related musculoskeletal disorders (WRMSD) and disability. Physician attitudes, beliefs and patterns of practice have a profound affect upon the management of these common problems (Symonds 1995, Buchbinder 2001). It is my intent to have an influence upon your beliefs about the importance of exercise and activity to help our workers in Onondaga County. I intend to do this using scientific evidence and a 'commonsense' approach.

This topic was assigned to me for a recent conference co-sponsored by the Onondaga Medical Society, entitled; "Controversies in Work-related Injuries". The conference was a collaboration of professional associations, attended by a cross-section of professionals. It was interesting and informative to hear the differing perspectives, and very important that we all communicate. The conference was very successful and the dialogue should continue.

I was asked to compare the use of passive versus active treatment modalities in the rehabilitation of WRMSD. My response to this question was simple; active treatment modalities are the key to successful treatment and rehabilitation. Passive approaches to WRMSD can encourage disability and delay recovery (Buckwalter JA. 1995, Nordin 1999). The scientific support for active treatment has been present, prevalent, and compelling for a long time (Spitzer 1987, Bigos S 1994, Abenham L 2000). And, the evidence continues to grow!

I will use an overview of the scientific evidence for the treatment of low back pain disorders to present my case. Low back pain is the most common and costly WRMSD, and all of the critical issues that relate to WRMSD in general can be addressed. Low back pain has been rigorously researched from many perspectives for many years.

First, let's identify factors that are associated with the onset of LBP and disability in an occupational setting. Tables 1 and 2 lists these factors, identified by Nordin in her Presidential Address to the International Society for the Study of the Lumbar Spine (Nordin 2001):

<b>Table 1: Factors associated with reporting a LBP episode in an occupational setting (Nordin 2001).</b>		
<b>Associated</b>	<b>Moderate Association</b>	<b>Strong Association</b>
<ul style="list-style-type: none"><li>• Smoking</li><li>• Job support</li><li>• Job satisfaction</li></ul>	<ul style="list-style-type: none"><li>• Work exposure to whole body vibration</li><li>• Lifting</li><li>• Down-sizing</li><li>• Unemployment</li><li>• Social support at work.</li></ul>	<ul style="list-style-type: none"><li>• Age</li><li>• Previous back pain history</li></ul>

**Table 2: Factors associated with disability resulting from a LBP episode in an occupational setting**

(Nordin 2001).		
Associated	Moderate Association	Strong Association
<ul style="list-style-type: none"> <li>• Gender</li> <li>• Abnormal gait</li> </ul>	<ul style="list-style-type: none"> <li>• Work exposure to whole body vibration</li> <li>• Co-morbidity</li> </ul>	<ul style="list-style-type: none"> <li>• Age</li> <li>• Previous back pain</li> <li>• Specific diagnosis</li> <li>• Perception of disability</li> <li>• Passive intervention.</li> </ul>

Note that most of the factors listed relate to age, gender, lifestyle and psychosocial factors. The physical factors (ROM, lordosis, weight etc.) that most healthcare providers focus on are not as strongly associated (Bigos 1992), except for lifting and vibration. In her speech, Nordin proceeds to identify evidence of factors that either delay or hasten the patient's recovery from a LBP episode in an occupational setting (Table 3). The advantages of an active approach to treatment are clear in this list.

**Table 3:** Factors that have been found to be associated with delaying or hastening recovery from LBP episode in an occupational setting (Nordin 2001).

Delays Recovery	Hastens Recovery
<ul style="list-style-type: none"> <li>• Old belief that long term rest is healthy.</li> <li>• Medicalization of the condition.</li> <li>• Providing long-term passive treatment.</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying evidence-based predictors.</li> <li>• Promoting activity and active treatment.</li> <li>• Educating the collaborators and communicating with the workplace.</li> </ul>

Most LBP episodes will recover in a short period of time, with approximately 90 % working by 7 weeks of onset (Spitzer 1987, Vanharanta 1989). This fact may lull the physician into assuming a more passive, palliative approach. The problem with this tact is that most LBP episodes are recurrent, and many lead to a progression of the pathology and the functional (activity) consequences. A passive intervention does not encourage the patient to take an active role in responsibility for their physical health, which is required to prevent recurrence and reduce the risk for future disability (Bigos 1987, Linton SJ 2000, Zigenfus GC 2000).

Only a small percent of the LBP cases (10 – 15 %) represent the majority (80 – 90 %) of the costs to industry (Mayer 1999). The majority of these costs are due to the direct and indirect expense of disability. Disability as a result of LBP is the modern dilemma, and a growing epidemic in westernized societies (Allan 1989). Therefore, the prevention of disability is the ultimate goal of LBP treatment. A passive, symptom-based treatment approach has no chance of improving the activity tolerance of a disabled worker.

When our target becomes overcoming disability and not the pain, the literature is clear that the most powerful factors associated with LBP disability are psychosocial (Main 1992, Nachemson 2000, Gatchel 1995). Nachemson states that; “these factors are not simply an overlay but rather are an integral part of the disability process”. Evidence-based psychosocial factors associated with back and neck pain, and the development of disability are listed in Table 4.



<b>Table 4:</b> There is strong evidence of the association of psychosocial (PS) variables with low back and neck pain, and the development of pain-related disability (Nachemson 2000).	
<b>Associations of PsychoSocial Factors with Neck &amp; Back Pain</b>	<b>PsychoSocial Factors Associated with Pain-related Disability</b>
Predicts transition from acute to chronic pain disability. Predicts the reporting of the onset of acute back or neck pain. Has impact on disability greater than biomedical or biomechanical factors.	Attitudes, cognitions, and fear-avoidance beliefs. Passive coping skills. Catastrophizing. Depression. Anxiety, distress, and related emotions. Self-perceived health.

As members of the healthcare team we are forced to recognize and deal with these factors when attempting to get at root-causes of the disability problem. Our treatment plans must address the relevant psychosocial issues affecting the patient, and include RTW as the primary goal of treatment. And, have confidence that RTW is therapeutic and a critical component of recovery. This has been recognized by large-scale scientific investigations in 5 major industrial countries since 1987. When the patient returns to work they are no longer disabled. Preventing and overcoming disability reduces risk to the patient of a host of social problems and premature death (Nachemson 2000, Nordin 2001). If we really care about our patients, we will find a way to avoid disabling them whenever possible.

In addition, let's look at the issue from the employer's perspective. Disabling the worker results in a 'time loss injury'. The indemnity and other indirect costs associated with this time away from work are far more expensive than the medical and healthcare costs in most cases. Snook (1987) provides the clinician with an idea of the serious financial impact on profit of a workers compensation claim (Table 6). This is something the healthcare community needs to give more time and attention to, as 'runaway' compensation costs can be a factor in an industry deciding to leave or not locate in certain geographic locations. Certainly, New York State does not have a reputation for managing these costs very effectively.

<b>Table 6.</b> Snook identifies the effect of worker's compensation costs on the profits of an employer. He does this by indicating how many more products or services would have to be produced or provided to cover a \$ 500 compensation loss if paid directly out of profits (Snook 1987).	
A restaurant must serve 1,940 \$ 3 lunches A supermarket 1,540 \$ 25 sales An electronics factory 20 TV sets priced at \$ 400 A bakery 47,620 loaves of bread sold at \$ 0.75 per loaf A garment manufacturer 640 men's shirts sold at \$ 15 A publisher 25,315 newspapers at \$ 0.25	A furniture manufacturer 120 \$ 50 chairs A tool maker 910 \$ 10 hammers A department store 12,500 pairs of boy's socks at \$ 1.25 a pair An appliance factory 1,350 electric iron at \$ 10 each.

So, if the scientific evidence is so compelling, why are so many treatments still passive, and why are so many patients with nonspecific back pain disabled? This is a complex, multi-factorial question, with no simple answer. However, a component of the problem is clearly conceptual and related to the clinical model used for intervention.

The classic biomedical model is a disease-based approach; establish the diagnosis and a successful treatment proceeds in specific order. This can be extremely effective with LBP

when a specific diagnosis can be established, but unfortunately 80 – 90 % of the patients have nonspecific LBP (Spitzer 1987, Abenheim 2000, Nordin2001). To complicate this, the false positive rate for HNP can be as high as 76 % in asymptomatic subjects (Boos 1995, 2000, Jensen 1994). And, there is evidence that significant psychosocial findings can interfere with the surgical intervention of specific diagnoses that respond well and consistently when these factors are not present (Schofferman 1992).

The biomedical model has significant flaws when applied to activity-related, lifestyle affected/induced, degenerative/age-related and disorders (Bandura 1997, Haldeman 1990). The emergence of the biopsychosocial model is critical to the effective management of LBP disorders (Waddell 1987, 1998). However, this requires many to change their clinical practice habits. This also means that we have to spend more time with each patient, and communicate with the workplace and the other collaborators relevant to case management. Table 5 identifies the components of a program, proven by RCT to effectively return 99 % of the patients to work with nonspecific, subacute LBP (Lindstrom 1992, ).

**Table 5:** The outline of a successful RTW program for sub-acute (8 weeks) LBP (Lindstrom).

1. **Functional Capacity Evaluation** – objective measurement of the patient's strength, ROM, balance, pain and perceived disability to establish a baseline for developing an individualized exercise program. This is repeated
2. **Workplace Visit** – visit the workplace to identify the physical demands of the job, recruit supervisor/management participation in the patient's recovery and other critical factors.
3. **Back School Education** – provide basic education and training about anatomy, biomechanics and the benefits of exercise and activity. Use only positive language during the sessions.
4. **Graded exercise with behavioral support** - develop a progressive exercise program based upon the Fordyce model of operant conditioning/contingency-management. Patient exercises to quota each session, and the quota is increased according to a structured plan. The patient is encouraged to take progressive control over the program; i.e. function independently. RTW without restrictions is encouraged as soon as the patient indicates readiness. Displays of pain and complaints are recorded, but not addressed. Reinforcement is provided for exercise and activity progressions.

## Conclusion

Activity-related problems require activity-related solutions. Taking a passive approach to problems of the moving, functioning parts of the human body cannot address the underlying 'root-cause' of the disorder. This is regardless of whether the problem lies within the tissues themselves, and/or the reactions of the individual to the actual, potential or perceived damage in the tissues. Too little exercise and activity atrophies the body and mind, too much breaks it down, but the correct dose of tissue stress will strengthen both body and mind (Mueller & Maluf 2001).

To quote Nordin one more time; “ In 1999 we had 16 randomized controlled trials that showed that activity and exercise are essential for the recovery of nonacute, nonspecific low back pain. How much more evidence do the health care professional community, the industrial community, and the social security community need to be convinced? “



## References

- ACC and the National Health Committee (1997). New Zealand acute low back pain guide. Ministry of Health & Accident Rehabilitation and Compensation Insurance Corporation. Wellington, New Zealand
- Abenham L, Rossignol M, Gobeille D, Bonvalot Y, Fines P, Scott S: The prognostic consequences in the making of the initial medical diagnosis of work-related back injuries. *Spine* 1995; 20: 791-5.
- Abenham L, Rossignol M, Valat JP, et al. The role of activity in the therapeutic management of back pain: report of the international Paris task force on back pain. *Spine* 25 (4S): 1S – 33S, 2000.
- Allan DB Waddell G An historical perspective on low back pain and disability *Acta Orth Scan Suppl* 60: 1-23, 1989.
- Bandura, A. Self-efficacy: The exercise of control. WH Freeman and Co., New York, 1997.
- Bigos SJ, Battie MC Acute care to prevent back disability: ten years of progress. *Clin Orth Aug* (221): 121 – 130, 1987.
- Bigos S, Battie M, Spengler D, et. al. A prospective study of work perceptions and psychosocial factors affecting the report of back injury. *Spine* 1991; 16 (6) 1-6.
- Bigos SJ, Battie MC, Spengler DM, et. al. A longitudinal, prospective study of industrial back injury reporting. *Clin Orthop* 1992 Jun;(279):21-34
- Bigos S, Bowyer O, Braen G, et. al. Acute Low back Problems in Adults. Clinical Practice Guidelines No. 14. AHCPR Publication No. 95-0642. Rockville, MD: Agency for health Care Policy and Research, Public Health Service, US Department of Health and Human Services. December 1994.
- Boos N et al. Volvo Award in Clinical Sciences. The diagnostic accuracy of magnetic resonance imaging, work perception and psychosocial factors in identifying symptomatic disc herniation. *Spine* 20: 2613-25, 1995.
- Boos N et al. Natural History of Individuals With Asymptomatic Disc Abnormalities in Magnetic Resonance Imaging Predictors of Low Back Pain-Related Medical Consultation and Work Incapacity *Spine* 25: 1484-1492, 2000
- Buchbinder R. Population based intervention to change back pain beliefs and disability: three part evaluation. *BMJ* 322 (7301): 1516 – 1520, 2001.
- Buckwalter JA. Should bone, soft-tissue, joint injuries be treated with rest or activity? *J Orthop Res* 1995; 13: 155-6.
- Carter JT, Birrell LN (eds). Occupational Health Guidelines for the Management of Low Back Pain at Work. London: Faculty of Occupational Medicine, 2000.
- Gatchel RJ, Polatin PB, Mayer TG: The dominant role of psychosocial risk factors in the development of chronic low back pain disability. *Spine* 20 (24): 2702-2709, 1995.
- Haldeman S: Presidential Address, NASS: failure of the pathology model to predict back pain. *Spine* 15(7): 718-724, 1990.
- Jensen MC et al. Magnetic resonance imaging of the lumbar spine in people without back pain. *N Engl J Med* 531: 69-73, 1994.
- Lindstrom I, Ohlund C, Eek C, et al. The effect of graded activity on patients with subacute low back pain: a randomized prospective clinical study with an operant-conditioning behavioral approach. *Phys Ther* 1992 72 (4): 279 - 290.
- Linton SJ & Andersson T Can chronic disability be prevented? A randomized trial of a cognitive-behavior intervention and two forms of information for patients with spinal pain. *Spine* 25 (21): 2825-2831, 2000.
- Linton SJ, van Tulder MW Prevention Interventions for Back and Neck Pain Problems: What is the Evidence? *Spine* 26 (7): 778 – 787, 2001.
- Main CJ, Wood PLR, Hollis S, Spanswick CC, Waddell G: The distress and risk assessment method: a simple patient classification to identify distress and evaluate the risk of poor outcome. *Spine* 17 (1): 42-52, 1992.
- Mayer TG, Gatchel RJ, Polatin PB, Evans TH. Outcomes comparison of treatment for chronic disabling work-related upper-extremity disorders and spinal disorders. *JOEM* 41 (9): 761-770, 1999.
- Mueller MJ, Maluf KS Tissue adaptation to physical stress: a proposed 'physical stress theory' to guide physicals therapy practice, education, and research. *Phy Ther* 82 (4): 383 – 403, 2002.
- Nachemson AL, Jonsson E, Editors Neck and Back Pain: The Scientific Evidence of Causes, Diagnosis, and Treatment. Lippincott Williams & Wilkins, Philadelphia 2000.
- Nordin M 2000 International society of the study of the lumbar spine presidential address: backs to work: some reflections. *Spine* 26 (8): 851-856, 2001.

Nordin M, Campello M. Physical therapy. Exercises and the modalities: when, what and why? *Neurologic Clin North Am* 1999; 17: 75-89.

Schofferman J, Anderson D, Hines R, Smith G, White A: Childhood psychological trauma correlates with unsuccessful lumbar spine surgery. *Spine* 17 (6S): S138- S144, 1992.

Snook SH The costs of back pain in industry. *SPINE: State of the Art Rev* 2 (1): 1 – 5, 1987.

Spitzer WO, LeBlanc FE, Dupuis M, et al: Scientific Approach to the Assessment and Management of Activity-related Spinal Disorders. *Spine* 12 (7S), 1987.

Symonds TL, Burton AK, Tillotson KM, Main CJ: Absence resulting from low back trouble can be reduced by psychosocial intervention at the work place. *Spine* 20 (24): 2738-2745, 1995.

Vanharanta H: Etiology, Epidemiology and Natural History of Lumbar Disc Disease. *Spine: State of the Art Reviews* 3 (1): 1-12, 1989.

Waddell G: A new clinical model for the treatment of low-back pain: biopsychosocial. *Spine* 12 (7): 632-644, 1987.

Waddell, G. The Back Pain Revolution. Churchill Livingstone, Edinburgh, 1998.

Zigenfus GC, Yin J, Giang GM, Fogarty WT. Effectiveness of early physical therapy in the treatment of acute low back musculoskeletal disorders. *JOEM* 42 (1): 35 – 39, 2000.