Utilizing MedX in Physical Rehabilitation of the Lumbar Spine
SportExcel Health and Human Performance - Chance Moore D.C., C.S.C.S.

MedX is an advanced line of computerized testing and rehabilitation equipment researched and developed in conjunction with the University of Florida and UCSD Schools of Medicine for the cervical and lumbar spine. MedX functional rehabilitation involves diagnostic testing and rehabilitation therapy.

Although MedX equipment has been researched and utilized worldwide, with thousands of patients, there are very few clinics in the Phoenix metro area that have the MedX medical equipment. MedX equipment is often considered the gold standard in spinal rehabilitation, but the equipment is expensive, takes up a significant amount of space, and requires extensive training. "MedX training" involves a stabilized pelvis, torso-mass counterbalance, isometric test points over a full or pain-free range of movement, and several other innovative features exclusive to MedX equipment. By utilizing this powerful testing and rehabilitation tool our clinicians are able to identify specific functional weakness and successfully treat many patients that have had limited or little success with other forms of physical therapy or chiropractic care in the past.

The standardized treatment protocols that our clinic utilizes for low back pain have been developed and been shown to be reproducible in a study by Legget and Mooney.[1]

The treatment protocols and MedX rehabilitation equipment we utilize enable us to treat patients with reduced frequency and duration, giving long-term relief of symptoms. MedX rehabilitation protocols are utilized by some of most respected orthopedic surgeons in the world and have been proven effective for the treatment of chronic and recurrent back pain in prospective controlled clinical trials. The MedX equipment allows us to offer services that are unique from that of other members in our specialties.

MedX spinal strength testing is indicated for patients who meet any one of the following conditions; 1) have had back pain that has lasted longer than four weeks, 2) no longer responding to conventional treatment, 3) recurrent episodes of back pain/disability or chronic low back pain. These computerized and highly advanced spinal rehabilitation protocols have the ability to specifically isolate the cervical and lumbar musculature. These measures objectively document the presence or absence of functional disability caused by soft tissue injury. This allows the clinician to establish or rule out medical necessity for spinal rehabilitation and treatment. Medical necessity is indicated based on consensus guidelines which include; comparing the patient’s spinal extensor strength to that of their healthy age matched normal counterparts at full flexion, full extension, and midrange. Other clinical information such as range of motion deficits, slope of the torque curve, shape of the strength curve, as well as chronic or recurrent pain are also important in making the decision for medical necessity.

MedX spinal rehab is different in many aspects to other types of spinal rehab protocols. Due to the pelvic stabilization the equipment is able to better isolate the erector spinae as well as load the deep layer of muscles multifidus, rotators,
intertransversarii, and interspinales. During single plane lumbar pelvic movement muscles are recruited in a specific order called movement patterns. During active trunk extension the order of muscle recruitment is as follows: first the hamstrings, then the glutei and finally the lumbar and thoracic muscles.[2] In patients with chronic low back pain, decreased activity of the low back causes weakness and fatty infiltration into the deep intrinsic muscles.[3] To compensate for this weakness we see patients with altered movement patterns of extension resulting in hypertonicity or trigger points in the iliocostalis lumborum, quadratus lumborum, gluteus medius, and piriformis. Tightness in the hamstrings is also a common adaptation that is observed clinically. To address resultant muscle weakness and tightness it is common for the clinician without MedX to prescribe global spinal stabilization exercises and static stretches. Although the clinician has correctly identified the appropriate muscle imbalances and deficits it is common to have limited or temporary success with traditional spinal stabilization and static stretching due to patient’s adaptation and compensation for the primary weakness of the deep muscle layer of the low back. The MedX equipment targets the appropriate muscles of the low back specifically, while restricting compensation from the gluts and hamstrings. Starting the chronic low back pain patient with spinal stabilization before addressing lumbar weakness often results in overloading the spine increasing the pain. MedX rehab allows the clinician to first address the patient’s primary weakness and reestablish the neuromuscular connections of the deep muscle layers before introducing spinal stabilization.

A home exercise program should be implemented immediately when starting a physical rehabilitation program. Advantages of a home exercise program include empowering the patient while decreasing dependency on the health care provider. At first we utilize lumbar range of motion stretches. As spinal stabilization is introduced into the treatment regimen and after the patient becomes proficient at maintaining spinal neutral with the transverse abdominals contracted, then home spinal stabilization exercises are prescribed. Patients are often concerned that they will need to continue indefinite treatment at our clinic to maintain the strength gains achieved through the progressive resistive exercise of MedX training. We emphasize the maintenance of a home exercise program including lumbar stretching and spinal stabilization. In 1995, Nelson, et al. published a controlled clinical trial of 895 chronic low back pain patients, which showed a 76% success rate for good to excellent results in patients with a 2 year history of chronic low back pain who attended MedX rehabilitation.[4] Even more impressive was the fact that 94% of these patients reported that their improvements were durable at 1-year follow-up. These results indicate that MedX therapy produces lasting, curative benefits for chronic low back pain patients including those with disc herniations, arthritis, and post-surgical LBP syndromes. In another study, Risch, et al. published a randomized controlled trial in the prestigious orthopedic journal SPINE, which demonstrated that MedX rehabilitation therapy results in a significant reduction of pain as well as improved physical and psychosocial functioning for chronic low back pain patients.[5]

In yet another study, MedX rehabilitation therapy was shown to be a viable alternative to non-emergent spinal surgery. Nelson and Mitchell, et al. studied 38 cervical and lumbar surgery candidates and showed that over 91% of spinal surgery candidates were able to avoid surgical intervention by attending Medx spinal rehabilitation
treatment.[6] This report, published in the January 1999 edition of Archives of Physical Medicine and Rehabilitation, showed that 35 of 38 patients recommended for spinal surgery were able to forego the surgery following 21 MedX sessions over a 10- to 12-week span. The total savings to insurers ran into the million of dollars. The MedX therapy sessions totaled approximately $1,995, while the surgeries would have cost from $60,000 to $160,000 on average. This study was conducted by Brian W. Nelson, MD, an orthopedic physician in Minnesota.

MedX spinal therapy has amassed impressive research results but little accompanying name recognition. That is because research publications insist on equipment manufacturer neutrality. They typically mention MedX only once, but then describe its exclusive attributes whenever talking about what produced the impressive outcomes.

In a New York Times Syndicate report on Dr. Nelson's Archives study, MedX therapy was identified as "weight lifting." When newspapers report that 'weight training' is effective in treating low-back pain they are inadequately informing their readers. "MedX training" indicates a stabilized pelvis, torso-mass counterbalance, isometric test points over a full or pain-free range of movement, and several other innovative features exclusive to MedX equipment. MedX training specifically – not generalized weight lifting or strength training – has proven effective in treating chronic low-back pain. Weight training can mean hyperextension, stiffed-leg deadlifts and countless other hazards that would overload a weakened spine.

Much of this information was gathered from www.medxonline.com. For additional information this is a great resource. You can also view a video by clicking on the following link: MedX video.

Following there some additional abstracts that were used in this article:

Orthopedics 1995 Oct;18(10):971-81

The clinical effects of intensive, specific exercise on chronic low back pain: a controlled study of 895 consecutive patients with 1-year follow up.

Nelson BW, O'Reilly E, Miller M, Hogan M, Wegner JA, Kelly C.

Physicians Neck & Back Clinic, Minneapolis, Minn., USA.

Eight hundred ninety-five consecutive chronic low back pain patients were evaluated. Six hundred twenty-seven completed the program. One hundred sixty-one began, but dropped out, and 107 were recommended for treatment but did not undergo treatment for various reasons. Average duration of symptoms prior to evaluation was 26 months. Forty-seven percent of patients were workers' compensation patients. The primary treatment was intensive, specific exercise using firm pelvic stabilization to isolate and rehabilitate the lumbar spine musculature. Patients were encouraged to work hard to achieve specific goals. Seventy-six percent of patients completing the program had excellent or good results. At 1-year follow up 94% of patients with good
or excellent results reported maintaining their improvement. Results in the control
group were significantly poorer in all areas surveyed except employment.

Spine 1993 Feb;18(2):232-8

Lumbar strengthening in chronic low back pain patients. Physiologic
and psychological benefits.

Risch SV, Norvell NK, Pollock ML, Risch ED, Langer H, Fulton M, Graves JE,
Leggett SH.

University of Florida, Gainesville.

The effects of exercise for isolated lumbar extensor muscles were examined in 54
chronic low-back pain patients. Subjects were randomly assigned to a 10-week
exercise program (N = 31) or a wait-list control group (N = 23). Results indicated a
significant increase in isometric lumbar extension strength for the treatment group and
a significant reduction in reported pain compared with the control group (P 0.05).
Treated subjects reported less physical and psychosocial dysfunction whereas the
control group increased in pain, and physical and psychosocial dysfunction. There
were no concomitant changes in reported daily activity levels. These results show that
lumbar extension exercise is beneficial for strengthening the lumbar extensors and
results in decreased pain and improved perceptions of physical and psychosocial
functioning in chronic back pain patients. However, these improvements were not
related to changes in activities or psychological distress.


Can spinal surgery be prevented by aggressive strengthening exercises?
A prospective study of cervical and lumbar patients.


Physicians Neck and Back Clinic, Roseville, MN, USA.

OBJECTIVE: To determine if patients recommended for spinal surgery can avoid the
surgery through an aggressive strengthening program. SETTING: A privately owned
clinic, staffed by physicians and physical therapists, that provides treatment for
patients with neck and/or back pain. METHODS: Over a period of 2 1/2 years,
consecutive patients referred to the clinic for evaluation and treatment were enrolled
in the study if they (1) had a physician's recommendation for lumbar or cervical
surgery, (2) had no medical condition preventing exercise, and (3) were willing to
participate in the approximately 10-week outpatient program. Treatment consisted
mainly of intensive, progressive resistance exercise of the isolated lumbar or cervical
spine. Exercise was continued to failure, and patients were encouraged to work
through their pain. Third-party payors in Minneapolis were surveyed for average costs. Average follow-up occurred 16 months after discharge. RESULTS: Forty-six of the 60 participants completed the program; 38 were available for follow-up and three required surgery after completing the program. DISCUSSION/CONCLUSIONS: Despite methodologic limitations, the results are intriguing. A large number of patients who had been told they needed surgery were able to avoid surgery in the short term by aggressive strengthening exercise. This study suggests the need to define precisely what constitutes "adequate conservative care."

Spine 1999 May 1;24(9):889-98
Restorative exercise for clinical low back pain. A prospective two-center study with 1-year follow-up.

Leggett S, Mooney V, Matheson LN, Nelson B, Dreisinger T, Van Zytveld J, Vie L.

U.S. Orthopedics, Little Rock, Arkansas, USA.

STUDY DESIGN: A comparison of treatment of 412 patients with chronic back pain at two separate centers using the same treatment protocols and outcome measures. Outcome was defined by specific strength testing; Short Form-36 scores at intake, discharge, and 1-year follow-up; self-appraisal of improvement at discharge and in a 1-year follow-up; and reuse of health care services after discharge. OBJECTIVES: To investigate the efficacy of standardized treatment methods using isolated lumbar strength testing and strengthening based on progressive protocols using specific equipment. Comparison of results should clarify the effect of the treatment center versus the efficacy of standardized protocols. SUMMARY OF BACKGROUND DATA: There has been little support in the scientific literature for exercise programs based on standardized protocols. The use of specialized equipment to achieve intense specific exercise also has been poorly supported. Overall health benefit has not often been related to specific improvement in strength. METHODS: More than 400 individuals with chronic back pain were evaluated at the initiation of treatment, discharge, and 1 year after discharge. Measures of efficacy were based on Short Form-36 scores, self-appraisal of improvement, and reuse of health care services after discharge. Study participants were patients with chronic back pain consecutively referred to each treatment site and underwritten by a variety of payers, including workers' compensation, Medicare, and private insurance. RESULTS: Overall response during the course of the program and at 1-year follow-up was similar between the two centers. Similar proportions of participants at each site demonstrated improvement in SF-36 scores, self-appraisal of improvement, and reuse of health care services. CONCLUSIONS: Standardized protocols using specific strength and measurement equipment can achieve similar benefits at different sites.

J Spinal Disord 2000 Apr;13(2):102-7
A preliminary report on the effect of measured strength training in adolescent idiopathic scoliosis.
Mooney V, Gulick J, Pozos R.

U.S. Spine and Sport Center, San Diego, California 92123, USA.

The authors studied 12 adolescent patients with scoliosis (10 girls and 2 boys) who were 11 to 16 years old and had curvatures ranging from 20 degrees to 60 degrees. Seven were right thoracic curves and five were thoracolumbar with double curves. When tested on the MedX Torso Rotation Machine, both sides were unequal in their torso rotation strength all patients. Myoelectric activity was asymmetric in both sides and in abdominal and paraspinal muscles of all patients. These asymmetries were corrected completely with torso rotation, which was associated with significant strength gains. Strength gains ranged from 12% to 40%. A 16-year-old girl with a 60 degree lumbar curve progressed and had surgery. None of the remaining patients progressed, and 4 of the 12 had decreases in their curvatures from 20 degrees to 28 degrees. None of the patients used braces during this study.

Spine 2001 Apr 1;26(7):788-97; discussion 798-9

A randomized clinical trial of exercise and spinal manipulation for patients with chronic neck pain.

Bronfort G; Evans R; Nelson B; Aker PD; Goldsmith CH; Vernon H
Northwestern Health Sciences University, Bloomington, Minnesota, USA.

STUDY DESIGN: A randomized, parallel-group, single-blinded clinical trial was performed. After a 1-week baseline period, patients were randomized to 11 weeks of therapy, with posttreatment follow-up assessment 3, 6, and 12 months later.

OBJECTIVES: To compare the relative efficacy of rehabilitative neck exercise and spinal manipulation for the management of patients with chronic neck pain.

SUMMARY OF BACKGROUND DATA: Mechanical neck pain is a common condition associated with substantial morbidity and cost. Relatively little is known about the efficacy of spinal manipulation and exercise for chronic neck pain. Also, the combination of both therapies has yet to be explored.

METHODS: Altogether, 191 patients with chronic mechanical neck pain were randomized to receive 20 sessions of spinal manipulation combined with rehabilitative neck exercise (spinal manipulation with exercise), MedX rehabilitative neck exercise, or spinal manipulation alone. The main outcome measures were patient-rated neck pain, neck disability, functional health status (as measured by Short Form-36 [SF-36]), global improvement, satisfaction with care, and medication use. Range of motion, muscle strength, and muscle endurance were assessed by examiners blinded to patients' treatment assignment.

RESULTS: Clinical and demographic characteristics were similar among groups at baseline. A total of 93% of the patients completed the intervention phase. The
response rate for the 12-month follow-up period was 84%. Except for patient satisfaction, where spinal manipulative therapy and exercise were superior to spinal manipulation with (P = 0.03), the group differences in patient-rated outcomes after 11 weeks of treatment were not statistically significant (P = 0.13). However, the spinal manipulative therapy and exercise group showed greater gains in all measures of strength, endurance, and range of motion than the spinal manipulation group (P < 0.05). The spinal manipulation with exercise group also demonstrated more improvement in flexion endurance and in flexion and rotation strength than the MedX group (P < 0.03). The MedX exercise group had larger gains in extension strength and flexion-extension range of motion than the spinal manipulation group (P < 0.05). During the follow-up year, a greater improvement in patient-rated outcomes were observed for spinal manipulation with exercise and for MedX exercise than for spinal manipulation alone (P = 0.01). Both exercise groups showed very similar levels of improvement in patient-rated outcomes, although the spinal manipulation with exercise group reported greater satisfaction with care (P < 0.01).

CONCLUSIONS: For chronic neck pain, the use of strengthening exercise, whether in combination with spinal manipulation or in the form of a high-technology MedX program, appears to be more beneficial to patients with chronic neck pain than the use of spinal manipulation alone. The effect of low-technology exercise or spinal manipulative therapy alone, as compared with no treatment or placebo, and the optimal dose and relative cost effectiveness of these therapies, need to be evaluated in future studies.


**Can strong back extensors prevent vertebral fractures in women with osteoporosis?**

Sinaki M, Wollan PC, Scott RW, Gelczer RK.
Department of Physical Medicine and Rehabilitation, Mayo Clinic Rochester, Minnesota55905, USA.

OBJECTIVE: To determine the influence of back extensor strength on vertebral fractures in 36 women with osteoporosis.

DESIGN: We conducted a cross-sectional study of female patients with osteoporosis by assessing anthropometric variables, bone mineral density, muscle strength, level of physical activity, and radiographic findings in the spine.

MATERIAL AND METHODS: The 36 study subjects with osteoporosis, who ranged from 47 to 84 years of age, satisfied specific inclusion and exclusion criteria that minimized confounding factors related to pathophysiologic features, diet, and medications. A physical activity score was determined for each subject on the basis of daily physical activities relating to homemaking, occupation, and sports.

RESULTS: The range of the physical activity scores-from 2 to 13-indicated that no subject was involved in unusually demanding physical activities. Bone mineral
density values ranged from 0.49 to 0.92 g/cm². Thoracic kyphosis ranged from 31.0 to 84.0 degrees. Isometric strength of the back extensor muscles ranged from 7.3 to 34.0 kg. Statistical analysis demonstrated a significant negative correlation between the strength of the back extensor muscles and thoracic kyphosis. Significant negative correlations were also found between back extensor strength and the number of vertebral compression fractures and between bone mineral density and the number of vertebral fractures.

CONCLUSION: The negative association between back extensor strength and both kyphosis and number of vertebral fractures suggests that increasing back strength may prove to be an effective therapeutic intervention for the osteoporotic spine. In persons with stronger back muscles, the risk of vertebral fractures will likely decrease.

Clinical Relevance: The MedX Medical Lumbar Extension machine is commonly regarded as the best tool available to strengthen the lumbar extensors. According to this study, strengthening the spinal extensors may be an effective treatment in the management of the osteoporotic spine.

Comparison of female geriatric lumbar-extension strength: asymptotic versus chronic low back pain patients and their response to active rehabilitation.

Holmes B, Leggett S, Mooney V, Nichols J, Negri S, Hoeyberghs A.
Department of Orthopaedics, University of California, San Diego, USA.

We compared lumbar-extension strength between healthy asymptomatic geriatric females (HEAL) and symptomatic geriatric females (INJ) seeking medical attention for chronic low back pain. The INJ group used the MedX lumbar-extension machine to perform isotonic exercises two times per week and were eventually reduced to one time per week. Range of motion (ROM) and strength were significantly different before beginning the program. After the program, ROM and strength improved significantly and were not different from those of the HEAL group. The average length of treatment was 97 days and 20 visits. Subjective pain ratings were significantly reduced (60%) and exercise weights significantly increased (71%). This reconfirms the notion that many back pain sufferers have weaker lumbar-extension strength and that some symptomatic geriatric women can increase strength with progressive resistance exercise, which leads to a decrease in low back pain.

[1] Spine 1999 May 1;24(9):889-98