# **The Chiropractic Report**

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#### **Professional Notes**

#### **Reliability of Whiplash Questionnaire**

The Neck Disability Index (NDI), developed by Canadian Memorial Chiropractic College (CMCC) researchers Silvano Mior, Howard Vernon and colleagues in the 1990s from the Oswestry Disability Questionnaire for back pain, is in use worldwide providing patient-reported disability levels from neck pain. Their initial publication on the NDI in 1996 has recently been voted one of the ten most influential papers in the literature on the management of neck pain.

Australian physiotherapy researchers Melanie Pinfold, Ken Naïve and colleagues from La Trobe University in Melbourne, Australia adapted the NDI to develop a questionnaire specifically for patients with whiplash-associated disorders (WAD) – the Whiplash Disability Questionnaire (WDQ).

They presented the WDQ in a paper in Spine in 2004. This reported on preliminary testing with 101 patients, and concluded that "dependent on the results of further psychometric testing the WDQ is likely to be an appropriate outcome

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### **Exercise to Prevent Back Pain**

#### **A Introduction**

THE JOURNAL OF THE AMERIcan Medical Association (JAMA) has just published a high-quality, up-to-date systematic review of the evidence on the effectiveness of exercise for the prevention of back pain. This incorporates the evidence from several recent trials.

Key conclusions of Steffens, Maher et al.<sup>1</sup>, researchers from Australia and Brazil, are:

- Exercise is effective in preventing low-back pain (LBP). For those with a previous episode of LBP exercise reduces the risk of a future episode during the next 12 months by 25-40%.
- The addition of patient education about back pain reduces the risk even further by nearly 50%.
- Prolonged exercise is required for prolonged prevention regular exercise should become a lifestyle.

Asked to provide expert commentary on the new review US researchers Timothy Carey MD, MPH and Janet Freburger PhD from the Sheps Center for Health Service Research at the University of North Carolina at Chapel Hill note:<sup>2</sup>

- More than 80% of us experience at least one episode of LBP in our lives.
- While most episodes of acute LBP "improve with time and conservative treatments....recurrence is common with estimates ranging from 24-80% in the first year".
- The reported reduction of risk of 25-40% is "impressive" and represents an effect size "large enough to have clinical and policy importance".
- "If a medication or injection were available that reduced LBP recurrence by such an amount we would be reading the marketing materials in our journals and viewing them on television. However, formal exercise instruction after an episode of LBP is uncommonly

prescribed by physicians. This pattern is, unfortunately, similar to other musculoskeletal problems in which effective but lower-technology and often lower-reimbursed activities are underused." They cite a recent study from their Center in which fewer than half of the surveyed patients with chronic back and neck pain had received exercise instruction "despite a good evidence basis for its effectiveness."

Carey and Freburger then make a number of recommendations, that we will come back to later. Many practical questions for doctors of chiropractic include:

- Given that exercise is valuable for the prevention of LBP, what kind of exercise, how often, and should it be at home, in a fitness club or in a clinical setting?
- How quickly should how much exercise be introduced?
- Is there benefit for physical reasons (improved fitness and muscle condition) or psychological ones (removing fear of pain, giving confidence to pursue daily activities so that pain is not disabling)?
- If adding education is helpful, what education?
- What about combining exercises and education with spinal manipulation to correct joint dysfunction/subluxation as in chiropractic practice? The new review makes no comment on that.

This issue of *The Chiropractic Report* addresses these questions – but looks first at the new systematic review in JAMA.

### **B JAMA Systematic Review**

2. For the average reader, which includes all health professionals not engaged in clinical research or the vast majority, understanding and evaluating

systematic reviews remains a complex process. Such readers understand that a systematic review is meant to be the best current scientific evidence on a subject (e.g. effectiveness of an intervention in the diagnosis, prevention or treatment of a given condition) because it reviews all the studies available, ranks them according to quality using established criteria, and reports the collective result.

But here are some of the confusing issues, raised in the context of chiropractic practice and the new review by Steffens et al.:

- Why do systematic reviews from different teams of expert researchers on the same body of evidence come up with different conclusions?
- Why are reviewers so reluctant to come up with clear recommendations that give good clinical guidance - typically saying the evidence is moderate to low quality at best and "we need more evidence before firm conclusions can be made." This is said for spinal manipulation for mechanical LBP despite over 100 trials. Steffens et al. do give us some firm conclusions, but rate the evidence for exercise for prevention of sick leave due to LBP as low to very low quality - meaning it is likely to be changed by one or two good new trials. Their highest rating is "moderate quality" for exercise and education.
- Why do such reviews, because of their rating systems, exclude all research except RCTs? This means, for example, exclusion of well-designed prospective case series from eminent researchers, such as the ground-breaking one on spinal manipulation for chronic, mechanical back pain from Kirkaldy-Willis and Cassidy a generation ago.<sup>3</sup> That study breaks systematic review rules because there was no control group. But these patients were their own controls they had been fully disabled for an average of over 7 years.
- Isn't experience showing us that, while the systematic review to pool and summarize the best evidence is fundamentally a good idea and worthy of further pursuit, at present it is very much a work in progress. It remains in development. When such a review is published it needs debate and interpretation. (The JAMA commentary by Carey and Freburger commences that in the present case.) Because it excludes so much of the published evidence, often to the

point of relying on a few or even 1-2 studies, a systematic review has its own form of scientific bias, which suggests it should be seen as only part of the picture, not the stand alone gold standard for evidence and practice.

- Clinical guidelines should be developed with due regard for good systematic reviews, but it is completely right and acceptable that they incorporate other research evidence and clinical experience and wisdom.
- 3. This is not the place for a detailed discussion of the methodology of systematic reviews, but one key point to understand is that the evidence reviewed, as by Steffens et al., is usually graded overall as having low quality because, after beginning with thousands of references and hundreds of potentially relevant studies, the strict rules on inclusion criteria and quality mean that final conclusions are often based on very few studies, often 5 or less and sometimes only 1-2. In other words, what you accurately perceive to be a vast, million dollar expert review of all the world's research output on a subject ends up with conclusions based on a few studies only. Watch that as we now consider the work of Steffens et al.
- 4. These researchers are from the University of Sydney Medical School and the Discipline of Physiotherapy, Medicine and Health Sciences at Macquarie University in Sydney, Australia, and the Department of Physiotherapy at the Federal University of Minas Gerais in Brazil, Points are:
- a. **Objective.** This was to investigate the effectiveness of various interventions for the prevention of non-specific LBP. Steffens et al. explain that this was important because earlier reviews were out of date and/or had major limitations. Further, "existing guidelines and systematic reviews lack clear recommendations for prevention of LBP."
- b. **Eligibility.** To be eligible for inclusion in the review studies needed to be:
- A randomized, controlled trial (RCT)
- Having participants without LBP upon entry into the study, except where the study outcome was work absence due to LBP
- Having comparison of the group receiving the study intervention/treatment with a group receiving no or minimal intervention. Studies com-

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paring two prevention strategies were excluded.

c. Quality Assessment. The quality of each trial included was assessed on the PEDro Scale (www.pedro.org.au) with a range from 0 (very low methodological quality) to 10 (high quality). The overall quality of the evidence on each issue (e.g. exercise to prevent LBP; exercise to prevent both LBP and sick leave/ work loss; value of back belts, or shoe insoles, to prevent LBP) was assessed by the GRADE System. This defines overall quality of the evidence on a subject as high, moderate, low or very low.

Importantly, this meant that if there was only one good-quality RCT on a subject, and with a total of fewer than 400 participants, the evidence was automatically graded as low, reduced further to very low is the PEDro score was lower than 7 out of 10.

d. **Results.** The literature search found 6,133 potentially eligible studies. Of

these 159 full-text articles were assessed for eligibility, and of these 21 RCTs accepted for inclusion. This was for all interventions to prevent LBP or LBP and sick leave. Here is the breakdown by category of these 21 RCTs:

- i. Exercise to prevent LBP. Short-term follow up (12 months or less), 4 trials with 898 total participants, long-term (more than 12 months), 2 trials with 334 participants. (Continuing our theme of understanding how few in numbers is the research that lies behind the conclusions of systematic reviews, about half of the participants in these trials received the minimal/placebo intervention. This means that the conclusions on short- and long-term prevention of LBP through exercise alone are based upon trials with some 450 and 165 active participants respectively. That is why the evidence from the best trials is given a "moderate to low" rating.)
- ii. Exercise and education to prevent LBP. Short-term follow up 4 trials, long-term 3 trials.
- iii. Exercise and education to prevent sick leave due to LBP. Short-term follow up 3 trials, long-term 2.
- iv. Education to prevent LBP. Short-term follow up 3 trials, long-term 2.
- v. Back belts to prevent LBP. Short-term follow up 2 trials, long-term 1. To prevent sick leave due to LBP, 1 trial with short-term results.
- vi. Shoe insoles to prevent LBP. 4 trials reporting short-term results.
- vii. Ergonomic program to prevent LBP. Short-term results 1 trial, long-term none. The same for ergonomic programs to prevent sick leave due to LBP.
- e. **Conclusions.** On this evidence, representing a limited number of generally good quality trials, Steffens et al. conclude:
- Exercise alone, or in combination with education, is effective for preventing LBP. Education alone is not.
- Exercise alone reduces the risk of a future episode of LBP in the next 12 months by 35%, but reduces sick leave/work loss on account of LBP by an even more impressive 78%.
- Adding education to exercise further reduces the risk of a future episode of LBP in the next 12 months to 45%.
- These results ('the effect size') reduce or disappear in the long-term, raising "the important issue that for exercise to remain protective against future LBP it is likely that ongoing exercise is required. Prevention programs focusing on long-term behavior change in exercise habits seem to be important."
- The level of evidence for other preventive strategies "is low or very low" principally because of the small number of trials accepted and assessed.

Steffens et al. may be understating the evidence for the benefit of exercise alone. They acknowledge another recent systematic review by Choi et al.<sup>4</sup> for the Cochrane Database which includes a trial they excluded because it had participants with LBP at baseline/the outset of the study. This reported a full 50% risk reduction in the first 12 months.

f. **Individual Trials.** Steffens et al. have a table of data that summarizes standard features of each RCT accepted in their review. These features include authors, number and type of participants (e.g. office workers, nurses, general adult population), outcome/result measured, intervention tested, control,

number of treatment/exercise sessions, and duration of intervention.

This provides useful basic data, but to get a better flavor of this research and what it means let's look in detail at one of the RCTs. Most of the trials come from Scandinavia and one of these, by Gundewall et al.<sup>5</sup> in Sweden, looks at work loss due to LBP in an occupational group that is at risk for back pain – nurses and nurse aids. Summary points on that trial are:

- i. **Purpose**. To assess the effect of preventive back muscle training exercises on physical condition (strength, endurance, coordination) and frequency of complaints and working days lost for low-back pain in nurses and nurse aides who have heavy and repetitive lifting and spinal flexion in their work and high frequency of back injuries.
- ii. **Study population and intervention**. 60 nurses (10) and nurse aides (50) were randomized into two groups.
- Training group: Subjects received individual instructions on a 20-minute exercise program at work which was then performed an average of 6 times monthly over 13 months. The exercises, fully described in the paper, involved trunk muscle strengthening with simple equipment such as wall bars, elastic bands and light weights and some simulated work tasks, supervised by physical therapists.
- Control group: These subjects received nothing other than instructions on how to complete report cards for back problems.

All participants were free of back pain, and each group was well-matched for various factors relevant to back pain such as age and job position.

iii. **Results.** The training group had increased muscle strength of 20%, whereas the control group had none, and there was a statistically significant improvement/reduction in the training group in pain levels, number of complaints and days off work. In fact only one person from the training group was absent from work over the period of 13 months, compared with 12 from the control group. Those in the training group had an average of 3.8 fewer days sick leave. The prevention program was not only effective but cost-effective. For every PT hour in the training program 1.3 days of work loss was saved, giving a cost benefit ratio of more than 1 to 10.

Why did this program work? Gundewall et al. acknowledge that there were probably both physical and psychosocial reasons including:

- Back strengthening
- Better and safer handling techniques, because of the training.
- Improved job satisfaction for those getting a training program because someone cared.

#### C Successful Exercise Programs

- 5. There is much research identifying and reporting on the features of exercise programs that make them successful, whether for primary prevention of back and neck pain, secondary prevention (preventing future pain and disability after a first episode has resolved) or treatment of a current episode of spinal pain. Here are some of the important features.
- 6. **Supervision and Compliance.** Exercise programs can be

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## The Chiropractic World

#### **Reliability of Whiplash Questionnaire**

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measure for patients with whiplash."The WDQ has been in ever wider use as this testing has proceeded.

The December issue of the Journal of Manipulative and Physiological Therapeutics (JMPT) has now published a thorough test-retest reliability study of the WDQ from Canadian chiropractic researchers Maja Stuper, Pierre Côté and colleagues from the UOIT-CMCC Centre for the Study of Disability Prevention and Rehabilitation at the University of Ontario Institute of Technology. This confirms that the WDQ is reliable in individuals with acute WAD. They note, however, that there must be a score change of about 15% (one sixth) to exceed the daily variation of disability when the condition is stable.

When Pinfold et al. presented the WDQ in 2004 they explained that whiplash was the most frequently recorded motor vehicle crash injury in their state of Victoria in Australia, and that in Sweden recent data was that approximately 60% of vehicle injuries causing disability were whiplash injuries. WorkSafe Victoria, the government-affiliated workers' compensation, health and safety agency has policy requiring the use of patient questionnaires by health professionals in support of claims for reimbursement. Many questionnaires, including the WDQ and NDI, can be found under Forms and Publications at www.worksafe.vic.gov.au.

The WDQ consists of 13 items addressing matters such as current pain level; personal care; role performance including work, home, and study duties; mobility including driving and public transport; sleep; tiredness; social and leisure; and emotional problems including sadness/depression and anger.

(Stupar M, Côté P et al. (2015) A Test-Retest Reliability Study of the Whiplash Disability Questionnaire in Patients With Acute Whiplash-Associated Disorders, J Manipulative Physiol Ther 38(9): 629-636.)

#### **Adverse Events**

The latest issue of JMPT also has a special section on adverse events. This demonstrates the profession discharging its responsibility to record and better understand adverse events. It also shows, however, how generally safe spinal manipulation is. There are few recorded serious injuries and fatalities, regardless of the qualifications of the practitioner. The case against unskilled practitioners with unacceptable training must be made more on the grounds of ineffectiveness than safety.

**Infants and Children**. Todd, Carroll et al. report a literature review for cases of adverse events following manual therapy from all categories of practitioner. The review covers all searchable databases for all case reports and studies to March 2014. For serious adverse events there were 12 articles reporting 15 events. These included 3 deaths (clinicians were a craniosacral therapist, physiotherapist and unidentified practitioner) and 12 serious injuries (7 chiropractors, 2 physiotherapists and a medical doctor, osteopath and unidentified practitioner).

The majority of these cases involved underlying, pre-existing pathology. The reviewers conclude that serious injury is rare

after manual therapy by anyone, but performing a thorough history and examination to exclude anatomical or neurologic anomalies before applying manual therapy is indicated and may reduce adverse events. (Todd AJ, Carroll MT et al. (2015) Adverse Events Due to Chiropractic and Other Manual Therapies for Infants and Children: A Review of the Literature, JMPT 38(9): 699-712.)

**SMT and Low-Back.** Hebert, Stomski et al. review all studies published to January 2012 in English, German, Dutch and Swedish and reporting serious adverse events ("results in death, or is life threatening, requires hospital admission, or results in significant or permanent disability") in adults (18 or older) following lumbopelvic spinal manipulative therapy by any type of practitioner. A total of 2046 studies were screened, yielding 41 relevant studies reporting 77 cases.

Adverse events consisted of cauda equina syndrome (29 cases, 38% of total); lumbar disk herniation (23 cases, 30%); fracture (7 cases, 9%); hematoma or hemorrhagic cyst (6 cases, 8%); or other serious adverse events (12 cases, 16%) such as neurologic or vascular compromise, soft-tissue trauma, muscle abscess formation, disrupted fracture healing, and esophageal rupture.

Important case details, such as descriptions of SMT technique, the pre-SMT presentation of the patient, the specific details of the adverse event, time from SMT to the adverse event, factors contributing to the adverse event, and clinical outcome "were frequently unreported". This, together with the "anecdotal nature" of the cases, "does not allow for causal inferences between SMT and the events identified." (Hebert JJ, Stomski NJ et al. (2015) Serious Adverse Events and Spinal Manipulative Therapy of the Low Back Region: A Systematic Review of Cases, JMPT (38)9: 677-691.

**Manipulation and Internal Carotid Strain.** Walter Herzog PhD and colleagues from the University of Calgary have published past work demonstrating that the forces reaching the vertebral arteries from chiropractic spinal manipulation are less than from mobilization and the usual range of motion tests performed by various health professionals – and far less than what is required to strain and damage tissue.

This new study from Herzog, Tang and Leonard was to quantify the strains applied to the internal carotid artery (ICA) during neck spinal manipulation and range of motion (ROM) diagnostic testing of the head and neck. Conclusions are "that maximal ICA strains imparted by cervical spinal manipulative treatments were well within the normal ROM. Chiropractic manipulation of the neck did not cause strains to the ICA in excess of those experienced during normal everyday movements. Therefore, cervical spinal manipulative therapy as performed by the trained clinicians in this study... does not seem to be a factor in ICA injuries."

As in Herzog's previous work fresh cadavers were used. Strains of the ICA (n=12) were measured in 6 fresh, unembalmed cadaveric specimens using sonomicrometry. Peak and average strains of the ICA obtained during cervical spinal manipulations given by experienced doctors of chiropractic were compared with the corresponding strains obtained during ROM and diagnostic test-

# News and Views

ing of the head and neck. (Herzog W, Tang C et al. (2015) Internal Carotid Artery Strains During High-Speed, Low-Amplitude Spinal Manipulations of the Neck, JMPT 38(9): 664-671.)

JMPT publishes a related systematic review by Chung, Côté et al. to determine the incidence of internal carotid artery (ICA) dissection after cervical spine manipulation in patients who experience neck pain and its associated disorders. A secondary objective was to determine whether cervical spine manipulation is associated with an increased risk of ICA dissection in patients with neck pain, upper back pain, or headaches.

Ischemic stroke secondary to cervical spine manipulation is a hypothesized adverse event, and in some countries the seriousness of these events and their perceived association to cervical spine manipulation has led some members of the public to call for a ban of the procedure.

There was a systematic search of MEDLINE, CINAHL, Alternative Health, AMED, Index to Chiropractic Literature, and EMBASE from 1970 to November 2012. Two independent reviewers using standardized criteria to screen for eligible articles considered cohort studies, case-control studies, and randomized clinical trials that addressed our objectives.

They planned to critically appraise eligible articles using the Scottish Intercollegiate Guideline Network methodology - but did not find any epidemiologic studies that measured the incidence of cervical spine manipulation and ICA dissection. Similarly, they did not find any studies that determined whether cervical spine manipulation is associated with ICA dissection. There is simply no credible evidence to support the perceived association between SMT and ICA injury. The new Herzog et al. study just discussed gives one reasons why. (Chadwick LR, Côté P et al. (2015) The Association Between Cervical Spine Manipulation and Carotid Artery Dissection: A Systematic Review of the Literature, JMPT 38(9): 672-676.)

#### **World Notes**

**Brazil – RIO 2016.** The 2016 Summer Olympics, officially the Games of the XXXI Olympiad and commonly known as Rio 2016, take place in Rio de Janeiro, Brazil, from August 5-21, 2016 and are followed by the Paralympics from September 7-18. As for the last Summer Olympics and Paralympics at London 2012, chiropractic services will be included in the host medical services



available to all athletes and support staff, together with physiotherapy and osteopathic services.

This is because of the success of the inclusion of these services during London 2012 as judged by athletes, coaches and administrators, recommendations to the RIO host organization made on behalf of the International Olympic Committee (IOC), and the fine work of the International Federation of Sports Chiropractic (FICS) and two of its sports chiropractic leaders. They are Marcelo Botelho DC, MD, ICCSP of Salvador, Brazil who currently serves as FICS First Vice-President and will be a coordinator for chiropractic services at RIO 2016, and Tom Greenway DC, ICCSP, former FICS Secretary-General and Coordinator, Chiropractic Services, London 2012, who will also serve on the RIO 2016 chiropractic team.

Following an extended recruitment process approximately 20 Brazilian and international sports chiropractors are being chosen to serve in the games host medical services. This is separate from chiropractors affiliated with individual country teams. It is an important precedent – the first Olympic Games to include chiropractors in the host medical services in a country where chiropractic practice is not yet recognized and regulated by law. There are two university-based schools of chiropractic in Brazil, and more than 1,000 graduates in practice.

**Denmark – Back in the ECU on 90th Anniversary.** In terms of education, research, practice, and acceptance and reimbursement for services within the mainstream health care system the chiropractic profession in Denmark is well-advanced and strong. It is represented and led by the Dansk Kiropraktor Forening (DKF), or Danish Chiropractors' Association, now with approximately 600 members. It has been a concern for the profession that the DKF, although remaining an active member of the World Federation of Chiropractic (WFC), withdrew from the European Chiropractors' Union (ECU) in the 1990s.

At the DKF Annual Assembly in November celebrating the association's 90th Anniversary, members voted to re-join the ECU, the DKF application for membership was subsequently approved by the ECU General Council, and membership has resumed as of January 1, 2016. *Source: WFC Quarterly World Report, December 2015.* 

Italy – Life University Branch Campus Plan Announced. The Association of Italian Chiropractors (AIC), led by President Dr John Williams, achieved legal recognition of the chiropractic profession in Italy in legislation passed in December 2007, a considerable achievement given strenuous opposition from other health professions, but development of the profession has been limited by the lack of any chiropractic educational program in the country. That is now to change.

In partnership with the AIC Life University held a seminar in Rome from November 21-21, 2015 at which Life University President Dr Guy Riekeman announced plans to establish a Life branch campus in Italy offering a doctor of chiropractic degree program commencing 2018. *Source: WFC Quarterly World Report, December 2015.* 

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successful in the clinic, in exercise facilities or at home, but in all cases supervision is vital to ensure compliance and success. A trial from Ljunggren et al in Norway<sup>6</sup> demonstrates this for home exercises for the secondary prevention of pain and disability. Points are:

a. **Study Population and Purpose**. This trial studied 126 adults aged 18-65 with a history of non-specific low-back pain who had recently been referred by general practitioners to physical therapists for treatment. This was now complete and

the patients were back at work. The purpose of the trial was to see whether supervised home exercises commenced at that stage would be performed by patients and would be successful in preventing future pain and disability.

- b. **Interventions**. The subjects were randomly assigned to one of 2 groups:
- i. Conventional PT exercises. General strength and flexibility exercises, as shown in Figure 1. Each exercise session took approximately 30 minutes and involved 9 exercises each per-

#### Figure 1

Conventional Norwegian Physiotherapy Exercises for Back Pain Patients - From Ljunggren, Weber et al, Spine 1997

- 1.Lie on your back with knees flexed
  - Lift your upper body half way up
  - Hold 3 seconds

Progression:

- Hold a sandbag behind your neck
- Increase the weight gradually
- 2.Lie on your side
  - Lift your uppermost leg

Progression:

- Apply a sandbag around the ankle
- Increase the weight gradually
- 3. Support your body on your knees and hands
  - Stretch one arm forwards and the opposite leg backwards
  - -Hold 3 seconds
- 4.Lie prone, a firm support under the abdomen
  - Place the hands behind your neck.
  - Lift your upper body
  - Hold 3 seconds

Progression:

- Hold a sandbag behind your neck
- Increase the weight gradually
- 5. Support your body on your feet and hands
  - Do push-ups
- 6.Lie on your stomach on the edge of a table, feet on the floor.
  - Grasp the edge of the table
  - Keep your knees straight and lift your feet off the floor

Progression:

- Lift your legs higher up (not higher than the edge of the table)
- Apply sandbags around the ankles
- Increase the weight gradually
- 7. Place two objects on the floor, 50 cm apart.
  - Bend down (flex your hips and knees) and pick up the objects
  - Stand up straight
  - Lift the objects above your head

Progression:

- Increase the weights of the objects
- 8. Tie a cut-off innertube of a bicycle-tire around a doorknob.
  - Sit on a stool with the end of the tube around your shoulders
  - Turn your body so that the tube stretches
  - Repeat to the other side

Progression:

- Increase the distance to the doorknob.
- 9.Sit on your knees at the edge of a bed, feet outside the edge.
  - Place your hands on your neck
  - Bend forwards
  - -Straighten up

Progression:

- Hold a sandbag behind your neck
- Increase the weight gradually



















formed in 3 series with 10 repetitions. There were 3 exercise sessions weekly for 12 months.

ii. TerapiMaster Exercises. An alternative set of exercises, also for strength and flexibility, using a low-cost Norwegian apparatus designed for PT treatment and general exercise. There was the same dosage and frequency of exercise.

Both forms of exercise were performed at home. However to encourage consistent performance or compliance there was:

- · A thorough initial instruction session.
- 1 follow-up every 6 weeks. This meant 8 follow-ups during the 12 month study 4 were by telephone calls, 4 by patient visits to PT centres. During these follow-ups patients were specifically asked about compliance, though they kept no diaries, and modification of exercises was made where this was felt appropriate.

During initial weeks exercises were phased in gradually.

- c. Measurements. Results (outcomes) measured were:
- i. Compliance with exercises and days of sick leave by PT survey on each follow-up, reported at the end of the trial (12 months) and at 24 months.
- ii. Patient satisfaction on an 11-point Visual Analog Scale ranging from 0 (very bad) to 10 (very good).

At the end of the trial patients had no further supervision, but were encouraged to continue with their exercise program.

- d. **Results**. There was high patient satisfaction with both exercise regimes, and excellent compliance. This led to a highly significant reduction in absenteeism in both groups in the first 12 months a reduction from 82.5 days off to 17.2 in the conventional exercise group, from 61.6 to 15.4 days in the TerapiMaster group.
- i. At least 2 of 3 (67%) of all patients voluntarily completed a second 12 months of exercise (13 could not be contacted because of changed addresses), though level of exercise or compliance dropped by about 25%. Notably however, in the second 12 months there was a further improvement in work attendance absenteeism declined to 9.9 days and 9.3 days respectively.
- ii. Neither exercise program was significantly better than the other.
- iii. Ljunggren et al. report that "both exercise programs reduced absenteeism by 75% to 80%" and conclude that general exercise "is beneficial for both the prevention and treatment of back pain."

They particularly note that exercise compliance is a problem "to which more attention should be devoted", since most people have not continued with training programs in other studies. "It is important to ensure that (patients) are given support and encouragement when exercising, either on an individual basis as in our study, or by participating in group activities. ….

- "One reason for the high level of compliance was probably the frequent follow-up procedures ... and the motivational effect of that contact on the patients. Indeed frequent follow-ups seemed to be a prerequisite for good compliance."
- 7. **What Form of Exercise?** The evidence does not support one form of exercise over others. Early important trials showing that different forms of exercise were equally effective for the treatment of patients with chronic pain were from Manniche et al. in Denmark<sup>7</sup> using trunk muscle exercises for

strength, and Deyo et al. in the USA<sup>8</sup> using relaxation and stretching exercises "designed to improve mobility and reduce pain by limbering muscles and ligaments that had become restricted in response to pain."

Those results have been confirmed in many studies, including one from Bronfort et al. from Northwestern College of Chiropractic (now Northwestern University of Health Sciences) in Minneapolis, in which one group of patients received chiropractic manipulation and trunk muscle strengthening exercises (TSEs) based on Manniche et al., another group manipulation and stretching exercises based on Deyo et al. Both groups had equally good results. At the end of the 11-week treatment period those receiving TSEs had a substantial increase in trunk flexion/extension strength and endurance, those receiving stretching exercises did not. However this did not translate into less pain and disability – increased strength alone is not the answer.

The types of exercise instruction in the studies assessed by Steffens et al. in their review were variable, including core exercises to strengthen back and abdominal muscles, stretching and spine range-of-motion exercises, general aerobic conditioning and combinations of these. For now, clinicians can use the exercise protocols they have found effective. However, as Carey and Freburger recommend, experts from the disciplines managing back pain patients "must come to consensus regarding standard, efficient and acceptable bundled interventions for LBP prevention." A one-size-fits-all intervention may be unrealistic, "however determining categories of exercise..... and the appropriate frequency, dose, and intensity for each category would be a positive start."

- 8. **Education and Progression.** Particularly for those with current pain, there is fear of aggravated pain and harm simply from maintaining activities of daily living (ADL), let alone commencing new exercises. Compliance and success requires:
- a. Education on the safety and appropriateness of exercise for recovery from pain and disability, and prevention of future problems. In the 1990s, as medical management began to move from rest to maintaining ADL and use of exercise, Indahl et al. in Norway<sup>10</sup> reported a trial with 975 patients on sick leave for 8-12 weeks with chronic LBP half of whom received standard medical management of rest and medication. The other half had no treatment simply being told that "the worst thing they could do to their backs was being careful", and being given other education on back pain, postural advice, and encouragement to return to ADL. These things alone produced a 50% higher reduction in sick leave.
- b. Given fear, many studies have confirmed the importance of graded introduction of exercise, progressing from less to more and finally to the full program. This progression is seen in Table 1 from the Ljunggren et al. trial.
- 9. Combining Exercise, Education and Manipulation. In chiropractic practice a standard method of preventing future episodes of pain and disability once a first episode is over is periodic patient visits, often on a monthly basis, to combine monitoring of compliance with recommended exercises, continuing education and advice on spinal health, and the assessment and manual treatment of joint dysfunction. Having regard to what is now known about the requirements of exercise programs that are successful in the prevention of spinal pain, including the need for regular supervision for compliance and prolonged continuance for prolonged prevention,

this represents an evidence-based and cost-effective approach to long-term prevention incorporating exercise. It has the added benefit of addressing underlying joint restrictions that may be a cause of future pain and disability.

#### **D** Conclusion

- 10. Steffen at al.'s new literature review showing that exercise, preferably combined with education on back pain and spinal health, is now the one proven method of preventing LBP the world's primary and likely most costly source of disability, places new urgency on the use and third party reimbursement of exercise programs. Carey and Freburger support that sense of urgency in their commentary on the review in JAMA, and call for:
- An interdisciplinary expert consensus on what should be the standard, most acceptable and efficient prevention programs, and how to access them individually and via group classes.
- A similar consensus on the key content of patient education on LBP prevention.
- Consensus on how to motivate patients to engage in continuing exercises. As just one example, employers can help by offering incentives such as reduced fee fitness club membership.
- Evidence convincing payers of the cost-effectiveness of preventive exercise/education programs for recovered patients. "In the interim payers should support exercise programs by covering a sufficient number of visits for instruction, and keeping co-pays to the minimum."
- To address these barriers all stakeholders need to work together. There should be consensus development conferenc-

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es, cross-specialty guidelines, and referral pathways financially attractive to the health care system and patients.

To quote their closing words: "The potential benefits to the health system, patients and employers are substantial." The chiropractic profession, with its expertise in spinal heath and its history of patient education and motivation on the benefits of early return to ADL and exercise, should clearly take a leading role in efforts to fulfil these recommendations.

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Netherlands – NCA Success Challenging VAT. Value-added or sales tax (VAT) in the Netherlands is 21%. Historically VAT-exempt, chiropractors became subject to VAT in January 2013, meaning that their fees rose overnight by 21%. This was not the case for regulated professions – chiropractic though well-accepted by the public is not yet regulated in the Netherlands – so many chiropractors felt forced to absorb the the tax themselves.

At a hearing in September 2015 the Netherlands Chiropractic Association (NCA) won an appeal on the matter, the Dutch Court ruling that chiropractic and physiotherapy (free of the tax) were at an equivalent academic and medical level and, as such, imposing VAT on chiropractic services was anti-competitive and unfair. Source: WFC Quarterly World Report, December 2015.