

**TREATMENT MANUAL FOR PHYSIOTHERAPIST-  
DIRECTED EXERCISE, ADVICE, OR BOTH FOR SUB-  
ACUTE LOW BACK PAIN: A RANDOMIZED  
CONTROLLED TRIAL**

# EXERCISE

The graded activity program comprised 12 supervised sessions over 6 weeks. Three sessions per week in weeks 1 and 2, two sessions per week in weeks 3 and 4 and one session per week in weeks 5 and 6. Missed appointments eg due to public holidays or illness were rescheduled.

The program was based on that described by Lindstrom et al (1). The program was an individualised submaximal, progressively increasing program that aimed to improve subjects' ability to complete functional activities specified by the subject as being difficult because of low back pain. The therapist used principles of cognitive behavioural therapy including setting progressively raised goals, shaping, encouraging self-monitoring of progress and self-reinforcement. In the treatment manual used in the trial practitioners were provided with guidelines for using cognitive-behavioural principles in the exercise program. These guidelines have now been published (2). To supplement the guidelines each trial physiotherapist received face-to-face training with the author of the guidelines, A/Prof Nicholas, a clinical psychologist.

At the beginning of the program the participant nominated 5 important activities that they were unable to do or had difficulty performing as a result of their low back pain. The participant was also asked to describe the work, activities of daily living and leisure activities that they wished to return to. The physiotherapist examined the participant to identify physical impairments and used the information from the history and physical examination to identify the functions that were presumably impaired and need training in the activity program. The physical activity program was individually prescribed for each participant and focused on improving the participant's ability to perform the nominated activities. Patients were involved in goal setting, monitoring and upgrading of the activity program. As per normal clinical practice participants did not receive 1:1 contact with the physiotherapist throughout treatment sessions, typically there was direct personal contact for 50% of the treatment session.

Each subject carried out a form of aerobic exercise (eg, walking or cycling), stretches, functional activities, activities to build speed, endurance and coordination, and trunk and limb strengthening exercises. Exercises were not restricted to the trunk but included the whole body. Subjects were also given an individualised home exercise program that was regularly evaluated by the physiotherapist, and subjects were encouraged to continue the home program for at least 6 weeks after the intervention period finished.

## **Individualisation of program**

The program included aerobic training, functional tasks, activities to build speed, endurance and co-ordination, stretches, trunk and limb strengthening exercises and all participants performed aerobic training. A key element of the program was that the activity program was designed so that it was compatible with the functional goals and the current abilities of the participant. The individualised program was adapted so that it included different activities more relevant to the patients' functional goals. Additionally the form of training and the mode of aerobic training selected (eg walking, bike) was chosen so that it could be continued in the home program. The physiotherapists used their clinical judgment and consulted with the participant to select these activities.

The physiotherapist designed a program that gradually increased the complexity of the training activity until eventually the patient was able to perform the goal functional activity. The complexity of the training activity could be increased by increasing the load, increasing the number of repetitions, increasing speed of movement, incorporating changes in direction, increasing balance requirements, increasing the height of a step, performance of concurrent tasks and linked tasks. The baseline testing was used to establish where to start the patient in the series of activities. In each case the patient should record and monitor their accomplishments.

## **Testing of baseline functional ability**

The physiotherapist used a range of tests to assess the participant's functional capacity. The following are examples of baseline activity tests for walking and lifting.

### **Walking**

- Fifty-foot walk

Subjects walk 25 feet, turn around, and walk back to the starting position, once as fast as they can and once at their preferred walking speed. They are timed during the performance of these walks. (3)

- Five-minute walk

Subjects are requested to walk as far as they can in 5 minutes. (3)

- Step-ups

Step up and down onto shallow step, record number of step-ups. Progress onto deeper step and increase number of steps. (4)

- Jogging on bouncer

Stand on bouncer and lift alternate feet slowly. Increase speed until jogging on the bouncer. (4)

- Skipping rope exercise

Place a rope stretched out on the floor. Step over it from side to side. Record number of steps. Repeat above and increase speed. Skip using the rope. Try not to land heavily on the heels. (4)

- Shuttle walking

Walk between markers on the floor. Record number of times they walk up and down. Increase their speed. (4)

- Stand on tiptoe with arms elevated

Rated as cannot manage, with some difficulty, without difficulty. (1)

### **Lifting/pushing/pulling tests & activities**

- Arm raising

The subjects stands with the arms by their side, raising alternate arms above their head. Record number of times they raise their arms(4)

- Free arm weights

The subjects lie on their back with their arms by their side, lifting right arm to left shoulder. Repeat with left arm. Repeat above with weight. Increase and record weight for progression. This exercise should be done slowly. (4)

- Medicine ball lifts

The subject lies flat on their back with their knees bent. They lift a small medicine ball up from their chest until their arms are straight and lower. Record number of lifts. Repeat above with heavier ball and increase repetitions. (4)

- Press ups

Subject stands with shoulders facing the wall with feet approximately 2 feet from the wall. Subject leans towards the wall and then pushes away keeping their back straight. Record number. (4)

- Floor to waist lift
- Waist to overhead lift
- Dynamic push/pull.

Ability to push/pull vehicle loaded with 100kg of weights. Rated as cannot manage, with some difficulty, without difficulty. (1)

- Horizontal lift

Lift milk crate from waist level shelf, move horizontally 4 feet put crate down again. Repeat five times. Scored as maximum safe lifted weight. (5)

- Front carry

Lift milk crate off floor or waist height bench, carry milk crate 25 feet forward and then return back to floor or bench. Recorded as maximum safe lift (5)

- Right-handed or left-handed carry

Lift container with handle (eg tool chest) off waist height bench, carry milk crate 25 feet forward and then return back to bench. Recorded as maximum safe lift. (5)

- Static push/pull

Average of static force held 3 seconds (5)

- Dynamic push/pull. (5)

Push weighted trolley 30 feet and then reverse and pull 30 feet. Scored as maximum weight safely moved. (5)

- Loaded reach

Subjects stand next to a wall on which a meter rule was mounted at shoulder height. They then reached forward at shoulder height, holding a weight that did not exceed 5% of body weight or 4.5kg. The maximum reach distance was recorded in cm. (3)

- Unloaded reach

As above except subjects do not hold a weight(3)

- Lateral pull down at gym station
- Bench press at gym station
- Pectoral strengthening at gym station

## **Examples of varying the complexity of functional tasks**

A key component of the graded activity program was a graded increase in the complexity of the key functional tasks identified at baseline. Example of increasing the complexity of walking and lifting are described below.

## **Walking**

- Increasing speed

Standing, stepping, walking on the spot, walking slowly, walking briskly, jogging, running

- Direction changes

Walking smoothly in a straight line, shuttle walking, timed up and go, repeated sit-to- stand

- Inclines

Level walking, step up shallow steps, climb flights of stairs, climb step ladder

- Balance

Walking on level floor, stand on tiptoes with arms elevated, stand on minitramp and lift alternate feet slowly- increase speed until jogging, wobbleboard, walking along 2x4 board

- Load

Walking without load, walking carrying a load in one hand, walking carrying a load in front with both hands, pushing a loaded trolley

- Increasing speed lateral movements

Sideways stepping, sideways steps -raising arms, star jumps

- Skipping

Step over rope from side to side, hop from side to side, skip using rope

## **Lifting/pushing/pulling**

- Press up against wall, modified press-up, full press-up
- Arm raising, arm raising with weights, overhead manipulation
- Lift from floor to waist, lift from waist to shoulder, horizontal lift,
- Unloaded reach, loaded reach
- Bench press at gym station increase reps and/or weight
- Pectoral strengthening at gym station increase reps and/or weight
- Lat pull down at gym station increase reps and/or weight
- Pushing an unloaded trolley, pushing an unloaded trolley through shuttles, pushing an unloaded trolley with stop and starts, increase the speed of pushing trolley (repeat with load)

# Sham Exercise

(Detuned ultrasound and shortwave diathermy)

## Overview

To control for the therapist's attention during the exercise session, detuned pulsed ultrasound (U/S) and detuned pulsed shortwave (SWD) were delivered. The US was performed for 5 minutes and the physiotherapist remained with the patient for this period. The SWD treatment was for 20 minutes and the physiotherapist was only with the patient when setting up the treatment and then left the cubicle returning at regular intervals to monitor safe delivery of treatment.

The therapists were trained to deliver the therapy in a credible manner and with equal enthusiasm as for the exercise intervention. Sample treatment sessions were audited by a chief investigator.

## Key points

- The physiotherapists aimed to replicate the normal clinical routine for delivering active pulsed U/S and SWD.
- The therapists were asked to always refer to the treatment as pulsed U/S and pulsed SWD **NEVER** placebo.
- The therapists were asked not to provide advice during U/S & SWD treatment sessions. If the patient requested advice the therapists were asked to first either try to deflect the conversation back to the treatment being delivered or provide placebo advice (see placebo advice section).
- The therapists were asked not to apply the principles of cognitive behaviour therapy used for the active exercise intervention.
- As would be the case in normal clinical practice for the delivery of the active form of SWD, the physiotherapists did not provide 1:1 contact throughout total treatment session.

While many of the steps are obviously redundant when delivering a sham treatment, eg checking for contraindications, their performance was believed essential to maximise blinding and treatment credibility. The approach we used was based upon the recommended approach to administering both treatments in active mode as described in the Australian Physiotherapy Association Clinical Standards for the use of Electrophysical Agents.

### 1. Assess the patient

Prior to administering the intervention the treating physiotherapists assessed the patient as per normal clinical practice. During the history they screened for recommended contraindications to the active forms of the two treatments eg circulatory insufficiency, bleeding disorders, metal in the area, acute inflammation/infection, severe cardiac or renal disease, cardiac pacemaker, malignancy, tuberculosis, osteomyelitis, pregnancy. During the physical examination they checked for the following precautions: open wounds, skin disorders. A hot/cold skin test was conducted to check thermal sensation.

## **2. Explain the benefits of the treatment**

Prior to administering the treatment the physiotherapist provided an explanation of the benefits of the treatment.

Brief version:

*The ultrasound and shortwave will help reduce your back pain. During the treatments you may feel a slight warmth.*

Longer version if more info is requested.

*The ultrasound and shortwave have similar clinical benefits but affect different tissues. The ultrasound is a sound or vibration that is absorbed into the soft tissues such as muscle and ligaments but not the bone. The ultrasound is mainly absorbed in the superficial tissues and we need to use a gel to transmit it. It is the same as used on pregnant mums. The SWD is an electromagnetic field that can penetrate to the deepest tissues in your back and also the bone. The benefit of using both treatments is that we can affect all the tissues in your back: the soft and hard tissues and also the superficial and deeper tissues.*

*The treatments have an anti-inflammatory effect by helping the body break down and disperse the painful chemicals produced following an injury. They also assist tissue repair and healing. Both treatments reduce the nerve's ability to conduct pain signals and so they have an analgesic effect. Lastly if there is any muscle spasm in the area they can help relax the muscle.*

*Do you have any questions?*

## **4. Provide standard warnings**

Prior to administering the treatment the physiotherapist provided the following standard warning.

*When receiving the ultrasound treatment, it will first feel quite cool because of the gel and the steel head of the machine. After a little while it may feel warm. This is normal. We are using a pulsed mode to allow the heat to disperse. If it gets any warmer than a mild warm feeling please let me know and I will turn down the intensity or the pulse ratio.*

*Do not move or touch any of the equipment during treatment.*

*When receiving the SWD treatment, you will first feel nothing and then it may warm up. We are using a pulsed mode to allow the heat to disperse. If it gets any warmer than a mild warm feeling please let me know and I will turn down the intensity or the pulse ratio.*

*Do not move or touch any of the equipment during treatment.*

## **5. Reassess after the treatment**

Prior to administering the treatment the physiotherapist identified features from the history and physical assessment that could be used to assess the effect of SWD/US treatment. Potential measures included self-reports of ability to perform activities at home, measured straight leg raise range of motion and self reports of resting pain at the clinic. The features were assessed before and after each treatment. Physiotherapists were asked to respond to the assessments as they would normally do for active treatment. For example if there was an improvement following treatment they would note this and reinforce the value of this improvement to the participant.

## Advice

The advice provided to participants was based upon that described in Indahl's trial (6). The physiotherapists aimed to reassure the participants that their low back pain was due to a benign condition and that the best thing that they could do for their back was to resume normal light activity in a graded fashion. The following is the script we provided to physiotherapists.

### Overview

“Based upon my examination you do not have anything seriously wrong with your back. The problem is a simple sprain of the disc or ligament and with time this will heal. A sprain of the disc or ligaments in your back produces inflammation and this will cause muscle spasm in your back muscles. The muscle spasm will diminish circulation to the muscles and lead to stiffness and pain and the pain can be quite severe. The muscle cramping in your back is much the same as the cramp you may get in your calf and just as it helps to move your foot to get rid of the cramp so movement of your back will help. When patients have LBP, pain or anticipation of pain can make them want to hold their back still but this is the worst thing to do because it will lead to increased muscle spasm and subsequently increased pain”.

“It is now at least 6 weeks from the onset of your LBP and it is quite safe to start returning to your normal activities. Light activity will not further injure the disc, ligaments or any other structure that could be involved in the process, and it is a general medical observation that light activity actually enhances the repair process. Being overly careful and avoiding activity is the worst thing you can do and will delay recovery. What you need to do is to start with light activity and set your own goals for increasing your activity levels until you have returned to your normal activities”.

“A lot of people are scared and worried by their LBP, this is natural. However in most cases this fear is unjustified and the fear will probably make your pain worse. Emotional stress will tend to make your LBP worse because it will increase muscle tension and so LBP. Again this does not mean you have re-injured your back. Unfortunately it can set up a vicious cycle where emotional stress leads to muscle spasm and so pain which leads to more stress and muscle spasm and so on”.

“You should try to bend and move your back as much as possible. For example when you are walking or moving around you should not hold yourself stiffly but rather try to be as flexible as possible. Keeping your back still is not helpful. The only exception is lifting. There are three rules to remember for lifting:

- (i) Avoid bending and twisting when lifting
- (ii) When lifting very heavy objects, lift correctly with the back as vertical as possible, make use of the thighs and keep the load close to the body
- (iii) Carrying involves static work for the back muscles, therefore any excess carrying should be avoided”.

“If you experience LBP this is a sign that circulation to the muscles is inadequate and you can help this by mobilising your back with stretching and light activity. If you experience

acute stabbing pain in the back, this does not mean you have re-injured your back it is usually an acute muscle spasm and you should treat this with stretching and light activity”.

“A lot of patients with LBP that has persisted for over 6 weeks are afraid that they will never recover. This is not true. The majority of patients do recover. You can increase your chances of making a good recovery by changing how you view your LBP. LBP patients who take on the sick role eg by resting, taking time off work and allowing others to do their work and chores are less likely to recover. As I said before being overly careful and avoiding activity is the worst thing you can do and will delay recovery. The best thing you can do is to mobilise the back by light activity and set your own goals for returning to your work and chores”.

**“In short, there is generally no reason to be afraid of your back. Do not be overcautious, but try to be as flexible as possible. Try to stop worrying about doing ‘something wrong’ with your back, but instead use it”.**

Practical implementation of the principles and guidelines will be demonstrated by the physiotherapist. Explain the nature of LBP and clarify any misconceptions.

# Sham Advice

## Overview

To control for the therapist's attention during the advice sessions, 'ventilation' or support sessions were provided.

The therapist provided the participant with an opportunity to talk about their low back pain and the therapist was asked to respond in a warm and empathic manner, and display genuine interest in the participant. However, no advice about low back pain was given.

## Keypoints

The therapist informed the participant at the first (and subsequent) sessions that these sessions were aimed at providing them with an opportunity to discuss the problems of living with low back pain.

The therapists pointed out that many people with such conditions reported that they felt alone or unusual and that other people often didn't seem to understand them or what they were going through, especially if these other people didn't have low back pain.

It was then suggested that these sessions were aimed at providing them with an opportunity to discuss a number of issues concerning their back pain.

The therapist told the patients that while the therapist may not be able to answer some questions about back pain, it can be helpful to have an opportunity to talk through some of these issues with a professional therapist.

The general principle was that the therapist avoids giving specific information or advice about back pain. Thus, recommendations for a specific exercise or posture were avoided. Equally, information on a likely cause of pain was avoided.

The therapist was trained so that they would be prepared to deal with questions directly and without sounding evasive. For example, if asked "do you think I should be resting more?" the therapist would say something like, "well, as you know we can't really give you specific advice on this, but what do you find helpful?" In other words, the therapist tried to deflect the question back to the patient to answer. The therapist was trained to neither agree nor disagree with the answer – just say something along the lines of "well it sound as if you're happy with that approach for now" or "it seems you're not quite sure what to do, but what might be your options?" Then, "well have you thought of trying one of those?"

Clearly, if the patient was considering something the therapist considered dangerous the patient should be advised to discuss it with their treating doctor as the therapist could say they were concerned about that particular proposal.

The three sessions were given a form of structure to promote the sense that they were planned and purposeful. Thus, the initial 10-15 minutes focused on the patient's experiences with their back since the last sessions. Then anything coming out of that could be discussed further (eg. if the patient has been concerned about reactions by work-mates or friends to their back pain then these matters could be discussed, again in an interested and empathic manner, but not with the intention of advising the patient on a particular course of action). Alternatively, if nothing particular comes out of the initial discussion, the therapist could move on to 'a suggested topic for today'.

The suggested topics might include:

1. Impact of back pain on daily activities/chores, hobbies, sports, etc.
2. Reactions of family, friends, work-mates to their back pain.
3. Experiences of dealings with medical practitioners and other health care providers in relation to their pain.
4. Possible impact of other events on their back pain (eg, stresses, family, activities, weather, work, travelling, household chores, work demands).

To end the sessions, the therapist should try to do this as politely as possible.

Remember, the therapist is trying to sound as interested in and empathic with the patient as possible. Thus, the end of the session could be introduced along the lines of: "well, I'm sorry but that's all we have time for today. In our next session I would like to look at xxxx".

## References

1. **Lindstrom I, Ohlund C, Eek C, et al.** The effect of graded activity on patients with subacute low back pain: a randomised prospective clinical study with an operant-conditioning behavioural approach. *Phys Ther.* 1992;72(4):279-293.
2. **Nicholas M, Tonkin L.** Persisting pain: using cognitive-behavioural principles for activity-based pain management. In: Refshauge K, Gass E, eds. *Musculoskeletal Physiotherapy. Clinical science and evidence-based practice.* 2nd ed. Oxford: Butterworth Heinemann; 2004.
3. **Simmonds M, Olson S, Jones S, et al.** Psychometric characteristics and clinical usefulness of physical performance tests in patients with low back pain. *Spine.* 1998;23(22):2412-2421.
4. **Frost H, Lamb S, Klaber-Moffett J, Fairbank J, Moser J.** A fitness programme for patients with chronic low back pain: 2-year follow-up of a randomised controlled trial. *Pain.* 1998;75:273-279.
5. **Isernhagen S,** ed. *Work injury: management and prevention.* Rockville: Aspen Publishers; 1988.
6. **Indahl A, Velund L, Reikeraas O.** Good prognosis for low back pain when left untampered. A randomised clinical trial. *Spine.* 1995;20(4):473-477.