

## PILATES SCIENTIFIC INFORMATION

### Q1. Scientific Backing

This document outlines the development and research substantiating the efficacy of the Pilates Method as a form of rehabilitation for both post acute and chronic injury. Studies have shown that this method of intervention can reduce pain and improve functionality.

The Pilates method of training has been around since the early 1900's. It was developed by Joseph Pilates to improve his own health, and, in a sense rehabilitate himself from childhood illnesses he endured. He used his unique form of training to rehabilitate war injured soldiers during WW1 and brought Pilates to the USA in the 1920's. This is where he continued to train clients for improved health, fitness and rehabilitation of injuries.

During the later half of the 1990's, research emerged advocating the principles of motor control retraining in patients with post acute and chronic low back pain that are the foundation of Pilates technique. Below is a sample of these studies.

Hodges, PW., Richardson, CA., 1996. **Inefficient muscular stabilization of the lumbar spine associated with low back pain.** Spine 21 (22), 2640–2650.

Hodges, P.W., Richardson, C.A., 1999. **Altered trunk muscle recruitment in people with low back pain with upper limb movement at different speeds.** Archives of Physical Medicine and Rehabilitation 80, 1005–1102.

Richardson C, Jull G, Hodges P, et al: **Local muscle dysfunction in low back pain. In: Therapeutic Exercise for Spinal Segmental Stabilisation in Low Back Pain.** London, Churchill Livingstone, 1999.

Richardson C, Jull G, Hodges P, et al: **Overview of the principles of clinical management of the deep muscle system for segmental stabilization.** In: Therapeutic Exercise for Spinal Segmental Stabilisation in Low Back Pain. London, Churchill Livingstone, 1999

Richardson C, Jull G, Toppenberg R, et al: **Techniques for active lumbar stabilisation for spinal protection: A pilot study.** Australian Physiotherapy 38:2, 1992

These significant studies and publications were seen to create a shift in paradigm for treating these populations and have continued to infiltrate the treatment techniques for many mainstream and allied health modalities, although this had been a part of the Pilates approach to rehabilitation for many years. Finally, the science was catching up to the Pilates world.

Since 2000, many researchers have turned their attention specifically to the Pilates modality as a tool for rehabilitation, and Pilates has been accepted into the mainstream as a widely accepted rehabilitation program by physical therapists and orthopedic surgeons. It is generally understood to enhance a patient's recovery process significantly. Below are samples of relevant studies.

Anderson, B.D., Spector, A., 2000. **Introduction to Pilates-based rehabilitation.** Orthopaedic Physical Therapy Clinics of North America 9, 395–410.

Lange C., Unnithan V, et al., 2000. **Maximising the benefits of Pilates-inspired exercise for learning functional motor skills.** Journal of Bodywork and Movement Therapy. 4:99-108

Graves, S., et al. 2005. **Influence of Pilates-based mat exercise on chronic lower back pain.** *Medicine & Science in Sports & Exercise*, 37 (5, Suppl.), S27.

Curnow D., Cobbin D, et al., 2009. **Altered motor control, posture and the Pilates Method of exercise prescription.** Journal of Bodywork and Movement Therapies 13:104-111

Bryan M., Hawson S., 2003. **The Benefits of Pilates Exercise in Orthopaedic Rehabilitation.** Techniques in Orthopaedics 18: 126-129

Cozen DM.,2000. **Use of Pilates in Foot and Ankle Rehabilitation.** Sports Medicine and Arthroscopy Review: Volume 8 Issue 4.

Rydeard R, Leger A, et al., 2006. **Pilates-based therapeutic exercise: effect on subjects with nonspecific chronic low back pain and functional disability: A randomised controlled trial.** The Journal of orthopaedic and sports physical therapy. 26:7 472-484

The following information are evidence based findings on the benefits of Pilates:

#### Lumbopelvic pain

- Back pain has been associated with the weakness and dysfunction of the ‘core muscles’ also known as the deeper abdominal muscles. These include the transverses abdominus (TA), multifidus (MF), pelvic floor muscles and the diaphragm muscle. The Pilates method aims to increase the strength and endurance of these ‘core muscles’, to lengthen and stretch the lumbar spine, which in turn decreases the compression of the joints, which causes an alteration in the tilt of the pelvis, which can lead to low back pain (Gladwell et. al, 2006).
- Pilates teaches a person to activate their TA and MF. Once the basics of ‘core muscle’ activation is mastered, clients are taught to maintain ‘core muscle’ activation while performing more functional movements, such as squats, which are used in the workplace.
- A study conducted by Gladwell et.al (2006) showed that subjects with non-specific low back pain who participated in a six week Pilates program experienced an improvement in their back pain symptoms, compared to the control group who did not participate in Pilates. The Pilates group had improvements in general health, pain levels, sports functioning, flexibility, and proprioception.
- Another study showed that subjects who participated in a Pilates based exercise program to address lower back pain showed equal improvements in measures of pain, function and core stability that were equal to the subjects that participated in traditional lumbar stabilization exercises that are provided for rehabilitating low back pain (Horvath, 2005).
- Pilates based principles and exercises play a significant role in the Back RX. This is a lumbar stabilization program that aims to improve flexibility, strength, and endurance in

people with diskogenic low back pain (Vad, Bhat, & Tarabichi, 2007). Pilates based exercises and principles are the basis of the stabilization exercises in this program. A study conducted by Vad et.al (2007) showed that 70% of subjects who participated in the Back RX program reported a successful outcome with their back pain at the one year mark compared to only 33% in the control group, who did not participate in the program. Also the average time off work and levels of pain medication were significantly lower in the Back treatment group. However, the most significant outcome was the lower rate of recurrence of an acute back pain episode in the Back treatment group. Only 17% of subjects in this group experienced a recurrence of symptoms, compared to 48% in the control group (Vad, Bhat, & Tarabichi, 2007).

### Neck pain

- Another study showed that spinal stabilization exercises, such as Pilates, are beneficial in managing back and neck pain (Moffett & McLean, 2006). Back pain has been associated with the weakness of ‘core stabilizers’, such as the multifidus and transverse abdominus. Neck pain has been associated with an inefficiency in the deep cervical flexors, which leads to the increased use and strength of the global muscles of the neck and shoulder girdle (Moffett & McLean, 2006). The weakness in the stabilizing muscles causes muscle fatigue under sustained low loads, such as sitting in front of a computer for long periods. Re-educating the postural (stabilizing) muscles of the spine and shoulder girdle, with Pilates, has been shown to improve back pain and function. It has also been shown to improve neck pain and headaches (Moffett & McLean, 2006).

### Principles of injury rehabilitation using Pilates

- Joseph Pilates believed that mobilizing early in rehabilitation decreased the convalescence period after a musculoskeletal injury (Segal, Hein & Basford, 2004). The Pilates Method starts by strengthening the core, which is achieved by 1. Coordinating breathing with movement. 2. Scapular, pelvic, and rib cage stabilization during abdominal movements. 3. Head and cervical spine placement to avoid neck strain (Segal, Hein & Basford, 2004).
- Pilates starts a client exercising with a wide base of support in prone, side-lying, and supine positions. The client is progressed as they develop strength and correct

technique. This is done by decreasing the base of support to retrain proprioceptive mechanisms and at the same time developing more efficient movement patterns (Segal, Hein & Basford, 2004). This system is similar to the dynamic stabilization exercises, used by therapists to treat and prevent musculoskeletal low back pain (Segal, Hein & Basford, 2004).

- Proprioception is an important part of rehabilitation because it forms the link between the musculoskeletal and nervous systems, which is of great importance for spinal stability (Segal, Hein & Basford, 2004). Pain or poor postural habits can inhibit deep proprioception. This can lead to a person developing compensatory movement patterns, which can increase the time of healing, after an injury, due to the ineffective biomechanics (Segal, Hein & Basford, 2004).
- The study conducted by Segal et al (2004) showed that just one hour of Pilates per week improved the flexibility of their subjects that was similar to changes achieved by 10 sessions of intensive physiotherapy. Patients suffering from low back pain, who partake in programs that are designed to improve their flexibility experience better function and fewer symptoms than their baseline measurements (Segal, Hein & Basford, 2004).
- Pilates promotes neuromuscular re-education in functional positions and planes, while focusing on stabilizing the spine (Bryan & Hawson, 2003). The benefits of Pilates include the development of strength, flexibility, proprioception, muscle balance and symmetry, balance, control, and improved posture and body awareness. The increased strength of the 'core' muscles allows for more efficient movement of the extremities. Hence, functional activities that require balance and control are performed more efficiently and safer (Bryan & Hawson, 2003).
- Machine based Pilates allow muscles to work concentrically and eccentrically using springs as resistance. Muscles also co-contract and stabilize to control movements and the path of the equipment. Exercises can also be modified to suite a person's capabilities by changing the resistance of the springs or altering the range of motion of an exercise (Bryan & Hawson, 2003).

Other musculoskeletal conditions which may benefit from Pilates

- Pilates is used to stabilize the pelvis, shoulder girdle, knees, and ankles. It can be beneficial for back pathologies such as, disc herniations, spondylolisthesis, low back pain, and scoliosis. It can also be beneficial for rehabilitation of the knee joint post anterior cruciate ligament (ACL) repair, meniscectomy, or joint replacement. The method can increase range of movement and strength in a safe, non-weight bearing, closed kinetic chain environment (Bryan & Hawson, 2003).

Please keep in mind that this evidence only forms a small sample of scientific journal articles that are available as to the benefits of Pilates for musculoskeletal rehabilitation. Many more published studies supporting the Pilates Method for rehabilitation exist. I have included a list of references used to obtain the above information for further reading. I have enclosed a sample of the journal articles used.

Unfortunately not all Pilates courses and training that instructors undertake are equal. Therefore, it is important to identify professional Pilates bodies, such as the Australian Pilates Method Association (APMA), who have a high standard of educational training and criteria for their registered members. This will ensure quality services being afforded to Workcover patients with rehabilitation needs.

## **2. How the services the studios provide will increase the chances of a return to work.**

- Please read the above information for the benefits of Pilates and how the principles are implemented for rehabilitating musculoskeletal injuries.
- Prior to undergoing formal Pilates training, an APMA accredited Pilates instructor must have prior experience with the Pilates method by way of personally participating in Pilates sessions for an extensive period of time. They also need to have completed tertiary level (or equivalent) study in anatomy and physiology.
- During the Pilates course, students must complete further personal practise of Pilates and complete 200 hours of workplace observation under accredited instructors.
- Among other subjects the course covers general and applied anatomy and physiology, assessment techniques, postural deficiencies, various pathologies and appropriate exercise prescription for those pathologies.

- Students are trained to use all of the Pilates apparatus.
- APMA Pilates Practitioners are required to attend courses as part of continuing education to remain accredited. They also maintain their indemnity insurance and first aid.
- All clients new to a studio undergo an initial assessment. This is where a client's baseline capabilities are assessed so individualised return to work programs can be developed to address muscle imbalances, musculoskeletal injuries etc.
- A client will work within their capabilities, and progress to more functional activities that resemble daily activities and work related tasks, when they are physically ready to do so.
- The client undergoes their Pilates sessions under full supervision with verbal and tactile feedback to ensure correct technique and safety.

## References

Bryan, M & Hawson, S (2003). The benefits of Pilates exercise in orthopaedic rehabilitation. *Techniques in Orthopaedics*, 18(1), 126-129.

Gladwell, V., Head, S., Haggard, M., & Beneke, R. (2006). Does a program of Pilates improve chronic non-specific low back pain? *Journal of Sport Rehabilitation*, 15, 338-350.

Moffett, J., & McLean, S. (2006). The role of physiotherapy in the management of non-specific back pain and neck pain. *Rheumatology*, 45, 371-378.

Segal, N.A., Hein, J., & Basford, J.R. (2004). The effects of Pilates training on flexibility and body composition: An observational study. *Archives of Physical Medical Rehabilitation*, 85, 1977-1981.

Vad, V.B., Tarabichi, Y. (2007). The role of the Back Rx exercise program in diskogenic low back pain: A prospective randomized trial. *Archives of Physical Medical Rehabilitation*, 88, 577-582.