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PREVENTION & REHABILITATION: EDITORIAL

Movement Health

The Movement theme

'Movement' has been the key theme of two recent Prevention and Rehabilitation editorials and companion pieces in this Journal. The first looked at two types of exercises that can be used in exercise prescription to fix an uncontrolled movement (UCM), which is a movement, usually in a specific direction such as flexion or a rotation, that an individual cannot knowingly control. The exercises described were: direction control exercises, that help teach the control of the neutral joint position, and, range control exercises, which help develop the muscular control of a movement through a joints ideal range (McNeill, 2014a, 2014b), the second editorial looked at the development of Movement screens as an analysis tool (McNeill, 2014c, 2014d). The final part in this informal series on Movement looks beyond assessment or types of specific exercise on to a bigger picture — Movement Health. What is it? And what is its role in prevention and rehabilitation?

We all move differently

Professor Shirley Sahrmann of the Washington University, says, in an audio interview published on Physiopedia (websource 1), that her career focus changed from looking at neurological patients, primarily stroke patients with spasticity, to those with musculoskeletal pain. Sahrmann reports that the common link between the two groups of patients was altered movement. Sahrmann says, 'I have always been intrigued by movement; how you can recognise a person from a distance by how they move long before you are close enough to see their face,' and 'how, if there is an ideal or normal gait pattern why there are so many 'manifestations of different.' Her interest in the differences in the movement of patients is responsible for transforming the vision of the American Physical Therapy Association, and, by extension the profession itself (Sahrmann, 2014).

Paul Hodges from the Queensland University also says 'People move differently in pain.' He comments that this view is unquestioned but that two current theories, 'the vicious cycle theory,' and 'the pain adaptation theory' are not refined enough to explain all the observations made about pain affected differences in movement. In the Journal, Pain, Hodges and Tucker (2011) suggests that pain creates changes at multiple levels of the nervous system leading to a variability in response to pain within muscles and between them. These changes may have short term benefits as adaptation to pain aims to reduce pain and protect the painful part, but long term consequences such as that altered movement patterns created by pain don't necessarily return to a pre-pain state.

When a pathology alters movement these conditions are referred to by Sahrmann (2014) as being 'pathokinesiologic'. Sahrmann identifies a second group of conditions as being 'kinesiopathologic' where movement, in this case faulty movement, creates the pathology itself.

Sahrmann suggests that the physical therapy profession should be 'focussing attention on kinesiopathologic and not just pathokinesiologic conditions.' Sahrmann is advising physical therapists that the focus on the pathoanatomical issue, though not unimportant, can perhaps misdirect therapists to try, with good intent, to positively affect an injured part. Treatments such as gentle joint mobilisations that open an intervertebral foramen and off load a nerve root that a disc bulge may be encroaching on, may, provide temporary relief, but does it change much for the client in the long term? More importantly it is the understanding of the movement system that the disc injury is part of and altering the behaviours of the client that may have caused the injury in the first place is perhaps more likely to be effective.

Isobel Warnock, a British Physiotherapist, describes a case study where changing the movement system was the only effective form of treatment available. She describes 'Ollie', who early in life sustained an injury to his left anterior cruciate ligament, but with no apparent further problems once it resolved, however, 8 years later Ollie started to develop a significant limp in the same leg. The hip was clearly painful and Ollie would walk with his hip moving significantly into adduction in stance to the point where he would lose balance. It was decided that the most appropriate therapy was going to be hydro-therapy. Ollie was placed on a treadmill in a pool in chest high water. He walked into a flow of water which actually pushed his leg

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out of adduction into a more aligned posture and slowly over repeated visits Ollie reduced his limp to the point he was walking normally. His pain also clearly reduced, but by how much on a VAS (visual analogue pain scale) — difficult to say — as Ollie is Isobel Warnock's dog.

Yes, there will have been pathoanatomic factors in Ollie's injury but the inability to ask Ollie how he was feeling meant that pain was not the key focus of the treatment, his movement system was. The Canine Hydrotherapist didn't use electrotherapy or manual therapy on the painful hip, the Canine Hydro-therapist just off-loaded the hip using buoyancy and encouraged, with a flow of water, a better gait pattern that, over time, better recruited and then strengthened the musculature of Ollie's rear left leg (He is now enjoying his walks again and is running without falling over).

Sarah Mottram, co-author of 'Kinetic Control: The management of uncontrolled movement' (Comerford and Mottram, 2012) said at a recent lecture, 'as the focus of musculo-skeletal research is on the management of pain there is a dearth of solid evidence about how people, who are *not* in pain, move. Normal movement is variable, especially in the trunk where there is such redundancy of muscles that can perform the same or similar tasks. Good movement control is about finding optimal ways to move and it seeks to create movement efficiency.'

Sahrmann in her 2014 paper suggests that Physical Therapists should be aiming to become "Lifespan practitioners." What she means by this is that physical therapy should be about optimising good movement behaviour within their clients lives appropriate to the stage in life that they have reached. This reduces the problems created by poor movement strategies, as well as rehabilitating those whose movement have been altered by pain. This is what Mottram refers to as 'Movement Health.'

'Movement matters!' says Mottram.

'Poor movement control is regularly shown in the literature to be related to the onset of symptoms, recurrence of symptoms, altered movement function & decreased performance (Comerford and Mottram, 2012).'

Nijs et al. (2014) points out that brain grey matter density and volume decrease in patients with chronic low back pain (specifically in the dorsolateral prefrontal cortex, thalamus, brain stem, and somatosensory cortex), and this was strongly correlated with pain duration and pain intensity. Nijs suggests that 'longitudinal studies should unravel whether brain changes are the cause or the consequence of pain.' Apparently, 'many of the grey matter changes observed in patients with pain subsided with cessation of pain … It is suggested, therefore, that the grey matter abnormalities found in people with chronic spinal pain do not reflect brain damage but rather a reversible consequence of chronic pain, which normalises when the pain is adequately treated.' In another study Nijs quotes in his paper, 'it was shown that motor control training, and not unskilled general exercise, can reverse reorganization of the motor cortex in patients with low back pain.' (Tsao et al., 2010) So perhaps mindful movement matters too!

'The aim of motor control training,' Nijs explains using a Richardson and Jull paper (1995) 'is to restore an optimal balance among the different muscles, which often means that the deeper muscles need to be facilitated by independent activation while overactive superficial muscles need to be inhibited in an individualised manner.'

A definition

'A definition of Movement Health (Blandford, 2014a, 2014b) is that it is, 'a desired state that is not only injury free and absent of the presence of uncontrolled movement but also a state that allows the exerciser to choose how to move.'

This suggests that Movement Health goes beyond a medical model and into a wellness or fitness model. Prevention of injury (or recurrence of injury) may mean that an individual might need to perform exercises from the rehabilitative sphere, while they are otherwise well to help maintain a state of Movement Health.

Having a choice on how to move suggests that there are different options available so if someone with Movement Health has a full library shelf of possible movement solutions to respond to any single movement challenge, the CNS (Central Nervous System) can just reach a hand back and grab the first solution that comes to hand to successfully accomplish that movement task. When someone is not in Movement Health their CNS reaches back and finds their library shelf empty save just one or two tired and overused solutions that don't quite fit the required movement challenge.

To remain in or re-attain Movement Health an individual needs:

1 **Awareness**: of the body, movement and movement quality
2 **Control**: of the software (CNS) and hardware (musculature and structure) of the neuromusculoskeletal system
3 **Varied Intensity**: A postural task needs to be achieved at a low intensity of physical work and a strength based task needs to be met with an appropriate high intensity of muscular effort
4 **Variability**: a wide choice of movement strategies should be available for use for a single movement task (Blandford, 2014b).

When recently interviewed for this editorial, Mottram said, 'The reason that it is important to understand the concepts around varied intensity is that an individual can have movement faults in low threshold movements — the movements associated with postural loads that require light effort to control, or in high threshold movements — that require strength to control, or both. This means that the strategies needed to gain these controls are different and require different "doses" of exercise to correct.'

The approach to the exercises to 'fix' the weakened musculature found in a high threshold UCM is the traditional strength and conditioning strategies. This involves the increasing application of load to exercises over time using, say, 3 sets of a 6RM — (repetitive maximum). A repetitive maximum is discovered by testing at what weight could an individual shift it only 6 times (in this case) before fatigue stops the activity. This can be described as as 'Time under tension.' The load providing the muscular tension required for strength and/or hypertrophy (Blandford, 2014b; Comerford et al., 2014).