

Review of Peak Conditioning Programs

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1. Introduction

The aim of this document is to assist workcover in developing work conditioning guidelines for the use of referrers, insurers, employers and workers.

To ensure an effective evaluation of work conditioning, we firstly provide a detailed description of the content and structure of a work-conditioning program.

Secondly, we provide a review of the current scientific literature relating to the key areas that can influence the return to work outcomes of a work-conditioning program.

Thirdly, we provide an analysis of functional and return to work outcomes for Peak Conditioning.

Finally, we summarise this information and provide recommendations to be considered by Workcover when establishing guidelines for work conditioning services.

2. Outline of the Peak Conditioning Work Conditioning Service

To be able to evaluate work-conditioning programs effectively, we must firstly clearly understand the fundamental purpose and structure of a work-conditioning program within the NSW workers compensation system.

2.1 Referrals

Peak Conditioning receives referrals from General Practitioners, Medical Specialists, Rehabilitation Providers, Insurers (Workers Compensation, CTP, Income Protection) and employers (self insured and externally insured).

Below is a breakdown of the source of Peak Conditioning referrals:

Source	Percentage
GP and Medical Specialist	57%
Rehabilitation Provider	25%
Insurer	16%
Employer	Less than 1%
Physiotherapist	Less than 1%

Referrals are usually made when:

- passive treatments are no longer indicated and the worker requires exposure to graded activity to increase their confidence in performing activities of daily living
- the injured worker has reached a plateau on suitable duties
- the injured worker has been terminated from their previous employer and the current medical restrictions are minimising vocational options
- the injured workers compliance in adhering to the injury management plan has been poor and the work conditioning program is a test of their motivation to improve their condition

Workers referred to Peak Conditioning have injuries in the following locations:

- low back (59%),
- shoulder (11%),
- neck (10%),
- knee (7%),
- multiple locations (7%).
- the other 6% of injuries are comprised of wrist, ankle, elbow and hand injuries.

Workers referred to Peak Conditioning experience the following types of injuries as indicated by their treating doctor:

- sprain and strain (65%)
- disc protrusion (19%)
- post surgery (5.5%)
- multiple injuries (4.5%)
- fractures (4%)
- contusion and crushing (2%).

In the majority of cases an initial work conditioning assessment will be performed unless the referral is from a medical specialist or physiotherapist specifically requesting that an initial assessment is not performed.

Physiotherapists are the most appropriate health professionals to perform initial work conditioning assessments as they are trained to identify neurological symptoms or 'red flags'. They are also in a position to reassure all parties, such as the treating doctor, of the need for the worker to move from passive clinical treatments to a more active approach.

2.2 Outline of the Initial Work Conditioning Assessment

The initial work-conditioning assessment is carried out by a physiotherapist. The assessments are useful for identifying if an injured worker is appropriate for a work-conditioning program and if so, outlining the requirements of the program.

2.2.1 Assessment Structure

It is the role of the physiotherapist, during the initial work conditioning assessment to:

- screen for 'red flags'
- evaluate psychosocial 'yellow flags' using the New Zealand Guidelines
- review work history and work status in consultation with the referrer
- assess physical status in relation to the work cover medical certificate

When an injured worker is deemed suitable for a work conditioning program the physiotherapist will complete the following steps.

Goals - Firstly, the physiotherapist will set goals for upgrading general levels of activity around the home and at work. This involves a process of reassuring the injured worker of the benign nature of their condition and the benefits they will derive from undertaking an increase in their general level of activity. These goals may be as simple as working out a plan for a worker with shoulder pain to gradually move towards hanging the washing on the line confidently.

Structure Program - Secondly the physiotherapist establishes a plan for the work conditioning program setting out venue, mode of exercise: pool or land based, duration of program and number of sessions. A decision on water or land based exercise is influenced by psychosocial factors such as fear of activity. Pool based exercise is often used as a stepping stone to overcome the injured workers apprehension of undertaking a gym program due to fear of reinjury.

Return To Work Goals - Finally, time frames and objectives are established with the rehabilitation case manager in relation to return to work objectives. Specific work related activities such as prolonged sitting, rotating or lifting become a primary focus of the program.

In normal circumstances the initial work conditioning assessment will take 45 – 60 minutes. Following the assessment the physiotherapist will discuss their findings with the referrer and treating doctor. The physiotherapist will also forward a report to the insurer, treating doctor, case manager and rehabilitation coordinator outlining their findings and recommendations.

2.2.2 Unsuitable to Proceed

A total of 14% of workers who undergo an initial work conditioning assessment are found to be inappropriate for a work conditioning program. An injured worker is deemed unsuitable for a work conditioning program where:

- there is identification of 'red flags'
- there are excessive psychosocial 'yellow flags' such as over riding compensation issues, workplace conflict or depression / anxiety. Where there are obvious psychological issues the referrer is recommended to seek psychological assessment before proceeding further
- there is insufficient time (e.g. will impact on the injured workers ability to participate in the return to work plan) or motivation to participate
- work conditioning with a behavioral approach has been performed previously with no successful outcome
- a work conditioning program would not be cost effective in terms of the anticipated return to work outcome compared to the cost of the service

2.3 Outline of the Work Conditioning Program

The Peak Conditioning approach to work conditioning programs has been shown to be effective in the subacute 22 and chronic phase of injury (see outcomes). The aim of a work conditioning program is to impact on behavior and musculoskeletal dysfunction and provide evidence to allow the treating doctor to confidently upgrade the workers work status. The work conditioning program aims to achieve these objectives through the application of a community based exercise program using a behavioral approach with high levels of communication with the referrer and treating doctor.

2.3.1 Staffing

Peak Conditioning use exercise physiologists to manage their work conditioning programs. Considering 'red flags' have been screened by the assessing physiotherapist and treating doctor, the primary role of the exercise physiologist is to implement an activity program with a behavioral approach and communicate the findings to the referrer and treating doctor to facilitate return to work. Exercise physiologists are tertiary qualified in exercise science. Following 'in house' training we have found exercise physiologist's to be very effective at motivating the worker to become less fearful of activity. They are also capable of effectively communicating program progress to the referrer and treating doctor to assist with the return to work process. Where we have had physiotherapist's undertaking work conditioning programs we have found them to be equally effective at achieving outcomes.

2.3.2 Service Options

The Peak Conditioning program is comprised of pool based and/or land based programs. Below is an example of the range of programs we provide:

- 12 sessions over 1 month
- 8 sessions over 2 months
- 3 sessions over 3 months
- 6 sessions over 3 months
- 12 sessions over 3 months

Individual adaptations can be made to these services depending on the requirements of the insurer, referrer and injured worker. A total of 75% of our programs are three month twelve session programs. The other 25% of programs are customised and designed by the physiotherapist. These programs include one month twelve session programs, one month four session programs, three month three session programs, three month six session programs and two month eight and twelve session programs. The three month twelve session program is based on the Lindstrom 22 format and tends to be appropriate for the majority of workers with persistent pain with no 'red flags'. The three-month twelve-session program usually provides sufficient time to upgrade the worker's program and work status. Supervised sessions are allocated depending on the needs of the worker but typically there will be three sessions within the first week, two the following week and they will be gradually reduced as the injured worker becomes more competent to exercise on their own. Then the role of the exercise physiologist is to monitor and upgrade the injured worker's program as well as to continue to liaise with the case manager, insurer and treating doctor.

2.3.3 Facilities

Work Conditioning programs are performed in community based fitness facilities ensuring that the pool/gym will be close to the injured worker's home or workplace. Using community based fitness facilities assists the injury management process in the following way:

1. Accessibility improves attendance and increases the likelihood that the injured worker will continue to exercise independently after the supervised program has finished.
2. Community fitness facilities promote a shift in the workers perception away from being disabled to being a functional valuable member of the community. It also encourages a change in behavior from the family who see their partner or parent attending the 'gym' to improve their condition rather than a treatment clinic.
3. Work Conditioning emphasis's education and moves the responsibility from the health professional to the injured worker for ongoing management of their condition.

2.3.4 Program Approach

Prior to beginning a program the exercise physiologist will reinforce the message established by the assessing physiotherapist regarding the philosophy of the work-conditioning program.

If the injured worker has a back injury with no 'red flags' and persistent pain the exercise physiologist will once again reiterate to the injured worker that 80% of the population experiences back pain. They will also reassure the injured worker that they have a simple back strain and exercise has been shown to be an effective means of improving their condition. The exercise physiologist will also explain to the worker that pain or discomfort should not be a measure of the improvement of their condition.

The activity related goals established by the physiotherapist are then reviewed with the injured worker and a quota of activity is set for the first week of the work conditioning program including exercise, home based and work based activity. It is made clear to the injured worker that increasing 'quotas' of activity will help them to achieve their personal goals for resuming activities enjoyed prior to being injured.

Pool based programs will often begin with basic walking, deep water running and resistor paddle work for upper extremity strengthening. Land based programs are usually started with cardiovascular exercise, floor based stability training and stretching. The objective of the first three weeks of the work conditioning program is to establish consistency of activity and confidence by setting a 'light load' for the worker and reinforcing neuromuscular retraining such as transversus abdominus bracing and scapular stabilisation exercises.

2.3.5 Program Progression

As the program proceeds successfully the injured worker will often be progressed from a pool-based program to a land-based program. Each injured worker has individual needs therefore programs advance at various speeds. As the land based program progresses, work simulation activities will become a larger component of the work-conditioning program.

During simulation of work activities the exercise physiologist provides the worker with 'cue words' or 'phrases'. The worker is then encouraged to use these cues and triggers when at the workplace or home to reinforce correct technique. During the program the exercise physiologist will provide encouragement and reassurance to the injured worker. They discuss any improvements made in exercise tolerance and upgrades in work or home based activities. The improvements are recorded and used to assist in providing evidence to motivate the injured worker if they begin to experience difficulty coping with the injury management plan.

2.3.6 Exercise Booklet

The worker is provided with an exercise booklet that includes pictures of all the exercises they are advised to perform (very effective for non-English speaking workers), an attendance record to assist with monitoring compliance and educational material regarding injury and exercise. The booklet assists the injured worker's to exercise independently and all injured workers are advised to complete an exercise log as they proceed through the program. Burton et al (1999) 6 have shown that educational booklets for patients with low back pain can give a positive effect on patient's beliefs and clinical outcomes.

2.3.7 Communication

Communication is the most important role of the exercise physiologist managing a work-conditioning program. It is vital that all parties involved in the rehabilitation process are kept informed about the progress of the program. Communication allows for improvements in the workers condition to be converted into return to work upgrades in a timely fashion. Similarly, communication allows for alternatives to be arranged for the injured worker if they are not progressing in the work conditioning program.

Initial contact with the injured worker takes place in the form of a letter requesting that they attend their GP for a consultation to obtain written approval to begin the work conditioning program. This written approval includes establishing a lifting tolerance for the injured worker and identifying any risk factors to be considered when exercising, such as heart disease, diabetes or hypertension. During the program the physiologist contacts the referrer prior to the initial session to establish the rehabilitation goal for the injured worker. A verbal update is also given after the initial session. The initial report is then faxed within three days. The exercise physiologist then updates the referrer by phone every two weeks throughout the program (weekly if it is a one-month program). If a problem arises the exercise physiologist will call the referrer immediately. Communication for the mid and final report are carried out in the same way. This level of communication allows time frames to be established by the case manager (CM) or Injury Management Advisor (IMA) for return to work upgrades, it also allows the IMA or CM to keep the employer informed of the workers progress.

Where the referrer of the program is a GP or a medical specialist communication regarding progress of the work conditioning program occurs by handwritten note when the patient is attending a consultation. Where there are psychologists, physiotherapists or chiropractors treating patients in conjunction with the work conditioning program the exercise physiologist performing the program communicates by phone or through a written note with these professionals so that treatment can be coordinated. Where a psychologist is involved with a pain focused worker the exercise physiologist will phone the psychologist to identify the recommended behavioral approach to apply throughout the work conditioning program.

2.3.8 Achieving Upgrades

The role of work conditioning is to bridge the gap in the injured workers perception of their physical status and the physical requirements of the rehabilitation goal. For this transition to occur it is necessary to provide all parties involved with objective evidence of the injured workers current physical status and the workers ability to perform work related tasks on repeated days over a series of weeks without aggravation. Without this information it becomes difficult, with complex cases, for the rehabilitation provider to convince the treating doctor that their patient can confidently tolerate an upgrade in work status.

2.3.9 Reports

Peak Conditioning reports provide a self-auditing system that evaluates psychosocial 'yellow flags', functional improvements and changes in work status. Using this method it is quite easy to determine if improvements are being made and if an upgrade is appropriate. The reports are concise as the professionals reviewing the reports often have a large number of clients or patients they care for and have restricted time to review written material. The reports are submitted every four to six weeks and are sent to the referrer, treating doctor and insurer.

2.3.10 Doctors Feedback Note

Peak Conditioning also uses a doctor's feedback note. These notes outline program progress and highlight improvements in the workers level of activity. They are sent along with the injured worker to their doctor's reviews. These enable the doctor to review the most recent physical status of the injured worker prior to filling out the next medical certificate.

2.3.11 Case Conferences

Communicating with the treating doctor is an essential component of a work-conditioning program. The treating doctors' role is certainly one of the most difficult within the injury management process. The treating doctor must balance the concerns of their patient with the multitude of information from providers, insurers, IMC's and work conditioning programs. In most cases the only piece of information the treating doctor has time to consider is the injured workers evaluation of their condition. This often creates a difficult situation when dealing with pain focused workers with no 'red flags'. Health professionals and the employer dealing with the injured worker often suggest the injured worker would be less fearful regarding undertaking new activities if the treating doctor had more time to reassure the worker regarding the non-physical nature of their injury. The method of communication that we have been using for dealing with 'more fearful' workers is to hold case conferences at the treating doctors practice with the injured worker, rehabilitation case manager, treating doctor and exercise physiologist present (see pg. 29 & 30). Although we have only recently started this process to date we have had positive results.

Often the treating doctor is unaware of the extent of the workers activity levels and is also not clear of the suitable duties available at the workplace. This obviously results from the lack of time the treating doctor has to read material sent to them by the involved health professionals.

The case conference provides a forum for the injured worker to voice their concerns and for the treating doctor to evaluate the objective evidence relating to the injured workers abilities. It also allows for decisions to be made immediately relating to upgrades in restrictions of work status with the consensus of all parties. The worker also feels reassured that clarity and direction have been achieved in the management of their condition. Where the injured worker is not motivated and does not wish to progress in the injury management this becomes evident through their behavior during the case conference process.

2.3.12 Non Compliance

Peak Conditioning has a clear non-compliance policy. Prior to a program beginning we highlight to the injured worker their obligations under the Workers Compensation Act - **Chapter 3, Section 57 Compliance by the Worker**. We explain the behaviour that we consider being non - compliance. On the first occasion that the injured worker breaches our non-compliance policy we give them a warning and notify the referrer. On the second occasion the referrer and insurer are informed. Where our non-compliance policy is breached a third time we phone the referrer and insurer to discuss whether they wish to continue with the program. Where there is agreement that we should cease the program we issue all parties with a non-compliance report detailing the breaches by the injured worker. For work conditioning programs that are ceased before completion we only bill the insurer for services provided.

2.4 Summary of the Peak Conditioning Work Conditioning Service

The Peak Conditioning work conditioning service is established around the fundamental principle of increasing the activity of the persistent pain worker and using innovative communication techniques to inform the rehabilitation case manager, insurer and treating doctor of these increases in activity so that an upgrade in work status may occur.

Increasing the activity of the injured worker occurs through implementation of a community based exercise program using an operant behavioral approach. Scrutiny of yellow flags allows goals to be established for overcoming activities that are feared by the injured worker in the home and at work and identifying obstacles such as compensation issues that will prevent a work-conditioning program being effective.

3. Review of Scientific Literature

An evaluation of work conditioning requires a review of the current scientific literature in relation to the key areas that impact on work conditioning programs ability to achieve return to work outcomes. The areas that impact on work conditioning programs ability to achieve return to work outcomes are psychosocial 'yellow flags', the application of exercise and activity, interaction with a multidisciplinary team of professionals; and the treating doctors understanding of the injury management process and willingness to upgrade their patients work status.

3.1. Psychosocial 'Yellow Flags'

Psychosocial 'yellow flags' have been shown to be powerful predictors of chronicity. Guidelines suggest that psychosocial issues are best managed at the primary care level or by treating health professionals unless serious issues such as pain medication dependence or chronic depression are evident. The consensus of leading researchers suggests that more investigation is required into the development of tools for identification and management of psychosocial 'yellow flags'.

Pincus et al. (2002) 35 state that pain researchers studying the clinical differences between acute and chronic back pain observed that acute pain was associated with a pattern of physiological responses seen in anxiety attacks. In contrast chronic pain was characterised more effectively by a series of responses and signs similar to those seen in depressive disorders. As a result of this research several experimental studies now indicate that pain related fear is one of the most potent indicators of observable physical performance and is highly correlated with self-reported disability.

Borkan et al. (2002) 4 also highlighted that there had been a paradigm shift in opinion regarding lower back pain from a biomedical injury to a multifactorial biopsychosocial pain syndrome. In this model they state that lower back pain is a functional disturbance rather than a signal of structural damage. They also state that most researchers in the field feel that back pain has been 'overly medicalised' and now needs to be 'demedicalised'. Although, having recognised the changing focus towards a more psychosocial approach there has also been some caution for flexibility to be employed so that patients with true 'red flags' are not missed in the search for 'yellow flags'.

Linton (2002) 24 considers that psychosocial factors are not only influential during the onset of pain but they also play a 'pivotal role in the transition from acute pain to chronic pain. One of the more confusing areas for researchers and clinicians that he comments on is 'which came first, the chicken or the egg' in other words were the psychosocial issues caused by the onset of injury or did the psychosocial issues exist before the injury occurred. He states that 'nearly every explanation of chronic pain stresses a developmental transition'.

Pincus et al. (2002) 35 go on to identify three stages in which psychosocial factors have the ability to influence low back problems, firstly the pre-onset period, secondly the time of seeking help (healthcare, support and/or compensation) and the third is the development of chronicity. They state that job dissatisfaction, perceived inadequacy of income and psychological distress may predispose episodes of back pain. Pincus et al. went on to identify that the development of chronicity could be predicted by two key factors. One being depression/distress and the second is fear avoidance behaviour.

Borkan et al. (2002) 4 state that research in identifying significant predictors of chronicity is only in its infancy as is a methodology for its application in clinical situations. The authors state that whilst it is important to be vigilant for obvious psychological problems and inappropriate beliefs, further work must be performed in developing screening tools.

It appears that the research being performed into psychosocial factors for chronic low back pain is becoming the gold standard for management of psychosocial issues in other persistent musculoskeletal pain disorders. Scholten – Peeters et al. (2002) 38 have developed a physiotherapy clinical practice guideline in Holland for patients with whiplash associated disorders. They state that the psychosocial indicators identified in low back pain may also be of importance in whiplash patients because 'there is often no obvious tissue damage that explains long lasting symptoms'. By consensus the authors agreed to adopt the prognostic indicators for identifying psychosocial issues with low back pain and apply them to the management of whiplash patients.

It is evident that the current research supports the importance of identifying psychosocial factors throughout the injury management process from the acute to the chronic phase. Although, once 'yellow flags' have been identified there appears to be less consensus on the most effective method of management. One of the key concerns for health professionals dealing with chronic pain patients is once yellow flags have been identified how they can be best managed by a treating health professional with no formal psychology qualification.

Linton (2001) 24 notes that the New Zealand authorities have produced a 'yellow flags' document providing guidelines for simple assessment of psychosocial issues. Koes (2001) 21 state that in comparison to guidelines elsewhere in the world the New Zealand guidelines give the most attention to explicit screening of psychosocial factors using a standardised questionnaire. They also state that with the exception of some general principles there is no specific advice on what to do about psychosocial factors when they are identified.

Van Tulder et al. (2001) ⁴⁷ performed a review of three behavioural treatments for low back pain within the framework of the Cochrane back review group. The three behavioural treatments reviewed were:

- 1) Operant treatment
- 2) Cognitive treatment
- 3) Respondent treatment

The operant approach is described as 'positive reinforcement of healthy behaviour and consequent withdrawal of attention toward pain behaviour'. It is stated in the review that all health care professionals can apply this approach.

The operant program starts with a number of baseline trials in which the patient exercises to their limit of tolerance. Based on the patient's results the therapist then sets a quota of exercises to be performed at each session. Initial quotas set are lower than baseline levels and are then increased systematically toward a preset goal. All treatment staff positively reinforce each increase.

Van Tulder et al. state that 'cognitive treatments are designed to identify and modify patients cognitions regarding their pain and disability'. They explain that 'cognitions can be modified directly by cognitive restructuring techniques (such as imagery and attention diversion) or indirectly by modification of thoughts feelings and beliefs'. They state that respondent treatment is designed to modify the physiologic system directly by providing the patient with a model of association between tension and pain and teaching the patient to replace muscular tension with relaxation.

Van Tulder et al. explain that behavioural techniques are often applied together as part of a comprehensive treatment approach. They report that a large variety of behavioural treatment methods are used for chronic low back pain because there is no general consensus about the definition of operant and cognitive methods'. They go on to explain that 'behavioural treatment often consists of a combination of these methods or is applied in combination with other therapies such as medications or exercise'.

The authors found that there was strong evidence that behavioural treatment of patients had a positive effect although the effects were only moderate or small. They also found that there is no strong evidence in favour of any type of behavioural treatment: cognitive, operant, or respondent treatment or combinations of these treatments (cognitive-behavioural treatment). They also found no difference when comparing these treatments to alternative active treatments.

The authors state that it is necessary to develop a mechanism of determining the most appropriate form of behavioural treatment for patients particularly considering the increasing acceptance of the biopsychosocial model.

Apart from the most appropriate technique for managing psychosocial 'yellow flags' another relevant issue is at what point it is appropriate to hand over the management of psychosocial 'yellow flags' to an appropriately qualified psychologist.

Pincus et al. (2002) ³⁵ highlight a study examining two interventions one by psychologists and one by two trained lay people. Both interventions were based on a brief educational activation program aimed at reducing patient's worries. At 3, 6 and 12 months both interventions were equally effective and both were superior to normal treatment (management by GP) in lowering patients worries, fear avoidance beliefs, pain and disability ratings. No difference was observed in work-related disability or health care use.

In regards to the management of psychosocial 'yellow flags' the New Zealand guidelines state ' Most at risk individual's can be affectively managed by their usual treatment provider without the need for referral to a psychologist. These patients will require strategies that are effectively integrated with requirements for analgesia and physical modalities to enable them to remain active and return to ordinary activities'. The New Zealand guidelines also state ' There is clear evidence that multidisciplinary teams or networks are effective in managing chronic back pain. They might include health professionals with appropriate training in musculoskeletal disorders, psychosocial assessment vocational management and other relevant specialties. These teams may not be embodied in a discrete organisation, but may reflect a close collaborative team approach for the assessment and comprehensive management of 'at risk' patients by professionals from various disciplines with specific skills working together'.

Michael Nicholas, Nick Kendall and Steve Linton also reinforced this message at the Workcover conference June 2001. They stated that health professionals without formal psychology qualifications through using the New Zealand guidelines can manage moderate psychosocial 'yellow flags' to a large extent. The New Zealand guidelines also state ' The presence of risk factors should alert the treatment provider to the possibility of long term problems and the need to prevent their development. Specialised psychological referrals should only be required for those psychopathology (such as depression, anxiety, substance abuse, etc) or for those who fail to respond to appropriate management'.

3.1.1 Psychosocial 'Yellow Flags' Summary

In summary, there is significant evidence to suggest that psychosocial yellow flags are strong predictors of chronicity. Consensus amongst researchers suggests that moderate psychosocial 'yellow flags' can be managed by treating health professionals using the New Zealand Guidelines. Where psychopathology exists or physical treatment with a behavioural approach fails a specialised psychology referral is required. Although leading researchers suggest that more investigation is required into the development of tools for identification and management of psychosocial 'yellow flags'.

3.2 A Review of Research Relating to Exercise and Activity

Exercise and activity are one component of a work-conditioning program. The majority of studies relating to exercise therapy use a methodology that is not comparable to the workers compensation setting. Apart from a few high quality studies which have shown good outcomes in the use of specific exercises for low back pain the findings relating to exercise therapy in the workers compensation setting are relatively inconclusive for application to workers compensation claimants.

3.2.1 Lower Back Pain and Exercise Therapy

Van Tulder et al. (2001) 45 performed a review of literature relating to exercise therapy within the framework of the Cochrane systematic review. Included in the review were randomised controlled trials (RCT's) that included all types of exercises such as specific back exercises, abdominal exercises, flexion, extension, static, dynamic, strengthening, stretching or aerobic exercises. RCT's in which exercise therapy was given as part of a back school or multidisciplinary treatment program were excluded. They found that specific exercises including flexion and extension exercises were not effective for acute low back pain.

Their investigation found that there is evidence to suggest that exercise therapy is more effective than usual care (primary care physician only) in chronic low back pain patients and that exercise therapy and conventional physiotherapy (consisting of hot packs, massage, traction, mobilisation, shortwave diathermy, ultrasound, stretching, flexibility and coordination exercises, electrotherapy) are equally effective for chronic low back pain patients.

The authors state that although scientific evidence is lacking there seems to be consensus that management of chronic low back pain patients should be aimed at restoring normal function and behaviour. They take a critical point from Waddell (1998) 49 that active rehabilitation is important for chronic pain patient treatment, but active rehabilitation and exercise therapy are not identical.

Mannion et al. (1999) 30, Mannion et al. (2001) 29 31, Kaser et al. (2001) 19 performed a study to evaluate three active therapies over three months for chronic low back pain patients. The patients responded to an advertisement in the local paper and were randomised to either:

- physiotherapy (30 minute sessions involving isometric exercises, exercises with therabands, advice on ergonomics and general strength training)
- muscle reconditioning using training devices (one hour group sessions: 10 – 20 minute aerobic warm up, 30 minutes of isoinertial loading of the trunk flexors & extensors, 15 minute stretch down)
- an aerobics/stretching class (one hour group classes involving stretching and muscle toning to music).

The authors found the three forms of active therapy were equally efficacious in their ability to effect significant reductions in pain intensity, pain frequency, and disability in tasks of daily living. The effects were maintained over the following six months apart from worsening disability in the physiotherapy group.

Having responded to an advertisement in the local paper it could be assumed that this group of chronic low back pain patients were particularly motivated compared to an average selection of chronic low back pain patients. The authors actually point out that their subjects were more motivated than a normal selection of chronic back pain patients due to their voluntary selection criteria.

An interesting finding of the study was improved psychologic measures such as pain intensity, pain frequency and disability in tasks of daily living despite having no behavioural approach included in their program.

Mannion et al. (2001) also found that erector spinae endurance tests using the Biering Sorenson method had improved remarkably despite lack of physiologic evidence to suggest improvements in fatigability of the erector spinae muscles. They found no increase in muscle hypertrophy or change in fibre type as a result of the three-month program. They were expecting to see a shift from the chronic low back pain phenomenon of increased type IIa fibres to more oxidative type I fibres seen in healthy populations. They believe three months was not sufficient time to cause a change in erector spinae muscle fibre type. They believe that increased endurance test times for erector spinae muscles were related to improvement in psychologic factors such as catastrophising, fear avoidance beliefs and self-efficacy in controlling pain.

The authors state that 'perhaps these attributes are addressed inadvertently by active therapy programs in so far as patients experience something quite different from their expectations (ie. there being able to complete the prescribed exercises without undue harm) and thereby correct their irrational cognitions and appraisals. It is also possible that patients readjust psychologically whenever pain is reduced for any reason and regardless of the intervention method. Thus, active therapy programs appear to incorporate many of the positive benefits of cognitive-behavioural therapy, with the additional advantage of serving to improve the general physical condition of the patient.'

Torstensen (1998) ⁴³ compared medical exercise therapy in a physiotherapy practice (seven to nine different exercises, 2 – 3 sets of 30 – 40 repetitions with a 10 – 15 minute warm up), conventional physiotherapy (heat or cold, massage, stretching, different forms of electrotherapy, traction and basic exercises) and self implemented walking (three times per week one hour per walk) over three months. All patients had chronic low back and existing claims in the Norwegian workers compensation system but entered the program on a voluntary basis.

By the end of the study the conventional physiotherapy and medical exercise therapy groups outperformed the self implemented walking group in outcome measures such as pain, activities of daily living, patient satisfaction, number of days on sick leave and total costs. However there was no difference between the medical exercise group and the physiotherapy group, which surprised the authors when they compared their findings to those of other authors such as Lindstrom 22. The Torstensen study was not return to work directed, had no communication with the treating doctor and did not incorporate a behavioural approach. These differences in methodology may explain why the medical exercise group was not superior to the clinical physiotherapy group in outcomes.

Taimela et al. (2000) 42 highlights the importance of patients continuing their exercise program following any formal exercise intervention. Chronic pain patients who had already completed a 12-week supervised exercise program had significantly less recurrences of pain and less absence from work in the 2-year period following treatment when they maintained a significant level of exercise following the 12-week program.

Frost (1995) 8 carried out a study comparing two groups of patients who were referred from orthopaedic consultants for physiotherapy. Both groups were given a home exercise program and then randomly allocated to back school or back school and fitness programme. The fitness programme included eight one hour sessions over four weeks involving a warm up, circuit of 15 progressive exercises and cool down. Participants were encouraged to think of themselves as sportspeople who need to improve their fitness rather than disabled patients. Pain was not discussed in the class. Scores on the Oswestry pain questionnaire were significantly lower in the fitness programme group and functional measures such as walking fitness were higher compared to the back school group. Suggestions by the author for lower pain scores by the author were increased production of endogenous opioids due to aerobic exercise.

Waddell (1998) 49 pg 31 states that pain transmission may be modulated by endorphins. There are chemical substances in the cerebrospinal fluid that act as analgesics like morphine. Certain cells in the central nervous system produce these and a number of similar substances. The concentration rises in the cerebrospinal fluid after exercise.

Maher (1999) 27 review 63 clinical trials relating to the prescription of activity in the management of non-specific low back pain. For the chronic low back pain they found that effective exercise programs used a quota system to prescribe the dose of exercise with no attention paid to pain behaviours. Pain behaviours were discouraged and well behaviours rewarded.

3.2.2 Summary of Lower Back Pain and Exercise Therapy Research

Mixed methodology and subject composition makes it hard to draw a conclusion from this research. Torstensen et al. 43 used workers compensation claimants whilst the other studies 8,29,30,31 did not mention their subject composition or had a combination of normal patients and workers compensation patients. Frost et al. (1995) 8 had subjects referred by an orthopaedic surgeon whilst the other studies reviewed 29,30,31, 43 used voluntary subjects. Frost et al. (1995) 8 used a behavioural approach whilst the other studies did not use a behavioural approach.

Overall the findings revealed that exercise therapy is of no benefit in the acute phase of injury 45, is no more efficacious than clinical physiotherapy in improving clinical measures such as activities of daily living 45 or reducing sick leave 43 in patients with chronic or persistent low back pain and may moderate pain through an increase in endorphins 49.

3.2.3 Specific Exercises and Low Back Pain

O'Sullivan et al. (1997) 34 evaluated the use of specific stabilizing exercise in the management of low back pain in people with spondylolysis or spondylolisthesis.

They used a randomised, controlled trial, test-retest design with a 3, 6 and 30-month postal questionnaire follow-up. They assigned forty-four patients with this condition to two treatment groups. The first group performed a 10-week exercise treatment program involving the specific training of the deep abdominal muscles, with co-activation of the lumbar multifidus proximal to the pars defects. The activation of these muscles was incorporated into previously aggravating static postures and functional tasks. The control group was assigned to their primary care physician for usual treatment. They reviewed cases where the patients LBP symptoms were recurrent and persisted longer than 3 months.

The study group were trained in the specific contraction of the deep abdominal muscles, without substitution from large torque producing muscles such as rectus abdominus and external oblique, using the abdominal drawing in manoeuvre. The holding time for these exercises was increased gradually, using a pressure biofeedback monitor, to the point where patients were able to perform 10 contractions with 10-second holds. The results were that specific exercise training of the stability muscles of the trunk is effective in reducing pain and functional disability in patients with chronically symptomatic spondylolysis and spondylolisthesis.

Hides and Richardson (2000 & 1996) 10, 11 evaluated the impact of a four week specific localised exercise program, performed twice per week aimed at restoring the stabilising protective function of the multifidus. Patients recruited had experienced their first episode of low back pain within the last three weeks and presented to the accident and emergency ward of a hospital because of this condition.

The exercises were designed specifically to activate and train the isometric holding function of the multifidus muscle at the affected vertebral segment (in co-contraction with the transversus abdominus muscle). Contraction of the multifidus was confirmed by real time ultrasound imaging.

The control group were managed medically and instructed to resume normal activity. The control group had a higher recurrence rate of lower back pain at 1 year (84%) and for 56% of subjects the recurrences were reported as being as severe and disabling as the original episode. The group to whom specific multifidus exercise was given reported only 30% recurrence at 1 year and these episodes were reported as severe in only 33% of cases.

Richardson (2002) 36 performed a study to examine the mechanisms by which deep muscle contractions can relieve pain and disability in the patient with low back pain. The authors' state that the ligaments surrounding the sacroiliac joint creep under prolonged load and additional muscle force called 'self bracing' is required to press the sacrum against the ilia. There testing of healthy subjects revealed that deep transversus abdominal contraction was more effective than abdominal bracing in improving the stiffness of the sacroiliac joint. The authors believe the findings provide explanation for the independent functional role of the transversus abdominus in the stabilisation of the lumbar pelvic region.

The study suggests that tightening of the sacroiliac joint through deep transversus abdominus contraction may be a protective mechanism for preventing recurrence of low back pain.

3.2.4 Summary of Specific Exercises and Low Back Pain Research

The research relating to specific exercises for acute and chronic low back pain reveals that specific transversus abdominus and multifidus exercises can reduce pain and disability for chronic spondylolysis and spondylolisthesis 34 and reduce recurrence of low back pain in patients with first occurrence of acute low back pain 10, 11.

3.2.5 Chronic Neck Pain and Exercise Therapy

Taimela et al. (2000) 41 examined the difference between three treatment groups: an active exercise group, a home exercise group and a control group. The active exercise group consisted of 24 exercise sessions over 12 weeks lasting 45 minutes each. The active treatment consisted of cervicothoracic stabilisation training designed to restore cervical muscle endurance and coordination, relaxation training to reduce unnecessary muscle tension, behavioural support to reduce anxiety and fear of pain, eye fixation exercises to prevent dizziness, seated wobble-board training to improve postural control.

The home exercise group received a lecture on neck care followed by practical advice on exercising. The control group attended one lecture regarding neck pain and it's consequences.

Taimela et al. found that the active treatment group offered benefits in chronic neck trouble including improved self experienced working ability. It was also found that the home exercise group without activation and controls is insufficient in the treatment of the condition. It was also found that home exercises alone were insufficient in the treatment of the condition. Although these results show an improvement in the patients undergoing supervised exercise for chronic neck pain the patients were recruited on a voluntary basis and represent a group with good self-motivation to alleviate their symptoms. The study also did not examine return to work outcomes.

Recruitment of volunteers appears to be common in chronic neck pain research. Bronfort et al. (2001) 5 also recruited volunteers from the local paper and excluded any patients with current or pending litigation. This study also seemed to lack any objective return to work comparisons between groups, only reporting improvements in the exercise and manipulation group in terms of patient satisfaction.

Jull et al. (2002) 16 performed a randomised control trial of manipulative therapy, low load exercise, combined manipulative therapy & exercise and control group for cervicogenic headache. They had a combination of subjects referred by GP's and recruited from local newspaper advertisements. The average duration of symptoms was 6 years. They found that exercise was as effective as manipulative therapy in reducing symptoms of cervicogenic headache but combination exercise and manipulation was slightly more effective. Headache relief was maintained over the twelve-month follow up. Caution must also be used in reviewing these results, as patients on workers compensation were not allowed into the study.

In a study by Jordan et al. (1998) 15 they investigated intensive training, physiotherapy and manipulation for chronic neck patients. The six-week program revealed similar improvements across all three groups in regards to self-reported pain, disability and medication use. The patients were referred by their GP although the authors did not mention if the participants were on workers compensation. There was no behavioural component to the program, communication with other health professionals or focus on return to work.

Nederhand et al. (2002) 32 found that cervical muscle dysfunction in grade 2 chronic whiplash patients appeared to be very similar to patients suffering from non-specific chronic neck pain when comparing EMG tested muscle reactivity following physical exercise. This study suggests that there is evidence that treatment for chronic neck pain and chronic whiplash patients should be approached in a similar manner.

Again although there are physiological similarities between chronic neck pain patients and chronic whiplash patients, when dealing with workers with persistent pain one of key issue's is non-physiological factors.

Finally Scholten-Peeters (2002) 38 aimed to provide a best evidence guideline for whiplash patients in the Netherlands. Due to lack of evidence relating to management of whiplash patients in the chronic phase the authors relied on consensus amongst experts. They agreed to use a treatment strategy similar to that for chronic pain in general. The authors recommend exercise therapy based on behavioural principles and a multidisciplinary approach for whiplash patients over twelve weeks duration since date of injury.

They state "A graded activity program based on behavioural principles will help patients improve their level of activities independently of pain and may change their ideas about pain. The activity level should be increased by planned fixed increments over a period of time. The baseline level depends on the present capacity of the patient. Activity levels are increased on a time dependent, not symptom dependant basis. The rate and size of the increments depend on the load tolerance and self-control of the patient. The essence of the program is to develop an individualised graded exercise program that helps the patient increase their level of activity. It is important to tell patients that progressive incremented activity levels may also lead to a progressive decrease in pain. Graded activation should primarily devote attention to activity levels in normal daily living because many beliefs and kinds of behaviour are specific to that setting'.

3.2.6 Summary of Chronic Neck Pain and Exercise Therapy Research

The general findings of this research are that exercise 41, 32 and exercise and manipulation 5, 16 are effective in improving parameters such as headache relief, self reported pain, disability and medication use for a non-workers compensation population experiencing persistent neck pain. The consensus on whiplash patients in the chronic phase is that exercise therapy based on behavioural principles with a multidisciplinary approach is the most effective method of management.

3.3 Biopsychosocial Multidisciplinary Rehabilitation

The amount of research undertaken into multidisciplinary rehabilitation is most probably not as extensive as research into the individual disciplines that make up the multidisciplinary team. There is also some cross over in the research between in house 'pain management programs' and community based teams of professionals undertaking a combination of physical treatment and a return to work intervention with high levels of communication with the treating doctor. Although there is certainly a role for both approaches in the management of persistent pain patients.

Guzman (2001) performed a Cochrane review of studies relating to multidisciplinary biopsychosocial rehabilitation for chronic low back pain. They define multidisciplinary biopsychosocial rehabilitation as a minimum of the physical dimension and one of the other dimensions (psychological, social or occupational). They reviewed ten trials with a differing mix of dimensions, duration's, time requirements and both out patient and inpatient programs. Their findings were that intensive multidisciplinary biopsychosocial rehabilitation is effective in decreasing pain and improving function but return to work outcomes are variable. The problem the reviewers face is that not all of the studies are focussed on the same objective. Some studies are trying to achieve a return to work outcome and others are purely focussed on improvements in quality of life measures for their patients.

Karjalainen et al. (2001) 18 performed a Cochrane review of studies relating to multidisciplinary biopsychosocial rehabilitation for neck and shoulder pain. They could only find two low quality studies on the area by Ekberg and Jensen. Due to the methodology of both studies the findings were of little use.

Karjalainen et al. (2001) 17 performed a Cochrane review of studies relating to multidisciplinary biopsychosocial rehabilitation for subacute low back pain (6weeks – 3 months since injury or claim) in working age adults. They defined multidisciplinary rehabilitation as including a physician's intervention, a psychological or behavioural intervention, a physical intervention and a vocational or workplace component. They only discovered two high quality trials that could be evaluated for the purposes of this review the Lindstrom 22 and Loisel 26 studies. They conclude that both studies demonstrate a statistically significant difference in return to work. Improvements were found in subjective disability and disorder specific functional status. No effects on intensity of pain could be attributed to the intervention. The authors state that the studies reveal that a reduction in pain should not be a condition of return to work.

Loisel 26 aimed to develop and test a model of management of subacute back pain, to prevent prolonged disability. They evaluated a population of workers compensation claimants in Canada. These workers were randomised into four groups: usual care, clinical intervention, occupational intervention and full intervention (combination of the last two).

The occupational intervention began after 6 weeks of absence from work and included an occupational physicians consultation with recommendations for light duties or recommendations for investigation. There was also a worksite assessment that involved evaluation of the worksite and consultation with the employer's representative, unions and injured workers with recommendation for job modifications.

The clinical intervention was started after a worker had been absent from work for eight weeks and included a visit to a medical specialist to screen red flags and back care education. If return to work did not occur after 12 weeks absence from work functional rehabilitation therapy was proposed to the practicing physician. This included fitness development and work hardening with a cognitive behavioural intervention using a modified Mayer approach.

The findings were that the median duration of absence from work for the full intervention group was 60 days, occupational intervention 67 days, clinical intervention 131 days, and the usual care group 120.5 days.

These findings suggest that combining a clinical approach with extensive workplace involvement is significantly more effective than a clinical approach alone.

Lindstrom (1992) 22 evaluated the effect of a graded activity program with an operant conditioning behavioural approach on subacute low back pain patients. The active group was compared to a control group who received traditional care from their treating doctor. Patients included in the study had been sick listed (on workers compensation) at the Volvo factory for eight weeks and were examined by an orthopaedic surgeon and psychosocially evaluated by a social worker before being randomised to an activity group or control group.

Patients were included irrespective of place of birth, or difficulty in speaking or understanding the Swedish language. Once in the study patients in the activity and control groups continued to be cared for by their regular doctor. Their treating doctor continued to write their medical certificate and return to work remained the decision of the treating doctor. The physicians who were responsible for the patients in the activity group were kept informed of their patient's progress by the physical therapist. All physicians of patients assigned to the activity group agreed for their patients to participate in the graded activity program. Return to work and sick leave was the primary outcome measure of the study. Patients who participated in the activity group were functionally assessed by the physical therapist to establish a baseline fitness for the exercise program. They then performed a workplace visit with the injured worker and supervisor to establish an understanding of the work requirements. The injured worker then participated in a back school education program where it was reinforced that activity was necessary to improve their condition.

The individually graded exercise program was established with an operant behavioural approach. The authors state that the essentials of the operant conditioning approach are to develop an individually graded exercise program

to teach the patient that it is safe to move while increasing his or her activity level. The therapist performs baseline trials with the injured worker to establish their tolerance level. The initial quotas for exercise are slightly lower than baseline levels but are increased systematically. Rather than exercising to tolerance the patient is exercising to quota and the focus shifts from pain to function. The exercises performed are specific to the needs of the patients and their work. The program used simple equipment such as dumbbells, stationary bicycle, indoor pool and gymnasium. Each patient performed their exercise program in the recreation department of the company 3 days per week until they achieved return to work. The therapist gave continual positive reinforcement for performed quotas and increased functional capacity.

Patient's complaints of pain or disability were observed but no attempt was made to change the program in response to such displays. The program was initially performed with the physical therapist continually present and gradually moved towards self-training sessions.

Findings were that patients in the activity group returned to work earlier and had less sick leave during the second follow up year than did patients in the control group. Patients in the activity group returned to work on average 5 weeks earlier than patients in the control group. Patients had on average 11 supervised exercise sessions and 10 unsupervised exercise sessions before returning to work. The economic savings were continued for at least two years after the intervention, as patients in the activity group were less often sick listed. As the authors did not exclude immigrants or non-Swedish speaking injured workers, and all participants were on workers compensation their findings are more applicable to western industrial population than most other studies.

Sinclair (1997) [39](#) evaluated the effectiveness of a Canadian workers compensation board sponsored early, active exercise and education program based in the community in comparison to usual care. This program was predominantly established to manage low back pain and this evaluation involved the over 800 claimants with a first incidence of low back pain. The objective was aggressive early intervention with treatment being provided as early as two days after injury. Local physiotherapy clinics were contracted to provide the service and patients were referred by their GP. Three program intensity levels were available to injured workers ranging from standard physiotherapy relief measures to functional conditioning, fitness achievement and education on body mechanics. Depending on the individual needs treatments lasted 1 – 4 hrs per day throughout 4 – 6 weeks of treatment. The rate for physiotherapists running the program was raised from \$12 per treatment to \$49 per treatment.

The authors found no advantage to participation in an early, active, intensive community clinic program compared with 'usual care' for new back injury workers compensation board claims in Ontario Canada. The clinics tended to keep people on benefits whilst attending the clinics without shortening the life of the claim. There were no reported advantages with respect to health

related quality of life. The average health care costs were \$900 more expensive for those who attended the clinics versus usual care.

The authors believe that this finding is not surprising considering the existing research which suggests that where there are no 'red flag' conditions it is wiser to intervene diagnostically and therapeutically as little as possible in the first few weeks after the onset of injury. Early exercise intervention has been shown to be ineffective in changing longer-term outcomes. The authors state that on the other hand there is considerable research to support early intervention at the sub acute phase of low back pain 4-12 weeks. They state that the one common essential element in all successful trials is to involve the workplace implicitly in the case management process. They also state that the absence of a return to work outcome with back pain is in some cases the result of a failed social transaction, amenable in most cases to conflict resolution and negotiation techniques aimed at both the firm and the worker.

In comparison to their initial pilot project, which was successful and prompted the wider trial, there were a number of areas that the authors believe may have contributed to the failure.

Firstly they believe allowing claimants to enter into treatment services within two days was incorrect, in their pilot project claimants were not allowed to enter until 22 days post injury.

Secondly in the pilot project cases were reviewed extensively to determine suitability for the program before referral was made. This lack of screening resulted in inappropriate referrals from GP's in the larger trial.

Thirdly, the prolonged treatments in the clinic may have been caused by the belief that the intensive program was sufficient to manage the claimants and no further intervention was required such as referral to rehabilitation providers. The higher rate of pay being provided to physiotherapists may have provided a perverse financial incentive for the clinics to prolong treatment.

Fourthly, in the pilot project the clinics were required to ring the employer to discuss the RTW requirements for the injured worker to structure treatment. As part of the wider trial this was not a requirement. This lack of communication resulted in an overtly clinical approach to management

3.3.1 Summary of Biopsychosocial Multidisciplinary Rehabilitation Research

The research relating to multidisciplinary rehabilitation simulates most closely the work-conditioning service Peak Conditioning perform 22,23 and the environment in which we apply our services 17,22,26,39.

The research shows that when you provide a return to work focused, behaviorally oriented exercise program that integrates strong and consistent communication with the treating doctor and is associated with a return to work

intervention you achieve good return to work outcomes in workers with subacute low back pain 17,22,26,39.

Intensive multidisciplinary biopsychosocial rehabilitation (Program >100 hrs) is effective in decreasing pain and improving function but return to work outcomes are variable 47.

3.4 The Role of the Treating Doctor

Main and Williams (2002) 28 state that ‘ primary care and emergency department doctors are potentially powerful therapeutic agents and can provide effective immediate care, but they may also unintentionally promote progression to chronic pain’.

They also state ‘The shift in emphasis from rest and immobilisation to active self management requires broadening the focus of the consultation from examination of symptoms alone to assessment, which includes patients’ understanding of their pain and how they behave in response to it. The shift towards self directed pain management recasts the role of the primary care doctor to the more rewarding one of guide or coach rather than a mere “mechanic.” ‘

Jensen (2000) 14 in a study of patients with non-specific spinal pain investigated whether the use of expert judgement in routine practice can provide a basis for reliable decision making regarding intervention for patients. They found that expert judgements were not based on health related issues, but almost solely on the patient’s age. At the 6 month follow up it was found the most consistent predictor of patient status were the patients own ratings of existing effective treatments and their perceived ability for learning to cope with the condition.

Schers et al. (2001) 37 performed a qualitative review of GP adherence to low back pain guidelines in Holland. This involved interviewing both patients and GP’s and investigating the patient-doctor interaction during the consultation. They found that patients attend the doctor’s surgery to receive a diagnosis or simple advice. When patients were told that the source of their pain was ‘non specific’ this did not tend to satisfy patients. The influences of the patient’s demands on GP’s decision making is substantial. Many patients felt that their GP should give in to their demands and most GP’s state that they usually do give in to patient’s demands to avoid conflict. The authors found that most non-adherences to the low back pain guidelines in the Netherlands by GP’s were related to dealing with more ‘demanding’ patients.

3.4.1 Summary of Research Relating to the Treating Doctor

The research suggests that the treating doctor has a very difficult role. Their dual roles as family physician and return to work physician may conflict when dealing with workers compensation patients 37. As stated in Schers et al. (2001) 37 the treating doctor’s report that they are aware of and understand the low back guidelines in Holland but find it difficult to adhere to the

guidelines when the patient is very demanding. As Main & Williams (2002) 28 state this compliance with patient demands for further tests and examinations may unintentionally promote progression to chronic pain.

The inherent conflicts that the treating doctor will experience in treating workers compensation patients are unlikely to change in the near future. Therefore the question that remains is how the allied health professionals involved with workers compensation patients can support and assist the treating doctor in undertaking the more objective role of 'guide or coach' for the injured worker.

4. Peak Conditioning Outcomes

4.1 Introduction

Scientific literature is an important part of establishing guidelines for health services in a compensation market. Just as important to the process of establishing guidelines is to closely examine the performance of the individual service in the compensation market.

The following are outcomes based on 326 workers with low back pain who completed a three month twelve session work conditioning program with Peak Conditioning between January 2000 and August 2002.

Provided is an outline of the source of referrals, payment, duration of injury, previous treatment and type of low back injury. The outcomes for the programs are provided in terms of functional improvement of the workers in areas such as lifting, pushing, pulling walking at the initial, six-week and twelve-week assessments. Also provided is the return to work rates of the workers involved in the sample at the initial, six week and twelve week assessments.

4.2 Profile of the Workers in the Sample

Sex: Male: 70%
Female: 30%

Average Age 37.6 yrs

Duration of injury at the start
of the program 6 – 12 weeks: 12%
13 – 26 weeks: 23.8%
27 – 52 weeks: 29.5%
Over 52 weeks: 34.7%

Nature of employment
at the time of injury Manual labour: 48%
Semi skilled: 25%
Skilled trade: 18%
Professional: 8.5%

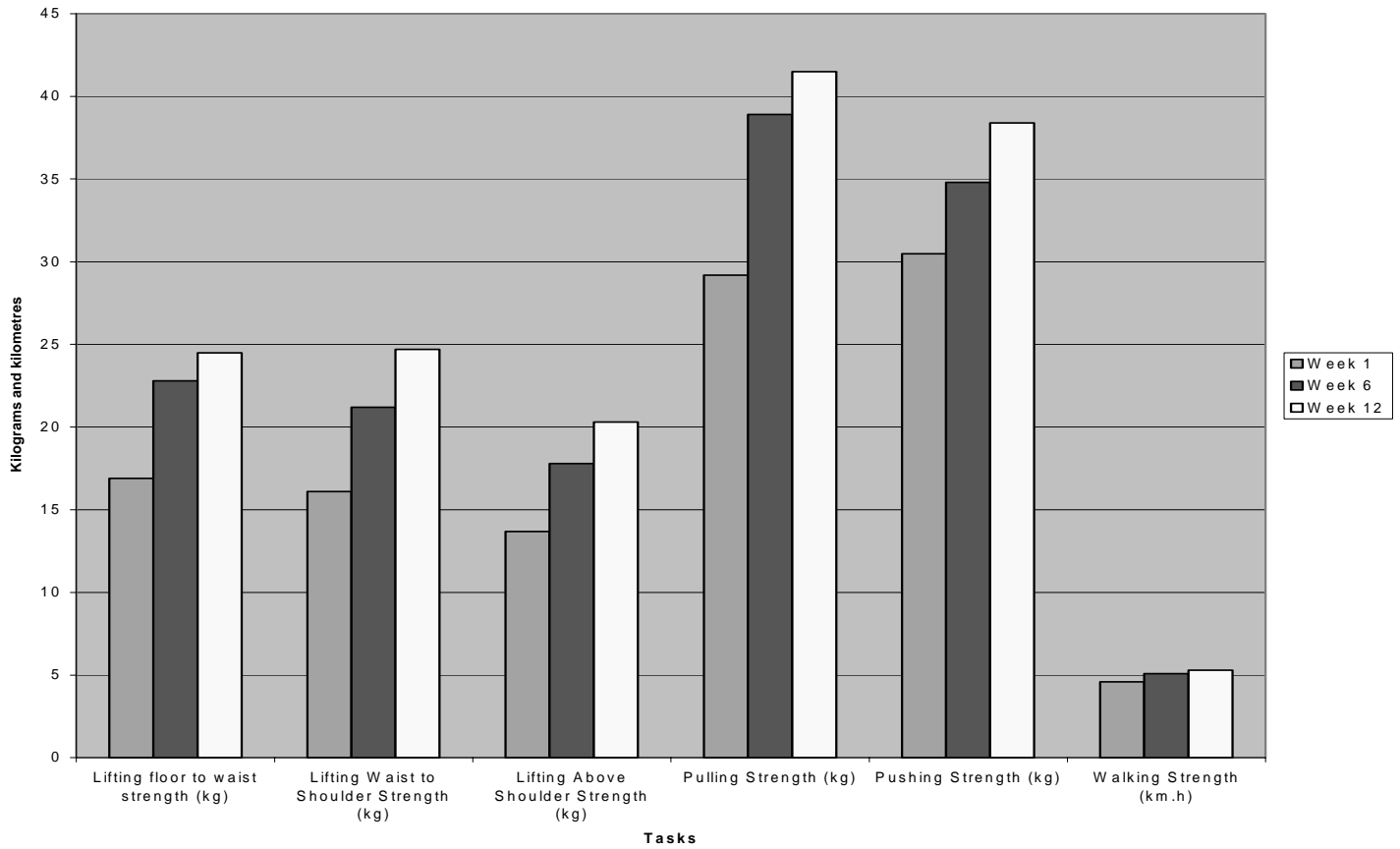
Nature of injury as stated by the GP on the workers compensation medical certificate	Sprain or strain: 64% Disc protrusion: 30% Post surgery: 3% Crush or multiple injuries: 3%
Previous treatment	1 – 6 weeks of physiotherapy: 24.4 % 7 – 12 weeks of physiotherapy: 21% Over twelve weeks of physiotherapy: 54%
Source of referral	Treating doctor: 35% Rehabilitation provider: 33% Insurer: 30% Workplace: Less than 1% Physiotherapist: Less than 1%
Source of payment	Workers Compensation Insurer: 79% Self Insurer: 15.5 % CTP insurer: 5% Income protection insurer: Less than 1%

4.3 Testing and Classification Procedure

For an outline of the testing procedure please see **Addendum 1**.

4.4 Changes in Physical Measures and 'Yellow Flags'

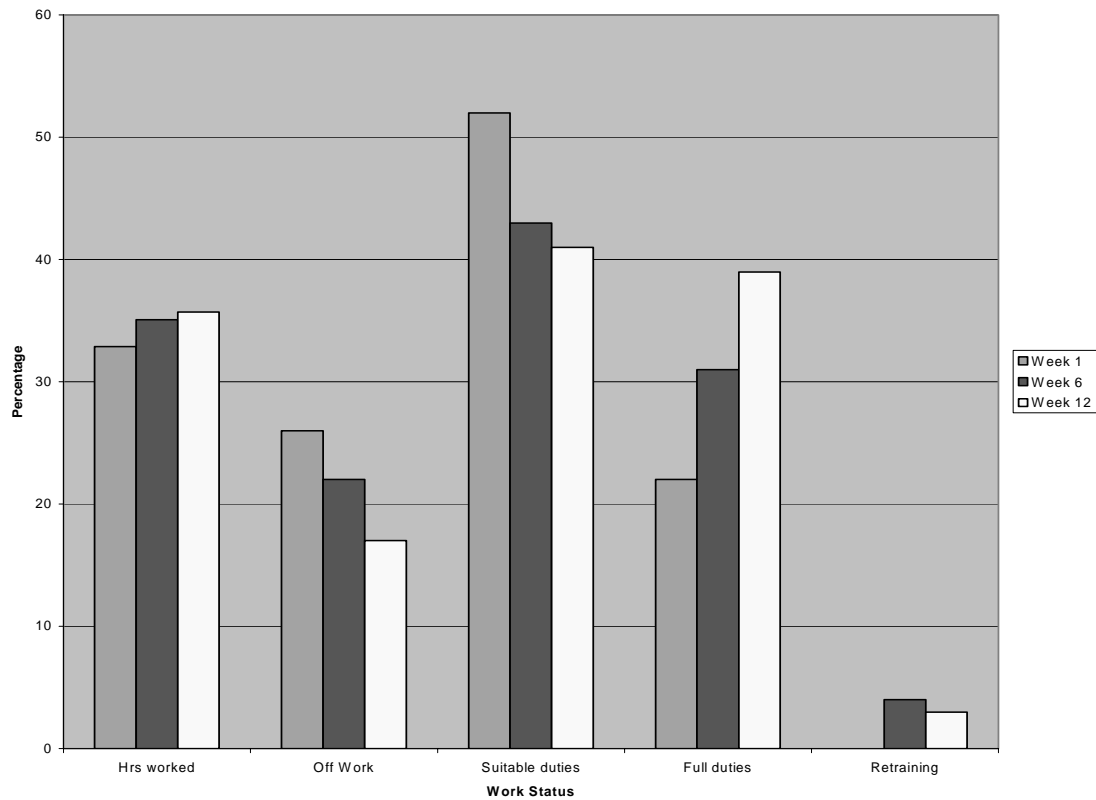
Peak Conditioning: Gym strengthening changes in strength for men and women with persistent low back pain (sample 326 people)



Changes in Physical Measures and 'Yellow Flags'			
	Week 1	Week 6	Week 12
Lifting Floor to waist	16.9kg	22.8kg	24.5kg
Lifting waist to shoulder	16.1 kg	21.2 kg	24.7 kg
Lifting above shoulder	13.7kg	17.8 kg	20.3 kg
Pushing	30.5 kg	34.8kg	38.4 kg
Pulling	29.2 kg	38.9 kg	41.5 kg
Walking	4.6 km.h	5.1 km.h	5.3 km.h
Yellow Flags (30 cases)	147	135	118

4.5 Changes in Work Status

Peak Conditioning: Gym strengthening changes in work status for men and women with persistent low back pain (sample 326 people)



Work Measures – Changes in Work Status			
	Week 1	Week 6	Week 12
Hours Worked	32.9 hrs	35.1 hrs	35.7 hrs
Off Work	26%	22%	17%
Suitable Duties	52%	43%	41%
Full Duties	22%	31%	39%
Retraining	0%	4%	3%

4.6 Evaluation of Outcomes for Peak Conditioning Work Conditioning Programs

Almost one third of the work conditioning programs in the sample were referred when the worker had been injured for over one year. Over half of the participants were working on suitable duties and had received over twelve weeks of physiotherapy treatment when they began their work-conditioning program. The source of referrals for this group of workers was almost one third each between treating doctors, rehabilitation providers and insurers. Workers compensation insurers funded 79% of the programs involved in the sample.

The physical status of injured workers at the initial assessment and twelve week assessment is comparable to findings of Lindstrom et al. (1992) 23 for squat lifting strength after completing a return to work focussed exercise program with a behavioural approach. Lindstrom et al. (1992) found that injured workers could squat lift 15.9 kg at the initial assessment and 21 kg after an average of 11 supervised sessions and 10 unsupervised sessions with the physical therapist or the equivalent of 7 – 8 weeks of conditioning.

Our findings are an average floor to waist lifting strength of 16.9 kg at the initial assessment followed by 24.5kg at the twelve-week assessment after twelve supervised sessions and 12 – 24 unsupervised sessions. Lindstrom (1992) recruited all of their subjects at 8 weeks after injury whilst 64.2% of the workers who contributed to the findings above began the Peak Conditioning program over six months after onset of injury.

Due to a change in our method of measuring psychosocial 'yellow flags' we only 30 cases where there were full measurements at initial assessment, six weeks and twelve weeks. The questionnaire used was the Linton and Hallden (1998) 25 questionnaire from the New Zealand guidelines. The scores gradually reduced from 147 at the initial assessment to 135 at the six-week assessment and 118 at the final assessment. Hurley et al (2000) suggest that a score of below 112 indicates preparedness for return to work. Initial assessment scores ranged from 181 – 93. It would be reasonable to suggest that this finding is representative of the average Peak Conditioning three month twelve session work conditioning program, although the average 'yellow flags' scores are probably higher for some of the longer term cases.

There appears to be a cascading affect on work status as the program progresses. From initial assessment to twelve week assessment the number of workers who are off work reduces from 26% to 17%, workers on suitable duties reduces from 52% to 43% and those workers on full duties increases from 22% to 39%.

In comparison to the return to work rates, the physical status of the workers at the completion of the twelve week program is floor to waist lifting 24.5kg, waist to shoulder lifting 24.7kg, lifting above shoulder 20.3kg, pushing 38.4kg, pulling 41.5kg and maximum walking speed of 5.3 km per hr.

On a review of 309 files earlier this year we found that the average return to work floor to waist lifting requirement for worker's participating in the Peak Conditioning work conditioning program's was 14.6 kg and the RTW lifting requirements ranged between 5kg – 40kg. This is a relevant measure of return to work ability considering almost 91% of the sample are in an occupation where the ability to lift floor to waist would be crucial to returning to pre-injury duties. Considering the average floor to waist lifting strength at the completion of the program with this group of workers was 24.5kg it appears strange that the rate of return to full duties was not higher.

The injured workers physical ability appears to be superior to the physical requirements of their return to work goal at the 12-week review point. Although at the 12-week review point 17% of workers are still off work and 39% are still on suitable duties.

There may be a number of possible scenarios that lead to this situation occurring.

The first reason for this discrepancy may be that the treating doctor is unaware of the injured workers improved physical ability to perform their preinjury duties as they have not had the time to read reports or receive phone calls from the exercise physiologists performing the work conditioning program or rehabilitation case manager. Despite being physically more capable in their work-conditioning program the injured worker may still be pain focussed and not reporting on their condition in an objective manner.

The second possible scenario is that the GP is aware of the injured workers performance in the work conditioning program as they provided medical approval to increase lifting restrictions but the injured worker is still experiencing pain and genuinely believes there is still a physical problem despite their functional ability. In this situation the GP is unsure of how to resolve the situation and does not wish to enter into conflict with the patient 37.

The third possible scenario is that the GP may be aware that the injured workers physical ability exceeds their return to work requirement but the injured worker is seeing a solicitor and pursuing a legal solution to their work injury. The injured worker is therefore unwilling to have their work status upgraded. In this situation the GP does not wish to enter into conflict with the patient 37 and must still provide their services as the patients treating doctor.

The fourth possible scenario is that the GP may be aware of the injured workers physical capacity but the injured worker does not wish to return to their original employer and is resisting any work upgrades. The injured worker is in conflict with the workplace and ideally wishes to be redeployed. The GP would have some idea that the injured worker does not wish to return to his or her original employer but feels unable to influence the situation.

16.5% of Peak Conditioning programs that are started are cancelled before the completion of the program primarily due to either legal or workplace issues becoming obvious barriers to the progression of the work-conditioning program. The outcomes evaluated above relate to workers who actually completed their program and displayed genuine motivation to improve despite complaints of pain. Therefore the likelihood is that the workers described in scenario three and four would have been screened out the work-conditioning program before the completion of the full work-conditioning program.

To make objective decisions regarding patients in scenario one and two the treating doctor must have the necessary support and information at hand to make appropriate judgements regarding return to work of the worker.

Ireland et al.(1998) 13 in their study of the rise and fall of repetition strain injury (RSI) in Australia report that once RSI was defined clearly and accepted as a non-physical condition medical practitioners became less prepared to certify patients who reported having symptoms of repetitions strain injury unfit for work. He states that acceptance of the non-physical basis of the injury was a prerequisite to successful treatment and it often unravelled complex and conflicting interpersonal relationships in the workplace with peers or superiors. He states that having overcome these hurdles it was surprising how often unsatisfactory social, family, marital and economic circumstances were expressed as job dissatisfaction. The other aspect of remission was the patient's willingness to return to work because absenteeism only reinforced the incorrect and misleading notion that the physical aspect of work had caused circumstances.

Ireland et al. states that that medical responsibility of the treating doctor lies in the accurate clinical and investigative assessment of patients and in differentiating the clearly defined physical conditions from non-physical occupational neuroses.

The main predicament for the treating doctor in dealing with persistent pain patients is time. Acute low back pain patients do not require a great deal of the treating doctor's time and there is often not a great deal of information to assimilate apart from physiotherapy reports and X-ray reports. The main source of information the treating doctor relies on in the acute stage for return to work where there are no red flags is the workers subjective reports of progress.

When an acute patient becomes a persistent pain patient with no red flags the treating doctor still has the same amount of time but enormous amounts of information to assimilate from specialist reports, rehabilitation provider reports, work conditioning reports and insurance company correspondence. A lack of time to talk to the patient and a lack of time to process the large amounts of information relating to the patient's progress makes it difficult for the treating doctor to point out to the patient that their condition is non-

physical and a progressive return to work irregardless of pain is the best course of action. Overlaying this situation is a desire in some instances to not enter into conflict with the patient 37.

One solution we have been trialing to over come this situation is the use of case conferences involving the worker, rehabilitation case manager, exercise physiologist and treating doctor at the treating doctors practice.

Case conferences provide the time and a suitable forum to discuss the workers case. One of the main purposes of the case conference is to highlight to the treating doctor the non-physical basis of the workers reports of pain by providing evidence of the workers ability to function normally. This evidence is provided by the exercise physiologist and includes the workers performance in their gym program and reports of upgrades in home-based activities. The role of the rehabilitation case manager is to provide a detailed description of the suggested upgrade in work duties. The physical requirements of these work duties will ideally be less demanding than the current functional ability of the worker.

Having presented this argument it is than the role of the worker to highlight any concerns of the suggested upgrade in work duties or contest any of the evidence provided in relation to their functional ability or fears they still might be experiencing. Undertaking this process provides the treating doctor with the time to establish a clear picture of their patient's abilities and motivation in regards to return to work. The case conferences we have carried out to date have ranged in time from 30 minutes – 55 minutes. Obviously the treating doctor charges the insurer at a higher rate but the cost of having all parties present is very small in comparison to resolving a return to work consensus. Our experience so far indicates that the treating doctor is appreciative to have the time without loss of income to assimilate sufficient levels of objective information to allow a clear decision to be made regarding his/her patient's progress. After hearing the evidence relating to their patients ability and after reading the patients file and being clear on no red flags being present the treating doctor is usually very supportive of upgrading their patients work status.

Of the ten case conferences we have performed since undertaking the process four have resulted in upgrades in work status and four have resulted in upgrades from pool to gym based exercise as a part of a longer term plan to upgrade work status. After being upgraded by their treating doctor two of the cases had their specialists take over as nominated treating doctor and their specialists removed them from the work-conditioning program. This is also a positive result it provides justification for the insurer to cease treatment expenditure on these cases. It also becomes clear that the injured worker does not wish to be involved in a very reasonable upgrade of work status. Two of the cases that were upgraded from gym to pool exercise were also referred to psychologist by their treating doctor following case conferencing at the suggestion of the exercise physiologist and case manager to try and improve their psychological status.

Under normal circumstances if case conferencing had not taken place on the ten cases mentioned above these programs would have been shut down due to lack of return to work progress.

4.7 Summary of Outcomes for Peak Conditioning Work Conditioning Programs

There appears to be a solid increase in functional performance, a gradual reduction in psychosocial yellow flags and a moderate change in return to work outcomes which are positive findings considering that almost two thirds of the workers have been on workers compensation for over six months. Return to work outcomes can be improved if we are more innovative in providing the treating doctor with the necessary objective information to identify that their patient's condition is non-physical.

5. Conclusion

Following are the main points that can be taken from the review of the Peak Conditioning service, research relating to work conditioning programs and the review of outcomes for the Peak Conditioning work-conditioning program:

5.1 Psychosocial 'Yellow Flags'

- There is significant evidence to suggest that psychosocial 'yellow flags' are strong predictors of chronicity.
- Consensus amongst researchers suggests that moderate psychosocial 'yellow flags' can be managed by treating health professionals using the New Zealand Guidelines.
- Where psychopathology exists or physical treatment with a behavioural approach fails a specialised psychology referral is required.

5.2 Exercise Therapy

- Exercise therapy has been described as exercises such as specific back exercises, abdominal exercises, flexion, extension, static, dynamic, strengthening, stretching or aerobic exercises 45 commonly performed in a clinical environment such as a hospital or physiotherapy clinic. Few of the research articles relating to exercise therapy investigated workers compensation claimants or used return to work as an outcome measure.
- Exercise therapy for low back pain is of no benefit in the acute phase of injury. Exercise therapy is no more efficacious than clinical physiotherapy in improving clinical measures for persistent low back pain
- Exercise 41, 32 and exercise and manipulation 5, 16 is effective for improving parameters such as headache relief, self reported pain,

disability and medication use for a non-workers compensation population experiencing persistent neck pain

- Consensus on whiplash patients in the chronic phase is that exercise therapy based on behavioural principles with a multidisciplinary approach is the most effective method of management.

5.3 Multidisciplinary Rehabilitation

- A return to work focused and behaviorally oriented exercise program that integrates strong and consistent communication with the treating doctor and is associated with a return to work intervention achieves good return to work outcomes in workers with subacute low back pain
- Intensive multidisciplinary biopsychosocial rehabilitation (Pain Management Program >100 hrs) is effective in decreasing pain and improving function but return to work outcomes are variable

5.4 Peak Conditioning Work Conditioning Program Outcomes

- Two thirds of workers participating in Peak Conditioning Work Conditioning programs have been on workers compensation for over six months.
- 59% of referred workers to Peak Conditioning Work Conditioning programs have lower back injuries
- Workers participating in three-month twelve session programs have improvements in lifting tolerance from 16.9kg to 24.5kg.
- There is reduction in workers off work from 26% at initial assessment to 20% including those workers on retraining
- There is a reduction in workers on suitable duties from 52% at initial assessment to 41% at twelve-week assessment
- There is an increase in workers on full duties from 22% at initial assessment to 39% at twelve-week assessment
- There is an increase in average hours worked from 32.9hrs per week at initial assessment to 35.7hrs per week at twelve-week assessment

6. Recommendations according to Workcover objectives for the review of Work Conditioning Programs

6.1 General Recommendations

Research suggests that earlier referral work conditioning may provide superior return to work outcomes

Case conferences may provide a non-adversarial method of negotiating return to work plans with treating doctors for more complex cases

6.2 Definition of a Work-Conditioning Program

A Work Conditioning program is focussed on facilitating return to work by increasing the activity of the injured worker through the application of exercise in a community based facility (fitness facility, workplace or home) with an operant behavioural approach and the management of 'yellow flags'. Work Conditioning programs impact on the return to work process by affectively and innovatively communicating their findings to the treating doctor, rehabilitation case manager, insurer and employer.

6.3 Professional Skills and Experience Required by Staff Delivering Work Conditioning Programs

6.3.1 Initial Work Conditioning Assessment Staffing

The initial work conditioning assessment should be performed by a physiotherapist with an understanding of occupational rehabilitation, chronic/persistent pain and the workers compensation system. A physiotherapist with experience in acute clinical treatment only will require extensive education in the identification and management of 'yellow flags', the NSW workers compensation system, occupational rehabilitation and the work conditioning approach.

6.3.2 Work Conditioning Program Staffing

A work-conditioning program should be staffed by an exercise physiologist with tertiary qualifications in exercise science and accreditation as an exercise physiologist with the Australian Association of Exercise and Sports Science (AAESS) or a tertiary qualified physiotherapist. Either of these professionals involved in the implementation of work conditioning programs must have further training in the identification and management of psychosocial 'yellow flags', the operant behavioural approach, the NSW workers compensation system and communication / negotiation skills. Both physiotherapists and exercise physiologists will require further training in exercise prescription techniques for workers with persistent pain.

6.4 Injured Workers Most Likely to Benefit from Work Conditioning

Due to the non-physical nature of the persistent pain condition suitability for a work-conditioning program is more 'worker' dependant than injury dependant. In relation to 'seriousness' of injury the main precursor for admittance to a work conditioning assessment is the treating doctors approval. Research has shown that workers with subacute low back pain and neck pain are suitable for work conditioning programs. Empirical evidence suggests that a range of injuries such as the following are suitable for work conditioning:

- Shoulder strain, pain or post surgery
- Wrist or hand pain, strain or post surgery
- Ankle strain, pain or post surgery
- Knee pain, strain or post surgery

As stated above due to the non-physical nature of persistent pain and the behavioural approach of the work conditioning program selection criteria are more biopsychosocial rather than biophysical. Some practical guidelines for the cost-effective use of work conditioning programs are outlined below.

It is appropriate to consider referral to a work conditioning program if:

- it has been over eight weeks since the date of injury
- the worker has no serious 'red flags' or neurological symptoms and the GP is supportive of a more active approach
- the injured worker has an obvious fear of activity or upgrading duties in the workplace
- the worker has been receiving passive treatments for over 12 weeks with no improvement in home or work based activity levels
- attempts to upgrade suitable duties have been unsuccessful
- the injured worker has been terminated from their previous employer and the current medical restrictions are minimising vocational options
- the injured workers compliance in adhering to the injury management plan has been poor and the insurer wishes to objectively establish the motivation of the worker

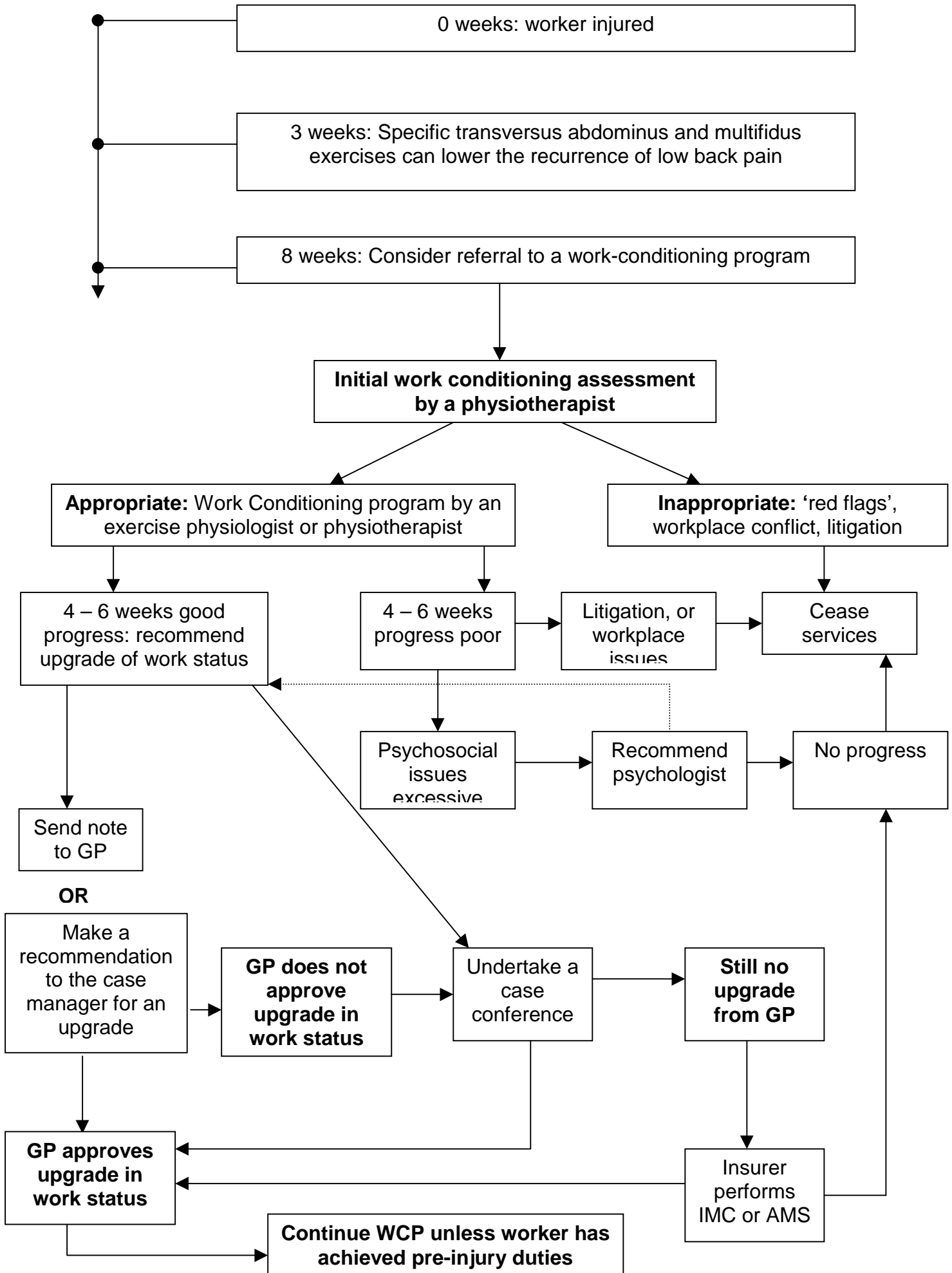
A referral should not be made to a work conditioning program if:

- The worker is focused on litigation
- There are work place issues or conflicts preventing the upgrade of the injured worker
- The treating doctor or specialist are not supportive of the work conditioning program or return to work
- The worker is extremely resistant to participating in a work conditioning program
- The worker will be undergoing surgery shortly, unless the surgeon has expressed a desire to have pre-operative conditioning

6.5 Desirable Features of a Work-Conditioning Program

- Key emphasis on minimising the medical expense of the workers compensation claim and the liability of the insurer/employer by focusing on the use of behavioural and physical techniques to achieve return to work and/or a reduction in the disability of the worker
- Innovative communication techniques to highlight the non-physical nature of the workers condition and readiness for return to work
- High levels of formal reporting and informal communication with the team of professionals managing the injured worker (rehabilitation case manager, insurer, employer) to allow coordination and timing of the return to work plan
- A defined start and finish point for services and clear screening and exit plan for ceasing services with inappropriate workers
- Screening and management of 'yellow flags' and identification of the requirement for psychological assistance when the worker exhibits psychopathology
- A priority of the program is the education of healthy behaviour patterns for the worker that can be continued in a cost effective manner without the need for supervision by a health professional. Evidence suggests that the workers do continue the health patterns for up to two years after the completion of services.
- A feature of the work-conditioning program that makes it easier for insurers to monitor costs and outcomes is the requirement for initial written approval to begin services. This initial approval includes a fixed cost for a package of services including educational materials, facility fees, supervision of sessions, communication and travel.

6.6 Recommended Flow of Services



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Addendum 1

Testing Procedures

Lifting Testing

Lifting testing is performed using a barbell within the gym setting. We test lifting floor to waist, waist to shoulder and above shoulder strength.

Pushing / Pulling Testing

We undertake pushing/pulling testing using a seated row or seated press within the gym setting. This equipment uses a pulley system and weight stack. Therefore the force the person can produce is actually less than the measured score in kilograms. The score provides the GP and other professionals involved with an indication of the person's ability to perform pushing and pulling tasks.

Walking Testing

Walking testing is performed on an electric motor driven treadmill in a gym based setting. The purpose of this test is to identify the maximum speed and distance the injured person can walk over ten minutes in metres. This test provides a measure of fitness for all injuries and function for lower back, neck and lower limb injuries.

Testing Method for Lifting, Pushing and Pulling

Testing is performed only to the lifting tolerance provided on the treating doctors approval documentation to Peak Conditioning. The worker is requested to lift the GP approved weight in the lifting, pushing and pulling tasks as many times as possible. If the injured person can lift, push or pull the weight for more than 25 repetitions this may be an indication that an upgrade in lifting restrictions is required.

'Yellow Flags' Questionnaire (Linton & Hallden 1998) and New Zealand Guidelines

The Linton and Hallden (1998) 'Yellow Flags' screening questionnaire establishes any issues that may obstruct the process of successful treatment outcome and return to work. The questionnaire examines fear avoidance, work beliefs, perceived improvement, problems with work function, anxiety and previous lost time due to injury. The questionnaire assists us in identifying the obstacles that may require attention during the conditioning program such as fear-avoidance behavior or obsessive focus on pain, or other areas that may prevent a good outcome such as dissatisfaction with work or management or compensation issues.