

The effectiveness of workplace interventions for people with work related upper limb disorders

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Clinical scenario:

During a placement in a private practice setting I noticed a high number of client referrals for return to work programmes following upper limb (specifically rotator cuff) injuries. Intervention usually involved the use of a therapist guided 'graduated return to work programme'. Williams, Westmorland, Schmuck, & MacDermid (2004) assert that work related upper limb disorders are becoming an increasing problem and have a negative effect on employee earnings, productivity, competitiveness and economic factors. Silman & Newman (1996) state that "work related upper limb disorders (WRULD) are...estimated to affect many millions of workers around the world annually" (p. 5). The term WRULD includes "...a variety of musculoskeletal problems, affecting the tissues of the hand, wrist, arm and shoulder" (Silman & Newman, 1996, p. 5).

Focussed clinical question:

Are workplace-based interventions effective in returning patients with work related upper limb disorders to pre injury work levels?

Summary of search, 'best evidence' appraised, and key findings:

Based on a search of ProQuest Nursing & Allied Health Source and CINAHL for Systematic reviews and Randomised Controlled Trials (RCT's) it could be concluded that there is limited research evidence available on this topic. Best evidence was considered to be a systematic review by Williams et al. (2004) and a RCT by Cheng & Hung (2007). Both articles were considered to be of high quality although some bias may have been present in the RCT. The systematic review showed poor quality evidence for the use of workplace-based interventions for WRULD's. The RCT also showed positive evidence which would be considered highly significant if potential bias issues were resolved. The need for further research was identified by both sets of authors and implications for occupational therapy practice are limited at best.

Clinical bottom line:

There is some evidence for the use of workplace-based interventions in returning patients with WRULD's to work, however research is limited, and is of predominantly poor quality.

Limitation of this CAT:

This critical appraisal has been peer reviewed by one lecturer as part of an assignment.

Search strategy:

Two databases were searched in order to find systematic reviews and RCT's. These types of study are considered best evidence for measuring the effectiveness of an intervention (Taylor, 2007). ProQuest Nursing & Allied Health Source was searched first using search terms: vocational rehabilitation and work related upper extremity disorders. CINAHL was searched using the terms: vocational rehabilitation, upper extremity disorder, upper limb disorder. Limiters were used in both searches to retrieve only full text articles, from peer reviewed journals published after 2001. These two searches resulted in the finding of two relevant systematic reviews but no relevant randomised clinical trials. A further search of CINAHL database using the search terms vocational rehabilitation, rotator cuff injuries, forearm, wrist, hand, and occupational therapy; using the additional limiter of randomised controlled trials only, was conducted. This search yielded one relevant randomised clinical trial.

Inclusion and exclusion criteria:

Inclusion:

- Systematic review or randomised controlled trial
- Adults over the age of eighteen
- Published after 2001
- Full text available
- Upper limb disorders with a return to work focus
- Relevant to occupational therapy
- Must contain outcome measures
- Published in peer reviewed journal
- Published in English

Exclusion:

- Did not meet inclusion criteria
- Prosthesis
- Psychosocial or any other diagnosis identified or analysed

Results of the search:

Study design / methodology of articles retrieved	Level (see Taylor p. 15)	Author (year)
Systematic review	1	Williams, Westmorland, Schmuck & MacDermid (2004)
Systematic review	1	Franché, Cullen, Clarke, Irvin, Sinclair, Frank, & The Institute for Work & Health Workplace-Based RTW Intervention Literature Review Research Team
Randomised controlled trial	2	Cheng & Hung (2007)

Best evidence:

The two articles I will use for this critical appraisal are:

1. Williams, Westmorland, Schmuck & MacDermid (2004)
As this article is a systematic review it is considered the highest form of evidence (Taylor, 2007). I chose this systematic review over the other one I found as it has more direct relevance to the topic (it is specific to upper limb disorders).
2. Cheng & Hung (2007)
As this is a randomised controlled trial it is considered the second highest form of evidence (Taylor, 2007). Given that my database search was self restricted to systematic reviews and RCT's, and I was required for this assignment to use two different types of evidence this was my only choice. This was the only directly relevant RCT I found.

Summary of best evidence:

Title of article: Williams, Westmorland, Schmuck & MacDermid. (2004). Effectiveness of workplace rehabilitation interventions in the treatment of work related upper extremity disorders: A systematic review

Aim/objective of the systematic review:

The objective of this systematic review was to: "...evaluate the available evidence on workplace rehabilitation interventions for work related upper extremity disorders" (p. 268).

Study Design:

Systematic review

Search strategy:

The authors conducted a search of Medline, CINAHL, and EMBASE to find articles published between January 1982 and May 2003. Key terms used were: hand, wrist, elbow, shoulder, upper extremity, upper limb, posture, wellness, ergonomics, exercise, accommodation, occupational therapy, physical therapy, occupational rehabilitation, vocational, treatment, intervention, workplace, occupation, employer, work-site, industry, cumulative trauma disorders, repetitive strain injury, rotator cuff, lateral epicondylitis, carpal tunnel, and tendonitis.

Criteria for considering studies:

Summarised inclusion criteria: 1) intervention given at the workplace; 2) population consisted of individuals with WRULD's; 3) intervention involved treatment not prevention; 4) study was published in English; 5) study involved primary research on one or more patient groups.

Setting & Participants:

Participants in selected studies had to have a WRULD and be receiving treatment in the workplace.

Method:

The search described above yielded a total of 811 hits. The abstract for each of the articles was independently assessed for its applicability by each of the four assessors (three physical therapists and one occupational therapist). If there was any doubt about whether an article should be included then the full article was retrieved and reviewed. Disagreements were discussed in a consensus meeting. This process further narrowed

the results to 53 articles. This number was further reduced to 21 through more scrupulous application of eligibility criteria and screening of the references used in the articles. Studies were then randomly allocated to two pairs of reviewers- nine studies to one pair, twelve to the other. Each study was reviewed independently by each member in the pair using the 'Evaluation Guidelines for Rating the Quality of an Intervention Study Form' (MacDermid, 2004). Articles were also assessed with regard to the level of evidence (Centre for Evidence-Based Medicine). Consensus between the two reviewers regarding methodology and quality of the articles was then reached. Where this was not the case a third reviewer "independently evaluated the article until agreement was determined" (p. 268). Twelve more studies were excluded at this stage due to more detailed analysis showing they did not meet the eligibility criteria.

Results:

Finally, eight studies were identified for more in depth review: four RCT's, three cohort studies, and one case series. Levels of evidence (discussed above) ranged from 1b to 4. Five of the studies scored a 32 or higher using MacDermid's Evaluation Guidelines (discussed above) indicating fair quality of research findings. Five workplace interventions were identified across the eight studies: "1) Exercises; 2) In-house/worksite physical therapy; 3) worksite analysis; 4) nurse case managers' training on accommodations; and 5) ergonomic modifications with regard to a) keyboard designs and b) rest and exercise breaks" (p. 270). Although each of the eight studies provided positive evidence for the use of these interventions the authors of this review questioned the research quality of every study. Problems cited included: limited sample size, lack of control group, poor description of treatment, lack of comparative data between groups being studied, the study was 'underpowered', low response rate, incomplete data, lack of statistical analyses, the use of unstandardised outcome measures, and intervention bias.

Original authors conclusions:

The evidence on this topic is "inadequate in scope and inconsistent in quality" (p. 273). However, it does tend towards positive outcomes for a number of interventions such as "ergonomic modifications..., nurse case managers' training on accommodations, and exercise programs" (p. 273). The authors are unable to make conclusive treatment recommendations due to the poor quality and limited nature of evidence available.

Critical appraisal:**Validity / trustworthiness of the results:**

Taylor (2007) suggests that the appraisal of a systematic review should seek to answer three main questions (p. 77):

Are the results valid?

The review had a clear focus: "...to evaluate the available evidence..." published between January 1982 and May 2003 "on workplace rehabilitation interventions for WREUD's" (p. 268). The authors searched for published materials on the Medline, CINAHL, and EMBASE databases using fairly exhaustive search terms. However, no searching of the grey literature was undertaken. References from the more relevant articles were screened as part of the evaluation process. Clear inclusion/exclusion criteria were stipulated and additional clarification provided on what could have been potential 'grey areas'. The applicability of each study was assessed individually by two or more assessors to avoid bias. Common reasons for article exclusion were provided at each subsequent stage of the refinement process. The methodological quality of each of the included studies was assessed using the 'Evaluation Guidelines for Rating the Quality of an Intervention Study Form' (MacDermid, 2004), and level of evidence (Centre for Evidence-Based Medicine). These guidelines were published in the same journal issue as this review, by one of the authors of this review. The guidelines assessment criteria seem sound however use of this guideline by other researchers at this time would have been minimal at best. Only five of the eight studies achieved a score of "32 or higher indicating fair quality of research findings" (p. 270). Level of evidence criteria were no longer available on the link provided by the authors. A basic summary of each of the articles reviewed was shown in a table. Results were grouped into five different intervention types with the method, results, and limitations of each study being discussed independently within the five headings.

What are the results?

Statistical data is provided for most of the studies and logical conclusions drawn regarding study effectiveness. Results and conclusions drawn are relevant to the aim of the study and clearly demonstrate a lack of high quality evidence in this area.

How will these results help me work with my clients?

Based on my experience these results could be highly applicable to a therapist working in private practice. Given the variety of interventions used in the reviewed studies it would be necessary to match the needs of the therapists' client group specifically to one of the

five intervention types. However, results of these studies have been shown to be flawed and should be used with caution.

Summary/conclusion:

This systematic review demonstrates a high level of validity. However, the use of more widely used and accessible measures of the reviewed articles methodology could have improved this aspect. Results were applicable to the aim of the study and conclusions drawn were rationalised. Limited use of these results may be applicable to occupational therapy practice.

Title of article: Cheng & Hung. (2007). Randomised controlled trial of workplace-based rehabilitation for work related rotator cuff disorder

Aim/objective of the study:

“...to investigate the effect of a workplace-based work hardening program on the return to work process of work-related rotator cuff disorder” (p. 489).

Study Design:

Quantitative- randomised controlled trial

Setting:

Participants in the clinic based work hardening (CWH) group received clinic based treatment. 41 of these participants received public hospital rehabilitation, and 5 private sector rehabilitation. Participants in the workplace-based work hardening (WWH) group received workplace-based rehabilitation.

Participants:

The participants for this RCT consisted of 103 workers “...recruited from workers’ compensation insurance companies in Hong Kong” (p. 489). Other inclusion criteria were: work-related rotator cuff tendonitis; >90 days since injury and cleared to start functional training/work trial; medium physical demand of work; worker and employer compliance; job coach allowed to visit workplace. Exclusion criteria were: severe tear of rotator cuff muscle requiring surgery; exacerbation of symptoms during functional capacity evaluation; worker refusal to join program; decline in physical condition following workplace training.

Participants were randomly allocated to either the WWH or CWH group. Nine of these participants were unable to complete the study. Of the remaining 94 participants there were 35 males and 13 females in the CWH group; and 37 males and 9 females in the WWH group. The authors found no significant differences between the two group demographics. The researchers did not note any significant differences between the two groups in baseline testing.

Method:

A questionnaire on demographic data and perception of work characteristics, the Shoulder Pain and Disability Index (SPADI), and a Functional Capacity Evaluation (FCE) were all completed as a means of baseline measurement.

Participants in the CWH received “routine conventional clinic-based work hardening

training” (p. 490). This consisted of mobilisation activities for the upper limb extremities; strength and endurance training; and work simulation.

Participants in the WWH were each allocated a job coach. Training programs included biomechanics and ergonomic training, shoulder stretching exercises, scapular control exercises, shoulder strengthening exercises, and job specific activities (modified work duties selected by the job coach).

Training sessions for both groups occurred three times per week. The intervention ran for four weeks. The SPADI and FCE were re-evaluated post intervention as an outcome measure. Telephone interviews were conducted one week after the exit assessment to assess whether return to work had been achieved and if so what level of duties were being performed.

Results:

“Independent *t*-test showed no significant differences on the SPADI, active range of motion of the injured shoulder joint and basic functional work capabilities between the two groups prior to the intervention” (p. 495).

Upon re-test following the intervention the WWH group reported statistically significant lower scores on the SPADI than the CWH (*p*-value 0.034). Members of the WWH group demonstrated a significant decrease in perceived shoulder problems.

“Workers in WWH group had significantly better improvement on active shoulder flexion, arm lifting force, high-near lifting force, carrying force, and overhead tolerance measures” (p. 496). Each of these factors had a *p*-value between groups of <0.05. Follow up phone interviews found that “...71.7% of the workers in WWH group could return to normal or modified duties in contrast to 37.5% of the workers in CWH group” (p. 496).

Original authors conclusions:

These results indicate that workplace based work hardening programs are more effective than clinic based programs in the areas of “perceived pain and disability, improvement in functional capabilities and prevention of further work disability” (p. 501). The authors also believe that a number of other psychosocial problems associated with being away from the work environment can be reduced through the use of job coaching. “Further studies related to process of change and long-term effectiveness are warranted” (p. 501).

Critical appraisal:**Validity / trustworthiness of the results:**

Taylor (2007) suggests that the appraisal of a RCT should seek to answer three main questions (pp. 54-55):

Are the results valid?

The aim of the RCT was clearly described. Inclusion/exclusion criteria were thorough and were clearly explained to the reader. Sufficient group demographics for both the WWH and CWH groups were provided. Intervention methods for the WWH group were well explained, whereas for the CWH group method descriptions were somewhat ambiguous. Outcome measures were appropriate and clearly explained. Participants were recruited from "...workers' compensation insurance companies in Hong Kong" (p. 489). The authors state that participants were then randomly assigned to one of the two groups, but do not state how this allocation was done. All participants who began the study were accounted for at its conclusion including 9 drop-outs due to lack of adherence, physical deterioration, or personal reasons. A comprehensive literature review was undertaken by the authors prior to this study. The blinding of participants in this study would have been exceedingly difficult especially if they had any understanding of traditional treatment practices. The authors clearly proved there were no significant differences between members of the two groups. The same baseline and outcome measures were used for both groups. Ethical issues such as the consent of the injured workers and employers to participate in the study were considered in the inclusion/exclusion criteria.

What are the results?

The outcome measures used were appropriate, clearly stated and analysed a number of different contributing factors. Results differentiating the two groups following the study were statistically significant in a number of areas (stated above in the article summary) and demonstrated the superior results of WWH.

How will these results help me work with my clients?

The WWH intervention could easily be applied by a trained occupational therapist to patients with the same degree of rotator cuff injury. Findings of this study were significant enough to apply to practice, however this is only one study.

Summary/conclusion:

The results of this study could generally be considered valid. However there is one potential problem in this area. Taylor (2007) states that if a trial does not state how random allocation was achieved then it cannot be considered an RCT and “cannot be seen as ‘gold standard’ evidence” (p. 55). The results of this study were compelling and indicate strong evidence for a workplace based approach for patients with work-related rotator cuff tendonitis.

Implications for practice, education and future research:

Analysis showed the systematic review by Williams et al. (2004) to be a trustworthy source of evidence. The same could be said to a lesser extent of the Cheng & Hung (2007) study although bias may potentially be present depending on the method of randomisation used.

Two main conclusions can be drawn from the review of these two articles.

The first is that there exists some positive evidence for the use of workplace-based interventions for people with WRULD's. The systematic review by Williams et al. (2004) identified eight studies which all had positive outcomes. Exercise, in house/worksite physical therapy, worksite analysis, nurse case managers' training on accommodations, and ergonomic modifications were all shown to be effective interventions. However, there were a number of flaws evident in each of these studies which greatly lessen their impact. The RCT conducted by Cheng & Hung (2007) demonstrated the effectiveness of workplace based work hardening over typical clinic based work hardening in a Hong Kong setting. However, this study was limited to participants with work related rotator cuff tendonitis employed in a medium physical demand level of work. This is a very specific group of a very different culture so implications for practice should be drawn with caution.

The second is the need for further, higher quality research in this area. Williams et al. (2004) searched three of the major databases for articles published over a twenty-one year period and only found eight relevant studies which all turned out to be of low quality. In their respective articles both sets of authors noted this as a limitation and expressed that the growing nature of this problem means further research is urgently needed.

I do not believe that major changes to practice should be made based solely on these results. Therapists would need to use their own judgement and clinical expertise to guide their application of these findings. It is my understanding that workplace based

interventions for WRULD's are quite common in New Zealand. The results of these studies do not indicate that this should change.

Practice in this area is largely guided by policies and procedures set forth by ACC. These policies and procedures are frequently changing in an effort to establish best practice and cut running costs. Occupational therapists are therefore required keep up with these changes.

References

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