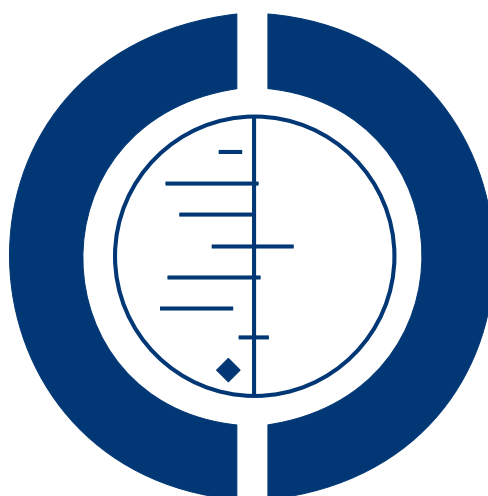


# Effectiveness of vocational rehabilitation intervention on the return to work and employment of persons with multiple sclerosis (Review)

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[Intervention Review]

# Effectiveness of vocational rehabilitation intervention on the return to work and employment of persons with multiple sclerosis

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## ABSTRACT

### Background

Multiple sclerosis is a neurological disease that frequently affects adults of working age, resulting in a range of physical, cognitive and psychosocial deficits that impact on workforce participation. Although, the literature supports vocational rehabilitation (VR) approaches in persons with multiple sclerosis (pwMS), the evidence for its effectiveness is yet to be established.

### Objectives

To evaluate the effectiveness of VR programs compared to alternative programs or care as usual on return to work, workability and employment in pwMS; to evaluate the cost effectiveness of these programs.

### Search methods

We searched the Cochrane Multiple Sclerosis Group's Trials Register (February 2011), PEDro (1990-2011), ISI Science Citation Index (1981-2011) the Cochrane Rehabilitation and Related Therapies Field trials Register and the National Health Service National Research Register.

### Selection criteria

Randomized and controlled clinical trials, including before - after controlled trials, that compare VR rehabilitation with alternative intervention such as standard or a lesser form of intervention or waitlist controls.

### Data collection and analysis

Two reviewers selected trials and rated their methodological quality independently. A 'best evidence' synthesis was performed, based on methodological quality. Trials were grouped in terms of type and setting of VR programs.

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## Main results

Two trials (one RCT and one CCT) (total 80 participants) met the review criteria. Both trials scored poorly on the methodological quality assessment. There was 'insufficient evidence' for VR programs for (a) 'competitive employment', in altering rates of job retention, changes in employment, improvement in rates of re-entry into the labour force; (b) for altering 'work ability' by improving participants' confidence in the accommodation request process, or employability maturity or job seeking activity. No evidence could be assimilated for changes in proportions of persons in supported employment or on disability pensions, nor for cost-effectiveness.

## Authors' conclusions

There was inconclusive evidence to support VR for pwMS. However, the review highlights some of the challenges in providing VR for pwMS. Clinicians need to be aware of vocational issues, and to understand and manage barriers for maintaining employment. Proactive and timely VR programs should incorporate practical solutions to deal with work disability, workplace accommodation and educate employers, and the wider community. Liaison with policy makers is imperative for government initiatives that encourage work focused VR programs. Future research in VR should focus on improving methodological and scientific rigour of clinical trials; on the development of appropriate and valid outcome measures; and on cost effectiveness of VR programs.

## PLAIN LANGUAGE SUMMARY

### Vocational Rehabilitation (VR) programs are used to support persons with multiple sclerosis (MS) on their entering or returning to work

Major as well as minor disabilities, such as physical, psychosocial, environmental and memory/attention impairment, significantly affect the entering or the returning to work of persons with MS. The objective of this review was to assess the efficacy and to evaluate the cost effectiveness of VR programs compared to other types of programs.

Among the pertinent medical literature, only two studies, comprising a total of 80 participants, met the criteria of the methodological quality necessary for their inclusion in this review, although the subsequent quality assessment revealed they scored poorly. Furthermore, the two studies were carried out in USA, with limited generalisability in other geographical/cultural settings. The whole data neither supports nor refutes the effectiveness or cost-effectiveness of VR programs for persons with MS.

The data also identified critical points worth of future attention: more awareness of vocational issues by professionals; putting in place practical solutions such as a proper workplace accommodations and employers' education; asking for political/governmental initiatives to really support disabled employees; taking into account that supported withdrawal from work at the proper time is as important as supported re-entering to work. Further research are necessary also to improve the methodology of the researches and to identify those individuals most likely to benefit.

## BACKGROUND

Multiple sclerosis (MS) is a chronic progressive demyelinating disorder of the central nervous system and a common cause of neurological disability that affects 2.5 million persons world-wide ([Atlas 2004](#)). Typically presenting in the third decade of life, MS tends to affect adults of working age and leads to a complex interaction of physical, cognitive, psychosocial, behavioural and environmental impairment, which can significantly impact upon their ability to work.

The International Classification of Functioning, Disability and

Health (ICF) framework developed by the WHO in 2001 ([ICF 2001](#)) classifies the impact of disease at several different levels including 'impairments' (body structure and function), limitation in activity (or 'disability') and restriction in participation. It also includes the contextual factors (personal and environmental), which further impact on the individual's ability to function and participate in society as they would wish. The ICF provides a detailed framework or problem list for describing disease experience at each level and "Core sets" comprising lists of ICF categories most relevant to a given disease have been described for a number of conditions including MS ([Khan 2007a](#); [Khan 2007b](#)).

In a cross-sectional cohort of pwMS from Australia (n=101) (Khan 2007a) the majority of subjects reported problems with one or more of the following as major areas of concern:

- 'acquiring, keeping and terminating a job' (ICF d845) - 73 (72.2%)
- 'remunerative employment' (d850) - 90 (89.1%)
- 'economic self-sufficiency' (d870) - 84 (83.1%)

These work-related categories were also identified for targeted intervention by an expert panel of MS care providers in determining the preliminary MS "Core Set," (Khan 2007b).

Work contributes to adult identity (Dyck 1995) and confers financial benefits and status (Catanzaro 1992), and employment is often an important factor in perceived quality of life (QoL) and well-being (Aronson 1997; Waddell 2006). Despite 95% of individuals having held jobs at some time in their lives, the employment statistics for pwMS estimates vary across the world with data from the United States and Europe ranging from 23- 32% (Aronson 1997; LaRocca 1985) to 51%- 80% (Morales 2004; Kornblith 1986; Gronning 1990; Jackson 1991).

These changes can have significant adverse effects on the individual, their family and society (Fraser 2003; Hassink 1993).

- Approximately 80% of pwMS who lose their job within a decade of diagnosis have inadequate retirement savings, are at risk of social isolation and are unable to re-enter the workforce (Kornblith 1986).
- The financial and disease burden of MS is considerable with costs that increase with disease progression (Murphy 1998).
- The estimated average lifetime losses in the US were US\$495 845 per person in 1993 (Minden 1993).
- In Australia, the annual cost of lost earnings due to workplace separation and early retirement from MS was A\$127.9 million in 2005 (Access Economics 2005).

For many, the onset of MS is gradual, and may occur in a pattern of intermittent relapses, interspersed with remission, or one of more insidious progression (NSF 2005). Early features may include:

- Subtle impairments in cognitive and executive function, which can interfere with the individual's memory and attention, as well as their ability to plan, organise and sequence activities.
- Fatigue and variable function may lead to unreliability in work attendance.
- Changes in personality and behaviour may lead to breakdown in interpersonal relationships both at home and in the workplace.

- In addition, there may be an element of euphoria or denial, and a general failure to recognise their own difficulties.

These 'hidden disabilities' often cause more disability in the workplace than physical disability (Beatty 1995). As time goes on, further barriers to employment in pwMS include physical limitations (eg mobility, dexterity, continence issues, fatigue, heat intolerance, pain and vision changes). Other important factors include the working environment and the nature of the job and job requirements (Aronson 1997; LaRocca 1985; Gronning 1990; Smith 2005) and social program factors such as health insurance and disability subsidy are important contributors to employment status (Johnson 2004). Interventions directed at retaining or return to work should therefore consider not only a person's role at home, at work and in the community, but also the need to target health providers and community and employer knowledge and attitudes (Johnson 2004; Sirvastava 2005), including work discrimination.

The UK National Services Framework (NSF 2005) for People with Long Term (Neurological) conditions outlines the need for vocational rehabilitation, which is defined as a 'process whereby those disadvantaged by illness or disability can be enabled to access, maintain or return to employment, or other useful occupation' (BRSM 2003). The NSF highlights the need for multi-disciplinary / multi agency vocational rehabilitation (VR) programs offered by local or specialist rehabilitation services to enable individuals to:

- enter training or work opportunities
- remain or return to existing jobs
- prepare and train for alternate job options
- plan withdrawal from work at an appropriate time (conserving pension and other rights); and
- access appropriate alternative occupational and educational opportunities.

Vocational rehabilitation can be broadly divided into three main groups:

- **General rehabilitation programs for pwMS** which may provide VR as part of their service.
- **Specialist MS VR services** which specifically support pwMS and return to work (eg The National Multiple sclerosis Society Web site <http://www.nationalmssociety.org>, 2008)
- **Statutory pan-disability VR services** that support a range of disabled persons (including pwMS) back to work e.g.
  - 'Pathways to Work' in the UK (Pathways 2002), the WORKSTEP program in the UK (Tyerman 2004).

- Department of Vocational Rehabilitation (DVR) in the US (<http://www.jan.wvu.edu/sbses/vocrehab.htm>, 2008), Social Security Administration Ticket to Work programs in the US ([http://www.yourtickettowork.com/program\\_info](http://www.yourtickettowork.com/program_info)),
- Commonwealth Rehabilitation Services (CRS) in Australia ([www.crsaustralia.gov.au](http://www.crsaustralia.gov.au), 2008)

Although, the literature supports VR approaches to job retention in pwMS that are multidisciplinary, with specialized clinical interventions for symptom management, provision and timeliness of workplace accommodations and education of employers and the wider community (BSRM 2000), the evidence to support VR programs in pwMS is unclear. Issues for future expansion of the evidence base for VR by traditional research and other methods also need discussion.

## OBJECTIVES

The primary objective of this review is to evaluate the effectiveness of vocational rehabilitation (VR) programs compared to alternative programs or care as usual on return to work, employment and work ability in persons with multiple sclerosis. A secondary objective is to evaluate the cost effectiveness of these VR programs.

## METHODS

### Criteria for considering studies for this review

#### Types of studies

This review includes all randomized controlled trials (RCTs) and controlled trials (including before-and-after studies) that compare VR with alternative (control) intervention such as standard or a lesser form of intervention (such as limited advice on return to work, referral information or liaison with employer) or waitlist controls or other confirmation of steady state at baseline.

#### Types of participants

Trials were included if the study population was working age (i.e. mean age between 18-65 years) and had the diagnosis of MS (sub types of MS were included- relapsing remitting, secondary progressive and primary progressive MS), irrespective of MS severity.

#### Types of interventions

All categories of VR programs (individual and /or group level), which incorporate a clearly defined vocational rehabilitation or work therapy element were included in this review. These included structured multi-disciplinary / multi-agency interventions to preserve employment such as clinic or community based counselling, planning for disclosure and accommodation, and work place accommodations. All three types of VR programs were included, such as those offered by 'general rehabilitation programs', 'MS specialized VR programs' and 'pan -disability VR programs' as described above. Studies were grouped on the basis of these categories for the purpose of analysis.

#### Types of outcome measures

For the purpose of this review, outcomes from VR programs for pwMS were similar to VR programs previously reported in persons with mental health disorders (Crowther 2001) and more recently in the acquired brain injury population (Nair 2008). Outcomes of VR programs were assessed at the multiple follow-ups over time.

#### Primary outcomes

- The change in proportion of pwMS in competitive employment. 'Competitive employment' is defined as full time or part time employment position held by a person in an ordinary work setting, for which they were receiving payment at the market rate (Crowther 2004).
- The change in proportions of persons in supported employment. 'Supported employment' is defined as employment in an 'open work' setting but with ongoing support such as government funded programs.

#### Secondary outcomes

- The rate of return to work in days of pwMS.
- The change in proportion of pwMS on disability pension.
- The improvement of work ability in pwMS (such as the proportion of persons with MS who are engaged in attending a sheltered workshop and earn a modest living).
  - Costs of programs and cost effectiveness of return to work or employment

#### Search methods for identification of studies

We considered articles of all languages and translated if necessary.

## Electronic searches

The Trials Search Co-ordinator searched the Cochrane Multiple Sclerosis Group's Specialised Register (February 2011).

The Cochrane Multiple Sclerosis Trials Register is updated regularly and contains trials identified from:

1. The Cochrane Central Register of Controlled Trials (CENTRAL);
2. MEDLINE (PubMed);
3. EMBASE (Embase.com);
4. CINAHL (Ebsco host);
5. LILACS
6. Clinical trials registries

Information on the Cochrane Multiple Sclerosis Group's Trials Register and details of search strategies used to identify trials can be found in the 'Specialised Register' section within the Cochrane Multiple Sclerosis Group's [module](#).

The keywords used to search this review version are listed in [Appendix 1](#).

For search methods used in the previous version please see [Appendix 2](#) and [Appendix 3](#).

Additional databases searched by authors:

1. PEDro (January 1990 to February 2011);
2. Cochrane Occupational Health Field Database;
3. Clinical Trials.gov;
4. RehabTrials.org;
5. Controlled-trials.com;
6. ISI Science Citation Index (January 1981 to February 2011).

## Searching other resources

We also hand searched articles from the most relevant journals (including *Work* and *Journal of Vocational Rehabilitation*), liaised with experts, consulted reference lists of review articles and contacted trialists for unpublished data.

## Data collection and analysis

Two authors (FK, LN) will independently screen all abstracts and publications identified by the above search. Details of methods are as follows.

## Selection of studies

Two authors (FK, LN) independently screened all abstracts and titles of studies that were identified from the search strategy for inclusion and appropriateness, based on the selection criteria. Once all potentially appropriate studies were obtained each study was then assessed independently by the two reviewers for inclusion. If there was a difference of opinion then the third author (LTS) arbitrated.

Reviewers were not masked to the name(s), of the author(s), institution(s) or publication source at any level. This was in order that the reviewers could contact trialists for further details with respect to methodology, randomisation or the specific nature of VR interventions if required.

## Data extraction and management

Two reviewers (FK, LN) independently extracted data from each study that met the inclusion criteria. They contacted authors if there was insufficient data or any clarification was needed. If data was insufficient or unavailable then the study was reported but not included in the final analysis. All studies that met the inclusion criteria were summarized in the table of Included Studies in the Review Manager software (RevMan 4.1.1) to include details on design, participants, interventions and outcomes.

## Assessment of risk of bias in included studies

The methodological quality of the included studies in this review were independently assessed by two reviewers (FK, LN), using the methodological quality checklist for internal validity criteria proposed by [van Tulder 2003](#) ([Table 1](#)). These criteria have been used widely in a number of Cochrane reviews addressing rehabilitation ([Khan 2007](#); [Turner-Stokes 2005](#)).

The van Tulder ([van Tulder 2003](#)) methodological quality checklist consists of 11 criteria for assessing internal validity ([Table 1](#)). All items on this list have equal weight. Each item is scored at 2 points for 'Yes', 1 for 'Don't know', and 0 for 'No', and item scores summated to a single total score (range 0-22). Any disagreements regarding scoring were resolved by consensus between reviewers. Studies were considered to be of high methodological quality if the score is at least 50% - ie, 11 out of 22 for the criteria for internal validity. Studies were rated as low methodological quality if they achieved less than these scores. Studies with fatal flaws (drop out rates of 40%, statistically significant baseline differences not accounted for in the analysis) were excluded.

Two authors (FK, LN) independently assessed methodological quality and reached a consensus. Any disagreements were resolved by a third reviewer (LTS). The details of the operational definitions of the criteria list and scoring used in methodological quality assessments are given in [Table 2](#).

## Data synthesis

Qualitative synthesis of 'best evidence' was presented based on the levels of evidence proposed by [van Tulder 2003](#) as shown in [Table 3](#). Subgroup analysis was completed by type of VR program. We discussed the trial strengths and limitations, and identified gaps in our current knowledge and suggested future research directions. More detailed quantitative analysis was not possible due to clinical heterogeneity, diverse outcome measures and the limited number of studies identified. However, limited quantitative analysis was



attempted where possible to determine odds ratios (OD), risk ratios (RR) and risk difference (RD) for employment.

## RESULTS

### Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

Electronic and manual searches identified 1805 titles and abstracts in 2008. Of these, 29 studies passed the first screening review and were selected for closer scrutiny. A hand search of these articles excluded a further 24 articles. The main reasons for discarding these 24 were that these were not interventional studies. A recent updated search (February 2011) identified a further 984 titles and abstracts. Of these 19 studies were further scrutinised and all were discarded as they were either not interventional studies or the intervention involved did not relate to vocation or work. Hence no new studies were included.

As previously reported, of the five remaining studies selected for formal review, three were excluded by consensus between the two raters for the reasons shown in the [Characteristics of excluded studies](#), leaving just two trials that met the inclusion criteria.

The included studies were one RCT ([LaRocca 1996](#)) and one CCT ([Rumrill 1997](#)) ([Characteristics of included studies](#)). The two studies identified used two different comparisons in this review comparing employed and unemployed pwMS. Therefore, results cannot be compared and the studies will be listed accordingly and the results presented separately.

#### A) VR compared to minimal intervention (control) in employed pwMS (job-retention)

The study by [LaRocca 1996](#) evaluated VR in the form of specialised services geared toward job-retention for 43 participants who were employed at the start of the study. 'Specialist VR services' were compared with 'standard medical care' only.

The length of follow up in the study by [LaRocca 1996](#) was 1 year.

#### B) VR compared to minimal intervention (control) in unemployed pwMS (career re-entry)

[Rumrill 1998](#), on the other hand, compared two VR programs of different intensities geared towards career re-entry in 37 participants who were unemployed at the start of the study.

The length of follow up in the study by [Rumrill 1998](#) was much shorter at only 16 weeks.

Both of the included studies were conducted in the US and included specialist MS VR programs that supported job retention and job re entry for pwMS. No trials were identified that addressed the other two models ie general rehabilitation program including VR or a pan-disability VR program.

### Risk of bias in included studies

The methodological quality scores of the two included studies ([LaRocca 1996](#); [Rumrill 1998](#)) are provided in [Table 4](#). Both trials had similar scores of 9 out of a possible total of 22 and were rated as being of low methodological quality.

#### A) VR compared to minimal intervention (control) in employed pwMS (job-retention)

The trial by [LaRocca 1996](#) was randomised, but there was no blinding of participants, care providers or outcome assessor; there was no concealment of allocation. Two participants in the intervention group were lost to follow up and intention to treat was unspecified. However, this is unlikely to have altered overall results as the sample size was small. In addition, there was a significant difference in participant baseline characteristics as the control group had had a much longer duration of disease (10 years since diagnosis and 12.8 years of symptoms vs 5.1 years since diagnosis and 8.7 years of symptoms) than the intervention group.

#### B) VR compared to minimal intervention (control) in unemployed pwMS (career re-entry)

The controlled clinical trial by [Rumrill 1998](#) recruited a non-randomised convenience sample. It did not describe the drop out rate, and had a short duration of follow up (16 weeks).

The summary of key indicators for randomization, concealed allocation, intention to treat and blinding of outcome assessor are included in the [Characteristics of included studies](#).

### Effects of interventions

#### Participant characteristics:

There were a total of 80 (78 completers) participants in the two studies considered in this review. Details are presented in the [Characteristics of included studies](#).

#### A) VR compared to minimal intervention (control) in employed pwMS (job-retention)

In the study by [LaRocca 1996](#), all participants had a diagnosis of clinically definite or laboratory-supported definite MS (by the Poser criteria) ([Poser 1983](#)), and were employed outside the home for pay at least on a part-time basis (mean 37.8 hours a week). Most (75.6%) of the participants were female and mean age was 41.6 years. Mean years since the diagnosis of MS was 7.5 and most were well educated with 14.9 (mean) years of education.

#### B) VR compared to minimal intervention (control) in unemployed pwMS (career re-entry)

The participants in the study by [Rumrill 1998](#) also had MS but were all unemployed at the start of the study. Again, most (78.4%) of the participants were female and mean age was 43 years. Mean years since diagnosis of MS was 12 and most were well educated with an average of 14 years of education.

#### Study characteristics

The results of the 2 studies are shown in [Table 5](#)- Description of Results of Included Studies.



### A) VR compared to minimal intervention (control) in employed pwMS (job-retention)

The study by [LaRocca 1996](#) involved 43 employed pwMS and compared 'specialised VR services' with a group who received on 'standard care', which involved limited input (telephone follow-up only). The specialised services included hour-long interviews with a psychologist and an employment specialist medical counselling geared towards job retention for pwMS, with offers of free intervention as indicated.

- This study was conceptualized as a study of the feasibility of a job retention program rather than a study of the efficacy of such a program *per se*. Therefore, no power calculation was undertaken and, while job retention was examined as an outcome, greater attention was paid to the process of implementing the program, people's response to the program and what role the program may have played in their employment experiences.

- Perhaps unsurprisingly given the small size of the sample, there was no statistically significant difference between the two groups in job retention at the one -year follow-up.

- Despite their conclusion that vocational rehabilitation was feasible in this group, the authors highlighted important challenges in implementation. Generally, people in the study were not very interested in adopting a preventative attitude, and did not want to think about heading off future problems. Only one out of six who reported cognitive problems was willing to attend a free cognitive rehabilitation program offered by the centre. Many patients either had no problems, or did not wish to acknowledge or work on them until they had reached crisis stage. However once the crisis had arisen, it was often too late to take corrective action. Thus, although there may have been quite a long period during which job retention was in jeopardy, this was not always apparent. Instead, it would appear as if the pwMS had worked successfully and then suddenly 'fallen off a cliff' with little or no warning.

Based on these findings, the authors concluded that:

- Psychological and cognitive problems may have a greater impact on employment for this group than has hitherto been recognised.

- Early VR intervention programs based on aggressive action on employment problems were unlikely to be taken up

- Instead, early intervention to be geared towards familiarising pwMS with the types of problems they may encounter later (such as cognitive issues) and the possible sources of help to turn to when the need arises.

- Since most are likely to seek help only in crisis, interventions that are geared towards a rapid response are needed

They also noted that many people tend to drag themselves to work at the expense of their parts of their lives and provision should be made to support work withdrawal at an appropriate stage before breakdown occurs.

### B) VR compared to minimal intervention (control) in unemployed pwMS (career re-entry)

The study by [Rumrill 1998](#), on the other hand, recruited a small convenience sample of 37 participants who were unemployed at the start of the study. Two VR programs of different intensities were compared, both geared towards career re-entry

- The higher intensity (intervention group n=23) involved telephone interviews to establish vocational profiles, a half-day "Accommodations Planning Team" (APT) seminar and follow up telephone and in-person support,

- The "lower intensity" (control n=14) intervention was minimal and consisted of two telephone contacts and a packet of instructional information.

Seven of the high intensity and four of the low intensity intervention group re-entered the labour force. Thus for the two groups together there was a statistically significant effect, but there was no significant group interaction. There was no change in self-efficacy or 'Employability maturity' (an interview tool to assess readiness for work), and no group differences between these attributes or in job-seeking activity. The authors advocated a 'least intervention' principle as they felt that pwMS were likely their own 'best experts' on seeking and securing jobs in their chosen fields, given their experience and maturity.

#### Synthesis of best evidence

Due to the marked differences in approach and philosophy between the trials, it was not possible to pool data from the two studies.

### A) VR compared to minimal intervention (control) in employed pwMS (job-retention)

The best evidence synthesis from the one RCT of low methodological quality (43 participants) suggests:

- There is insufficient evidence that VR programs for employed pwMS changes the proportion of pwMS in part-time or full-time competitive employment ([LaRocca 1996](#)).

### B) VR compared to minimal intervention (control) in unemployed pwMS (career re-entry)

The best evidence synthesis from the one CCT of low methodological quality (37 participants) suggests:

- There is insufficient evidence that VR programs for unemployed pwMS alters the proportion of pwMS in part-time or full-time competitive employment ([Rumrill 1998](#)).

- There is insufficient evidence that VR programs for unemployed pwMS alters work ability (by improving participants' confidence in the accommodation request process (as assessed by accommodation self efficacy measure); or employability maturity or job seeking activity) ([Rumrill 1998](#)).

It was not possible to provide any evidence in either employed or unemployed pwMS for the following outcome measures due to lack of eligible studies.

- The change in proportions of persons in 'supported employment'.
- The rate of return to work in days of persons with MS.
- The change in proportion of persons with MS on disability pension.
- Costs of programs and cost effectiveness of return to work or employment.

### Quantitative analysis

The sample sizes in both studies are too small to draw any conclusions about probability of employment.

#### A) VR compared to minimal intervention (control) in employed pwMS (job-retention)

The [LaRocca 1996](#) study showed an OR of 0.86 (95% CI 0.05-14.77) for maintaining employment.

#### B) VR compared to minimal intervention (control) in unemployed pwMS (career re-entry)

The [Rumrill 1998](#) study showed an OR of 1.09 (95% CI 0.25-4.71) for finding employment.

## DISCUSSION

At the present time, no conclusive evidence to support VR programs (preventative or therapeutic, job retention or job re-entry) for employed and unemployed pwMS could be drawn due to a lack of relevant randomized and clinically controlled trials. The two trials that fulfilled the criteria for this review included specialist MS rehabilitation VR programs that respectively addressed job retention and job re entry for pwMS. Both were of low methodological quality, and both emanated from the United States, and so may have limited generalisability within other cultural settings. No new trials were identified from updated searches between 2008 and February 2011.

Because of the entirely different philosophy and design of the studies there was no opportunity for pooling of actual data. Our synthesis of best evidence found insufficient evidence for the effectiveness of VR programs in employed or unemployed pwMS. It was not possible to report outcomes of VR programs for the change in proportions of persons in supported employment or on disability pensions; nor on the cost of VR programs or the cost effectiveness of VR programs. Neither was there any data to support recommendations on the optimum intervention type, setting, duration or components of a VR program for pwMS. Limited quantitative analysis (odds ratios, risk ratios and risk difference) is presented. However, given the small sample sizes, it was difficult to come to any conclusions for maintaining or finding employment.

Whilst many people would not normally consider vocational rehabilitation to have adverse effects, a number of potential unwanted effects were uncovered.

- The study by [LaRocca 1996](#) highlighted that VR could identify cognitive issues which may lead to job loss at an earlier stage than if they were simply ignored, and thus the requirement for alternative options to be in place, especially alternative means of financial support, if Pandora's box is to be opened.

- They also noted the potential problem that supporting the individual to continue work against all odds may be to the detriment of other important quality of life issues, such as family relationships and leisure - so that supported withdrawal from work at the appropriate time may be just as important as job retention.

The review highlights a number of important issues for research in vocational rehabilitation in the context of MS and indeed other long-term neurological conditions.

1. Research in this area faces the same challenges as have been highlighted in previous reviews of MD rehabilitation ([Khan 2007](#); [Turner-Stokes 2005](#)). The conclusions that may be drawn from traditional experimental designs, such as controlled clinical trials, are compromised by relatively small numbers in the face of marked heterogeneity in populations, interventions and the outcome measurements that are most relevant to record.

2. The study by [LaRocca 1996](#) in particular highlights the practical problems of introducing vocational rehabilitation for pwMS in particular compliance and willingness to engage in the management of issues such as cognition, and potential adverse effects noted above. For recruitment to be successful and attrition avoided, mechanisms must be in place to provide longer-term vocational support after the end of the research period.

3. It was recognised at the outset that vocational rehabilitation is multi-faceted and includes a number of different approaches according to the needs of the individual, including job retention, work re-training, work re-entry/employment and work withdrawal at the appropriate time. The review has served to highlight further that these are distinct entities which cannot realistically be combined under one heading. Future reviews and secondary analyses are likely to need to divide studies under these separate headings, rather than attempt to coalesce them under the global term of vocational rehabilitation.

4. The primary outcomes selected for this review were the proportion of pwMS in competitive or supported employment. Whilst these have the benefit of being robust outcomes of intuitive clinical value, they are open to bias from external confounders, as a VR program may be successful in equipping the individual with the relevant work-related skills/ stamina etc, but jobs may simply not be available if the job market is saturated in that area and the available workforce exceeds the capacity available, or in the presence of other environmental contextual issues such as lack of suitable transport etc. For this

reason, vocational rehabilitation programs must work hand in hand with the relevant policy-makers to ensure that resources are available to support disabled employees in the workplace. In the meantime, there is a need to develop robust tools to measure work ability and support needs, and such tools are already under exploration (NSF 2005).

The WHO ICF (ICF 2001) provides a useful framework for describing and recording the various factors which may impact on an individual's ability to work.

Its multifaceted perspectives include:

- the physicians' view of management of complex and interacting symptoms and impairments that may impact on work in pwMS
- the therapists' views in terms of managing change in functional status in work related activities.
- the perspective of the pwMS, or the 'insider' who may have a somewhat different 'lived experience' - which is global and personal (Yorkston 2005).
- the various environmental factors interact with all these constructs, such as the physical, social and attitudinal environment in which people live and conduct their lives and the knowledge and attitudes of the public, employers and health professionals (Khan 2007a; Johnson 2004).
- the personal factors that can influence work include intrinsic influences or attributes of a person (such as self-efficacy and positive adaptation), as well as gender, education level, MS type and severity (Beatty 1995; Jongbloed 1996).

This model therefore can accommodate for severity of threats to working ability, be they the severity of the conditions itself and its functional limitations, or the result of contextual factors. The ICF model may therefore help to provide a common language for describing diversity in future research.

#### Limitations of this review

Conclusions from this review are limited by the small number of studies of poor methodological quality and diverse approaches to VR as described above. In addition, the authors recognise a number of limitations in the methodology of the review itself, and the completeness of our recovery of the relevant literature.

1. There may have been a degree of selection bias from the literature search (van Tulder 2003), given that our search strategy principally encompassed the cited literature, despite the extended range of terms that were used to capture the widest possible selection of the relevant literature.
2. Publication bias is well described, in that trials with positive results tend to be published in favour of those with negative

findings (Egger 1998). In this review, both of the trials included were essentially negative in that neither showed a significant interaction between the treatment and control groups for the primary outcome. Nevertheless, we cannot exclude the possibility that there have been other negative trials that have not reached the published literature.

3. Similarly, although our search strategy included searching of reference lists within the relevant papers for other possible articles missed in our electronic searches, reference bias (Goetzsche 1987) is a further possible confounder, in that authors, too, tend not to report findings that do not support their case for promoting the intervention in question.

We therefore welcome contacts from any readers who are aware of important high quality studies that would meet the criteria for this review, but are so far not included.

#### Summary and future research

In summary, the research evidence presented in this review neither supports nor refutes the effectiveness or cost-effectiveness of vocational rehabilitation for pwMS. However, it has served to highlight some important issues relating to research in this field, as well as some potential problems in service implementation. Contextual factors, including employment policy, transport and other social/environmental issues are critical to the success of VR programs, so that interventions require a multidisciplinary /multi-agency approach extending well beyond the normal boundaries of health and social care.

VR has the potential to provide a highly cost-effective approach to care for selected patients, but further research is needed to address the critical components of care and to identify those individuals most likely to benefit. Future studies should improve methodological rigour by using rigorous research designs. At the same time it must be recognised that experimental trial methodologies cannot address all the questions that need to be answered in long term conditions, and that alternative designs (such as longitudinal cohort studies) are required to assess the long term effects and, in particular the cost-implications and benefits of VR in this context. Improved methods for outcome evaluation are required, including the development and systematic application of appropriate outcome measures, and the use of standardised frameworks, such as the ICF to describe potential confounds such as severity of condition and contextual threats/barriers.

It is also important to acknowledge the particular challenges in VR research, including the issues of patient recruitment, compliance, follow up and attrition rates, as well as the threats to the individual of engaging in research that may have long term implications but is not subsequently followed by on-going support.

## AUTHORS' CONCLUSIONS

## Implications for practice

- VR interventions are multi-faceted and include a range of different dimensions including job retention, work re-training, work re-entry/employment and work withdrawal at the appropriate time. Individuals may require one or more of these interventions at different stages of their condition.

- Provision of VR for pwMS requires highly specialist knowledge. Treating health professionals need to be familiar with the complexity of MS; and the contextual and personal factors that may confound intervention if not appropriately addressed.

- Cognitive issues in particular are frequently underestimated.

- VR interventions should be proactive and timely, but at the same time they have the potential to leave pwMS unsupported if not adequately followed through - a holistic multi-disciplinary/multi-agency approach is required.

- Liaison with policy makers is imperative for government initiatives that encourage work focused VR programs.

## Implications for research

- Further research to evaluate VR programs is required, ideally in across international and boundaries so that the results reflect the effectiveness of interventions in a variety of different

political and social contexts, with varied employment rates and social welfare systems.

- Trials should involve robust methodology in a range of different study designs as appropriate to the research question.

- Future studies should address not only the effectiveness, but also cost effectiveness of VR programs, as well as the impact of return to work on mental and social outcomes need exploration.

- Further research is required to develop appropriate outcome measures to evaluate work ability.

- The ICF model of disability can be used to explore interactions of intrinsic and extrinsic factors on return to work and VR programs.

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\* Indicates the major publication for the study

## CHARACTERISTICS OF STUDIES

### Characteristics of included studies [author-defined order]

LaRocca 1996

Methods	<b>Randomisation</b> - yes <b>Outcome assessor blinding</b> - no <b>ITT</b> - no	
Participants	N = 43 N ( <b>completed study</b> ) = 41. Intervention: 23 (2 drop outs) Control: 20 (USA) <b>Inclusion criteria</b> Diagnosis of definite MS, employed outside the home for pay at least on a part-time basis; living within reasonable travel distance of the Center, no serious medical or psychiatric condition that could interfere with participation in the program, at risk for employment problems by self-report <b>Exclusion criteria</b> Not specified. <b>Gender</b> 24.4% male, 75.6% female <b>Age</b> mean age 41.6 (SD 9.6) years <b>Years since diagnosis</b> 7.5 (SD 6.3) years <b>Years of education</b> 14.9 (SD 2.4) years <b>Weekly hours worked</b> 37.8 (SD 4.7) years	
Interventions	<b>Intervention group</b> (N=23): Two-part program comprising (1) a medical/counselling component (1 hour interview with further counselling sessions as required by psychologist and neurologist involvement for management of MS symptomatology if necessary) and (2) an employment services component (1 hour evaluation by employment specialist with information provided, referrals (eg. to occupational therapist) when necessary and at least 1 follow up telephone call) <b>Control group</b> (N=20): Two telephone calls at 12-month interval, answering any questions raised but offering no additional services or referrals	
Outcomes	<b>Primary Outcomes:</b> Job retention, changes in employment <b>Other:</b> response to program, assessed needs, services offered and acceptance.	
Notes	2 participants in the intervention group could not be contacted at 1 year follow up and were discussed but not included in the statistics reported	
<b>Risk of bias</b>		
<b>Bias</b>	<b>Authors' judgement</b>	<b>Support for judgement</b>
Allocation concealment (selection bias)	High risk	
Blinding (performance bias and detection bias) All outcomes	High risk	
Incomplete outcome data (attrition bias) All outcomes	High risk	2 participants in the intervention group could not be contacted at 1 year follow up and were discussed but not included in the



		statistics reported
<b>Rumrill 1998</b>		
Methods	<b>Randomisation</b> - no <b>Outcome assessor blinding</b> - no <b>ITT</b> - no	
Participants	<b>N</b> = 37 <b>N (completed study)</b> = 37. Intervention: 23 Control: 14 (USA) <b>Inclusion criteria</b> Diagnosis of MS, unemployment <b>Exclusion criteria</b> Not specified. <b>Gender</b> 21.6% male, 78.4% female <b>Age</b> mean age 43 years <b>Years since diagnosis</b> mean 12 years <b>Years of education</b> 14 years (No SD reported for age or years since diagnosis).	
Interventions	<b>Intervention group</b> (N=23): (1) Telephone structured interview to establish vocational profile. (2) Matching of each participant with a local employer in his or her chosen field and a vocational rehabilitation counsellor into a three-person team that then attended half-day "Accommodations Planning Team" seminars. Seminars were guided by experienced facilitators and designed to (a) establish resource networks and job leads (b) strengthen interview skills (c) consider participant need for reasonable accommodations (d) understand rights to non-discriminatory employment practices under Title I of the American Disabilities Act (ADA) (e) formulate goal-directed placement plans. ( Seminars included simulated interviews, in depth analyses of the local labour market, role plays in which participants practiced requesting reasonable accommodations from employers and public statements from each team's members detailing how they would assist the participant after the seminar in obtaining employment. (3) telephone and in-person follow up support <b>Control group</b> (N=14): Two telephone calls and a packet of instructional information	
Outcomes	<b>Primary Outcomes:</b> Employment status <b>Other:</b> Accommodation self-efficacy measure, employability maturity interview, job seeking activity, participant evaluations	
Notes	Limitations of this study included the small size and convenience nature of the sample, the time-sampling method of assignment to groups, the absence of a true control group and the relatively short (16 weeks) follow-up period	
<b>Risk of bias</b>		
<b>Bias</b>	<b>Authors' judgement</b>	<b>Support for judgement</b>
Random sequence generation (selection bias)	High risk	
Allocation concealment (selection bias)	High risk	

**Rumrill 1998** (Continued)

Blinding (performance bias and detection bias) All outcomes	High risk	
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**Characteristics of excluded studies** [ordered by study ID]

Study	Reason for exclusion
Lee 2005	No control group
Roessler 1997	No control group
Rumrill 1997	Details of MS subgroup not provided

## DATA AND ANALYSES

### Comparison 1. VR of high intensity versus VR of low intensity

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Rate of Employment	1	37	Odds Ratio (M-H, Random, 95% CI)	1.09 [0.25, 4.71]

### Comparison 2. VR vs minimal intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Rate of Unemployment	1	43	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.06, 13.02]

## ADDITIONAL TABLES

Table 1. Methodological Criteria List (van Tulder 2003)

A. Was the method of randomization adequate?
B. Was the treatment allocation concealed?
C. Were the groups similar at baseline regarding the most important prognostic indicators?
D. Was the patient blinded to the intervention?
E. Was the care provider blinded to the intervention?
F. Was the outcome assessor blinded to the intervention?
G. Were co-interventions avoided or similar?
H. Was compliance acceptable in all groups?
I. Was the drop out rate described and acceptable?
J. Was the timing of the outcome assessment in all groups similar?
K. Did the analysis include an intention to treat analysis?

**Table 2. Operational definitions and Scoring of the Methodological criteria list: (score: yes=2, don't know=1, no= 0)**

A. Method of randomization was positively scored if a random assignment sequence was used (computer generated random table number and/or use of opaque sealed envelopes)
B. Concealment of treatment allocation was scored positively where an independent person generated the assignment and was not responsible for determining eligibility of the patients. A central randomization scheme involved numbered or coded containers such as on-site computer systems that provided allocation in locked unreadable files accessible only after inputting the characteristics of an enrolled participant and sequentially numbered sealed opaque envelopes. If concealment of treatment allocation was described only as randomized, it was considered unclear
C. To get a positive score the groups had to be similar at baseline (regarding demographic factors, duration and severity of complaints, percentage of patients with neurologic symptoms and value of main outcome measures)
D. The reviewer determines if enough information about blinding is given to score a 'yes'
E. The reviewer determines if enough information about blinding is given to score a 'yes'
F. The reviewer determines if enough information about blinding is given to score a 'yes'
G. Co-interventions should either be avoided in the trial design or should be similar between index and control groups to score a 'yes'
H. The reviewer determines if the compliance to the interventions is acceptable, based on reported intensity, duration and number of sessions for both index intervention and control intervention, to score a 'yes'
I. The number of participants who were included in the study but did not complete the observation period or were not included in the analysis must be described and reasons given. If the percentage of withdrawals and drop outs does not exceed 20% for short term follow-up and 30% for long term follow-up and does not led to a substantial bias, a 'yes' is scored
J. Timing of outcome assessment should be identical for all intervention groups and for all important outcome assessments to score a 'yes'
K. All randomized patients are analysed in the group they were allocated to by randomization, for the most important moment of effect measurement (minus missing values) irrespective of non- compliance and co-interventions to score a 'yes'

**Table 3. Method for synthesis of best evidence (based on van Tulder 2003)**

Strong evidence: provided by consistent, statistically significant findings in outcome measures in at least two high quality RCTs
Moderate evidence: provided by consistent, statistically significant findings in outcome measures in at least one high quality RCT and at least one low quality RCT or a high quality CCT
Limited evidence: provided by statistically significant findings in outcome measures in at least one high quality RCT; or provided by consistent, statistically significant findings in outcome measures in at least two high quality CCTs (in the absence of high quality RCTs)

**Table 3. Method for synthesis of best evidence (based on van Tulder 2003) (Continued)**

Indicative evidence: provided by statistically significant findings in outcome and or process measures in at least one high quality CCT or low quality RCT (in the absence of high quality RCTs)
No/ insufficient evidence: Results of eligible studies do not meet the criteria for one of the above stated levels of evidence; or no eligible studies
Conflicting evidence: (statistically significant positive and statistically significant negative) results among RCTs and CCTs; or no eligible studies

**Table 4. Methodological Quality of Included Studies**

Criteria	Study ID: LaRocca 1996	Study ID: Rumrill 1998
A. Randomization	Yes = 2	No = 0
B. Allocation Concealment	No = 0	No = 0
C. Baseline characteristics similar	No = 0 (significant difference between yrs of education and yrs since diagnosis)	Unclear = 1
D. Patient blinded	No = 0	No = 0
E. Care provider blinded	No = 0	No = 0
F. Outcome assessor blinded	No = 0	No = 0
G. Co-interventions avoided or similar	Yes = 2	Yes = 2
H. Compliance acceptable	Inadequate = 1 (compliance good on specific, inexpensive, short term recommendations but not on recommendations targeting the more complex problems)	Yes = 2
I. Drop out rate described and acceptable	Yes = 2	Yes = 1 (acceptable but not described)
J. Timing of the outcome assessment similar	Yes = 2	Yes = 2
K. Intention to treat	No = 0	No (not mentioned but no drop outs)= 1
<b>Total Score</b>	<b>9</b>	<b>9</b>

Table 5. Description of Results of Included Studies

A) VR compared to minimal intervention (control) in employed pwMS (job-retention)	LaRocca 1996 (Low Quality)
Assessment points	Baseline, 12 months
Statistical tests	$\chi^2$ analysis
Summary of Results	<p><b>Job retention:</b>            No statistically significant differences between groups.            Unemployment : 1 person in each group.            Intervention group: 3 persons on sick leave at entry to the program assumed permanent unemployed status by 12 months.            Intervention group: 1 person working part-time at entry was working full-time at the 12 month follow-up</p> <p><b>Changes in employment:</b></p> <p><b>A) Job change</b>            Intervention group: 1 person changed jobs (none in control group)</p> <p><b>B) Significant change in their duties</b>            Intervention group: 3 had some significant change in their duties (2 in the control group)</p> <p><b>C) MS Disclosure</b>            Intervention group : 2 persons had not disclosed their MS at entry but did at 12 month follow-up</p> <p><b>D) New Work accommodation</b>            Intervention group: 4 persons (3 in the control group).</p> <p><b>E) Impact of work intervention</b>            Both groups: 6 noted impact of the interventions in their workplace</p>
Author's conclusions	A combined medical-community job-retention program is feasible in MS. However, patients do not generally wish to take advantage of job-retention services until an employment crisis develops. Future programs should develop more effective approaches to early intervention to realize their maximum potential
B) VR compared to minimal intervention (control) in unemployed pwMS (career re-entry)	Rumrill 1998 (Low Quality)
Assessment points	Baseline, 16 weeks
Statistical tests	ANOVA
Summary of Results	<p><b>Employment</b>            Both the intervention group and the control group significantly improved employment status. Both interventions appeared equally effective</p>

**Table 5. Description of Results of Included Studies** (Continued)

	<p>Intervention group Pre 0 vs post 7 (intervention group) (SD 0.47)  Control group Pre 0 vs post 4 (control group) (SD 0.47)  Pre-vs post test effect for time (employment status for all participants) <math>F_{1,35} = 13.73</math>, <math>p = 0.001</math>  Pre-vs post test effect for group membership (intervention group pre-test/post-test means vs control group pre-test/post-test means) <math>F_{1,35} = 0.01</math>, <math>p = 0.91</math>  Pre-vs post test interaction effect (Intervention group gain scores vs Control group gain scores) <math>F_{1,35} = 0.01</math>, <math>p = 0.91</math>  <b>Secondary outcomes</b>  <b>A) Accommodation self-efficacy measure:</b> Neither intervention impacted on accommodation self-efficacy significantly, nor was either intervention more effective than the other in improving participants' confidence in the accommodation request process  Intervention group Pre Mean 58.3 (SD10.95) vs post mean 57.57 (SD12.31)  Control group Pre mean 53.21(SD 10.14) vs post mean 54.21 (SD 14.58)  Pre-test vs post-test for time <math>F_{1,35} = 0.00</math>, <math>p = 0.95</math>  Pre-vs post test effect for group membership <math>F_{1,35} = 1.48</math>, <math>p = 0.23</math>  Pre-vs post test interaction effect <math>F_{1,35} = 0.17</math>, <math>p = 0.68</math>  <b>B) Employability maturity interview:</b> There was no between-group or within-group impact on employability maturity  Intervention group Pre Mean 15.30 (SD3.31, range 0-22) vs post mean 15.22 (SD 3.04)  Control group Pre mean 12.36 (SD 4.36) vs post mean 13.93 (SD 4.25)  Pre-test vs post-test effect for time <math>F_{1,35} = 1.64</math>, <math>p = 0.21</math>  Pre-test vs post-test effect for group membership <math>F_{1,35} = 3.78</math>, <math>p = 0.06</math>  Pre-test vs post-test interaction effect <math>F_{1,35} = 2.05</math>, <math>p = 0.16</math>  <b>C) Job seeking activity</b>  Both groups appeared similarly active following the respective interventions with no significant between-group difference in the numbers of job applications obtained (1.48 SD 3.12 vs 2.00 SD 3.16, <math>t = -0.49</math>) and completed (1.35 SD 3.13 vs 1.43 SD 3.22, <math>t = 0.07</math>), employers contacted (1.91 SD 3.53 vs 3.54 SD 7.82, <math>t = -0.55</math>) and job interviews scheduled (0.83 SD 1.64 vs 0.86 SD 1.51, <math>t = -0.06</math>) and attended (0.78 SD 1.65 vs 0.79 SD 0.31, <math>t = -0.01</math>)</p>
<p><b>Author's conclusions</b></p>	<p>The effects of the two job placement strategies are such that at 16 week follow up, a statistically significant number (11 of 37) of participants (all of whom were unemployed at the inception of the project) had re-entered the labour force and both strategies appeared equally effective</p>



## WHAT'S NEW

Last assessed as up-to-date: 17 March 2011.

Date	Event	Description
17 March 2011	New search has been performed	Search updated to February 2011. No new trials that fit the inclusion (or exclusion) criteria identified. Hence neither results nor conclusion have changed

## HISTORY

Protocol first published: Issue 1, 2009

Review first published: Issue 1, 2009

## CONTRIBUTIONS OF AUTHORS

Fary Khan is the main author and has been heavily involved with all aspects of the review.

Louisa Ng assisted with the methodology and searches and was involved with other aspects of the review.

Lynne Turner-Stokes assisted with overall design and especially the discussion aspect of the review.

## DECLARATIONS OF INTEREST

None known.

## SOURCES OF SUPPORT

### Internal sources

- Department of Rehabilitation Medicine, Royal Park Campus, Royal Melbourne Hospital Melbourne, Australia.

### External sources

- None, Not specified.

## **INDEX TERMS**

### **Medical Subject Headings (MeSH)**

\*Employment; \*Rehabilitation, Vocational; Controlled Clinical Trials as Topic; Multiple Sclerosis [\*rehabilitation]; Program Evaluation; Randomized Controlled Trials as Topic

### **MeSH check words**

Humans