Systematic Review on Multiple Sclerosis

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Systematic Review Question

What is the effectiveness of interventions within the scope of occupational therapy practice for persons with Multiple Sclerosis?

Additions to MS Search Strategy

• Articles included:
  – January 2003 to May 2011

Search results

• Initial screening yielded a total of 3484 titles and abstracts
• 70 Articles relevant to the research question were included:
  – Level I – 43
  – Level II – 13
  – Level III – 14
  – Level IV – 0
  – Level V - 0

Themes of evidence

• Integrated Rehabilitation Programs
• Fatigue Management Programs
• Health Promotion Programs
• Client Factors and Performance Skill:
  – Cognition
  – Emotional Regulations
  – Motor and Praxis Skills
    • Exercise
    • Motor training

Integrated Rehabilitation Program

• Sixteen studies were categorized into this theme:
  – Inpatient rehabilitation program
    • 2 Level I and 3 Level III
  – Outpatient rehabilitation program
    • 1 Level I and 1 Level II
  – Home-based program
    • 1 Level I, 1 Level II, and 1 Level III
  – Rehabilitation program in a variety of settings
    • 2 Level I
  – Vocational rehabilitation
    • 1 Level I
  – Functional mobility
    • 2 Level I and 1 Level II
Integrated Program: Inpatient Rehabilitation

  - Level III, N = 193
  - The greatest improvement were in ADLs
  - Participants may benefit from self-care skill training directly compared to therapeutic exercise
  - Increasing OT intensity was positively associated with the improvement of ADL performance.

- Strong evidence that MS patients may benefit from the individualized and goal-oriented multidisciplinary rehabilitation program (MDR) in improvement of functional status, motor function, self-perceived quality of life, MS related disability.
  - Total sample size across studies: N=538

Integrated Program: Inpatient Rehabilitation

- OT’s role in MDR:
  - Maintaining use of upper extremities for ADL
  - Enhancing communication skills and attention span
  - Providing adapted equipment
  - Fatigue and stress management

Integrated Program: Inpatient or Outpatient Rehabilitation

- Khan et al, 2008 (Level I):
  - MDR had short term effect on the levels of activity but not participation.
  - Significant improvements in FIM scores: transfers, locomotion, and self-care.
  - Low intensity outpatient and home based MDR provided strong evidence for longer term improvement in quality of life

Integrated Program: Home-based Rehabilitation

- Inconsistent evidence supports the use of telerehabilitation program in home based setting.
  - 12-week telerehabilitation program (HAT) was effective in improving balance and walking ability (Finkelstein et al, 2008, Level III)
  - No significant differences between usual care and a one-month home based telerehabilitation system (HCAAD) in grasping, gross movement, and finger dexterity (Huijen et al, 2008, Level I)

Rehabilitation Program: Vocational Rehabilitation

- Systematic Literature Review (Khan et al, 2011, Level I)
- No conclusive statements could be drawn for vocational rehabilitation
  - the diversity of target population, aim of intervention, and the small number of studies included
## Rehabilitation Program: Functional Mobility
- Insufficient evidence supports the use of assistive technology
  - Both static and dynamic AFOs helped improve static balance (Cattaneo et al., 2002, N = 14, Level II)
  - A combination of an AFO and external FES had significant improvement in performance and satisfaction of COPM (Esnouf et al., 2010, N = 64, Level I)
  - Exercise training on core stability had significant improvement in satisfaction of COPM (Esnouf et al., 2010, N = 64, Level I)

## Fatigue Management: Face-to-Face
- 3 Level I and 1 Level II included
- **Fatigue: Take Control** (Hugos et al., 2010, N = 30, Level I)
  - Included multiple strategies for managing fatigue
  - Immediate effect only
    - Significant improvement in fatigue impact and self-efficacy
    - No significant improvement in fatigue severity was observed

## Fatigue Management: Face-to-Face
- **Managing Fatigue Course** (Mathiowetz et al., 2005, N = 169, Level I; Mathiowetz et al., 2007, N = 169, Level I; Sauter et al., 2008, N = 32, Level II)
  - First proposed by Packer et al. (1995)
  - Short term efficacy (immediately post-course)
    - Reduction of fatigue impact
    - Improved some aspects of quality of life
    - Improved self-efficacy
  - Long term efficacy (1 year post-course)
    - Beneficial effects of the course were maintained for both outcomes

## Fatigue Management: Long distance
- 1 Level I and 2 Level III studies were included
- Online fatigue self-management program (Ghahari et al., 2010, N = 95 (74 MS), Level I)
  - Adapted from Managing Fatigue program
  - After intervention,
    - Significant improvement in fatigue impact
    - Fatigue self-management group had no better improvement than the information-only group

## Fatigue Management: Long distance
- Teleconference delivered energy conservation program (Finlayson, 2005, N = 29, Level III; Finlayson et al., 2007, N = 29, Level III)
  - Adapted from Managing Fatigue program
  - Immediate effect
    - Significant reduction in fatigue severity, fatigue impact, and increase quality of life (bodily pain and general health)
  - Strength
    - Social support and normalization, quality and usefulness of the resources, comfort and confidence with the format (participants)
    - Power of peers and value of repetition (therapists)
  - Limitation
    - Logistics and time (both participants and therapists)
    - Diverse needs of participants (participants)

## Health Promotion Program
- 3 Level I studies were included
- Individualized physical rehabilitation (IPR) vs. group wellness intervention (GWI) (Plow et al., 2009, N = 42, Level I)
  - Significant improvement in health and physical activity in both groups
  - IPR: more in reducing fatigue impact and impeding the decline of physical health
  - GWI: better in improvement of mental health
Health Promotion Program

- 12-week motivational interviewing based telephone counseling (Bombardier et al, 2008, N = 130, Level I)
  - Significant improvement in physical activity, spiritual growth, and stress management
  - Significant improvement in self-reported minutes of exercise per week
  - No significant finding in fatigue.

Health Promotion Program

- Health promotion education program (OPTIMISE) (Ennis et al, 2006, N = 62, Level I)
  - Significant improvements found in the intervention group were health responsibility, physical activity, spiritual growth, and stress management
  - Beneficial effects were maintained 3 month post-intervention

Performance Skills

Emotional Regulations

- 5 Level I and 1 Level II studies were included


- MS patients may benefit from the combination of education, multidisciplinary program, goal setting, homework assignments, and discussion forums (Malcomson et al, 2007)

Performance Skills

Motor and Praxis: Exercise

- 14 Level I, 2 Level II, and 7 Level III studies were included
- Exercise types:
  - Physical activity
  - Aerobic exercise
  - Resistance training
  - Yoga

- Targeted population:
  - Persons with mild to moderate MS
- Aerobic exercise was the most common type.
- No exacerbation of MS related symptom was reported secondary to exercise programs
- Effect sizes for body function, activity, and quality of life varied greatly (Asano et al, 2009, Level I systematic review)
Performance Skills
Motor and Praxis: Exercise

- Immediate or short term effect of exercise
  - Improved Walking performance
    - Geddes et al., 2009, N = 12, Level I; Pere, 2007, N = 36, Level III; Freeman et al., 2004, N = 10, Level III; Romberg et al., 2004, N = 114, Level II
  - Improved Physical fitness and mood
    - Calc et al., 2010, N=45, Level I; De Souza-Torresia et al., 2009, N = 13, Level III; Fragoo et al., N = 10, Level I; Rietberg et al., 2007, N = 23, Level I; Rietberg et al., 2004, Level I; Schulz et al., 2004, N = 39, Level I; White et al., 2004, N = 8, Level III
  - Improved Quality of life
    - Roehrs et al., 2004, N = 31, Level III; Schulz et al., 2004

Performance Skills
Motor and Praxis: Exercise

- Some evidence for aerobic exercise and/or strength training decreased fatigue impact but not disability (Velikonja et al., 2010, N=20, Level I; Freeman et al., 2004, N=10, Level III; McCullagh et al., 2008, N=30, Level I; White et al., 2004, N=8, Level III)

- Limited evidence for long-term effects of exercise (McCullagh et al., 2008, N=30, Level I)

Performance Skills: Cognition

- Limited evidence for attention training
- Beneficial effect on computer-based training program
  - On information processing/attention and decision making (Flavia et al., 2009, N = 20, Level II)
  - Phonemic retrieval (Solari et al, 2004, N = 77, Level I)
- Long-term efficacy on cognitive function remained unclear

Performance Skills
Motor and Praxis: Exercise

- Yoga was beneficial for selective attention ability but not for mood, spasticity, or executive functions (Velikonja et al., 2010, N=20, Level I)
- Pilates-based group exercise program showed improvements in balance, walking performance, physical component and motor component of fatigue impact (Freeman & Allison, 2004)
- Men and women with MS benefitted equally from aerobic and strengthening exercises (Suraika et al., 2004, N = 95, Level I)
- Some evidence for unloaded leg cycling exercise to reduce MS related spasticity and pain (Scarriff et al., 2009, N = 22, Level II)

Performance Skills: Motor Training

- Improvement on Balance performance:
  - Balance-based torso weighting improved balance (Wolters et al., 2009, N = 38, Level I)
  - Balance retraining aiming at motor and sensory strategies improved static balance (Cattaneo et al., 2007, N = 30, Level I)
- Improvement on Upper extremity motor function:
  - Constraint-induced movement therapy improved amount of use (Mark et al., 2008, N = 5, Level III)
  - Robot-based rehabilitation protocol reduced duration of tracking movement and improve smoothness of the trajectory. (Carpenella et al., 2009, N = 16, Level I)
  - MS patient with ataxia may benefit from PT, but the benefits were not sustained (Wills et al, 2007, Level I systematic review)

Performance Skills: Cognition

- Limited evidence supports the efficacy of memory training
  - Healthy participants benefitted more at immediate recall with self-generation strategy whereas MS patients benefitted more at 4-week recall (Goverover et al, 2008, N = 38, Level II)
  - General memory, visual working memory, and verbal auditory working memory (Skall et al, 2010, N = 107, Level II)
- MS patients benefitted from spaced learning at the immediate and 30 minutes delayed recall (Goverover et al, 2010, N = 38, Level II)
### Performance Skills: Cognition

- No positive effects in maintenance and long term (5 weeks) efficacy of the Story Memory Technique for MS participants (Chiaravalloti et al, 2005)

- Higher repetition had poorer recall ability across learning trials in healthy and MS participants (Chiaravalloti et al, 2003, N = 84, Level II)

- Pure treatment effect of 6-week non specific homework-based cognitive training program could not be determined (Brenk et al, 2008, N = 41, Level II)

### Limitations

- Overall
  - Insufficient studies with strong methodology
  - Inconsistent outcome measures across studies
  - Potential publication bias if non-significant findings are not published

- Individual studies
  - Small sample size
  - High attrition rates
  - Lack of a control group
  - Lack of short- and long-term follow-up assessments
  - Presence of co-intervention
  - Mixed types of MS or other neurological conditions
  - Unreported reliability and validity of outcome measures
  - Difficult to determine OTs unique contribution in MDR

### Implications Clinical and community-based

- MS patients benefit more from intervention addressing functional performance, participation, and symptom management

- Interventions executed in settings with the presence of professionals, such as inpatient and outpatient programs, had better results compared to those settings without, such as home-based exercise program

### Implications Clinical and community-based

- Fatigue management:
  - Conducted independent of other rehabilitation services
  - Provide clearer evidence of the benefits of OT
  - Beneficial effects on reduction of fatigue impact and improvement of quality of life
  - Stronger evidence supports group management course delivered in face-to-face format
  - Weaker evidence supports teleconference and online formats
  - No study provides evidence of the efficacy of fatigue management in the individual format

- OT could have a role in development of wellness/health promotion programs

### Implications Clinical and community-based

- Positive evidence for impairment level focused studies

  - Immediate but not long-term effects were observed

  - OT interventions should foster clients’ active learning and engagement in those chosen occupations

### Implications Clinical and community-based

- Positive evidence for impairment level focused studies

  - Aerobic exercise (cycling and aquatic therapy), resistance and stretching exercises, and yoga studies revealed improvements in endurance and muscle strength

  - Although beneficial effect of cognitive retraining, it is unknown whether the results of these studies on memory and attention can be generalized to problem solving in the real world
### Implications

**Clinical and community-based**

- Positive evidence for **impairment level** focused studies
  - CBT based psychological interventions are beneficial for reduction of depression
  - There is a need to evaluate activity-based intervention effects on psychological variables

**Program Development**

- Community-based settings
  - Developing programs that help persons with MS engage in wellness program, physical activity, and fatigue management
- Clinic
  - Contribute to improving MDR
  - Incorporate activity-based intervention strategies
- Both clinic and community-based OT practitioners
  - Developing programs addressing balance among person, occupation, and environment systems

**Education and Training of OT students**

- Evidence-based findings regarding factors influencing health and well-being of persons with MS
- Fatigue management and development of physical activity and wellness programs in curricula
- Fieldwork serving persons with MS in community-based programs will benefit future OT practitioners entering the workforce

**Research**

- Need more OT researchers evaluating OT interventions for persons with MS
- Need to evaluate both short-term and long-term efficacy of OT interventions
- Need to evaluate effects of OT interventions on the activity and participation level
- OT needs to be involved in design of MDR programs
- Comparison of group vs. individual formats for fatigue management.
- Comparison of distance vs. in-person formats for fatigue management