

APPENDIX

Table. Summary of articles providing level of evidence (LOE) on mobility assistive technology use and persons with multiple sclerosis (MS).

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
Ambrosio et al. (2004) [1]	Examine relationship between type of mobility device used & social participation in persons with MS.	19 individuals with MS aged 18–65.	Questionnaire	Individuals who are nonambulatory & have manual & power wheelchairs available have highest activity level. Ultimate prescription of AT should allow users to re-engage in activities they value.	Observational; LOE = IV
Ambrosio et al. (2007) [2]	Investigate demographic differences between veterans with MS & veterans with SCI who were issued wheelchair by VHA & describe differences in mobility device prescription.	2 VHA databases.	NA	Veterans with MS were significantly less likely than veterans with SCI to receive higher quality wheelchairs (manual or power).	Observational; LOE = IV
Aronson (1997) [3]	Describe satisfaction with QOL & determine relationships between QOL as a whole & other factors, e.g., demographic characteristics & physical disability measures.	697 individuals with MS.	Questionnaire	Health received lowest satisfaction rating. Poorer QOL was associated with unemployment, moderate or worse MS symptoms, fatigue, mobility limitations on stairs, disease course other than stable, & social activities.	Observational; LOE = IV
Baum & Rothschild (1983) [4]	Examine mobility restriction among individuals with MS & its relationship to selected disease & demographic characteristics.	Individuals in National MS Survey database.	NA	>1/2 of individuals reported needing indoor & outdoor assistance. Longer duration, older age at 1st diagnosis, admitted awareness of diagnosis, currently unmarried, non-white, & "probable" MS diagnostic code were significant factors increasing percentage needing assistance. Most individuals relied on wheelchair or another person's assistance. Few individuals relied on crutches or leg braces.	Observational; LOE = IV
Blake & Bodine (2002) [5]	(1) Review impairments & associated activity limitations & participation restrictions of persons with MS, (2) provide overview of high- & low-technology AT appropriate for persons with MS, (3) discuss funding opportunities for AT, (4) review current studies of AT used for person with MS & discuss future research directions, & (5) consider AT as intervention for	NA for systematic review.	NA	Constellations of impairments are seen during lifetime with MS. Paucity of research on MS AT use. MS Society of Canada survey (427 respondents) indicate 61% used manual wheelchair, 44% other mobility aids, 39% walkers, 15% scooters, 8% electric wheelchairs, & 7% orthotics. Proper seating & positioning needed. "Service" needs to be incorporated as component of AT process. Funding for AT is biggest obstacles because of progressive nature of MS.	Systematic review; LOE = V

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
	disability prevention.			Identified need for AT outcomes research.	
Boss & Finlayson (2006) [6]	Develop understanding of family members' reactions to acquisition of power mobility by persons with MS from perspectives of end users and their family members.	Participants with MS who use power mobility devices.	Semistructured interviews	Important that family members & patients understand & agree on acquisition of power mobility device. Success in this process will determine positive use of device chosen.	Descriptive; LOE = IV
Buning et al. (2001) [7]	Describe transition from manual to powered mobility and its influence on occupational performance & feelings of competence, adaptability, & self-esteem.	Convenient sample of 8 individuals with static & progressive conditions.	Occupational Performance History Interview & Psychosocial Impact of Assistive Device Scale used to measure participants' perceptions of impact of powered mobility device on their competence, adaptability, & self-esteem.	Significant improvement in occupational performance was shown after introduction of powered mobility device. Psychosocial Impact of Assistive Device Scale showed positive impact of 2 or greater for 75% of participants on 19/26 items.	Repeated measures intervention; LOE = V
Cattaneo et al. (2002) [8]	Quantify fall risk among patients with MS and report importance of variables associated with falls.	50 people with MS divided in two groups according to their reports of falls.	NA	Variables pertaining to balance skills, gait impairment, & cane use differed between faller & nonfaller groups, & incidence of those variables can be used as predictive model to quantify fall risk in patients with MS. Findings emphasize multifactorial nature of falls in this patient population.	Retrospective case-control with two-group sample of convenience; LOE = V
Craddock & McCormack (2002) [9]	Outline development of AT service delivery model and suggest client-centered approach.	NA	NA	Success of service-delivery program requires client-centered focus.	Systematic review; LOE = V
Ding et al. (2007) [10]	Examine how individuals use power wheelchair seating functions such as tilt, backrest recline, & seat elevation during typical daily activities using SFDL.	11 power wheelchair users with tilt, recline, &/or seat elevator (6 males & 5 females).	1st visit to collect demographic information of subjects & their wheelchairs & pressure mapping in different positions. 10-14 data collection. Midvisit to check sensor placement, download data, & replace battery. Final visit to return SFDL & complete brief questionnaire.	Subjects did not use large angles of tilt & recline as much as clinicians recommend, they used those features frequently & thus had lower peak pressures.	LOE = III

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
Devitt et al. (2003) [11]	Investigate impact of wheelchair use on QOL of persons with MS.	16 wheelchair users with MS.	NA	13 participants rated wheelchair as extremely important to their life, with high satisfaction. Participants who were independent with propulsion had average higher satisfaction than those requiring someone to push their wheelchair. Tilt & power mobility positively affect QOL. These options allow participants to stay longer in their chairs, conserve energy, access various environments, and participate in more occupations during day.	Descriptive; LOE = IV
Dewey et al. (2004) [12]	Compare experiences of tilt-in-space wheelchair use & conventional wheelchair use in individuals with MS.	7 individuals with MS using tilt-in-space wheelchair & 16 individuals with MS using conventional wheelchair.	NA	Fatigue was symptom reported. 5/7 participants who used tilt-in-space wheelchair said that they could rest comfortably in chair during day without having to return to bed or transfer to static chair. 1/2 conventional wheelchair group described their chair as uncomfortable. 4/7 in tilt-in-space group reported difficulty with size of & maneuverability their chair in home compared with 4/16 in conventional wheelchair group.	Descriptive/qualitative; LOE = IV
Doerksen et al. (2007) [13]	Examine association between features in built environment with self-report & objectively measured physical activity behavior.	196 participants returned questionnaires.	Questionnaire	Aspects of built environment influence health status & behavior among people with MS.	Observational; LOE = IV
Fay & Boninger (2002) [14]	Review literature on mobility devices in MS & examine how they can be used in degenerative disorders such as MS.	NA	NA	Within 15 yr of onset, 50% of individuals with MS will require assistance with walking. Clinicians should be mindful of clinical history of clients with MS. Canes may be simple but effective solution for people with MS with ataxia & weakness.	Observational; LOE = IV
Finlayson et al. (1998) [15]	Gather information on demographic, health, social, & financial characteristics of persons with MS nationwide in Canada.	~400 people with MS responded.	Survey-based	Performance limitation was found to vary according to each person's occupation but fatigue level did not.	Observational; LOE = IV

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
Finlayson et al. (2001) [16]	Describe types of assistive devices in possession of persons with MS & identify factors that best predicted probability of possessing these devices.	906 individuals with MS from anonymous mail survey of members of MS Society of Canada (Atlantic Division).	Secondary analysis using frequency distributions & logistic regression of existing cross-sectional data.	Mobility aids & grab bars were most commonly reported assistive devices. Seeing occupational therapist, working, having progressive type of MS, having more activity limitations & symptoms, & having MS for longer were found to increase probability of possessing assistive devices.	Secondary analysis; LOE = V
Finlayson & Van Denend (2003) [17]	Develop understanding of experience & meaning of mobility among older adults with MS.	27 participants with MS (mean age 62 yr).	Questionnaire-based	Overall, participants showed concern about mobility loss, becoming burden to caregivers, & moving to nursing home in future.	Retrospective design with secondary analysis; LOE = IV
Finlayson (2004) [18]	Describe health-related concerns & service needs of adults with MS.	27 individuals with MS aged 55–81 yr.	Questionnaire-based	Fear of future was predominant concern among participants. Within this fear, participants expressed particular concerns about experiencing further losses of mobility & independence, becoming burden on caregivers, & having to move to nursing home.	Phenomenological approach; LOE = IV
Finlayson et al. (2006) [19]	Identify factors associated with increased likelihood of reporting fear of falling among people with MS.	1,064 individuals with MS, aged 45–90 living in mid-western United States.	Telephone interview	63.5% of participants reported fear of falling. Increased likelihood of reporting fear of falling was associated with being female, experiencing greater MS symptom interference during everyday activities, history of fall in past 6 mo, & using walking aid.	Observational; LOE = IV
Freeman (2001) [20]	Determine factors that may contribute to restrictions in mobility & everyday functional activities in individuals with MS.	NA	NA	In MS, problems with balance, mobility, & function may constantly evolve throughout disease course. When symptoms mild, maintenance of mobility & function may be achieved by straightforward interventions. When problems are complex, more comprehensive & intensive multidisciplinary approach is necessary.	Observational; LOE = IV
Gulick et al. (1989) [21]	Determine what conditions made performing work or tasks more difficult & easier in individuals with MS.	508 people with MS.	Questionnaire	Conditions reported to impede performance of work & tasks were physical restrictions, person-environment interaction, & MS-related symptoms. Conditions reported to enhance performance of work & tasks were assistive devices, human support, personal attributes, health promotion behaviors, & person-environment adjustment.	Observational; LOE = IV

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
Gulick (2001) [22]	Determine if personal attributes & social support function as mediating &/or moderating variables between emotional distress & ADL functioning in individuals with MS.	686 individuals with MS.	NA	Personal attributes & social support functioned as mediator variables between emotional distress & ADL functioning.	Observational; LOE = IV
Harris Interactive (2008) [23]	Examine symptoms experienced, difficulty walking, QOL, mobility devices, finances, exercise, & partner experiences in individuals with MS.	Survey 1: 1,011 U.S. adults with MS. Survey 2: 317 U.S. adults currently caring for family member/friend with MS.	Questionnaire	2/5 people with MS reported difficulty walking. When 1st diagnosed, more people with MS were concerned about QOL than pain or potential costs. Most people with MS view mobility devices as way to maintain independence. Difficulty walking resulted in increased daily expenses for people with MS. Exercise plays a positive role in lives of people with MS. Most MS care partners are optimistic about their role.	Observational; LOE = IV
Janssens et al. (2003) [24]	Quantify expectations among wheelchair-dependent patients recently diagnosed with MS & their partners.	101 participants with MS & 78 partners.	Survey-based	Most participants did not know what to expect in 10 yr or in a lifetime after their diagnosis. Participants with higher functional limitation had higher perception of risk but lower perception of seriousness.	Observational; LOE = IV
Klewer et al. (2001) [25]	Analyze problems in elderly individuals with MS.	53 individuals with MS from Berlin Section of German MS Association.	Standardized questionnaire that considered social situation, daily problems, disease course, & disabilities; EDSS.	Elderly individuals reported impaired mobility & inability to use public transportation. About 96% presented EDSS scores >6.0. Nearly 50% complained about spasticity & pain due to spasticity. >70% suffered from bladder dysfunction.	Observational; LOE = IV
Kraskowsky & Finlayson (2001) [26]	Identify major findings of published research on factors influencing older adults' use of adaptive equipment.	14 studies involving older adult sample were selected from major electronic bibliographic databases.	NA	47%–82% of prescribed equipment continues to be used by older adults, with use decreasing over time. Equipment suitability, adequate training, & pre-prescription home visits contribute to rates of use of adaptive equipment. Lack of fit among person, his or her environment, and equipment was primary reason identified for nonuse of adaptive equipment.	Observational; LOE = IV
Lacoste et al. (2003) [27]	Characterize use of powered tilt-&-recline systems.	40 power wheelchair users (32 men & 8 women) with multiple diagnoses (neuro-muscular disease, SCI, & others) recruited from two	Subjects were interviewed from list of 25 objectives: reasons they used their repositioning system & order of importance of each reason.	97.5% of subjects were using their powered tilt-&-recline system everyday & their satisfaction was high. They also reported that their main objective was to increase comfort & promote rest.	LOE = IV

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
Laffont et al. (2008) [28]	Compare performance of power wheelchair with stair-climbing capacity & conventional power wheelchair (Storm 3).	rehabilitation centers in Montreal, Canada. 25 participants with various diagnoses who used power wheelchair as primary means of mobility.	Participants performed indoor & outdoor driving trials with both devices; also curb clearing & stair climbing with TopChair.	Satisfaction with Storm 3 chairs was higher compared with TopChair; going over curbs was easier with TopChair, as expected. Most participants found TopChair easy to use & only a few felt insecure while driving TopChair.	Open-label study, experimental design; LOE = II
Lankhorst et al. (1996) [29]	Determine characteristics of individuals with MS.	73 Dutch & Flemish individuals with MS, 25 with rheumatoid arthritis & 25 with spinal cord lesion.	Individuals with MS were assessed with Disability & Impact Profile. Results were compared with available data from individuals with rheumatoid arthritis or spinal cord lesion.	Substantial deterioration of QOL measures in individuals with MS compared with patients with chronic illnesses (e.g., rheumatoid arthritis, SCI). Walk, climb stairs, clean home, work were cited by individuals with MS as most commonly affected QOL factors.	Comparative analysis; LOE = IV
MacAllister et al. (2007) [30]	Evaluate impact of psychological distress & cognitive dysfunction among children with MS.	NA	NA	Having family member with MS affects everyone in family. Assessment of & intervention with children with MS should be interdisciplinary, including school teachers.	Systematic review; LOE = IV
Mansson & Lexell (2004) [31]	Assess performance of ADL among individuals with moderate to severe MS.	NA	Survey to gather qualitative information.	Personal & instrumental ADLs were impacted by people with moderate to severe MS; they were independent for personal ADLs but needed assistance with instrumental ADLs.	Descriptive; LOE = IV
Miller & Coyle (2004) [32]	Describe clinical symptoms & signs of MS.	NA	NA	Diagnosis of MS, while often straight forward, may be difficult without unequivocal & recurrent clinical signs.	Descriptive; LOE = IV
Myhr et al. (2001) [33]	Evaluate disability & prognosis in untreated population-based incidence cohort of MS patients.	220 patients with MS.	Patients were interviewed & examined during 1995 with EDSS.	RR course & long interepisode intervals in early phase of MS were associated with better outcome. Other onset characteristics indicating favorable outcome were associated with RR course, while characteristics indicating unfavorable outcome were associated with PP course.	Analysis of disease progression through life table analysis with different endpoints & multivariate Cox regression analysis for evaluation of prognostic factors; LOE = V
National Multiple Sclerosis Society (2008) [34]	Answer frequently asked questions about MS.	NA for systematic review.	None	MS is chronic, unpredictable disease of CNS. Anyone can develop MS. ~400,000 people have MS. MS symptoms vary from person to person. MS symptoms occur when immune-system attack affects myelin.	Nonsystematic review; LOE = V

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
Noseworthy et al. (2000) [35]	Research causes & treatments of MS to obtain more knowledge & improved care for MS patients.	NA	None	MS is autoimmune disease directed against CNS myelin or oligodendrocytes. Genetic & environmental factors are important in MS development. Treatment is directed at acute attacks & reduction of attack frequency.	Observational; LOE = IV
Osborne et al. (2006) [36]	Describe pain interference & explore its associations with several indexes of health & psychological functioning among people with MS.	451 veterans with MS who received VHA services 1995–2000.	Participants filled out questionnaires related to pain.	Participants reported moderate level of pain. Poor general health & pain were significantly correlated, influencing daily function.	Cohort retrospective design; LOE=IV
Perks et al. (1994) [37]	Identify & describe marginal user population & their propulsion difficulties.	Survey of wheelchair users in Tay-side, Scotland.	Home interviews about wheelchair-propelling experiences.	Marginal users represent ~15% of occupant-propelled wheelchair propulsions. Model diagnosis was MS. 59% of marginal users felt their wheelchairs were not adequate for their requirements.	Measures intervention; LOE = V
Peterson et al. (2007) [38]	Identify factors associated with increased likelihood of reporting fear of falling among people with MS & factors associated with activity curtailment among subset of individuals reporting fear of falling.	1,064 individuals with MS, aged 45–90 yr living in midwestern United States.	Telephone interviews	63.5% reported fear of falling. 82.6% reporting fear of falling reported curtailing activity. Increased likelihood of activity curtailment was associated with using walking aid, needing moderate or maximum assistance with instrumental ADLs, & having less than excellent self-reported mental health.	Observational; LOE = IV
Pittock et al. (2004) [39]	Study change in disability over 10 yr in individuals with MS.	161 individuals with MS in 1991 Olmsted County, Minnesota, MS prevalence cohort.	Assessment at baseline & year 10; outcome measures: EDSS, quantitative clinical measures, & self-report	Survival was reduced. 30% of patients progressed to needing cane or wheelchair over 10 yr follow-up period. Individuals with EDSS 3.0–5.0 range are at moderate risk of developing important gait limitations over 10 yr period.	Repeated measures intervention; LOE = V
Ramsaransing & De Keyser (2006) [40]	Review literature on benign course in MS to increase understanding of different aspects of benign course in MS.	Previous studies' subjects with MS.	Observation of previous publications addressing different MS courses & other relevant articles.	Benign course in MS may involve different steps in pathophysiology, similar inflammatory response, better regulating/inhibiting mechanism to counteract damage by inflammation, superior repair mechanism for neural damage done.	Observational; LOE = IV
Ripat & Booth (2005) [41]	Identify key characteristics of assistive device service delivery model preferred by various stakeholders in Canada.	18 participants interviewed in three focus groups.	NA	Users of AT are unique, decision-making process exists & is important, providing AT is complex process. Future funding guidelines should be developed to improve service delivery in general.	Descriptive; LOE = IV

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
Sawatzky et al. (2007) [42]	Determine functional measures that best correlate with skill levels of people with disabilities who operate Segway Personal Transporter, & explore subjects' personal experiences with Segway through qualitative analysis.	23 subjects aged 19–65 yr with various disabilities, including MS, who could ambulate at least 6 m with or without assistance.	Provision of Segway; outcome measures: Segway task assessment, Berg Balance Scale, & timed up & go test.	No correlation found between participants' functional scores & performances on Segway; Segway is appropriate mobility device for broader range of disability groups & functional levels than 1st realized. Benefits: 100% felt device was highly useful mobility aid; could promote independence in self-care, productivity, & leisure; might enable them to be more involved in meaningful occupations; disability was less visible when on device; at eye level with device. Barriers: Cost & lack of funding by insurers; difficult to get on/off or carry items; weight & size of device; access to public places & sidewalks possible barrier. Performance: Segway features make it more desirable than current mobility options; more maneuverable, faster.	Prospective cohort with three training sessions with Segway; LOE = IV
Scherer (1996) [43]	Review & summarize results from many research efforts on use of assistive devices.	NA	None	To ensure that AT enhance user's QOL, future emphasis should focus on consumer involvement in selection & evaluation of appropriate AT and on ways to make technologies more widely available & affordable.	Literature review; LOE = V
Scherer & Glueckauf (2005) [44]	Define environmental factors of ICF and describe how AT can improve function among individuals with disability.	NA for systematic review.	None	Effective use of AT device can be maximized by matching device with user goals, needs, & environmental resources. Abandonment can be decreased if those issues are considered.	Nonsystematic review; LOE = V
Simsarian & Sanders (2008) [45]	Review comprehensive care model for people with MS.	NA	None	In addition to informing individuals with MS of their diagnosis course, doctors & nurses must inform patients to seek counselor support to help not only themselves but their family.	Nonsystematic review; LOE = V

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
Solari et al. (2006) [46]	Prospectively assess changes in self-perceived health status over 5 yr.	205 individuals with MS who participated in 1999 postal survey & their significant others.	Assessment at baseline & year 5; outcome measures: Individuals were sent MSQOL (54-item scale) & CMDI & completed demographic/clinical questionnaire, while health-related quality of life & CMDI were assessed in participants' significant others.	Proportion requiring constant bilateral walking assistance increased from 16% to 33%. Proportion using housing adaptations increased from 17% to 27%. Use of daily home care increased from 19% to 28%. Proportion of those severely impaired doubled over study period. In 23% of participants, disease remained mild over median duration of 11 yr.	Repeated measures intervention; LOE = V
Sutliff (2008) [47]	Review importance of physical therapy care & mobility devices for individuals with MS.	NA	None	Goal of physical therapy, while working in team, is to improve QOL for people with MS by providing them with good treatment & adequate mobility devices.	LOE = V
Uustal & Minkel (2004) [48]	Test safe & effective use of new mobility device, iBOT 3000 Mobility system, by people with disabilities.	20 subjects who used manual or power wheelchairs.	Participants used iBOT for 2 wk in their home or community	No difference was found between using iBOT and participants' own wheelchairs. 10/20 participants could climb stairs independently; the other 10 could climb stairs with assistance of 1 person. Independent mobility can be enhanced with feature such as climbing flights of stairs.	Prospective design with participants acting as own controls; LOE = III
Verza et al. (2006) [49]	Evaluate whether interdisciplinary approach to evaluating & prescribing AT reduces abandonment in MS, & assess types of AT devices abandoned by people with MS & why they no longer used devices.	54 subjects (35 females & 19 males) obtained 151 AT devices over 6-year review period.	Establishment of interdisciplinary evaluation team & patient & family involvement in device selection (pre-intervention: physical therapist recommends device to physician without patient or family involvement).	25 (37.3%) devices abandoned during preintervention phase & 8 (9.5%) during intervention. Reasons for abandoning device during preintervention phase: (1) 36.4% worsening of physical status. (2) 30.3% User nonacceptance. (3) 24.2% Inappropriateness. (4) 9% insufficient/lack of training. During intervention phase, no abandonment due to inappropriateness or insufficient/lack of training.	Retrospective medical records review, case series; LOE = V
Whetten-Goldstein et al. (1998) [50]	Obtain data on cost of personal health services, other services, equipment, & earnings of individuals with MS.	606 subjects with MS who were members of National MS Society.	NA	Most people with MS have health insurance. Health insurance covered 51% of costs for services, excluding informal care. Compensation for earnings loss was average of 27%. 57% of cost is in form of burdens other than personal health care for individuals with MS.	Observational; LOE = IV

*Sackett model definition of levels of evidence (LOE):

I. Evidence is obtained from metaanalysis of multiple, well designed, controlled studies.

II. Evidence is obtained from at least one well-designed experimental study.

III. Evidence is obtained from well-designed, quasixperimental studies such as nonrandomized, controlled single-group, pre-post, cohort, time, or matched case control series.

Reference	Purpose	Population	Intervention	Relevant Finding	Study Design & LOE*
IV. Evidence is from well-designed , nonexperimental studies such as comparative and correlational descriptive and case studies.					
V. Evidence from case reports and clinical examples.					
ADL = activity of daily living; AT = assistive technology; CMDI = Chicago Multiscale Depression Inventory; CNS = central nervous system; EDSS = Expanded Disability Status Scale; ICF = International Classification of Functioning, Disability and Health; NA = not applicable; PP = progressive progression, PT = physical therapist, QOL = quality of life, RR = relapse remitting, SCI = spinal cord injury, SFDL = seat feature data logger, VHA = Veterans Health Administration.					

REFERENCES

- Ambrosio F, Boninger ML, Fitzgerald S, Liu B, Mapa M, Collins DM. Mobility device as a determinant of social participation in persons with multiple sclerosis. Proceedings of the RESNA 26th International Annual Conference. 2003. Atlanta, GA. Arlington (VA): RESNA; 2004.
- Ambrosio F, Boninger ML, Fitzgerald SG, Hubbard SL, Schwid SR, Cooper RA. Comparison of mobility device delivery within Department of Veterans Affairs for individuals with multiple sclerosis versus spinal cord injury. *J Rehabil Res Dev*. 2007;44(5):693–701. [PMID: 17943681] DOI:10.1682/JRRD.2006.02.0016
- Aronson KJ. Quality of life among persons with multiple sclerosis and their caregivers. *Neurology*. 1997;48(1):74–80. [PMID: 9008497]
- Baum HM, Rothschild BB. Multiple sclerosis and mobility restriction. *Arch Phys Med Rehabil*. 1983;64(12):591–96. [PMID: 6661022]
- Blake DJ, Bodine C. An overview of assistive technology for persons with multiple sclerosis. *J Rehabil Res Dev*. 2002;39(2):299–312. [PMID: 12051472]
- Boss TM, Finlayson M. Responses to the acquisition and use of power mobility by individuals who have multiple sclerosis and their families. *Am J Occup Ther*. 2006;60(3):348–58. [PMID: 16776403]
- Buning ME, Angelo JA, Schmeler MR. Occupational performance and the transition to powered mobility: A pilot study. *Am J Occup Ther*. 2001;55(3):339–44. [PMID: 11723976]
- Cattaneo D, De Nuzzo C, Fascia T, Macalli M, Pisoni I, Cardini R. Risks of falls in subjects with multiple sclerosis. *Arch Phys Med Rehabil*. 2002;83(6):864–7. [PMID: 12048669]
- Craddock G, McCormack L. Delivering an AT service: A client-focused, social and participatory service delivery model in assistive technology in Ireland. *Disabil Rehabil*. 2002;24(1–3):160–70. [PMID: 11827150] DOI:10.1080/09638280110063869
- Ding D, Cooper RA, Cooper R, Kelleher A. Monitoring seat feature usage among wheelchair users. In: Engineering in Medicine and Biology Society, 2007. EMBS 2007. 29th Annual International Conference of the IEEE. 22–26 Aug 2007. Lyon, France. Los Alamitos (CA): IEEE; 2007; p. 4364–67.
- Devitt R, Chau B, Jutai JW. The effect of wheelchair use on quality of life of person with multiple sclerosis. *Occupational Therapy in Health Care*. 2003;17:63–79. DOI:10.1300/J003v17n03_05
- Dewey A, Rice-Oxley M, Dean T. A qualitative study comparing the experiences of tilt-in-space wheelchair use and conventional wheelchair use by clients severely disabled with multiple sclerosis. *British Journal of Occupational Therapy*. 2004;67(2):65–74.
- Doerksen SE, Motl RW, McAuley E. Environment correlates of physical activity in multiple sclerosis: A cross-sectional study. *Int J Behav Nutr Pys Act*. 2007;4:49. [PMID: 17922918] DOI:10.1186/1479-5868-4-49

14. Fay BT, Boninger ML. The science behind mobility devices for individuals with multiple sclerosis. *Med Eng Phys.* 2002;24(6):375–83. [PMID: 12135646] DOI:10.1016/S1350-4533(02)00037-1
15. Finlayson M, Impey, MW, Nicolle C, Edwards J. Self-care, productivity and leisure limitations of people with multiple sclerosis. *Can J Occup Ther.* 1998;65(5):299–308.
16. Finlayson M, Guglielmello L, Liefer K. Describing and predicting the possession of assistive devices among persons with multiple sclerosis. *Am J Occup Ther.* 2001;55(5):545–51. [PMID: 14601815]
17. Finlayson M, Van Denend T. Experiencing the loss of mobility: Perspectives of older adults with MS. *Disabil Rehabil.* 2003;25(20):1168–80. [PMID: 14534060] DOI:10.1080/09638280310001596180
18. Finlayson M. Concerns about the future among older adults with multiple sclerosis. *Am J Occup Ther.* 2004;58(1):54–63. [PMID: 14763636]
19. Finlayson ML, Peterson EW, Cho CC. Risk factors for falling among people aged 45 to 90 years with multiple sclerosis. *Arch Phys Med Rehabil.* 2006;87(9):1274–79. [PMID: 16935067] DOI:10.1016/j.apmr.2006.06.002
20. Freeman JA. Improving mobility and functional independence in persons with multiple sclerosis. *J Neurol.* 2001;248(4):255–59. [PMID: 11374088] DOI:10.1007/s004150170198
21. Gulick EE, Yam M, Touw MM. Work performance by persons with multiple sclerosis: Conditions that impede or enable the performance of work. *Int J Nurs Stud.* 1989;26(4):301–11. [PMID: 2613450] DOI:10.1016/0020-7489(89)90017-5
22. Gulick EE. Emotional distress and activities of daily living functioning in persons with multiple sclerosis. *Nurs Res.* 2001;50(3):147–54. [PMID: 11393636] DOI:10.1097/00006199-200105000-00004
23. Harris Interactive. Key findings from two new multiple sclerosis surveys [Internet]. New York (NY): National MS Society and Acorda Therapeutics; 2008 [cited 2008 Mar 30]. Available from: <http://www.nationalmssociety.org/news/news-detail/download.aspx?id=1018>.
24. Janssens AC, De Boer JB, Va Doorn PA, Van ver Ploeg HM, Van ver Meché FG, Passchier J, Hintzen RQ. Expectations of wheelchair-dependency in recently diagnosed patients with multiple sclerosis and their partners. *Eur J Neurol.* 2003;10(3):287–93. [PMID: 12752403] DOI:10.1046/j.1468-1331.2003.00583.x
25. Klewer J, Pöhlau D, Nippert I, Haas J, Kugler J. Problems reported by elderly patients with multiple sclerosis. *J Neurosci Nurs.* 2001;33(3):167–71. [PMID: 11413662]
26. Kraskowsky LH, Finlayson M. Factors affecting older adults' use of adaptive equipment: Review of the literature. *Am J Occup Ther.* 2001;55(3):303–10. [PMID: 11723971]
27. Lacoste M, Weiss-Lambrou R, Allard M, Dansereau J. Powered tilt/recline systems: Why and how are they used? *Assist Technol.* 2003;15(1):56–68. [PMID: 14760982]
28. Laffont I, Guillon B, Fermanian C, Pouillot S, Even-Schneider A, Boyer F, Ruquet M, Aegerter P, Dizen O, Lofaso F. Evaluation of a stair-climbing power wheelchair in 25 people with tetraplegia. *Arch Phys Med Rehabil.* 2008;89(10):1958–64. [PMID: 18929024] DOI:10.1016/j.apmr.2008.03.008
29. Lankhorst GJ, Jelles F, Smits RC, Polman CH, Kuik DJ, Pfenning LE, Cohen L, Van der Ploeg HM, Ketelaer P, Vleugels L. Quality of life in multiple sclerosis: The disability and impact profile (DIP). *J Neurol.* 1996;243(6):469–74. [PMID: 8803821] DOI:10.1007/BF00900502
30. MacAllister WS, Boyd JR, Holland NJ, Milazzo MC, Krupp LB; International Pediatric MS Study Group. The psychosocial consequences of pediatric multiple sclerosis. *Neurology.* 2007;68(16 Suppl 2):S66–69. [PMID: 17438240]
31. Månsson E, Lexell J. Performance of activities of daily living in multiple sclerosis. *Disabil Rehabil.* 2004;26(10):576–85. [PMID: 15204511] DOI:10.1080/09638280410001684587
32. Miller A, Coyle PK. Clinical features of multiple sclerosis. *Continuum.* 2004;10:38–73.

33. Myhr KM, Riise T, Vedeler C, Nortvedt MW, Grønning M, Midgard R, Nyland HI. Disability and prognosis in multiple sclerosis: Demographic and clinical variables important for the ability to walk and awarding of disability pension. *Mult Scler*. 2001;7(1):59–65. [\[PMID: 11321195\]](#)
34. National Multiple Sclerosis Society. FAQs about MS [Internet]. New York (NY): National Multiple Sclerosis Society; 2008 [cited 2010 Mar 5]. Available from: <http://www.nationalmssociety.org/about-multiple-sclerosis/what-we-know-about-ms/FAQs-about-MS/index.aspx>
35. Noseworthy JH, Lucchinetti C, Rodriguez M, Weinshenker BG. Multiple sclerosis. *N Engl J Med*. 2000;343(13):938–52. [\[PMID: 11006371\]](#) [DOI:10.1056/NEJM200009283431307](#)
36. Osborne TL, Turner AP, Williams RM, Bowen JD, Hatzakis M, Rodriguez A, Haselkorn JK. Correlates of pain interference in multiple sclerosis. *Rehabil Psychology*. 2006;51(2):166–74. [DOI:10.1037/0090-5550.51.2.166](#)
37. Perks BA, Mackintosh R, Stewart CP, Bardsley GI. A survey of marginal wheelchair users. *J Rehabil Res Dev*. 1994;31(4):297–302. [\[PMID: 7869277\]](#)
38. Peterson EW, Cho CC, Finlayson ML. Fear of falling and associated activity curtailment among middle aged and older adults with multiple sclerosis. *Mult Scler*. 2007;13(9):1168–75. [\[PMID: 17881391\]](#) [DOI:10.1177/1352458507079260](#)
39. Pittock SJ, Mayr WT, McClelland RL, Jorgensen NW, Weigand SD, Noseworthy JH, Weinshenker BG, Rodriguez M. Change in MS-related disability in a population-based cohort: A 10-year follow-up study. *Neurology*. 2004;62(1):51–59. [\[PMID: 14718697\]](#)
40. Ramsaransing GS, De Keyser J. Benign course in multiple sclerosis: A review. *Acta Neurol Scand*. 2006;113(6):359–69. [\[PMID: 16674602\]](#) [DOI:10.1111/j.1600-0404.2006.00637.x](#)
41. Ripat J, Booth A. Characteristics of assistive technology service delivery models: Stakeholder perspectives and preferences. *Disabil Rehabil*. 2005;27(24):1461–70. [\[PMID: 16421071\]](#) [DOI:10.1080/09638280500264535](#)
42. Sawatzky B, Denison I, Langrish S, Richardson S, Hiller K, Slobogean B. The segway personal transporter as an alternative mobility device for people with disabilities: A pilot study. *Arch Phys Med Rehabil*. 2007;88(11):1423–28. [\[PMID: 17964882\]](#) [DOI:10.1016/j.apmr.2007.08.005](#)
43. Scherer MJ. Outcomes of assistive technology use on quality of life. *Disabil Rehabil*. 1996;18(9):439–48. [\[PMID: 8877302\]](#) [DOI:10.3109/09638289609165907](#)
44. Scherer MJ, Glueckauf R. Assessing the benefits of assistive technologies for activities and participation. *Rehabil Psychology*. 2005;50(2):132–41. [DOI:10.1037/0090-5550.50.2.132](#)
45. Simsarian J, Sanders C. An evolving approach to patient support programs for MS. *MS Exchange*. 2008;12(2):1–2.
46. Solari A, Ferrari G, Radice D. A longitudinal survey of self-assessed health trends in a community cohort of people with multiple sclerosis and their significant others. *J Neurol Sci*. 2006;243(1–2):13–20. [\[PMID: 16380136\]](#) [DOI:10.1016/j.jns.2005.11.005](#)
47. Sutliff MH. Team focus: Physical therapist. *Int J MS Care*. 2008;10(4):127–32.
48. Uustal H, Minkel JL. Study of the Independence iBOT 3000 Mobility System: An innovative power mobility device, during use in community environments. *Arch Phys Med Rehabil*. 2004;85(12):2002–10. [\[PMID: 15605340\]](#) [DOI:10.1016/j.apmr.2004.04.044](#)
49. Verza R, Carvalho ML, Battaglia MA, Uccelli MM. An interdisciplinary approach to evaluating the need for assistive technology reduces equipment abandonment. *Mult Scler*. 2006;12(1):88–93. [\[PMID: 16459724\]](#) [DOI:10.1191/1352458506ms1233oa](#)
50. Whetten-Goldstein K, Sloan FA, Goldstein LB, Kulas ED. A comprehensive assessment of the cost of multiple sclerosis in the United States. *Mult Scler*. 1998;4(5):419–25. [\[PMID: 9839302\]](#)