

Falls in people with multiple sclerosis: experiences of 115 fall situations

Clinical Rehabilitation
2018, Vol. 32(4) 526–535
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DOI: 10.1177/0269215517730597
journals.sagepub.com/home/cre



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Abstract

Objectives: The aim was to describe falls and the perceived causes, experienced by people with multiple sclerosis shortly after falling.

Design: A qualitative study using content analysis and quantitative data to illustrate where and why people report falls most commonly. Semi-structured telephone interviews were performed. Interviews were conducted shortly (0–10 days) after a fall.

Subjects: In all, 67 informants who had reported at least one fall during the previous three-month period and who used a walking aid participated.

Results: A total of 57 (85%) informants fell at least once during eight months resulting in 115 falls; 90 (78%) falls happened indoors, most commonly in the kitchen ($n = 20$; 17%) or bathroom ($n = 16$; 14%). Informants fell during everyday activities and walking aids had been used in more than a third of the reported falls. The falls were influenced of both intrinsic and extrinsic factors. Two categories emerged from the analysis: ‘activities when falling’ and ‘influencing factors’. The category contained three (basic activities of daily living, instrumental activities of daily living and leisure and work) and six (multiple sclerosis-related symptoms, fluctuating body symptoms, being distracted, losing body control, challenging surrounding and involvement of walking aid) subcategories, respectively.

Conclusion: The majority of falls occurs indoors and in daily activities. Several factors interacted in fall situations and should be monitored and considered to reduce the gap between the person’s capacity and the environmental demands that cause fall risk. Fluctuation of bodily symptoms between and within a day is a variable not earlier targeted in multiple sclerosis fall risk research.

Keywords

Accidental falls, multiple sclerosis, walking aid, content analysis

Received: 17 March 2017; accepted: 15 August 2017

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Introduction

People with multiple sclerosis are at risk of falls since imbalance is a common and often an early symptom.¹ A meta-analysis reported a fall rate of 56% during a three-month period.² Falls seem to occur most commonly indoors (65%) at daytime (75%).² More than 80% of the falls happened during transfers and more than 60% had fallen during ambulation.³

Falls risk factors can be either intrinsic or extrinsic. However, the circumstances in which falls occur are complex in nature.⁴ A systematic review⁵ of eight articles ($n = 1929$ participants) identified 18 risk factors. A meta-analysis found an increased fall risk for four risk factors, the intrinsic factors: impaired balance, cognition and progressive multiple sclerosis, and the extrinsic factor: use of walking aid. Others have reported identified intrinsic fall risk factors to be lower extremity malfunction,⁴ limited walking abilities,⁶ reduced muscular endurance, divided attention,⁶ not paying attention,³ fatigue^{3,6} and heat-sensitivity.⁶ Examples of identified extrinsic fall risk factors are environmental⁶ such as slippery or uneven surface or malfunction or non-use of walking aids.⁴

Walking aids are frequently used by people with multiple sclerosis; up to 60% use at least one mobility aid and the majority of them use more than one.⁷ Using walking aid can be seen as a marker of multiple sclerosis disease progression and thus a decreased level of function. Walking aid use requires dual-tasking⁸ which can cause falls.^{6,8} While a systematic review and meta-analysis^{5,9} have identified the use of walking aids as a risk factor for falls,⁵ people with multiple sclerosis have⁶ highlighted the use of walking aid as a factor in preventing falls by helping them maintain their balance.

Previously published studies describing the circumstances of falls in people with multiple sclerosis have collected data up to more than 12 months after the actual fall. Evidently, the risk for recall bias increases with time from events, that is, falls.

The aim of the study was therefore to describe falls and the perceived causes, experienced by people with multiple sclerosis shortly after falling.

Methods

A mixture of qualitative and quantitative data was used in this study,¹⁰ collected through semi-structured telephone interviews. The interviews were analysed using content analysis to enable some depth in the verbatim descriptions as well as a ranking of the categories based on how frequently they were described.^{10,11} The interviews were conducted from November 2014 to June 2015 by the first author (A.C.).

Study population

The study sample was recruited from eight different centres in Sweden; both from primary health care centres and hospitals. In each centre, clinical physiotherapists were in charge of the recruitment process.

To be considered for inclusion, the person had to (1) be diagnosed as having multiple sclerosis by a neurologist, (2) report at least one fall during the previous three-month period and (3) use a walking aid (intermittent or continuously).

The potential informants were informed of the purpose of the study, given written information and asked, verbally or in writing, to participate. Inclusion criteria were controlled for by asking the informants about their use of a walking aid as well as when their last fall had occurred by the physiotherapist during a regular visit or by A.C. in a telephone call. Obtaining written consent was mandatory.

The goal was to acquire descriptions of at least 100 falls in order to have a broad variety of experiences and make it possible to quantitatively rank the categories.¹¹ In total, 78 individuals were identified as eligible and asked to participate. When 67 had accepted to participate, the recruitment process ended since we calculated that at least 30% of the informants would fall more than once during the study period.

Procedures

Demographic data were collected via a study-specific questionnaire sent by mail including a patient-administered expanded disability status

scale in which the disease burden is self-rated.¹² The patient-administered expanded disability status scale was interpreted by a neurologist to decide an expanded disability status scale score.

The informants were instructed to contact A.C. by e-mail, text message or telephone immediately after having a fall. A fall was defined as ‘an unexpected event in which participants come to rest on the ground, floor, or a lower level’.¹³ The interviews were either conducted directly at contact, often the same day as the fall, or scheduled shortly thereafter (0–10 days). Each informant could be interviewed a maximum of three times. Every two weeks, reminders to get in touch if they fell were sent by a text message.

An interview guide was constructed with four content areas: (1) description of the fall, (2) their regular use of walking aids, (3) the process when the walking aid was prescribed, and (4) the role of the walking aid in the described fall situation. This article presents the analysis of the first, second and the fourth content areas. The first question asked was standardized: ‘Can you tell me what happened the last time you fell’. Follow-up questions were then asked for deeper understanding. At the end of each interview, the informants were encouraged to tell the interviewer anything else they wanted to talk about that had not been covered by the interview questions. All interviews were conducted by A.C., who has several years of clinical experience of rehabilitation of people with multiple sclerosis and their problems related to imbalance and falls. The interviews were audio recorded and transcribed verbatim by a secretary or by A.C. The Regional Ethics Committee in Uppsala-Örebro approved the study (2014/302) that followed the Declaration of Helsinki.

Data analysis

A qualitative content analysis was conducted in the following steps, primarily by the A.C., using NVivo 11 software¹⁴ throughout the process:

1. The transcribed interviews were first compared to the audio recordings to correct any errors or ambiguities.

2. The transcripts were read several times in their entirety to get an overall picture of the material.
3. The texts were condensed and coded on the basis of the aim.
4. A manifest analysis was performed in which the overall activity in the fall situation was analysed and quantitatively ranked.¹¹ This analysis was kept close to the text.
5. The perceived possible causes for the fall to occur were analysed, with a more latent approach. The codes were grouped into categories. During this process, codes were moved back and forth between categories.
6. To attain homogeneity within the categories, the categories were organized to be exhaustive and mutually exclusive.
7. Quotations from different interviews and informants were chosen to illustrate the different categories.

All authors took an active part throughout the analysis. Codes and categories were continuously discussed until consensus was reached.

Results

Out of the 67 informants, 57 (85%) reported at least one fall and 32 (48%) reported more than one. A few had experienced two falls within a short time before contacting the study leader and thus described both falls in one interview. In all, 106 interviews were conducted, resulting in 115 unique fall situations. The first interview with each informant took between 8 and 54 minutes (mean 19 minutes). The length of a second or third interview was shorter at 2–22 minutes (mean 9 minutes).

The expanded disability status scale score for the total sample ranged from 3.5 to 7.5 (median 6.0); this is roughly equivalent to being able to move freely with moderate disability to being unable to walk more than a few steps. See Table 1 for demographics characteristics.

Two different categories emerged during the analyses: ‘activities when falling’ and ‘influencing factors’; and the two different categories contained three respectively six subcategories. See Supplementary Figure 1 and Table 2 for overview.

Table 1. Demographics of the study population.

Variable	Total (n = 67)	Fallers (n = 57)	Non-fallers (n = 10)
Age (years)	57.33 (10.5) 56 (23–78)	56.14 (10.2) 55 (23–77)	64.10 (10) 65.5 (49–78)
Gender			
Male	18 (27)	16 (28)	2 (20)
Female	49 (73)	41 (72)	8 (80)
Years since diagnosis	15.7 (11.5) 13.5 (0–44)	15.54 (11.49) 14 (0–44)	16.6 (12.26) 13.5 (5–14)
Subtype			
Relapsing-remitting	14 (21)	13 (22.8)	1 (12.5)
Secondary progressive	37 (55)	32 (56.1)	5 (62.5)
Primary progressive	12 (18)	10 (17.5)	2 (25)
EDSS Score	6.0 (3.5-7.5)	6.0 (3.5-7.5)	6.0 (3.5-7.0)
Waling device indoors/outdoors			
None	20 (30)/4 (6)	19 (33.3)/4 (7)	1 (10)/0 (0)
Unilateral	12 (18)/12 (18)	9 (15.8)/8 (14)	3 (30)/4 (40)
Bilateral crutches/canes	2 (3)/5 (8)	2 (3.5)/5 (8.8)	0 (0)/0 (0)
Walker	22 (33)/20 (30)	17 (29.8)/16 (28.1)	5 (50)/4 (40)
Wheelchair	3 (4)/8 (12)	3 (5.3)/7 (12.3)	0 (0)/1 (10)
Other	8 (12)/17 (25)	7 (12.3)/16 (28.1)	1 (10)/1 (10)
Family			
Single	28 (42)	27 (47.4)	1 (10)
Living with a partner	39 (58)	30 (52.6)	9 (90)
Accommodation			
Flat	40 (60)	36 (63.2)	4 (40)
House	27 (40)	21 (36.8)	6 (60)

EDSS: Expanded Disability Status Scale.

For categorical variables, n (%) is presented.

For continuous variables, mean (SD)/median (min; max) is presented.

Activities when falling

In total, 90 (78%) of the reported falls happened indoors, most often in the informant's own home. The most common places to fall were the kitchen or the bathroom ($n = 20$, 17% and $n = 16$, 14%), respectively (Table 3).

The informants were performing everyday activities when they fell. Even if they knew that the activities exposed them to a fall risk, they said it was more important to remain as active as possible than to stop doing the activities. Avoiding them would significantly constraint their everyday life. This category was divided into three subcategories: *basic activities of daily living*, *instrumental activities of daily living* and *leisure and work*.

Basic activities of daily living. Most falls, 53 (46%), were reported to have occurred during basic activities of daily living. This subcategory includes basic mobility (transfers), such as walking from one room to another or getting up from the bed ($n = 35$, 30%); toilet hygiene, such as being on the way to the toilet ($n = 12$, 10%); personal hygiene, such as taking a shower or a bath ($n = 3$, 3%); grooming, such as shaving or brushing one's hair ($n = 2$, 2%) and dressing, such as taking off stockings ($n = 1$, 1%):

It was early in the morning. Then of course I have the bathroom a ... So then I start walking, using the walker. It's a little less than 10 metres to the bathroom. And when I have to get up and go to the bathroom

Table 2. Overview of categories and subcategories.

Categories	Activities when falling	Influencing factors	
		Intrinsic	Extrinsic
Subcategories	Basic activities of daily living Instrumental activities of daily living Leisure and work	Multiple sclerosis–related symptoms Fluctuating body symptoms Being distracted Losing body control	Challenging surroundings Involvement of walking aid

Table 3. Location of the falls ($n = 115$).

Location		Frequency, n (%)
Indoors ($n = 90$ (78))		
Kitchen		20 (17)
Bathroom		16 (14)
Hallway		14 (12)
Bedroom		13 (11)
Living room		8 (7)
Stairs		3 (3)
Laundry room		2 (2)
Public place		5 (4)
Unspecified		9 (8)
Outdoors ($n = 25$ (22))		
At home		8 (7)
Elsewhere		17 (15)

I'm in quite a hurry. So with the walker I get myself into the bathroom, feel the pressure, and with my last few steps I'm really rushing, and then I trip, I walk with the walker in front of me then and I swing myself around it. Then I walk up to the toilet seat, but this time I didn't do that – instead, I went straight for the toilet seat, because I was in such a rush, you know? And then I feel I really have to go, so I pull down my trousers and position myself, I position myself at the toilet, hovering over the toilet. And at the same time, I stumble on one of the wheels of the walker. (Informant 8)

Instrumental activities of daily living. Of the falls, 44 (38%) were reported as happening during instrumental activities of daily living. This subcategory includes housework, such as cleaning, ironing or making the bed ($n = 26$, 23%); preparing food, such as moving food from the stove or getting ingredients from the refrigerator ($n = 7$, 6%);

shopping for groceries ($n = 5$, 4%); transportation within the community by bus or car ($n = 4$, 3%) and communication via telephone, such as talking or texting ($n = 2$, 2%):

Uh, that I had been standing and emptying out the dishwasher. Then I was going to put away these cutting boards. In the bottom drawer where we keep them. And discovered that one had fallen, had fallen in behind there, and I was going to try to squeeze in behind there and I did get it. But it turned out there was another one there. So then I squeezed my arm down again. You hunch over, you know, when you're in that position. And then I just felt that "No, my legs can't take it". And that's when I fell, right? (Informant 59)

Leisure and work. In 18 (16%) of cases, the falls occurred during leisure activities, such as walking the dog or riding a horse ($n = 15$, 13%), or during work while in the lunchroom or walking the stairs ($n = 3$, 3%):

I fell off the horse yesterday. Yeah, my dogs ran around the horse's legs and the horse got a bit nervous, so he took a few extra steps. And kicked backwards. So then I fell onto the ground. (Informant 64)

Influencing factors

Several factors, individually or in combination, had negatively influenced informants' balance and thus induced falls because of a sudden loss of control. This happened during activities considered normal and performed on a regular basis. Six subcategories emerged, as shown in Supplementary Figure 1 and Table 2. Four of them were classified

as intrinsic factors: multiple sclerosis-related symptoms, fluctuating body function, being distracted and losing body control. Two subcategories were considered to reflect extrinsic factors: challenging surroundings and involvement of walking aid.

Multiple sclerosis-related symptoms. Lack of strength was described as contributing to 56 (48%) of the falls. The informants described in different terms how they lacked the strength, in either their lower or the upper extremities, to execute the intended activity. For example, they described how they were unable to lift a foot high enough and so the foot got stuck on the floor or they tripped over thresholds or other obstacles. Sometimes, they described how their legs just gave away:

My leg just buckled – that is still a fact. (Informant 41)

Several informants talked about how a sudden loss of balance explained why they ended up falling. Some described the loss of balance as being a result of overwhelming fatigue which struck them as though a switch had been turned off. Others talked about getting overbalanced in one direction during the activity. Loss of sensation in their feet or feeling dizzy challenged their balance further. Bladder urgency, which caused them to hurry to the toilet was also described as a possible factor for why some of the falls occurred.

Fluctuating body function. Many multiple sclerosis symptoms fluctuate in severity, often suddenly, which creates difficulties in successfully managing the symptoms. Some informants described their body functions as fluctuating from day to day as well as within a day, causing them uncertainty about their current capacity. In addition, multiple sclerosis symptoms can aggravate due to heat sensitivity or stress, which the informants described in 27 (23%) of the fall situations. Examples of stressful situations informants described were experienced were a lack of time, having other persons walking close behind them or hurrying to the toilet.

I was in a hurry to get out. That – it's the stress that's the culprit, I think. It lies behind so much. (Informant 78)

Being tired or fatigued were reported to contribute to the falls in more than a quarter ($n = 32$, 28%) of the fall situations. Fatigue was described as being of both muscular and cognitive in character and sometimes appearing without warning:

Yeah, but I was tired, too. When I'm tired my balance gets worse. 'Cause my whole body becomes ... I get extremely tired, very fast. Or when I do a lot, I use up all my energy, and when it's finished it's really finished. (Informant 16)

Being stiff or having cramps in the lower extremities due to spasticity were perceived to contribute to falls in 12 (10%) of the situations:

The side-effects of medication and alcohol intake were described as influencing body function and adding to fall risk.

Being distracted. Not focusing on the activity being performed was described by informants as causing a fall in 38 (33%) of the situations. Activities demanding divided attention could result in carelessness in the execution of the activity; informants described this as taking chances or being clumsy. They expressed the need to focus on one thing at the time to be able to maintain balance:

Cause I have to concentrate on how I walk. And I can only do one thing at a time. Yeah, I have to concentrate when I walk. I have to think about it. (Informant 16)

Losing body control. Frequently ($n = 44$, 38%) mentioned causes for falls were related to specific body movements during an activity. Informants described rotating the body as challenging their balance, regardless of the body part (head, torso or whole body rotation) involved, especially if the rotation was performed quickly. The informants explained how in some situations inefficient reactional movements had caused them to fall. Several explained that fall occurred when they reached for something or bent over to grab something on the floor.

I was just going to grab a little bag from the bottom of the cupboard. Then I bent over and put my finger into the bag instead. So I was just going to bend down a little further when – Wooops! (Informant 58)

Challenging surrounding. Environmental factors (surroundings, other persons, things or pets) were described in 44 (38%) of the situations as creating a risk for a fall.

Surfaces were described as creating fall risks in almost a quarter of the falls, especially for standing and walking activities but also in relation to hand support:

Walking on slippery or uneven surfaces and on an unfamiliar surface or walking downhill were perceived as contributing factors.

And then it's very shiny and smooth, and it snowed, and so – whoosh! – and my legs gave way. (Informant 31)

Some of the informants talked about how different objects in the environment negatively affected their ability to maintain stability. Being in a crowded environment, tripping over an object or being put out of balance in other ways, such as by pets, was mentioned. Clumsy, heavy or non-functional shoes were described as a potential fall risk factor.

Involvement of walking aid. This sub-category was related to the informant's use of a walking aid in the fall situation. Different perspectives were given, where some described how they fell while using it, while others talked about falling because of not using it. In 44 (38%) of the fall situations described, the informants claimed to have used their walking aid as usual. They described how the walking aid just did not give enough support to prevent the fall. In one situation, the walking aid broke. In another, the informant believed the aid weighed too little, thus resulting in a fall:

So it's like a half-basement down there – I just have one of those small walkers and that's what I use for walking down there. And it's a bit too light. And sometimes my backside takes over and then I fall backwards. (Informant 40)

Not handling the walking aid properly was given as a reason why 21 (18%) of the falls occurred. Some informants reported not having locked the walking aid correctly during use. Others reported how they had not placed the walking aid

correctly for optimal support. In 13 of the fall situations (11%), the walking aid was not used correctly, making the informants lose control of the situation. In 13 of the fall situations, the informants described using other supports (walls or furniture) instead of their usual walking aid. The informants themselves said that incorrect use of the walking aid induced falls:

Yeah, it was a bit of a hassle, but maybe it [the crutch] ends up in the air more than you use it, like. Yeah, when you lift the bags, 'cause then you have to lift up your crutch a little, and then you have no balance, right? (Informant 23)

In 6 (5%) of the falls, the informants did not use the walking aid, for some reason. Some described how they automatically began an activity without the walking aid and without thinking about the possible need for it; they acted out of habit. They also talked about not being able to use the walking aid for the needed support of because the physical environment precluded it (i.e. one man could not place the aid on its regular spot due to a broken garage door, which resulted in him falling).

No, it was just that I didn't have anything to hold onto like this. Yeah, and then that's what happened. (Informant 22)

Discussion

The majority of the reported falls occurred indoors at home during basic activities that are performed on a regular basis in daily life. Intrinsic as well as extrinsic factors were narrated to cause falls. The intrinsic factors reported by the informants could all be related to being diagnosed with multiple sclerosis and the impact on fluctuating symptoms within a day is a new finding. Extrinsic factors that were mentioned to impact the falls were challenging surroundings and the involvement of walking aid. Intrinsic factors can influence extrinsic factors, and vice versa, which impinge the activities performed.

In this study, 78% of the falls occurred indoors. An international meta-analysis² reported a slightly lower indoor fall frequency in comparison – 65%.

Possible explanations for the differences might be the higher expanded disability status scale score in this study (4.29 vs. 5.9). A higher expanded disability status scale score could also mean that they are less actively involved in outdoor activities in society but spend more time indoors. A peak score for fall risk has been suggested at expanded disability status scale score 6 since a transition in walking ability is likely,² which half the informants ($n = 33$; 49.3%) had in this study.

Most frequently, the falls took place during basic activities of daily living which is in line with the results of Gunn et al.,¹⁵ who reported general mobility functions, such as turning, walking and moving between positions, as the activities in which most participants (27.7%) fell and 16.4% of the falls occurred while engaging personal hygiene.

Another frequently described activity in which informants fell was housework, also comparable with previously reported studies.^{15,16} Performing housework and other domestic chores was considered important so as to stay as independent as possible, which highlights the importance of investigating each informants' individualized fall prevention strategies.

Of the informants, 14 were still working and 12 (85%) of them reported that they had fallen. Only three of the falls occurred while at work: two while walking stairs and one in the lunchroom. Undertaking extra safety precautions to insure not to fall among coworkers while at work has been described.

The intrinsic factors often interact with each other, making it difficult to determine one single explanation for the fall. Intrinsic factors were more determinant than extrinsic factors, and reduced strength,¹⁷ impaired balance,¹⁸ loss of sensation in their feet¹⁹ or bladder incontinence²⁰ are all well-known multiple sclerosis-related symptoms that the informants described as influencing factors in why they fell. While previous research²¹ has shown that deteriorating multiple sclerosis status during the last 12 months increases fall risk, this study shows that fluctuating symptoms (i.e. fatigue, spasticity or feeling stressed) within a day also is a fall risk factor. This making it difficult for them to know their physical ability at that moment which caused falls.

Cognitive function has been related to fall frequency at people with multiple sclerosis.²² The informants described being distracted as an influencing factor for the falls which can be related to the previously reported fall risk factor dual tasking.^{6,23,24} They often talked about not being focused or concentrating enough on a particular task, which made them unaware of potential threats to maintaining balance. The ability to divide their attention was also described as being influenced by whether the informants were stressed or fatigued, indicating the complexity of the fall situation and how the various influencing factors affect each other.

Sudden challenges of the body control without being able to recover balance were also described by the informants to have influenced the falls. Delayed responses to postural perturbations, increased sway in a quiet stance as well as reduced ability to move towards limits of stability have been reported in a review¹⁸ to cause falls. All influencing intrinsic factors relate to those identified in the review, with the addition of the dual-task problematics.

One of the external factors, environment,^{6,25} was described to influence fall risk. However, most of the falls did not occur in unusual environment indicating that for people with multiple sclerosis, even familiar environments that can be adjusted to one's personal needs can be hazardous. Although, to be able to stay as active as long as possible forces them to inhabit different surroundings, thereby exposing themselves to fall risk.

Several studies have described the correlation for fall risk and the use of walking aids, with varying conclusions. While some suggested an increased risk for falls when using a walking aid,^{5,9} others did not find such risk.² This majority of the informants in this study described their walking aid as facilitating rather than hindering them in everyday life. However, since over a third of the fall situations involved a walking aid use, the optimal usage is questioned. This stresses the importance of having the right walking aid prescribed and continuous evaluation to provide optimal support. Suboptimal use of walking aids was frequently described, highlighting the importance of practising in the

environment in which it is meant to be used. Deserting the walking aid when moving around indoors at home and instead rely on walls and furniture to keep maintaining balance was commonly described.

Methodological considerations

The strength of the study is the short time between falling and the interview that reduces recall bias and allows a more accurate and detailed description. Telephone interviews allow more detailed description compared to questionnaires. The interviews were conducted from November to June in Sweden, which meant they spanned three very distinct seasons with diverse weather conditions. The study sample represents a variety of age, gender, functional status and the informants lived in urban or rural areas which will increase generalizability of the results. The interview guide and the interview technique were tested before use but the interview technique was further refined during the interview process.

Using a content analysis inspired by Weber¹¹ creates the possibility of quantifying qualitative data, that is, proportions and frequencies of events. The trustworthiness of the study was considered in terms of credibility (having the right focus), dependability (stability in data over time) and transferability (the possibility of transferring the results to other settings and groups) as proposed.²⁶ Credibility was established by performing a large number of interviews in a large geographical area. The study period was limited to minimize the risk for inconsistency during data collection. All authors have a good knowledge of imbalance and fall in people with multiple sclerosis and have previous experience of qualitative methods. A consensus process was used during all steps of analyses.

The study relies on the informants' description of the fall and there is no guarantee that all falls were reported. A direct observation may have provided more information. Technology such as body worn sensors may enable a more objective data. The study sample only included people with expanded disability status scale score 3–7.5, and the conclusion can only refer to similar population.

Further research could possibly use similar study design to explore when and why people with mild multiple sclerosis falls.

In conclusion, several influencing factors, both intrinsic and extrinsic, interacted in each fall situation. Fluctuating bodily symptoms of multiple sclerosis make it difficult to know a person's current capacity in the activity performed. The gap between what the informants are physically capable of and the demands of the activity performed and of the environment creates fall risks, especially when divided attention is needed to succeed in the task. The walking aid was not described as causing the fall situations; however, they were often involved in the fall situation. If not used as intended, walking aids cannot prevent a fall.

Clinical Messages

- Falls occur mainly indoors during basic activities.
- Fluctuating symptoms within the day are a not previously described factor that causes falls.
- There is an interaction within and between intrinsic and extrinsic factors.
- Rehabilitation professionals should target both intrinsic and extrinsic factors in order to reduce fall risk.
- Thorough follow-ups on prescribed walking aids are warranted.

Acknowledgements

The authors wish to thank the participating physiotherapists: Ellinor Cedergren, Department of Physiotherapy at Örebro University Hospital; Malin Andreasson and Helena Vesterlin, NeuroRehab, Mälars hospital in Eskilstuna; Ingrid Lundström and Margareta Wibom, Rehab Clinic at Västerås Hospital; Sara Keisu and Helena Jensen, Physical Therapy Special Care, Gävle Hospital; Marie Fredriksen and Sara Hedström, Physiotherapy Primary Health Care Centre in Linköping; Oskar Davidsson and Lisbeth Franzén, Physiotherapy Clinic at Nyköping Hospital; Monica Svensson, Department of Rehabilitation and Department of Medical and Health Sciences, Linköping University, Motala and Lena Sanner and Malin Nilsson Merrick, Rehabunit, Central Hospital, Karlstad.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship and/or publication of this article: The study was supported by grants from the Uppsala-Örebro Regional Research Committee (RFR-467731), the research committee of Örebro County Council (OLL-490701) and the Norrbacka-Eugenia Foundation.

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