

Walking Characteristics on the 5 Days Before and After a Fall: No Harm, No Foul, No Change?

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Background:

It is difficult to motivate older people to change behavior following a fall. We hypothesized that for non-injurious falls there would be little change in walking speed or activity for the 5 days preceding or immediately following the fall.

Objective:

To describe changes in gait and activity that occur in the time surrounding a fall using continuous home monitoring.

Methods:

- Subjects were 230 independently living, cognitively intact older adults (>70) who are participants in the ORCATECH Intelligent Systems for Assessing Aging Changes (ISAAC) study
- Weekly on-line health forms recorded falls that occurred in the prior week over a 12 month period
- Falls were defined as any fall, including a slip or trip, in which the subject came to rest on the floor, ground or on a lower level
- Falls were included for analysis if:
 - An exact fall date could be determined by report
 - Sensor activity data was available for the 10 days surrounding the fall (5 days preceding and 5 days after the fall)
 - There was no major injury, such as joint injury, fracture, head trauma or hospitalization
- Continuous in-home monitoring was assessed with infrared X10 motion sensors that were placed along hallways and in rooms (about 10 per household) within the subjects' homes (1-3)
- Counts of sensor firings allowed determination of gait speed, walks per day and total activity (total sensor firings) per day

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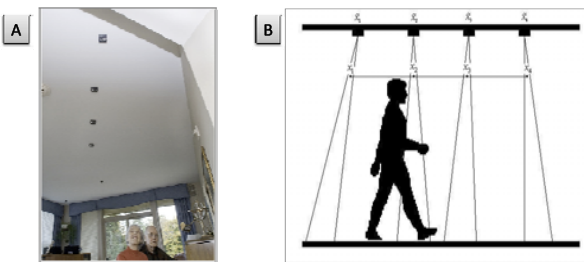


Figure:

[A] A home sensor line in place; [B] Schematic of a person walking through a sensor line containing four sensors with their fields of view shown. Sources: [A] Julie Keefe, the New York Times, Nov 7, 2009; [B] Hagler et al. 2009.

Statistical Analysis:

- Paired t-tests compared mean values of the median daily gait speed, walks per day, and total sensor firings in the day preceding and following a fall to determine whether there was any evidence of a difference
- Measures were compared in one day intervals (one day before to one day after a fall, two days before to two days after, etc.) up to 5 days out; data was adjusted for multiple comparisons using Bonferroni correction.

Results:

- 15 falls reported by 13 subjects that met the inclusion criteria
- Fallers were 12 women and 1 man (92% women) and had a mean age of 86.5 yrs (range:73–95) at the time of the fall.
- Subjects walked 4.4 cm/s slower on the first day after a fall ($p=0.05$). However, this significance was lost after adjustment for multiple comparisons.
- There was no significant difference in walks per day or total activity between the days preceding and following a fall.

	Mean of pre/post differences (\pm SD)	p value
Gait Speed (cm/s)		
1 Day	4.4 \pm 8.1	0.05
2 Days	2.2 \pm 8.1	0.30
3 Days	1.7 \pm 7.6	0.41
4 Days	1.8 \pm 7.3	0.36
5 Days	1.2 \pm 6.8	0.49
Walks per day (number)		
1 Day	-0.7 \pm 16.1	0.86
2 Days	-0.5 \pm 13.8	0.88
3 Days	0.7 \pm 12.0	0.83
4 Days	0.7 \pm 10.7	0.79
5 Days	1.6 \pm 9.0	0.51
Total Activity (counts)		
1 Day	0.7 \pm 458.6	1.0
2 Days	-14.1 \pm 572.6	0.93
3 Days	-21.9 \pm 545.2	0.88
4 Days	6.5 \pm 504.6	0.96
5 Days	51.3 \pm 477.3	0.69

Conclusions: In subjects with non-injurious falls, there may be a transient slowing in gait speed initially after a fall, but this finding is lost by the second day after a fall. We found no significant changes in activity measurements in the time after a fall compared to the time preceding a fall. This suggests that older persons do not significantly change their walking habits after a fall in the absence of an injury which may contribute to a “no harm, no foul” attitude toward falls.

References:

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