

# Slips, trips and falls in US hospital workers- detailed investigation

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## Abstract

In 2003 the health services sector was the largest employer in the USA, and slips, trips and falls (STF) accounted for the largest proportion of lost time injuries (20%). A follow-back study of hospital workers who STF was conducted to better describe STF circumstances and inform ergonomic interventions. One hundred twenty-three health care workers, who reported a STF to the occupational health department in seven US hospitals, were recruited and interviewed using a structured telephone questionnaire. Participants were predominantly female (86%) with a mean age (range) of 46 (19-67). One hundred and eight workers (88%) fell: 53% after slipping, 32% after tripping. Liquid contaminants (e.g., water, cleaning solutions) were involved in 36% of the events. Sixty-four percent of the STF occurred at a transitional area: dry/wet (32%), one type of floor to another (20%), or uneven surfaces (15%). Forty-one percent of workers fell forward, 23% fell to the side, and 21% fell backward. While the hands, knees, and buttocks were most often the points of impact, the back, knees, ankles/feet were most frequently injured. For workers who were injured (93%), strains and sprains (29%), contusions (27%), and non-specific pain and soreness (24%) were typical. Other injuries included abrasions, fractures, edema and lacerations.

*Keywords: collaborative studies, epidemiology, health care research, occupational injuries*

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## 1. Introduction

### 1.1 Falls

Globally, falls represent the third leading cause of disability after depression and anemia. Falls are also the second leading global cause of accidental death, after motor vehicle collisions [1]. In the USA, falls are the second largest source of annual, unintentional

injury mortality [2] and the leading reason for unintentional injury emergency department visits [3].

### 1.2 Falls at work

Same level falls contribute between 20 and 40 % of disabling workplace injuries in developed countries [4]. Based on the 2005 Liberty Mutual Workplace Safety Index, the annual direct burden of disabling

injuries from same level falls in the US in 2003 was estimated at \$6.9 billion, the second largest loss area in industry after overexertion [5]. (This figure did not include the cost of injuries from slipping and tripping that did not result in a fall).

### *1.3 Falls in health care*

The health services sector is the largest employer in US private industry with some 10 million workers. In 2003, slips and trips with or without a subsequent fall on the same level accounted for the largest proportion of lost time injuries to health care workers (20%)[6]. The incidence rate of these injuries in hospitals was considerably higher than in private industry (38.2 vs. 24.7 per 10,000 FTEs) [7]. The significance of the problem is clear from the available national injury data. However, details on the circumstances, events and injury outcomes related to STF in hospital workers are lacking.

### *1.4 Objectives*

As recommended by several of the authors, this study attempted to improve on prior studies of STF by giving increased attention to workplace circumstances [4]. A case follow-back study of hospital workers who slipped and/or tripped with or without a subsequent fall was conducted to better describe STF circumstances and outcomes and to better inform systematic ergonomic interventions in the hospital environment.

## **2. Methods**

### *2.1 Study sites*

Seven US hospitals participated in the follow-back study. Four of these were private - part of a large non-profit, health care system in the central Midwest. These ranged in size from a small community hospital to a large urban hospital. The other 3 study sites were located in the northern Midwest, the Southeast and the West. These large, regional hospitals were part of the US Veterans Health Administration national system of medical centers. Three sites began the study in mid-2001. One hospital entered in 2002, and the remaining hospitals entered the study in 2003.

### *2.2 Participants*

Workers who reported experiencing a slip, trip and/or fall event while on hospital grounds to the hospital's occupational health department were eligible to participate in the study. It was not necessary for the worker to have sustained an injury in order to participate.

### *2.3 Procedure*

Informed consent and summary case information were obtained by on-site occupational health personnel and faxed to the Liberty Mutual Research Institute for Safety, Quantitative Analysis Unit in Hopkinton, Massachusetts. Identified cases were followed up for telephone interview as soon as complete case and consent information were received. Interviewed participants were compensated for their participation, and the study was conducted under the supervision and approval of the Liberty Mutual Research Institute for Safety Institutional Review Committee for the Protection of Human Subjects along with individual hospital Institutional Review Boards.

Once a worker agreed to participate in the study and all required paperwork was received, study interviewers generally followed-up the participant within 48-72 hours at telephone number designated by the participant. In the event that the first attempt to contact the participant was unsuccessful, up to 7 additional attempts would be made to contact the participant (including messages). After this point, the participant would be classified as a non-respondent.

Participating workers answered questions during a 30 minute, structured telephonic interview administered by a trained interviewer. The interview included detailed questions on the worker, the slip, trip and/or fall event and any injury sustained. Other questions addressed the presence and nature of floor contaminants and the presence and type of floor surface transitions. This report presents results for cases interviewed between August 2001 and February 2005.

## **3. Results and Discussion**

Of workers who agreed to participate in the study through February 2005, 81% successfully completed the interview. These participants were interviewed within a median 15 days from the date of their injury.

Participants proved to be more difficult to reach by

telephone than workers in general industry in a prior large scale study of hand trauma which used a similar retrospective design [8]. In the USA, there is a general trend of increasing difficulty in using telephonic interview as households are increasingly screening calls, changing to mobile numbers which may not always be available, etc.

### 3.1 Participant demographics

One hundred twenty-three workers had participated in the study as of February 2005. Eighty-six percent of the workers were women. Seventy-one percent of workers identified themselves as White-Not Hispanic, 20% as Black-Not Hispanic, and 3% as Hispanic. Participants averaged 39.6 (s.d. = 7.4) work hours per week, had a mean age of 46 (range = 19-67) years, and had worked for the hospital for an average of 9.3 (median = 5.4) years.

Table 1 presents the occupational classifications for participants. Fifty percent of participants worked in an occupation that was involved in directly providing care to hospital patients.

Table 1  
Most frequently reported occupations among healthcare workers who participated in the follow-back study<sup>a</sup>

Occupation <sup>b</sup>	Count	Percent
Registered nurses	33	27
Receptionists, secretaries, and clerks	16	13
Health technologists and technicians	11	9
Maids and housemen	10	8
Licensed practical nurses	7	6
Cooks, kitchen workers, supervisors food prep.	7	6
Nursing aids, orderlies/ attendants, dental assistants	6	5
Managers, medicine and health	6	5
Dieticians	4	3
Social workers	4	3

<sup>a</sup> Occupations with more than 3 workers are shown.

<sup>b</sup> US Census 1990 occupational titles.

### 3.2 STF and environmental characteristics

Participants were asked about their STF event

including whether they slipped, tripped, slipped and tripped, subsequently fell or fell without a slip or trip. Table 2 presents the results by type of STF event.

Table 2  
Type of STF event, n = 123

Type of event	Count <sup>a</sup>	Percent
Slipped	65 (8)	53
Tripped	41 (6)	33
Slipped and tripped	3 (1)	2
Fell w/o slip or trip	14	11

<sup>a</sup> 15 individuals slipped and/or tripped without falling ( ).

Workers reported slipping (53%) more frequently than tripping (33%). Of the 108 workers who fell, most reported a slip with a subsequent fall (53%) versus a trip and fall (33%). This proportion is typical of that reported in the literature.[4]

Forty-one percent of workers indicated they fell forward, 23% fell to the side, and 21% fell backward. Workers who fell most often cited the hands, knees, or buttocks as the primary points of impact with the floor or ground.

Participants were asked about the condition of the floor or other surface where they experienced their STF event. Table 3 shows the floor condition results.

Table 3  
Floor/surface condition

Floor condition	Count	Percent
Clean and dry	54	44
Liquids on floor <sup>a</sup>	44	36
Frost, snow or ice	14	11
Solid contaminants	7	6
Other/Don't know	4	3

<sup>a</sup> Liquids: water (n=21), oil (n=7), cleaning solution (n=5), bodily fluid (n=2), other (n=3), don't know/missing (n=6).

Forty-four percent of workers described the floor or surface where they experienced their STF as clean and dry. Fifty-three percent of workers noted the presence of some type of contaminant including water, ice, hospital fluids, etc.

Sixty-four percent of STF occurred at a transitional area: wet to dry/dry to wet (32%), from one floor type to another (20%), or uneven surfaces (15%). Participants could indicate more than one type of transition if multiple types were present.

### 3.3 Injuries resulting from STF

While the hands, knees, and buttocks were most often the points of impact, the back, knees, ankles/feet were most frequently injured body parts. Overall, 114 workers (93% of all study participants) reported being injured as a result of their STF event. Table 4 presents the most frequent natures of injury. There were a total of 228 distinct injuries among the 114 injured workers for an average of 2 injuries per worker.

Table 4  
Most frequently reported injuries resulting from STF event among participating healthcare workers.

Nature of Injury	Count	Percent
Sprains, strains, tears	66	29
Bruises, contusions	61	27
Soreness, pain	55	24
Abrasions	8	4
Fractures	7	3
Edema	7	3
Cuts, lacerations	4	2
All other	20	8

The reporting mechanism selected for this study relied on workers reporting to the occupational health clinic at their respective hospital. Workers who were more severely injured may have bypassed the clinic and gone directly to a trauma center. Workers who were unconscious or in too great a need of emergency care to be approached regarding participation could also have been excluded. In addition workers who experienced an STF event but were not injured may have been less likely to present to the occupational health clinic.

### 4. Conclusion

Of 123 health care workers who participated in the study, the majority were female and middle aged. Most workers fell, the majority after slipping, and roughly one third after tripping. Liquid contaminants were involved in 36% of the events. The majority of the STF occurred at an area of surface transition. The back, knees, ankles/feet were most frequently injured and sprains and strains, contusions, and non-specific pain and soreness were typical injury outcomes. The results indicated the importance of managing surface

contamination and surface transitions in hospital settings. Findings from this study informed the development of interventions including floor cleaning and maintenance programs that were part of a comprehensive intervention program to combat STF in hospitals.[9]

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