Risk Factors for Slips, Trips, and Falls: A Case-Crossover Study of US Health Care Workers

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Introduction

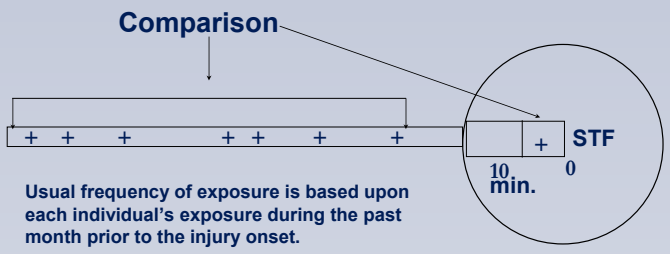
- We conducted a case-crossover study to evaluate potential transient risk factors for a slip, trip or fall (STF) event among US health care workers.
- A case-crossover design was used to control for differences between individuals such as age, gender, occupation, risk-taking behavior, and BMI.

Case Selection and Exposures

- Workers reporting a STF event (injured or not) to one of seven occupational health departments over a three-year period were interviewed via telephone.
- Exposure prevalence for factors was ascertained at the time of the STF event (hazard period) and during their past work week or month (control period) for:
  - workplace-related (contamination, unusual pathway)
  - work-task related (pushing/pulling, carrying)
  - worker-related (rushing, distraction)

Methods

Usual Frequency Approach: contrasts exposure in the hazard period with the expected exposure (Sorock et al., 2004)



Usual frequency of exposure is based upon each individual's exposure during the past month prior to the injury onset.

Relative Risk Estimator

Incidence Rate Ratio (IRR) = The ratio of unexposed person-time for exposed cases to exposed person-time for unexposed cases. This is the Mantel-Haenszel estimator for incidence rate ratio data.

Results

- 153 workers, 131 women (86%) and 22 men were interviewed with a mean age of 46 years (19-67)

Table 1. Most frequent occupations (n ≥ 4)*	Count	%
Direct Patient Care		
Registered nurses and nurse practitioners	42	27
Health technologists and technicians	16	10
Nursing aids, orderlies/attend, dental asst.	11	7
Licensed practical nurses	9	6
Managers, medicine and health	8	5
Social workers	5	3
Dieticians	4	3
Therapists	4	3
Indirect Patient Care		
Receptionists, secretaries, and clerks	26	17
Maids and housemen	11	7
Cooks, Kit. Worker, Supervis. Food prep	8	5
Teachers	4	3

* Census 1990 Occupation Titles

Table 2. STF Event Type (N=153)		
Slip, Trip and/or Fall	Count*	%
Slipped	84 (9)	55
Tripped	51 (7)	33
Slipped and tripped	3 (2)	2
Fell w/o slip or trip	15	10

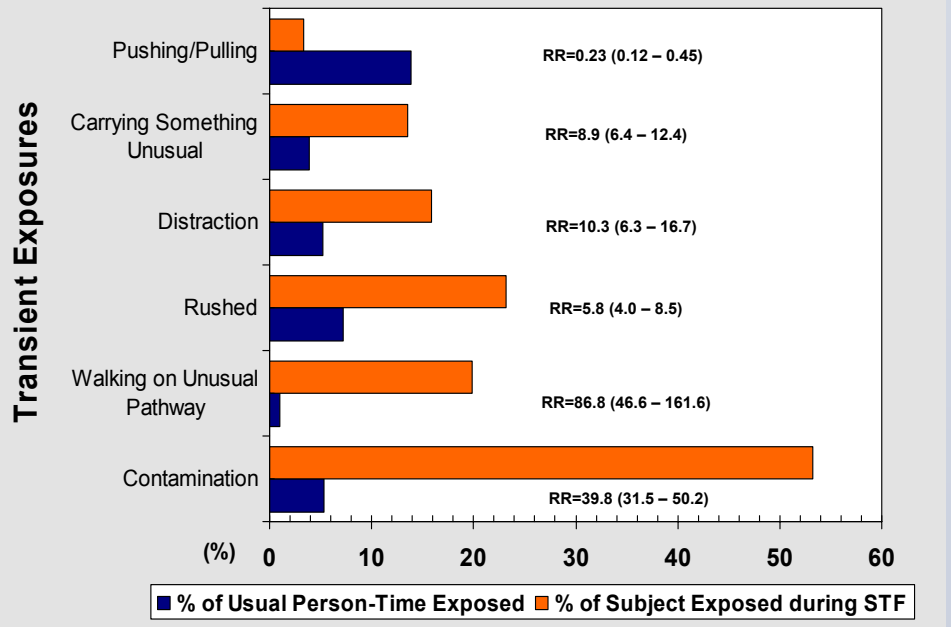
*18 individuals slipped and/or tripped without falling ( )

- 49% slipped and fell, 28.8% tripped and fell

Table 3.	Count	%
Number of Subjects with any Injury	142	93
Nature of Injury:		
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

- There were a total of 228 injuries among the 153 subjects
- Ninety-two percent of subjects sustained an injury from their STF

Figure 1. Case-crossover results for Transient Factors



- Preliminary findings suggest that the short-term relative risk (95% CI) of a STF was highest when:
  - walking on an unusual pathway, 86.8 (46.6-161.6)
  - when contamination was present, 39.8 (31.5-50.2)
- Other transient factors in decreasing order of short-term relative risk were carrying objects, being distracted, and being rushed.
- Pushing/pulling reduced the short-term STF relative risk by about 77%, RR=0.23 (0.12-0.45).

Strengths and Limitations

Strengths

- STF case provides their own control information (efficient)
- Control of between-person confounding

Limitations

- Potential for control period selection bias
- Limited control of multiple exposures that are correlated over-time within a case (e.g., walking on a contaminated floor while rushing)
- Potential for recall bias (Lombardi et al., 2002)

Summary and Conclusions

- The results suggest the importance of several transient modifiable risk factors to help prevent STF events at work. Importantly, floors should be kept clean and dry, and hospitals should develop a system that allows employees to rapidly report floor spills so that contaminants can be cleaned-up promptly.
- The case-crossover method is an efficient approach for studying transient risk factors for STF events.

This work was approved by the Liberty Mutual Research Institute for Safety Institutional Review Board and participating study site IRBs, BJC HealthCare℠ and the US Veterans Administration, VA Medical Centers.

References

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