



KEY POINT SUMMARY

OBJECTIVES

To report on an observational study linking hip fracture risk with flooring type in residential homes for older people.

To evaluate whether the floor properties had a significant effect on the risk of a fracture occurring in a fall.

DESIGN IMPLICATIONS

Type of flooring, and floor covering, should be taken into account, to design safer environments for older, and frail, people.

Wooden sub-floors may pose a lower risk of injury compared to concrete sub-floors.

In trying to mitigate the effect of hard sub-floors with soft floor coverings, designers should carefully balance the risk of fall against the potential benefit to injury.

Does the Type of Flooring Affect the Risk of Hip Fracture?

Simpson, A. H. R. W., Lamb, S., Roberts, P. J., Gardner, T. N., Evans, J. Grimley
2004 / Age and Ageing
Volume 33, Issue 3, Pages 242-246

Key Concepts/Context

Hip fractures are a serious consequence of falls, especially for aging populations. Number of hip fractures occurring worldwide is estimated to reach 6.3 million worldwide, by the year 2050. Conventionally the issue of fractures has been looked at in terms of intrinsic factors related to the patient. Extrinsic factors that could affect the impact, such as the floor (or surface of the impact) have not been investigated in great details. This UK based study seeks to fill this gap in the research.

Methods

Over a period of two years (1998-2000) thirty four residential care homes for older people that were similar in their admission criteria and in the range of mobility of the residents, were studied. Data on the number and location of falls were recorded prospectively for a minimum of 2 years from the falls register of each location. Data were collated with the clinical records from the Accident and Emergent Service of the hospital (for which these homes provided the catchment area). Mechanical properties of the floor were assessed using a transducer that was developed, and that could be dropped onto the floor to simulate and measure the peak impact force during a fall by a person of average height and weight. The nature of the underfloor structure, floor covering, and the impact force in each room were measured. 4 types of floors were identified and classified as :1) Wood sub-floors with no carpet, 2) Wood sub-floor with carpet, 3) Concrete sub-floor with no carpet, 4) Concrete sub-floor with carpet. A total of 34 homes, and 733 rooms were surveyed.

Although observational data was collected on where residents were and the activities they were engaged in, due to uncertainties and inaccuracies in the coding this data was not analyzed.



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Findings

A total of 6,641 falls and 222 fractures were recorded. Wooden carpeted floors were associated with the lowest number of fractures per 100 falls. The risk of fracture resulting from a fall was significantly lower compared to all other floor types. The mean impact force was significantly lower on wooden carpeted floors compared to the other floor types.

Contrary to expectations, carpeting was not associated with a significantly lower risk of hip fracture following a fall; the difference between carpeted and uncarpeted wooden was not statistically significant, and the association with carpeting on concrete floors was the opposite of expected, with a lower risk, (not statistically significant) associated with the uncarpeted floors. Authors suspect that the uncarpeted concrete floors occurred most frequently in bathrooms, and possibly staff were particularly vigilant and reported milder or less complete falls, alternately, the falls could be broken by seizing handrails, or other bathroom fixtures.

This study was reportedly the first to combine mechanical and clinical aspects related to injury and flooring, and found a significant the relationship between the type of flooring and the risk of incurring a fracture in a fall. The study did not, however, ascertain if the risk of falling varied with floor type.

Limitations

A majority of the floors in this study were already carpeted, so the study gives more insight on the sub-floor than the floor covering. More research is needed on floor coverings and sub-floors as a system. Observational data was not analyzed therefore the falls were not analyzed within the context of specific activities and locations within the facility, which could provide additional insight. Authors caution that trying to make concrete sub-floors safer for injury by using thick carpets and underlays would depend on whether this resulted in an increase in the risk of falling which could outweigh the benefit from the reduction in risk of hip fracture.