



KEY POINT SUMMARY

OBJECTIVES

To identify different physical design elements that can potentially contribute to falls within patient rooms.

Physical design factors contributing to patient falls

Pati, D., Valipoor, S., Cloutier, A., Yang, J., Freier, P., Harvey, T. E., & Lee, J. 2017 | *Journal of Patient Safety*. Volume 00, Issue 00, Pages 1-8

Key Concepts/Context

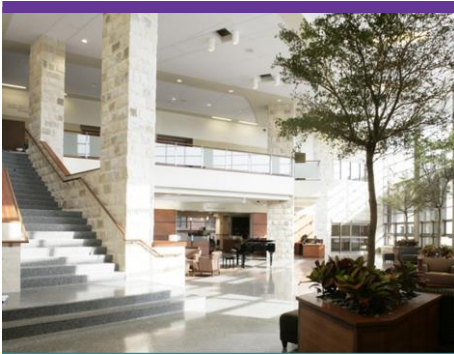
Previous studies show that patient falls in hospitals are not only a leading cause of disability, injury, and mortality, but that they also affect the family members of patients, the caregivers, and the overall healthcare system. While many of these previous studies focused on intrinsic factors that contribute to patient falls, such as the physical, physiological, mental, and psychological states of the patients themselves, more research is needed to better understand how the physical designs of patient rooms contribute to fall rates. The authors posit that previously published literature has helped establish “where” falls occur, but “how” and “why” they occur, especially in the context of physical design, requires further investigation.

Methods

The authors constructed a mockup of a clinician zone and patient bathroom, and recruited 27 subjects (16 female and 11 male) over the age of 70 to participate in a physical-simulation-based study. Participant activities were captured using video recording and motion-capture technology, and these data were assessed alongside biomedical data and video clips of potential fall moments. On the day of the trial, participants were outfitted with 62 reflective markers. The markers were used to signify anatomic landmarks that would allow for the analysis of patient “jerk trajectories,” where the center of mass (COM) of a given human body dictates the rate of change of acceleration of the body with respect to the “smoothness” or time of a given movement. Each randomized trial lasted between two to four minutes, and a total of 600 simulations were run in the study.

Findings

Analysis of the data found that although participant sex and age, along with the bathroom’s location in relation to the patient bed, were important aspects of the data, the ultimate factors behind patient falls were postural. Since postures are a



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function of an individual's interaction with a given physical environment, this emphasizes the relevancy of physical design in patient fall rates. Using designs to minimize the amount of turning motions a patient makes could help reduce falls. Pushing and pulling motions that could contribute to patient falls within the clinician zone were prevalent while managing the IV pole within restricted spaces. Reducing the amount of obstructions around the patient bed and on the way to the bathroom could reduce patient falls.

Limitations

The authors note several limitations within this study. The study design itself involves an experimental setting that excluded many intrinsic factors that could contribute to fall rates. It could also be argued that "potential falls" do not represent actual falls. The authors state that this study does not attempt to make any claims concerning external validity; the findings may not be generalized and applied to every context of patient fall scenarios.

Design Implications

Physical designs that generally reduce clutter, obstructions, and the amount of constricted turning motions that a patient must make could reduce fall rates. Data analysis revealed that increasing the height of patient chairs could reduce physical instability in the participants. In bathroom spaces, the positioning of handles for balance and movement should be carefully considered so that patient stability is maximized. The authors also suggest that redesigning IV poles to make them easier to manage in restricted spaces could reduce the risk of patient falls.

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