



KEY POINT SUMMARY

OBJECTIVES

The objectives of the study were to examine the hypothesis that nurses create their own movement paths around hospitals based on their assignments and spatial limitations, and to recognize how the floor plan affected the time they spend with patients.

Unit-Related Factors That Affect Nursing Time With Patients: Spatial Analysis of the Time and Motion Study

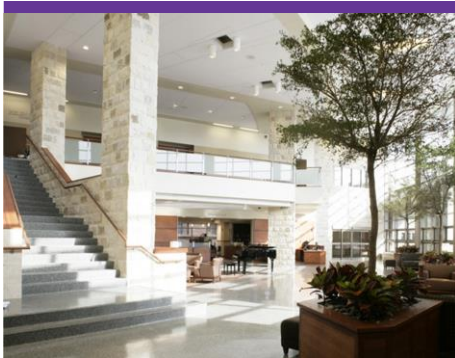
Hendrich, A. L., Chow, M., Bafna, S., Choudhary, R., Heo, Y., 2009 | *HERD: Health Environments Research & Design Journal*, Volume 2, Issue 2, Pages 5-20

Key Concepts/Context

Nurses spend many hours at hospitals caring for patients. There was a link established by previous studies between the amount of time spent in patient rooms and health outcomes. The floor plan of the facility has an impact on the nurses' movement patterns and the time they spend with patients. Using novel analysis techniques, an evaluation of data samples collected by a previous Time and Motion study that tracked movement and activities of medical-surgical nurses at different hospitals was conducted for this article on the connection between the unit layout and the nurses' behavior.

Methods

Spatial analysis techniques from the architectural theory of physical syntax were used on the Time and Motion data previously collected. Radio-frequency identification (RFID) tracking data of nurses was applied to architectural plans along with other clinical information. In addition, the nurses had personal digital assistants (PDA) that required them to enter their location and activity at random times. To make the analysis easier, the activities were divided into categories: nursing practice, unit-related functions, nonclinical activities, and waste time. The complete methodology of the spatial analysis of the data collected from the Time and Motion study was not presented and only initial results were discussed. One variable of space syntax was used for this study to illustrate the utility of the technique. The data used consisted of the RFID tracking of 53 nurses during 143 shifts from only 5 of the 36 medical-surgical units selected for the whole study. A generalized linear model (GLM) was constructed using variables to evaluate the effect of spatial characteristics on the following parameters: number of entries to patient rooms and number of entries to nurse stations. In the end, only one variable



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was used for this part of the study: linear integration. It was defined as a measure of the centrality of a space with respect to the entire layout.

Findings

The analysis of the Time and Motion study data showed that the nurses spent most of their time on other activities and not on patients. The results showed that patient contact assessment was only at 7.2% and patient care activities at 19.3%. Initial data did not show that the architecture influenced the nurses' movement or activities. They spent most of their time at the nurse station at 38.6% and patient rooms at 30.8%. For this study the data analysis showed that spatial properties of nurse assignments had a predictable impact on the patterns of nurse movement through the facility. Nurses with particular assignments made more visits to patient rooms and nurse stations. Specifically, two movement strategies were identified by the analysis: a high frequency of short trips and fewer longer trips. Increased frequency of trips to patient rooms may contribute to more time spent in patient care, leading to better health outcomes but also to exhaustion among nurses.

Limitations

The study was a small sampling of the data collected from the larger Time and Motion study: furthermore, the authors explained that a more comprehensive analysis would be following at a later date.

Design Implications

Changes could be made architecturally by designing rooms with particular spatial properties and by optimizing the location of the nurse station to improve movement patterns. The study models used showed how the different layouts affected the nurses' movement patterns and how visits to patient rooms increased, leading to more care time spent. This simulation model could be used by healthcare planners and designers for the assessment of unit layouts against healthcare outcomes.

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