SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

To describe a parametric study that measured daylight levels in rooms featuring different architectural features.

Assessment of daylight in rooms with different architectural features

Cammarano, S., Pellegrino, A., Verso, V. R. M., Aghemo, C., 2015 | B*uilding Research & Information*. Volume 43, Issue 2, Pages 222-237

Key Concepts/Context

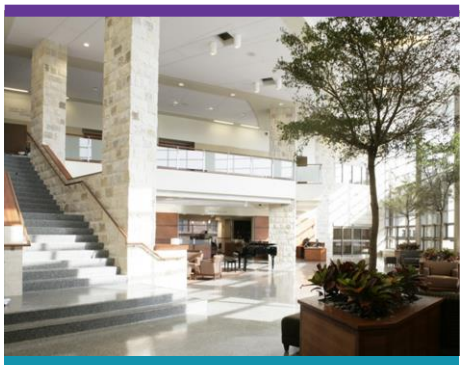
In an effort to reduce energy consumption and costs, many designers are focusing on producing buildings that make effective use of natural lighting. Numerous studies have shown how natural lighting holds a variety of potential benefits for building inhabitants; however, further research is needed to better understand how interior and exterior building designs can promote or hinder occupant exposure to natural lighting.

Methods

The authors studied the interior daylight conditions of a single room using computer simulations that modeled several different daylight settings. The simulated room model incorporated real-world data on the room's latitude, climate, orientation, external obstructions, window area, depth, and visible glazing transmittance. Data were analyzed to understand how climate-based daylight patterns might be altered by architectural features. A graphical tool is then provided for future design teams considering how to optimize room orientation for daylight exposure.

Findings

General observations made from data analysis were as follows: 1) Room orientation has a significant effect on overall daylight amount (ALE), and the absence of blinds can result in frequent cases of overheating within a given space. 2) Room orientation, even with the presence of blinds, can still greatly influence lighting and temperature levels depending on the overall orientation of the hospital and other outdoor factors. 3) Room depth directly affects lighting levels. The researchers suggest that simple considerations of window sizes, shapes, and glazes could better manage the effects of natural lighting in all structures.



The Center for Health Design: Moving Healthcare Forward

The Center for Health Design advances best practices and empowers healthcare leaders with quality research that demonstrates the value of design to improve health outcomes, patient experience of care, and provider/staff satisfaction and performance.

Learn more at www.healthdesign.org

Limitations

The authors note that their study design and proposed tool for daylight analysis is inherently limited due to its design as a visual tool; only certain variables that arise within daylight analysis can be accurately represented visually. The data analyzed in this study are derived largely from computerized simulations rather than real-world rooms.

Design Implications

Careful consideration of window placement, dimensions, and construction materials can greatly affect the amount of daylight that enters a room and alters its illuminance levels and temperature. While access to daylight is overall beneficial, designers should consider how to optimize window fixtures so that there is neither too much nor too little daylight within a given space.