

The Impact of Hospital Intensive Care Unit Window Design on Daylighting and Energy Performance in Desert Climate

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Abstract : This paper addresses the design of hospital Intensive Care Unit windows for the achievement of visual comfort and energy savings. The aim was to identify the window size and shading system configurations that could fulfill daylighting adequacy, avoid glare and reduce energy consumption. The study focused on addressing the effect of utilizing different shading systems in association with a range of Window-to-Wall Ratios (WWR) in different orientations under the desert clear-sky of Cairo, Egypt. The results of this study demonstrated that solar penetration is a critical concern affecting the design of ICU windows in desert locations, as in Cairo, Egypt. Use of shading systems was found to be essential in providing acceptable daylight performance and energy saving. Careful positioning of the ICU window towards a proper orientation can dramatically improve performance. It was observed that ICU windows facing the north direction enjoyed the widest range of successful window configuration possibilities at different WWRs. ICU windows facing south enjoyed a reasonable number of configuration options as well. By contrast, the ICU windows facing the east orientation had a very limited number of options that provide acceptable performance. These require additional local shading measures at certain times due to glare incidence. Moreover, use of horizontal sun breakers and solar screens to protect the ICU windows proved to be more successful than the other alternatives in a wide range of Window to Wall Ratios. By contrast, the use of light shelves and vertical shading devices seemed questionable.

Keywords : daylighting, desert, energy efficiency, shading

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