

COMBINING STRUCTURAL AND FUNCTIONAL MODELLING: EXPLORING THE RELATIONSHIP BETWEEN THE BUILT ENVIRONMENT AND RESILIENT HEALTHCARE

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Abstract

Several studies indicate that the built environment plays a role on both patients' outcomes and providers' performance in healthcare. Thus, the built environment is part of the joint cognitive system involved in patient care, and it can either hinder or support resilience. This study explores the relationship between the built environment and system resilience in a 39-beds intensive care unit (ICU). Six steps were followed: (i) the structural modelling of the ICU, using Building Information Modelling (BIM) – this tool allows for the multidimensional modelling of physical areas and information management; (ii) the identification of the structural requirements (i.e. those arising from human interactions with the built environment); (iii) the functional modelling of the ICU, using the FRAM; (iv) the identification of the functional requirements (i.e. those arising from organizational design and routines); (v) the assessment of the extent to which the ICU complied with those requirements; and (vi) an analysis of the relationships between the structural and functional requirements, as well as of how these influence the ICU resilience. This analysis was supported by the FRAM model, which included two functions referred to as <comply with structural requirements> and <comply with functional requirements>. The outputs of these functions were coupled to the preconditions of the regular ICU functions, supporting the exploration of possibilities of functional resonance resulting from no compliance with the requirements. The sources of data for all steps were the same, involving interviews with professionals, observations of ICU operations, and the analysis of regulations that set mandatory requirements. The findings from this study offered insight into improvement opportunities in the design of a new more resilient ICU, which is under construction.

Keywords: built environment, intensive care unit, resilient healthcare, requirements management