



## KEY POINT SUMMARY

### OBJECTIVES

The aim of this literature review was to explore key design considerations for a cardiac intensive care unit (CICU) model.

## Designing a cardiac intensive care unit by employing an evidence-based design approach

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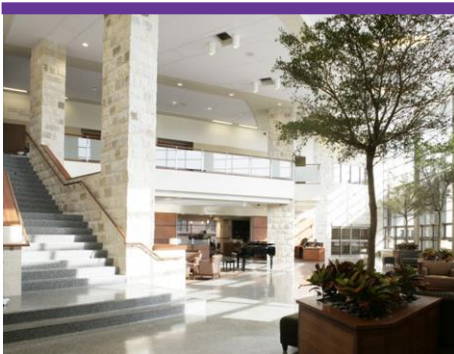
### Key Concepts/Context

Research shows that the design of the physical environment of cardiac intensive care units (CICUs) plays a significant role in patient outcomes, patient safety, and quality of care. Evidence-based design decisions further influence healthcare personnel well-being, such as reducing workplace injuries and workers' compensation claims. The results of this review of peer-reviewed, empirical research articles to inform CICU prototype models further validate the integration of evidence-based recommendations to optimize physical space utilization.

### Methods

The literature review was initially conducted utilizing the following databases: Google Scholar, ScienceDirect, and PubMed. Inclusion criteria were as follows: written in English; published between 2000 and 2019; peer-reviewed; and included environment design and associated health-based outcomes which influenced or may influence intensive care unit design. Articles from previous literature searches were also included if inclusion criteria were met. Selected articles were then organized via Excel and verified for analysis by the researchers. Next, design aspects were coded to generate thematic clusters of related concepts.

An evidence-based design conceptual framework designed by Ulrich et al. (2010) was employed to guide the literature search and review. Per the framework, there are nine categories which aid in classifying built environment design variables: audio environment, visual environment, safety enhancement, wayfinding system, sustainability, patient room, family support spaces, staff support spaces, and physician support spaces. These variables have been directly linked to various healthcare-related outcomes which include patient and organizational outcomes.



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## Findings

A total of 44 articles were included in the review. From the content analysis, eight (n=8) assessment domains were created, with corresponding design criteria, definitions, and key recommendations.

- **Safety Enhancement–Domain** included criteria such as visibility of the patient, hand hygiene and handwashing, flooring that facilitates ease in ambulation, and access control.
- **Visual Environment–Domain** included a focus on the finishes, lighting, and color. Criteria emphasized the appeal of the environment, such as daylight, positive distraction, and attentiveness.
- **Audio Environment–Domain** included sound-absorbing materials, noise control, pleasant sounds, and environment control. Design recommendations focused on dampening non-therapeutic noise sources while incorporating pleasant sounds into the healing potential of the patient space.
- **Wayfinding System–Domain** included signs, maps, information cues, interior markers and clustering. The main focus was navigable spaces with an easily interpretable, cohesive system of symbols, colors, and wording.
- **Patient Room–Domain** included logistic aspects of space design, such as room shape and size, which extends to pathways and bathrooms. The focus is ergonomic, efficient access to the patient by healthcare staff as well as caregiving family.
- **Family Support Spaces–Domain** includes means of comfort to those in caregiving roles to the patient. Amenities (such as a family lounge and sleeping rooms) as well as means of information access were described as key criteria and recommendations for this domain.
- **Staff Support Spaces–Domain** includes decentralization of nurse workstations and supplies to complement a focus on ergonomics and efficiency in workflow (housekeeping spaces for clean and soiled materials). Staff comfort is also recommended, and some examples included breakrooms, lockers, and restrooms.

## Limitations

Design recommendations collated from the literature review were based on expert consensus or from pilot, formative, or qualitative research studies. Financial, social, and cultural factors were not specified, given the inclusion criteria emphasis on physical environmental design. The authors constrained the type and number of databases and did not record exact literature search dates, which hinders the replicability and rigor associated with literature extraction. There was potential for researcher bias in the analysis and synthesis of included articles, as neither the coding process nor the evaluation strategy were defined nor rooted in a specific methodology. While a conceptual framework was employed to guide the literature



review, the findings of the literature search (results) did not include all categories depicted in the framework (e.g., sustainability).

### Design Implications

Practical design implications derived from this literature review include: positive distractions (artwork, visual access to nature); preventative measures to cross-contamination such as single-bed rooms; doorways that accommodate equipment movement and patient ambulation; and caregiver workstations that permit direct visibility to patient bedspace.

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