



KEY POINT SUMMARY

OBJECTIVES

The objective was to analyze functional scenarios of one specific NICU design to determine how to better meet users' spatial requirements.

Through the Eyes of the User: Evaluating Neonatal Intensive Care Unit Design

Denham, M. E., Bushehri, Y., Lim, L., 2018 / HERD: Health Environments Research & Design Journal, Volume 11, Issue 3, Pages 49-65

Key Concepts/Context

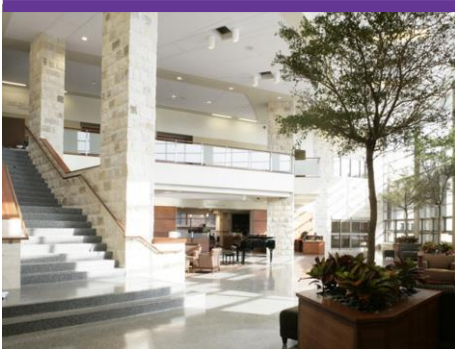
Premature babies require special care in neonatal intensive care units (NICU). This could take on average 80 days and would include the presence of the mother for proper infant development. The newborns have an increased risk of developing healthcare-associated infections (HAI), and therefore are in need of a controlled physical environment. In recent years there was a shift in NICU design from an open-bay layout to single-family rooms. For this study, an NICU design was developed to accommodate the baby, the mother, family members, and caregivers. The design was evaluated based on the functional requirements of each user by applying functional scenarios (FS).

Methods

The study started with a literature review to understand the users' needs. Furthermore, design guidelines were examined and interviews with NICU providers and parents were conducted. This was followed by the development of quantitative metrics for each user's FS so the characteristics of an NICU design could be evaluated. A layout was selected to be used as a model for evidence-based design analysis. The floor plans provided were in BIM format so they had space dimensions, materials, and equipment information. Activities outside the NICU were not considered and only relevant data inside the room was collected. The analysis that followed used an FS model with three steps:

1. State the FS's representing the needs of users
2. Define spatial metrics that support or hinder the needs of users
3. Analyze the design with the spatial metrics

The resulting analysis was graphically represented for clarification and better understanding and to make it useful for people outside of the architectural field.



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Findings

In all, 23 scenarios were developed: six for babies, six for families, and 11 for providers and caregivers. The users' needs were divided into three groups:

Babies' needs

1. Infection prevention – In order to protect babies from infections, the sink in the NICU must be located no closer than 3 inches from the isolette.
2. Minimizing exposure to environmental stimuli – To protect the babies from loud noises, surfaces with high STC ratings need to be used.
3. Supporting enriching care activities – A 4-foot clearance is required around the isolette to allow for caregiver access.

Family needs

1. Direct access to the baby and privacy – The clearance around the kangaroo chair and its location are important for access as well as its visual privacy.
2. Adequate space for daily activities – Space must be provided for family movement in the NICU.

Provider and caregivers needs

1. Infection prevention – For better hand hygiene a sink should be provided near the entrance to the room.
2. Care activities – Travel paths for caregivers must be considered for proper workflow.
3. Care zones – Family and provider zones must be distinct areas.
4. Visibility of patients – Caregivers should be able to see the patient in the NICU from the outside for adequate monitoring.

Limitations

The study focused on one NICU layout without considering adjacent spaces, limiting the findings to one specific room. In addition, only one floor plan was used for the FS methodology analysis. Multiple NICU layouts are needed to better evaluate the proposed design solutions for future facility planning.

Design Implications

A proposed NICU design was used to measure clearances and analyzed them against the requirements of the Facilities Guidelines Institute. The NICU room was designed by experts in evidence-based design, patient-family centered design, and developmental care. The FS criteria developed by the authors were intended to be used by design professionals to evaluate future layouts of NICUs.