



KEY POINT SUMMARY

OBJECTIVES

The objective of this study was to describe the experiences of end-users of an ICU designed and constructed using EBD.

Evidence-based design in an intensive care unit: End-user perceptions

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Key Concepts/Context

Authors consider evidence-based design (EBD) to be particularly relevant in the case of intensive care units (ICUs) given the high acuity of the patients and the multidisciplinary model of care. This qualitative study describes the experiences of end-users of an ICU designed using EBD principles in Calgary, Canada. Participants indicated that natural light and low sound levels contributed to a pleasant atmosphere, the positive aspects of larger spaces outweighed the concerns of distance, and adequately designed family spaces encouraged family involvement in the care process.

Methods

This was a qualitative research study where end-users were interviewed at two different times – 2-3 months after the facility was inaugurated and again 12-15 months after opening. There were 24 participants in the first phase, and 15 in the second phase. The participants included clinical staff, support staff and family members.

Findings

Four themes and 11 sub-themes emerged on analyzing the data:

1. Atmosphere:
 - a. Abundant natural light: End-users referred to not only the natural daylight but the absence of artificial skylights as contributory to a positive atmosphere in the new ICU. Views of nature were also mentioned as being significant to making the ICU pleasant.



- b. Lower noise levels: Participants said that the lower noise levels allowed for better concentration and task completion, and fewer interruptions.
2. Physical spaces:
 - a. Single-occupancy rooms: The ability to maintain privacy and confidentiality, the space to accommodate providers and family members during both routine and emergency care, improved infection control and prevention, and individualized care were considered to be positive aspects of the single-patient room. In the first phase of data collection, increased distance from patients, lack of visual and auditory (alarms) contact, and feelings of isolation, and concerns about calling for help from inside a room were considered to be some negative aspects of the single room. However, during the second phase, distance from patients and calling for help from inside a room were the only mentioned concerns.
 - b. Rooms clustered into clinical pods: The clustering of patient rooms into clinical pods was considered by many participants as a negative factor in the new ICU as these were widely spread out. This hindered social interaction among providers, reduced visual contact between providers, obstructed the smooth movement of providers in times of need to busier areas of the ICU, increased walking distances, and was challenging for cross coverage of patients. In the second phase, participants identified two aspects as positive – it allowed family members to identify the ICU team, and the pods prevented stressful activity in one area from affecting the entire ICU.
 - c. Medication rooms: Nurses commented that the use of the medication room was capable of accommodating multiple providers. The lower noise levels in the medication rooms allowed for fewer distractions during medication preparation, and hence, a decreased potential for errors. The only negative aspect of the medication room was that alarms could not be heard.
 - d. Tradeoffs of larger space: More space at the bedside allowed family members to be present, facilitated teamwork activities and fewer interruptions during multidisciplinary rounds.
 3. Family participation in care: The large size of the family support area allowed for larger and diverse groups to use the space and develop informal social networks. A need was expressed for small family spaces that would



allow for privacy. The availability of computers with Internet access and free public telephones were also appreciated by end-users.

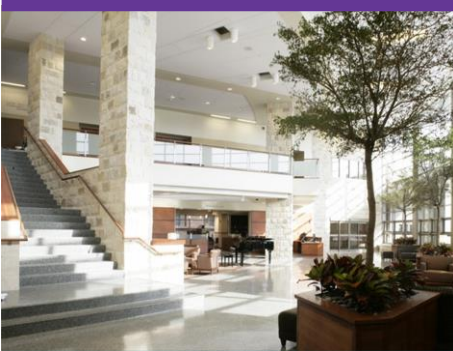
4. Equipment: In the first phase, the participants were very pessimistic about the usability of the equipment, but after a year in the second phase of data collection they expressed that the new equipment was helpful. Participants were of the view that storage for equipment and supplies should be identical in all pods for easy retrieval. It was felt that provider connectivity had improved with increased computer availability.

Limitations

The authors indicate the following as limitations of their study: 1. Recall bias (where questions asked may lead research subjects to elaborate on or omit certain aspects of their experience), 2. The small sample size.

Design Implications

- Some of the implications for design from this study are presented by the authors with their disadvantages. Designers may take both positive and negative aspects into consideration before incorporating these design aspects into an ICU setting:
- Large windows with access to natural light and views of nature or artificial skylights.
- Provision to control light and sounds.
- Single-occupancy rooms in ICU with adequate space for family members and providers; more space at the bedside for multiple providers. The challenge with this is difficulty in hearing bedside alarms and more walking for providers.
- Clustering of rooms into clinical pods was considered advantageous as a pod allowed family members to identify the ICU team. However, they were considered disadvantageous by the care providers as these were seen to hinder interaction between them, a smooth flow during busy times, challenged teamwork, and led to more walking and a need for more numbers of providers.
- Medication rooms with space for multiple providers, low noise levels, restricted access; the challenge was the inability to hear alarms.



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- Family support areas with a mix of spaces for larger groups (for social networking) and smaller groups (for privacy); and access to computers, Internet, and public telephones.
- Storage configuration for equipment and supplies may be identical in all pods.

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