Feature

Patients and Their Families Weigh in on Evidence-Based Hospital Design

Kathleen Trochelman, RN, MSN
Nancy Albert, RN, PhD, CCNS, CCRN, NE-BC
Jacqueline Spence, RN
Terri Murray, RN, BSN
Ellen Slifcak, RN, BA

BACKGROUND In 2 landmark publications, the Institute of Medicine reported on significant deficiencies in our current health care system. In response, an area of research examining the role of the physical environment in influencing outcomes for patients and staff gained momentum. The concept of evidence-based design has evolved, and the development of structural guidelines for new hospital construction was instituted by the American Institute of Architects in 2006.

OBJECTIVE To determine perceptions of patients and their families of evidence-based design features in a new heart center.

METHODS Hospitalized patients and their families, most of whom were in intensive care and step-down units, were surveyed and data from the Hospital Consumer Assessment of Healthcare Providers and Systems were reviewed to determine perceptions of evidence-based design features incorporated into a new heart center and to assess patients' satisfaction with the environment.

RESULTS Responses were reviewed and categorized descriptively. Five general environment topics of focus emerged: privacy, space, noise, light, and overall atmosphere. Characteristics perceived as being dissatisfying and satisfying are discussed.

CONCLUSIONS Critical care nurses must be aware of the current need to recognize how much the physical environment influences care delivery and take steps to maximize patients' safety, satisfaction, and quality of care. (*Critical Care Nurse.* 2012; 32[1]:e1-e11)

CE Continuing Education

This article has been designated for CE credit. A closed-book, multiple-choice examination follows this article, which tests your knowledge of the following objectives:

1. Discuss the concept of evidence-based design in health care environments
2. Identify evidence-based design features associated with improved patient care
3. Recognize the role of physical environment in influencing patient outcomes

©2012 American Association of Critical-Care Nurses doi: 10.4037/ccn2012785

Evidence-based practice assumes critical appraisal of current practice and integration of new research findings, expert opinion when research is lacking, and patients' perceptions and desires. In recent years, evidence-based design (EBD) has become a more pronounced guiding principle in health care. The concept of EBD is to design and build health care facilities founded on research or the best available information, ensuring that the relatively permanent physical environment facilitates the delivery of quality care, thereby improving patients' outcomes and safety.[2]

Review of the Literature on EBD in Critical and Acute Care

Substantial support exists for the view that a health care structure itself affects quality of care, patients' safety and satisfaction, as well as staff satisfaction and service efficacy.[3] In a report to the Center for Health Design funded by the Robert Wood Johnson Foundation, Ulrich and associates[4] identified more than 600 studies that link hospital design with clinical outcomes. Table 1 provides key references related to patients' outcomes after acute hospitalization on medical-surgical or intensive care units. Authors identified several design standards that should be universally adopted: use of single-bed rooms in almost all situations, natural light and views of nature, navigation or "wayfinding" systems for

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

Table 1 Evidence-based design features and effects

Feature	Effect
Single bed rooms	Reduced nosocomial infections[5-11] Reduced medication errors[12,13] Reduced patients' falls[12] Improved privacy, confidentiality, communication[14-16] Improved satisfaction of patients[17-19] Reduced noise/improved sleep[20-25] Improved family visitation, social support[26,27]
Natural light	Reduced depression/agitation[28,29] Reduced length of stay[30,31] Improved sleep[32] Reduced analgesic use[33]
Wayfinding	Improved satisfaction/reduces stress[34,35]
Views of nature	Reduced stress/pain[36-40]
Unit layout	Improved efficiency[41-44]

outpatients and visitors, and unit layouts that reduce staff walking time, thereby increasing time for patient care. Single rooms were associated with lower rates of nosocomial infection, fewer medication errors, decreased noise, greater privacy for patients, improved social support by patients' families and significant others, improved communication between patients and staff, and an overall increase in patients' satisfaction with care.[5-26] Natural light in patient care areas reduced agitation in elderly patients, decreased length of stay, lessened the need for pain medication, and reduced depression.[27-33] Researchers[34] reported that the cost of an inefficient system for navigation in a major regional hospital was more than $220 000 per year or $448 per bed. Much of this cost involved 4500 hours of hospital staff other than information staff giving directions. Views of nature from patients' rooms and during procedures reduced stress and pain,[35,36] and redesigned nursing units improved work efficiency.[37]

In 1999 and 2001, the Institute of Medicine reported on numerous deficiencies in the existing health care system in 2 landmark reports. The first report "To Err Is Human" exposed the incidence of preventable medical errors.[38] Contributing factors included the decentralized and fragmented nature of our delivery system and lack of attention to error prevention by health care organizations and health care providers. Most often, however, errors were caused by ineffective systems, processes, and conditions. In "Crossing the Quality Chasm: A New Health System for the 21st Century,"[40] it was further reported that the current health care delivery system was not patient-centered, and was in fact ineffective, inefficient, untimely, and inequitable.

Evidence-based design addresses a number of deficiencies in the health care delivery system.[41] For example, patient-centeredness refers to the recognition of patients' preferences and values. In relation to physical environment, patient-centered designs include variable acuity rooms that allow patients to be cared for with fewer transfers, single-bed rooms, accommodations for family members, and access to information. Ineffectiveness refers to underuse and overuse of tests and other necessary services. In relation to physical environment, effectiveness can be enhanced by ensuring adequate lighting, multiple unit workstations, and noise reduction. Efficiency is addressed through the use of rooms for patients and unit layouts that are standardized. Timeliness of care is influenced by the size and shape of patient units. Equity can be addressed by assessing and planning for current and projected population demographics and their needs early in the design process.[41]

Rashid[42] examined intensive care units (ICUs) built between 1993 and 2003 and considered to be best-practice units by the Society

Authors

Previously, Kathleen Trochelman was a nurse researcher in the Department of Nursing Research–Nursing Institute at the Cleveland Clinic, Cleveland, Ohio.

Nancy Albert is director of nursing research and innovation at the Nursing Institute and a clinical nurse specialist at the Kaufman Center for Heart Failure at the Cleveland Clinic.

Jacqueline Spence is a nurse manager in the cardiothoracic surgery telemetry areas, Heart and Vascular Institute, and Nursing Institute at the Cleveland Clinic.

Terri Murray is a nurse manager in the cardiothoracic surgery telemetry areas, Heart and Vascular Institute, and Nursing Institute at the Cleveland Clinic.

Ellen Slifcak is a research staff nurse in the Department of Nursing Research–Nursing Institute at the Cleveland Clinic.

Corresponding author: Nancy Albert, RN PhD, Cleveland Clinic, 9500 Euclid Avenue, J3-4, Cleveland, OH 44195 (e-mail: albertn@ccf.org).

To purchase electronic or print reprints, contact The InnoVision Group, 101 Columbia, Aliso Viejo, CA 92656. Phone, (800) 899-1712 or (949) 362-2050 (ext 532); fax, (949) 362-2049; e-mail, reprints@aacn.org.

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

of Critical Care Medicine, the American Association of Critical-Care Nurses, and the American Institute of Architects. Although characteristics supported by EBD were found, most units lacked consistent design solutions for improving outcomes for patients and staff. Family presence was restricted, and waiting areas were located outside the unit. Layout issues and mixed-use areas contributed to staffing and safety problems. Although the design of some units was not optimal, newer ICUs had best-practice design features such as private rooms, free-standing beds with access from all sides, hand-washing sinks, improved waste disposal facilities, and natural light to facilitate vision and circadian rhythm stability.[43,44]

Research on EBD is evolving. Hospital administrators and architects may use some characteristics that match EBD recommendations but not use others because of physical and/or budgetary restrictions. Therefore, it is important to assess both positive and negative outcomes of unit design to help identify the most beneficial elements. It is well recognized that patients' satisfaction is a valuable indicator in evaluating quality of care. The purpose of this survey was to examine responses of patients and their families to EBD features incorporated in a new heart center.

EBD Features of New Heart Center

The Cleveland Clinic, a large Midwest tertiary-care medical center in Cleveland, Ohio, opened a 395-bed heart and vascular hospital in October 2008 on the main campus of its system, with all beds providing ICU or telemetry/intermediate care services. In the planning phase, many aspects of EBD were considered. All rooms for patients were designed for single-bed use. Other EBD features include expansive windows, pullout futons supporting unrestricted family presence at the bedside, footwalls containing a large, easy-to-see flat screen television (Figure 1), large private bathrooms, headwalls with recessed space to stow medical equipment out of sight, and additional storage for patients and staff hidden behind room walls (Figure 2). Bathroom lights are motion sensitive. The shower area is spacious and entered by crossing a very low step. Patients can enter the shower by using a wheelchair or walker if necessary. In addition to a main nursing station, nursing units have auxiliary workstations. Nursing units also have multiple clean and dirty utility rooms and medication and supply rooms designed to decrease staff walking time and noise. ICU rooms have large multiposition lounge chairs and bedside toilet/sink units that appear as a seat when not being used for elimination needs (Figures 3 and 4).

Figure 1 Patient's room: window size, chairs, television, artwork, and futon.

The large bright main entrance of the stand-alone building was designed to facilitate patient flow and navigating through the building. Information desks are clearly visible, and numerous trained and highly visible "Red Coat" volunteers are strategically positioned and available to assist patients, patients' families, and health care workers. Directories are located outside elevators on each floor. Lounge areas are spacious with large windows, multiple seat groupings partitioned for privacy, multiple large-screen televisions, refrigerators, and a staffed information desk to facilitate communication between families and health care teams. A rooftop glass-walled observatory provides a scenic respite for patients, their families, and staff.

When patients were moved from old to new hospital rooms, a rare opportunity existed to assess the

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

Figure 2 Headwall with out-of-sight equipment storage, (A) opened and (B) closed.

perceptions of patients and their families of the differences between the old and new environments of care. The goal was to determine what aspects of the physical environment were perceived as improved, unchanged, or worsened in order to anticipate the care needs of future patients and their families and enhance satisfaction with the physical environment.

Methods

This project was exempt from the oversight of the institutional review board under the federal exemption category 2, as this project was intended to be a quality assessment of the perceptions of patients and their families related to environment of care.

Data collection was guided by asking patients and their family members, when present, to respond to the following open-ended questions: (1) What have you noticed that is different in this environment compared with the old unit? (2) Do these differences affect you and if so, how? (3) What improvements are still needed? (4) Has the care you've received changed since coming to the new building? (5) Is there anything else about the new building we should know? Data collection was anonymous and confidential. Participants' responses did not place them at risk because data were not used in patient care or shared with nursing staff. Further, follow-up questions were not elicited to determine respondents' meaning or to gain additional insights.

Questions were developed by 2 clinical nurse specialists and 2 nurse managers and were intended to be broad in scope and to elicit personal descriptive responses. Using a convenience sample of patients and family members who were awake and alert, 1 nurse and 1 patient service associate transcribed verbal responses after providing the rationale for data collection. All patients and their families were interviewed within 1 week of the move from their old to their new room. Five general environmental topics emerged: privacy, space, noise, light, and overall atmosphere or "feel."

In addition to data collected from interviews, relevant data on patients' satisfaction from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) and Press Ganey surveys were examined. The nationally used HCAHPS and Press Ganey surveys are valid, reliable, and standardized, and HCAHPS results are publicly reported.[45] The HCAHPS survey asks discharged patients 27 questions about their hospital stay; however, we assessed only data related to environment of care, as noted in results reported in Figure 5. The Press Ganey survey asks additional

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

Figure 3 Chair for patient in intensive care unit.

Figure 4 Intensive care unit sink/toilet, (A) opened and (B) closed.

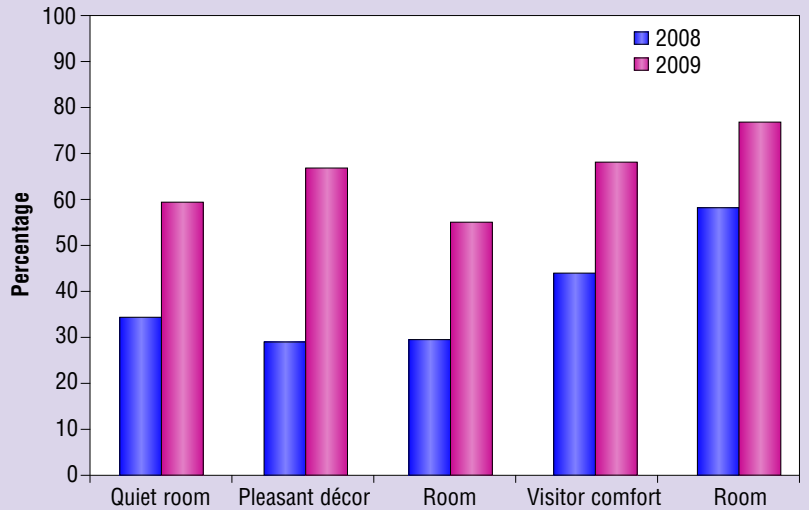
questions about admission, room, meals, nurses, physicians, visitors and family, personnel issues, tests and treatments, and overall assessment using a Likert-like scale with 5 points, from 1 (very poor) to 5 (very good). As with the HCAHPS survey, we assessed only the data related to the patient's experience with the room (pleasantness, décor, and temperature) and the comfort of patients' visitors and family with accommodations because these data reflected the goals of the project.

The HCAHPS and Press Ganey surveys are administered by Press Ganey to a random sample of adult patients across medical conditions between 48 hours and 6 weeks after discharge from the hospital. Per requirements, patients are surveyed throughout every month of the year. Data for this report were provided by a member of the hospital's Quality Practice and Safety Institute. Data collection on the nursing units of the old heart center occurred from January through September 2008. Data from the new heart center were collected during the same time frame 1 year later, from January through October 2009. Data on patients' satisfaction represented responses from patients on four 36-bed telemetry units before the move and six 24-bed telemetry units after the move. Interview responses were reviewed verbatim and categorized descriptively on the basis of the care themes raised by the patients and their family members.

Results

The old heart center had 244 beds consisting of 28 coronary care and heart failure ICU beds, 108 cardiothoracic surgical telemetry beds, and 108 cardiac medical telemetry beds. The new heart center has 395 beds consisting of 34 coronary care and heart failure ICU beds, 76 cardiothoracic ICU beds, and 285 telemetry beds. Cardiothoracic surgery ICU patients were not included because the length of stay in that environment is usually less than 24 hours. Patients were not moved on 1 day; rather moves from the old to new environment occurred on consecutive Saturdays during a 4-week period. Based on a 90% occupancy in the old facility on the days that patients were moved, and assuming an additional 10% of patients moved would not meet eligibility criteria to be interviewed, our sample of 103

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024



2008	631/1829	326/1129	331/1123	483/1094	1071/1835
2009	1763/2977	1992/2981	1626/2956	1991/2916	2283/2981

Figure 5 Hospital Consumer Assessment of Healthcare Providers and Systems "always" or "very good" scores before (April-September 2008) and after (January-October 2009) change in environment. Rating options for quiet and cleanliness were *never*, *sometimes*, *usually*, and *always*; rating options for all other factors were *very poor*, *poor*, *fair*, *good*, and *very good*. Data on the quiet and cleanliness factors were provided from January through September 2008.

hospitalized patients and families who participated represented 62.7% of the available population. No other participant descriptors were collected.

Characteristics Eliciting Satisfaction With the New Physical Environment

Patients and their families overwhelmingly reported being pleased with the overall room design (Table 2). When responding to the first 2 questions of the survey ("What have you noticed that is different in this environment compared to the old unit" and "Do these differences affect you and if so, how?"), nearly a third of patients commented on having a private room.

Some stated they did not have to worry about "bothering anyone" or invading their roommate's privacy. A female patient stated "I get up earlier than most people; now I don't have to worry about disturbing my roommate . . . I can watch TV in the morning." Others stated, "Privacy is big", and "The private room is a blessing." Patients reported that it was easier to talk with their family members and that they could rest or sleep when they wanted. Patients also commented on being able to adjust the room thermostat to their comfort level.

Patients and their families reported that the new rooms were quieter, more spacious, less confining, less cluttered, and allowed more family visitation. One elderly man commented, "I can get up so much easier, there is nothing to bump my feet on." A female patient stated that she felt "less confined; [it is] easier to maneuver." Others stated that they felt more independent and were less stressed about getting up to go to the bathroom. The large bathroom with motion-sensitive lighting was also a positive feature. Some patients were pleased that they could "get a chair in there to wash" and that it was easier to maneuver in the low-step shower. The addition of a futon was appreciated by patients and their family members. Family members stated that they were very pleased that they had a place to rest or sleep in the patient's room. Large windows elicited nearly unanimous approval. Comments included "I can see better," "beautiful windows," "the big windows are lovely," "nice view," "lots of light," "happy for the view," "big windows are more cheerful," and "don't need to use the lights."

The overall atmosphere was described by patients as being less like a hospital and more like home or a hotel. Most patients reported

Table 2 Satisfying design features of patients' rooms (N = 91)

Satisfying features	% of patients commenting on the feature
Privacy of room; no roommate	31.9
Room size	29.7
Bathroom	26.4
Reduced noise	23.1
Television	23.1
Window size/view	19.8
Lighting	16.5
Storage	5.5
White walls	4.4
Television control; artwork; and electrical outlets	1.1 (each)

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

Table 3 Dissatisfying design features of patients' rooms (N = 91)

Dissatisfying features	% of patients commenting on the feature
Television control	16.5
Chairs	12.1
Noise	9.9
Clock placement and face (no numbers on face)	5.5
Bathroom	4.4
Signage	4.4
Television	3.3
White walls	3.3
Lighting	2.2
Private room; room size; window size or view; artwork, storage; and electrical outlets	1.1 (each)

that they felt happier, less anxious, more relaxed, less stressed, more comfortable, and more independent. Families also reported that they felt more relaxed, more comfortable, and happy that the room could accommodate overnight visitors.

Characteristics Eliciting Dissatisfaction With the New Physical Environment

Because patients had spent time in an older semiprivate room before being transferred to the new heart center environment, they were able to compare elements of the environment in the old and new space that were unchanged, prompted dissatisfaction, or needed to be improved (Table 3). Light controls for the room were an issue for some. Patients reported dissatisfaction with the fact that they could not access all light controls in the room while in bed. One patient was concerned about unlabeled red wall switches, asking "what happens if I bump them?" One female patient was concerned that the bathroom was a little farther away. One man suggested that an extra handicap bar by the toilet would have been helpful. Although the large-screen television was well received, a number of patients reported that the controls were difficult to use and allowed the user to scroll through the channels only in 1 direction. One patient stated that Internet access and a bedside keyboard would have been very desirable. A numberless clock positioned at the side of the bed was reported to be difficult to see and read. A wall calendar, a small refrigerator, and hand cleaner for family members were requested by a few patients.

Although the rooms themselves were quieter, hallway noise continued to be a problem. The size and design of patients' chairs was a concern for many (see chair in Figure 1). A streamlined office-style chair with open arms had been selected by the designers. Patients reported that they did not feel comfortable sitting in them. Comments included that they were "unfriendly . . . can't sit up in them," "my wires and gown get caught," "not enough padding on arms," "no foot rest," "[I'm] worried about sitting in those chairs," and "don't want to get out of bed—don't like the chairs."

Finding their way around remained an issue for many visitors. The "Red Coat" volunteers were lauded for their assistance but others reported that the facility was difficult to navigate, that more directories were needed, and that it was too much walking.

Nursing Care Changes With a Change in Environment

When asked "Has the care you've received changed since coming to the new building?" patients and their families overwhelming reported being very pleased with the care in both the old and new heart centers. Some noted that in the new rooms, nurses "move[d] in and out more smoothly," were "more attentive," and were "more responsive, in better spirits."

Patients' Satisfaction With a Change in Environment

In addition to face-to-face surveys, HCAHPS data were examined before and after hospital opening for changes in cardiac patients' perceptions of their hospital experience. Improvements were noted in every area of environment of care when old and new facility experience responses were compared (Figure 5). For example, when asked how often the area around the room was quiet at night, patients reported it was "always" quiet 59.2% of the time in 2009 compared with 34.5% of the time in the old heart center. When asked about the pleasantness of room décor, patients reported "very often" 66.8% of the time in the new environment of care compared with 28.9% in the old heart center environment.

Discussion

Design decisions made today may affect care delivery for decades. With the current unprecedented surge in hospital construction, it is imperative that environmental characteristics influencing the well-being of patients, visitors, and staff be identified and incorporated in

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

Table 4 Nursing implications for evidence-based design

- Be aware of the influence of the physical environment on patients, patients' families, and staff
- Arrange for private rooms whenever available
- Be aware and, if possible, remedy factors affecting physical privacy and communication privacy of patients and their family members
- Encourage and facilitate family visitation in or near patients' room
- Provide patients with control over lighting, temperature, and television, radio, or other controls
- Minimize noise
- Enhance natural lighting and views of nature by opening window curtains/blinds whenever possible
- Ensure safe walkways in patient rooms and bathrooms by removing/moving medical equipment or other impediments
- Have patients provide feedback on comfort of chairs, pillows, blankets, and other supplies or equipment that can be updated for comfort and support. For example, assess chair features for patients with multiple intravenous catheters, telemetry wires, or other entangling attachments
- Consider how much of your time is spent walking (gathering supplies, accessing computers, etc) and how this can be lessened
- Participate in committees planning changes in the design of nursing units

future hospital designs. Based on the Institute of Medicine's findings regarding effects associated with environment-of-care design features, hospitals built in the 1950s to 1970s are outdated and inadequate in meeting today's health care demands[46] and have significant safety issues and inefficiencies. In reports from the Pebble Project, a research initiative of the Center for Health Design, patients' outcomes improved when EBD concepts were implemented.[2] Topics specific to patient safety, such as medication errors, infection, pressure ulcer development, cognition, and falls, were not raised by patients when answering questions nor were those topics assessed objectively or through review of quality data. Structural elements of EBD that were most often vocalized as satisfiers were private rooms, larger private bathrooms, and large windows with a view. These same structural EBD features could enhance patients' safety in relation to falls and cognition.

Satisfaction of patients and their families with the hospital experience was enhanced when EBD elements were incorporated in the structural plan. Casscells et al[47] found that patients and their families strongly endorsed private rooms, space in the patient's room for family members to stay overnight, lighting and temperature controls, and means for maintaining awareness of the outside world through television, books, and papers. In our quality assessment, quality scores based on HCAHPS and Press Ganey data improved in the new heart center environment, reflecting enhanced patient and family satisfaction.

Knowledge gained from patients and their family members can be applied by nurses working in new or older critical care, intermediate, and telemetry care areas. Although many design elements were perceived as improvements, some features of the new heart center were not optimal. Overall functional status and timely discharge may be affected if bedside chairs are uncomfortable or do not offer support features needed to encourage use. Because early mobility and general activity are critical in avoiding functional decline,[48] lessons learned about the comfort of chairs (and other furniture) could help determine if furniture choices facilitate mobility.

Availability of an easy-to-see television can improve sensory stimulation and help patients remain oriented and aware of local and national events outside of the hospital. In addition, the television is an educational feature if used to provide patients with new knowledge about their illness or plan of care. Thus, an ability to use controls independently may affect knowledge, emotions, and space-time orientation as well as provide entertainment. Finally, in our study, the inability to control room lighting was dissatisfying. Lighting can affect circadian rhythm and sleep patterns.[49,50] Ensuring a patient's ability to control lighting independently may be a factor in achieving optimal sleep and recovery. Offering patients meaningful sources of sensory stimulation and a sense of control of the environment can help maintain patients' orientation, promote normal sleep patterns, and improve satisfaction with care. Table 4 provides a list of EBD considerations that can apply to new, remodeled, or current environments of care.

Evidence-based design is cost-effective. In an analysis of 1-time capital expense compared with reasonable operational savings, increased market share, and philanthropic donations, Sadler et al[51] indicated that initial additional

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

capital costs would be recovered in 2 to 3 years. In another in-depth analysis, Berry et al[52] demonstrated that estimated savings and revenue increases generated from a building constructed according to EBD guidelines would result in nearly recapturing the additional investment in the first year. Ultimately, construction costs associated with EBD can be balanced by a short time to breakeven. Because our occupancy rate was historically high for heart center services (consistently >95%), occupancy rate comparisons were not conducted.

In 2006, the American Institute of Architects developed guidelines for new hospital construction that were based, in part, on EBD data. These guidelines are currently used by 42 states and the US federal government.[53] Not only does EBD create a visually appealing environment of care, but EBD has been associated with improved clinical outcomes, including aspects of patient safety, and directly addresses many deficiencies identified by the Institute of Medicine. Patients' independence and safety, control over the environment, and overall satisfaction with care provided during a hospital stay can be improved with EBD. Interventions that aid in reducing dissatisfying aspects of the environment may enhance patients' care and further improve clinical outcomes, safety, and satisfaction with the hospital experience. CCN

eLetters

Now that you've read the article, create or contribute to an online discussion about this topic using eLetters. Just visit www.ccnonline.org and click "Submit a response" in either the full-text or PDF view of the article.

Financial Disclosures
None reported.

References

1. Reigle BS, Stevens KR, Belcher JV, et al. Evidence-based practice and the road to magnet status. *J Nurs Adm.* 2008;38:97-102.
2. The Center for Health Design Pebble Project overview. The Center for Health Design Web site. http://www.healthdesign.org/sites/default/files/Pebble Project Brochure.pdf Accessed November 11, 2011.
3. Agency for Healthcare Research and Quality. *The Hospital Built Environment: What Role Might Funders of Health Services Research Play?* http://www.ahrq.gov/qual/hospbuilt/hospenv.pdf. Accessed November 7, 2011.
4. Ulrich RS, Zimring C, Joseph A, Quan X, Choudhary R. The role of the physical environment in the hospital of the 21st century. Center for Health Design website. http://www.healthdesign.org/research/reports/pdfs/role_physical_env.pdf. Accessed November 7, 2011.
5. Ben-Abraham R, Keller N, Szold O, et al. Do isolation rooms reduce the rate of nosocomial infections in the pediatric intensive care unit? *J Crit Care.* 2002;17(3):176-180.
6. Chang VT, Nelson K. The role of physical proximity in nosocomial diarrhea. *Clin Infect Dis.* 2000;31(3):717-722.
7. Bracco D, Dubois MC, Bouali R, Eggimann P. Single rooms may help to prevent nosocomial bloodstream infection and cross-transmission of methicillin-resistant *Staphylococcus aureus* in intensive care units. *Intensive Care Med.* 2007;33(5):836-840.
8. Walsh W, McCullough KL, White RD. Room for improvement: nurses' perceptions of providing care in a single room newborn intensive care setting. *Adv Neonatal Care.* 2006;6(5):261-270.
9. Wilson APR, Ridgway GL. Reducing hospital-acquired infection by design: the new University College London Hospital. *J Hosp Infect.* 2006;62:264-269.
10. Chaudhury H, Mahmood A, Valente M. Advantages and disadvantages of single- versus multiple-occupancy rooms in acute care environments, a review of the literature. *Environ Behav.* 2005;37(6):760-786.
11. Zhou Q, Moore C, Eden S, Tong A, McGeer A. Factors associated with acquisition of vancomycin-resistant enterococci (VRE) in roommate contacts of patients colonized or infected with VRE in a tertiary care hospital. *Infect Control Hosp Epidemiol.* 2008;29(5):398-403.
12. Hendrich A, Fay J, Sorrells A. Courage to heal: comprehensive cardiac critical care. *J Healthc Des.* September 2002:11-13.
13. Hendrich A, Fay J, Sorrells A. Effects of acuity-adaptable rooms on flow of patients and delivery of care. *Am J Crit Care.* 2004;13(1):35-45.
14. Barlas D, Sama AE, Ward MF, Lesser ML. Comparison of the auditory and visual privacy of emergency department treatment areas with curtains versus those with solid walls. *Ann Emerg Med.* 2001;38(2):135-139.
15. Chaudhury H, Mahmood A, Valente M. Nurses' perception of single-occupancy versus multioccupancy rooms in acute care environments: an exploratory comparative assessment. *Appl Nurs Res.* 2006;19(3):118-125.
16. Harris DD, Shepley MM, White RD, Kolberg KJS, Harrell JW. The impact of single family room design on patients and caregivers. *J Perinatol.* 2006;26:S38-S48.
17. Nguyen Thi PL, Brianon S, Empereur F, Guillemin F. Factors determining inpatient satisfaction with care. *Soc Sci Med.* 2002;54(4):493-504.
18. Jolley S. Single rooms and patient choice. *Nurs Stand.* 2005;20(9):41-48.
19. Lawson B, Phiri M. Hospital design: room for improvement. *Health Serv J.* 2000;110(5688):24-26.
20. Southwell MT, Wistow G. Sleep in hospitals at night: are patients' needs being met? *J Adv Nurs.* 1995;21(6):1101-1109.
21. Aaron JN, Carlisle CC, Carskadon MA, Meyer TJ, Hill NS, Millman RP. Environmental noise as a cause of sleep disruption in an intermediate respiratory care unit. *Sleep.* 1996;19(9):707-710.
22. Baker CF. Discomfort to environmental noise: heart rate responses of SICU patients. *Crit Care Nurs Q.* 1992;15(2):75-90.
23. Gabor JY, Cooper AB, Crombach SA, et al. Contribution of the intensive care unit environment to sleep disruption in mechanically ventilated patients and healthy subjects. *Am J Respir Crit Care Med.* 2003;167(5):708-715.
24. Parthasarathy S, Tobin MJ. Sleep in the intensive care unit. *Intensive Care Med.* 2004;30(2):197-206.
25. Durston P. Partners in caring: a partnership for healing. *Nurs Adm Q.* 2006;30(2):105-111.
26. Brown KK, Gallant D. Impacting patient outcomes through design: acuity adaptable care/universal room design. *Crit Care Nurs Q.* 2006;29(4):326-341.
27. Lewy AJ, Bauer VK, Cutler NL, et al. Morning vs. evening light treatment of patients with winter depression. *Arch Gen Psychiatry.* 1998;55(10):890-896.
28. Beauchemin KM, Hays P. Sunny hospital rooms expedite recovery from severe and refractory depressions. *J Affect Dis.* 1996;40(1-2):49-51.
29. Beauchemin K, Hays P. Dying in the dark: sunshine, gender and outcomes in myocardial infarction. *J R Soc Med.* 1998;91(7):352-354.
30. Benedetti F, Colombo C, Barbini B, Campori E, Smeraldi E. Morning sunlight reduces length of hospitalization in bipolar depression. *J Affect Dis.* 2001;62(3):221-223.
31. Van Someren EJW, Kessler A, Mirmiran M, Swaab DF. Indirect bright light improves circadian rest-activity rhythm disturbances in demented patients. *Biol Psychiatry.* 1997;41(9):955-963.
32. Walch JM, Rabin BS, Day R, Williams JN, Choi K, Kang JD. The effect of sunlight on post-operative analgesic medication usage: a prospective study of patients undergoing spinal surgery. *Psychosom Med.* 2005;67(1):156-163.
33. Harris PB, McBride G, Ross C, Curtis L. A place to heal: environmental sources of satisfaction among hospital patients. *J App Soc Psych.* 2002;32(6):1276-1299.
34. Brown B, Wright H, Brown C. A postoccupancy evaluation of wayfinding in a pediatric hospital: research findings and implications for instruction. *J Arch Plan Res.* 1997;14(1):35-51.
35. Frumkin H. Beyond toxicity: human health and the natural environment. *Am J Prev Med.* 2001;20(3):234-240.
36. Diette GB, Lechtzin N, Haponik E, Devrotes A, Rubin HR. Distraction therapy with nature sights and sounds reduces pain

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

during flexible bronchoscopy: a complementary approach to routine analgesia. *Chest.* 2003;123(3):941-948.
37. Shepley MM. Predesign and postoccupancy analysis of staff behavior in a neonatal intensive care unit. *Child Health Care.* 2002;31(3):237-253.
38. Institute of Medicine (IOM). *Keeping Patients Safe: Transforming the Work Environment of Nurses.* Washington, DC: National Academy Press; 2004.
39. Institute of Medicine. To Err is Human. Institute of Medicine Web site. http://www.iom.edu/Reports/1999/To-Err-is-Human-Building-A-Safer-Health-System.aspx. Accessed November 7, 2011.
40. Institute of Medicine. Crossing the Quality Chasm. Institute of Medicine Web site. http://www.iom.edu/Reports/2001/Crossing-the-Quality-Chasm-A-New-Health-System-for-the-21st-Century.aspx. Accessed November 7, 2011.
41. Henriksen K, Isaacson S, Sadler BL, Zimring CM. The role of the physical environment in crossing the quality chasm. *Jt Comm J Qual Patient Saf.* 2007;33(11):68-80.
42. Rashid M. A decade of adult intensive care unit design: a study of the physical design features of the best-practice examples. *Crit Care Nurs Q.* 2006;29:282-311.
43. Nelson R. Designing to heal. *Am J Nurs.* 2006;106(11):25-27.
44. Clancy C. Designing for safety: evidence-based design and hospitals. *Am J Med Qual.* 2008;23(1):66-69.
45. HCAHPS: Hospital Care Quality Information from the Consumer Perspective. CAHPS Hospital Survey. Facts. http://www.hcahpsonline.org/facts.aspx. Accessed November 7, 2011.
46. Carayon P, Alvarado CJ, Schoofs Hundt A. Reducing workload and increasing patient safety through work and workspace design. Paper commissioned by the Institute of Medicine Committee on the Work Environment for Nurses and Patient Safety. http://cqpi.engr.wisc.edu/system/files/r185.pdf. Accessed November 7, 2011.
47. Casscells SW, Granger E, Williams TV, et al. TRICARE Management Activity Healthcare Facility Evidence-Based Design Survey. *Mil Med.* 2009;174(3):236-240.
48. Brown CJ, Friedkin RJ, Inouye SK. Prevalence and outcomes of low mobility in hospitalized older patients. *J Am Geriatr Soc.* 2004;52(8):1263-1270.
49. Wakamura T, Tokura H. Influence of bright light during daytime on sleep parameters in hospitalized elderly patients. *J Physiol Anthropol Appl Human Sci.* 2001;20(6):345-351.
50. Revell VL, Burgess HJ, Gazda CJ, Smith MR, Fogg LF, Eastman CI. Advancing human circadian rhythms with afternoon melatonin and morning intermittent bright light. *J Clin Endocrinol Metab.* 2006;91(1):54-59.
51. Sadler BL, Hamilton DK, Parker D, Berry L. The compelling business case for better buildings. In: Marberry SO, ed. *Improving Healthcare With Better Building Design.* Chicago, IL: Health Administration Press (Foundation of the American College of Healthcare Executives); 2006:125-144.
52. Berry LL, Parker D, Coile RC Jr, Hamilton DK, O'Neill DD, Sadler BL. The business case for better buildings. *Healthc Financ Manage.* 2004;58(11):76-86.
53. Zimring C. Building the evidence base for evidence-based design. *Environ Behav.* 2008;40(2):147-150.

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024

CE Test

Test ID C1213: Patients and Their Families Weigh in on Evidence-Based Hospital Design

Learning objectives: 1. Discuss the concept of evidence-based design in health care environments 2. Identify evidence-based design features associated with improved patient care 3. Recognize the role of physical environment in influencing patient outcomes

1. Which of the following is an effect of single (private) hospital rooms?
a. Reduced nosocomial infections
b. Increased patient falls
c. Decreased communication between patients and staff
d. Reduced social support

2. Which of the following is associated with natural light in patient care areas?
a. Increased agitation in older adults
b. Increased analgesic use
c. Increased length of stay
d. Reduced depression

3. Which of the following design standards is primarily associated with decreased stress and pain during procedures?
a. Single-bed rooms
b. Views of nature
c. Natural light
d. Unit layout

4. In relation to physical environment, what can enhance patient-centered *effectiveness*?
a. Family member accommodations
b. Minimizing laboratory draws
c. Noise reduction
d. Variable acuity rooms

5. Standardized unit layouts primarily address patient-centeredness by which of the following?
a. Providing service effectiveness
b. Being efficient
c. Displaying equity
d. Demonstrating timeliness

6. What deficiency in health care delivery can be addressed by assessing and planning for current and projected population demographics and their needs early in the design process?
a. Untimeliness
b. Inequities
c. Inefficiencies
d. Ineffectiveness

7. In addition to overall atmosphere, privacy, and space, what other general environment topics of focus emerged in this survey?
a. Family presence and emergency preparedness
b. Communication and infection control
c. Music and art
d. Noise and light

8. Compared with 34.5% of the time in the old heart center, how often did patients report it was "always" quiet at night in 2009?
a. 39.2%
b. 49.2%
c. 59.2%
d. 69.2%

9. What is correct about evidence-based design in health care?
a. Overall hospital size is an important aspect of evidence-based design.
b. The effects of evidence-based design are geared toward patient, not staff, satisfaction.
c. Evidence-based design addresses deficiencies identified by the Institute of Medicine.
d. Evidence-based design is a component of national, hospital patient satisfaction scores.

10. What design feature did patients in this survey perceive as the most satisfying?
a. Room size
b. Large bathroom
c. Reduced noise
d. Private room

11. What design feature did patients in this survey perceive as the most dissatisfying?
a. Remote television control
b. Comfort of chairs
c. Lighting options
d. Clock face design

12. What nursing intervention best reflects application of evidence-based design data?
a. Open window curtains and blinds whenever possible
b. Arrange for semi-private rooms whenever available
c. Adjust the television controls for patients
d. Control room lighting for patients

Test answers: Mark only one box for your answer to each question. You may photocopy this form.

1. ❑**a**	**2.** ❑**a**	**3.** ❑**a**	**4.** ❑**a**	**5.** ❑**a**	**6.** ❑**a**	**7.** ❑**a**	**8.** ❑**a**	**9.** ❑**a**	**10.** ❑**a**	**11.** ❑**a**	**12.** ❑**a**
❑**b**	❑**b**	❑**b**	❑**b**	❑**b**	❑**b**	❑**b**	❑**b**	❑**b**	❑**b**	❑**b**	❑**b**
❑**c**	❑**c**	❑**c**	❑**c**	❑**c**	❑**c**	❑**c**	❑**c**	❑**c**	❑**c**	❑**c**	❑**c**
❑**d**	❑**d**	❑**d**	❑**d**	❑**d**	❑**d**	❑**d**	❑**d**	❑**d**	❑**d**	❑**d**	❑**d**

Test ID: C1213 Form expires: February 1, 2014 Contact hours: 1.0 Fee: AACN members, $0; nonmembers, $10 Passing score: 9 correct (75%) Synergy CERP: Category A
Test writer: Denise Hayes, RN, MSN, CRNP

AMERICAN ASSOCIATION of CRITICAL-CARE NURSES

For faster processing, take this CE test online at www.ccnonline.org ("CE Articles in this issue") or mail this entire page to: AACN, 101 Columbia Aliso Viejo, CA 92656.

Program evaluation

	Yes	No
Objective 1 was met	❑	❑
Objective 2 was met	❑	❑
Objective 3 was met	❑	❑
Content was relevant to my nursing practice	❑	❑
My expectations were met	❑	❑
This method of CE is effective for this content	❑	❑

The level of difficulty of this test was: ❑ easy ❑ medium ❑ difficult
To complete this program, it took me _____ hours/minutes.

Name _____ Member # _____
Address _____
City _____ State ____ ZIP _____
Country _____ Phone _____
E-mail _____
RN Lic. 1/St _____ RN Lic. 2/St _____
Payment by: ❑ Visa ❑ M/C ❑ AMEX ❑ Discover ❑ Check
Card # _____ Expiration Date ____
Signature _____

The American Association of Critical-Care Nurses is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

AACN has been approved as a provider of continuing education in nursing by the State Boards of Nursing of Alabama (#ABNP0062), California (#01036), and Louisiana (#ABN12). AACN programming meets the standards for most other states requiring mandatory continuing education credit for relicensure.

Downloaded from http://aacn-az.silverchair.com/ccnonline/article-pdf/32/1/e1/112531/e1.pdf by guest on 10 April 2024