Charting Nursing's Future

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Reports on Policies That Can Transform Patient Care

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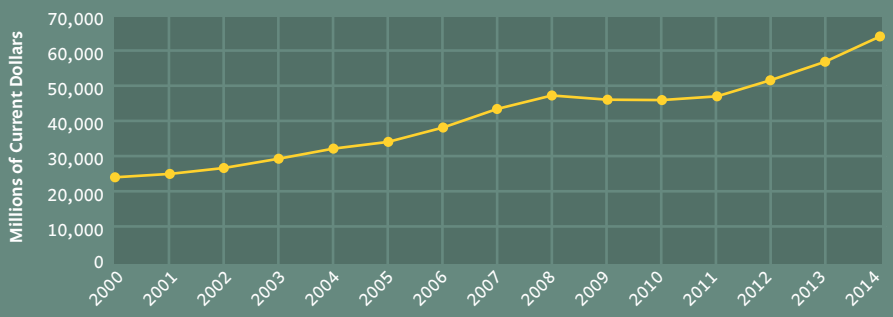
Addressing the Quality and Safety Gap—Part III: The Impact of the Built Environment on Patient Outcomes and the Role of Nurses in Designing Health Care Facilities

The U.S. is in the midst of a major health care construction boom, with spending projected to exceed $60 billion by 2014 (see figure 1, below). Nurses at all levels and in every setting have a critical role to play on multidisciplinary teams charged with assessing, planning, and designing new and replacement facilities. Evidence-based design (EBD) provides a framework for ensuring that decisions about layout, lighting, and other physical elements are grounded in research, and there is some evidence to suggest it also yields positive economic returns on investment through improvements in patient outcomes, staff effectiveness, and operational efficiency. This report, the third in a miniseries on quality and safety, discusses EBD as it relates to nursing practice, administration, and education and highlights the importance of alignment among architecture, information technology, clinical processes, and workplace culture.

Figure 1 **The Health Care Construction Boom**



Health care construction almost doubled in value from 2000 to 2008, driven by many factors, including demographic changes, the need to replace aging facilities, and new guidelines intended to improve safety and quality, such as the use of private, single-bed patient rooms. Although growth flattened during the economic downturn, the forecast is for strong growth in the future.

Source: FMI Corporation, www.fminet.com, 2010.

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The Value of Nursing

Nurses might not know how to read architectural drawings or use computer-assisted drafting tools, but they have a very important role to play in helping plan and design physical spaces that support the delivery of safe, effective patient care. Their clinical knowledge, patient-handling experience, and problem-solving skills make them good candidates to serve on multidisciplinary design teams convened by health care providers to solicit staff input on new construction and renovation projects, or act as consultants to architecture and design firms that cater to the health care industry. Nurses who helped design St. Mary's Medical Center North in Powell, Tennessee, for example, advocated for wider doorways to facilitate patient handling, nonslip floors to prevent falls, supply servers with pass-through doors, and view windows to allow nurses to see patients from the hallway, says Cynthia McCullough, RN, MSN, vice president, senior health care consultant, and director of clinical services for HDR Architecture, who worked on the project.

Photo: St. Mary's Medical Center North, Powell, Tennessee, Mercy Health Partners

Engaging Nurses in Evidence-Based Design

Evidence-based design (EBD), a relatively new methodology supported by a small but growing body of literature, addresses the impact of physical surroundings on patient safety, quality of care, efficiency, and retention of staff in hospitals, community health centers, and long-term care facilities. The California-based Center for Health Design defines EBD as "the process of basing decisions about the built environment on credible research to achieve the best possible outcomes."

Many of these outcomes depend on nurses' ability to do their jobs, so it is very important to obtain their input. "Of all the health care professions, nursing is the backbone for what goes on in hospitals," says Kerm Henriksen, PhD, human factors advisor for patient safety at the federal Agency for Healthcare Research and Quality. "Nurses have a lot of practical knowledge and can help identify design threats to patient safety and quality of care, like having to dispense medications in high-traffic areas that invite interruption."

Nurses also bring an interdisciplinary orientation that is of great value to a design team, explains Henriksen. "They are aware of the other system components that have a daily impact on their activities and are accustomed to stepping outside their silo—working with folks in pharmacy, for example—to address barriers to good patient care." In addition, because of their extensive hands-on experience, nurses can help identify instances of misalignment among architecture, technology, and work process.

Despite these benefits, nurses' input is not always obtained. According to a survey of architects, barriers include nurses being too busy during their regular shifts to attend meetings and reluctant to come in on their time off, especially if they won't be compensated. In addition, architects don't always budget enough time in their plans to bring nurses up to speed on the design process. "Nurses and architects don't always speak the same language," explains Janet Beck, RN, BSN, MBA, a health care design consultant who has worked on several major construction projects.

Overcoming these obstacles to nurse involvement requires leadership. Cheryl Herbert, RN, MBA, FACHE, EDAC, president of Dublin Methodist Hospital in Ohio, hand selected nurses to help plan and design the hospital she now runs and secured buy-in from their supervisors so they could participate during regular work hours. "People saw it as an opportunity to contribute, to put their fingerprint on something significant," says Herbert. "We tried to tie our work directly to patient outcomes." She notes that ideal candidates for design teams are individuals who can see the big picture and who are capable of "thinking in terms of 'ideal states' rather than just how to tweak things a little."

Kaiser Permanente brings in nurses to test new design ideas at its Sidney R. Garfield Healthcare Innovation Center in northern California. The 37,000-square-foot facility includes an outpatient clinic, a home environment, and an inpatient unit with emergency, medical-surgical, critical care, labor and delivery, operating, consultation, and waiting rooms as well as nurse work stations. Marilyn P. Chow, RN, DNSc, FAAN, vice president of patient care services, explains that they can compare different space configurations—for example, completely separate, private neonatal intensive care unit (NICU) rooms off a hallway versus adjoining rooms with openings between them—by setting them up and then bringing in a group of NICU nurses to try them out. "We have a strong commitment to having frontline staff be part of the design process," says Chow.

> "Nursing is the backbone for what goes on in hospitals. Nurses have a lot of practical knowledge and can help identify design threats to patient safety and quality of care."
>
> Kerm Henriksen, PhD, human factors advisor for patient safety at the federal Agency for Healthcare Research and Quality

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Aligning Infrastructure, Leadership, and Processes: A Multidisciplinary Model

Efforts to address the "quality chasm" in health care have proliferated since the Institute of Medicine published its landmark study in 2001 (see citation, page 4). Coordination, however, has been lacking, according to Eileen B. Malone, RN, MSN, MS, EDAC, senior partner at Mercury Healthcare Consulting LLC and former CEO and commander emeritus of DeWitt Army Community Hospital at Fort Belvoir. "We have these wonderful stovepipes of innovation but very little integration because architects, IT experts, and clinicians tend to work in separate silos," she says. Her model, developed for the military but then refined for a broader application, focuses on common strategic goals—such as preventing falls—and provides a conceptual framework for examining the interplay among physical, technological, and human factors, as well as the need for more multidisciplinary research. "Nurses have a very important role to play in this research," says Malone.

Modified from Malone, E., J. R. Mann-Dooks, and J. Strauss. 2007. *Evidence-based design: Application in the Military Health System.* Falls Church, VA: Noblis, p. 12.

U.S. Military Health System

In 2005, federal legislation called for an overhaul of the U.S. Department of Defense's Military Health System (MHS) to improve the quality of care delivered to active-duty military personnel deployed around the world. In anticipation of many facilities being closed, renovated, or replaced, the MHS (distinct from the Veterans Health Administration) adopted nine design principles to guide its work: (1) provide patient- and family-centered care; (2) achieve world-class quality and safety; (3) create a positive work environment; (4) improve operational effectiveness; (5) be sustainable with a high level of community responsibility; (6) provide high value and be good stewards of taxpayer money; (7) be evidence- and performance-based; (8) design for maximum flexibility, standardization, and growth; and (9) base decisions on best practices and innovation. Inherent in these principles is a recognition that design affects patient outcomes and staff effectiveness.

Eileen B. Malone, RN, developed the evidence-based design model presented in the box on page 2 while serving as a consultant to the MHS. "As a nurse, when you're facing important investment decisions that will affect your patients, you review the literature," says Malone. "We found Ulrich and Zimring's meta-analysis,* which was full of scientific research, very helpful," she recalls.

In addition to retaining consultants with expertise in nursing and design, the MHS relies on nurse method analysts, who hold a master's degree in nursing or health care administration, to advise chief financial officers about the clinical implications of proposed modifications to existing facilities and to serve as project nurses, guiding the planning of new facilities. They look at workflow, demographics of the population to be served, and other services available in the community to assess the impact of infrastructure on patient care and inform decisions about the number of treatment rooms, which clinics to offer on-site, etc.

"We recognize the value of bringing clinical aspects to the architectural and design process," says Lieutenant Colonel Judith Hawkins, BSN, MHA, a division director in the U.S. Army Health Facility Planning Agency. "Without input from clinicians, including nurses, you won't get a hospital; you'll just get a building."

Louisiana State University Academic Medical Center

Construction is scheduled to begin early next year on a brand new public hospital in New Orleans, Louisiana, to replace one flooded by Hurricane Katrina. To solicit input from frontline staff during the design phase, Mary L. Kelly, RN, MSN, MHA, clinical liaison to the planning team, convened interdisciplinary groups of nurses, physicians, and ancillary staff to discuss patient and family zones, standardized rooms, nurse travel times, patient visibility, controlled access, natural lighting, and other design elements.

The planning team also benefited from "just-in-time research" underwritten by a grant from the Robert Wood Johnson Foundation and conducted by experts from Georgia Tech's College of Architecture, who pulled together evidence from the literature to inform decision making. For example, they opted to equip rooms with "open" showers based on research and expert judgment suggesting a lip or sill can create a tripping hazard.

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"We pulled in nurses at all levels."

Mary L. Kelly, RN, MSN, MHA, clinical liaison to the team designing the new Louisiana State University Academic Medical Center

*Ulrich, R., X. Quan, and C. Zimring. 2004. *The role of the physical environment in the hospital of the 21st century.* Concord, CA: The Center for Health Design. Report funded by the Robert Wood Johnson Foundation.

Voices from the Field

New Hanover Regional Medical Center

"When we were planning our new Women's and Children's Hospital, which opened in September 2008, nurses were at the table, designing the labor and delivery suites, the intensive care unit, everything. They recognized this was a once in a lifetime opportunity to create a really wonderful, family-centered healing environment for our patients. They were completely invested in the process, had a lot of ownership, and wanted to make sure they got it right.

"Nurses are all about improving safety and quality of care, and they asked the architects important, practical questions like, 'How is this feature going to work?' But they couldn't always see beyond 'what is' to 'what could be.' What I brought to the table was that middle ground. My role was to make sure I stayed in touch with the staff but also up to date on the evidence-based design literature—the research. I also needed to be able to communicate effectively to bridge the gap between clinicians and designers.

"When we were getting ready to transition to the new facility, we acknowledged and even set up an expectation that there would be problems to address. The nursing managers and I went on rounds frequently and asked questions and worked with IT and other departments to make adjustments. That helped us to be successful."

Barbara Buechler, RN, BSN, MHA, administrator, Betty H. Cameron Women's and Children's Hospital, New Hanover Regional Medical Center, Wilmington, North Carolina

"The key to good design is getting participation from staff members who are very close to the work of caring for patients."

A Survey of Major Evidence-Based Design Features

Whether nurses are involved in new construction projects, major renovations, or merely facility upgrades that take place over the lifetime of a building, they need to be aware of the impact of the built environment on patient safety, staff effectiveness, patient centeredness, and the timely delivery of efficient and equitable services—aims identified by the Institute of Medicine.* This awareness is, ideally, grounded in research rather than personal preference. Cynthia McCullough, RN, MSN, vice president, senior health care consultant, and director of clinical services for HDR Architecture, says part of her job is to gently steer nurses toward the literature. "Personal preference is important, but it is not how I'm going to design a multimillion-dollar facility," she says.

What follows is a roundup of findings from studies conducted by evidence-based design experts, accompanied by a table on page 5 compiled by a team led by Roger S. Ulrich, PhD, and Craig Zimring, PhD, for a review article that appeared in the *Health Environment Research and Design (HERD) Journal* in 2008:

- **Single-bed room configurations** reduce the spread of disease among patients, protect patient confidentiality and privacy, and foster better communications because patients are less reluctant to share personal information such as a history of drug abuse or domestic violence.
- **Acuity-adaptable rooms** reduce the need for patient transfers, which can prolong hospital stays and interfere with continuity of care.
- **Decentralized unit layouts** increase time spent by nurses at the bedside compared to the traditional layout featuring a large nursing station and centralized supply location at one end of a long hallway.
- **Ventilation and filtration systems** improve indoor air quality by removing allergens, pathogens, and outgases from patient rooms, staff areas, and public spaces.
- **Ergonomically designed patient beds, rooms, and nursing stations** reduce the incidence of patient falls and staff injuries. Patient lifts and handrails are particularly effective.
- **Better and brighter illumination** leads to fewer medical errors. According to one study, adequate lighting is especially important for older workers.
- **Exposure to natural sunlight** reduces stress among patients and staff, blunts perceptions of pain (as measured by pain medication usage), leads to shorter hospital stays, and improves quality of sleep. Natural sunlight also allows nurses to more accurately assess skin tone—which is important when making diagnoses—and reduces jaundice in newborns.
- **Noise reduction features,** such as carpet, acoustical tiles, and use of handheld pagers rather than intercoms and overhead public announcement systems, improve the quality of patients' sleep and reduce stress and barriers to communication among patients, visitors, and staff. According to one study, quieter environments are also associated with reductions in blood pressure, pulse rates, and readmission rates among intensive care unit heart patients.
- **Strategic placement of hand-washing sinks** reduces infection by facilitating good hygiene among staff. In an incident reported in 2008, 13 immunosuppressed patients in a Toronto hospital died because of exposure to bacteria from sink drains placed too close to patients' beds.
- **Good wayfinding systems** with maps, landmarks, signage, information kiosks, and directories help patients, visitors, and employees find their way around and allow staff to focus on clinical duties rather than giving directions and answering routine questions.
- **Positioning of furniture to create distinct zones** in private rooms and public spaces enhances privacy and facilitates family interaction.
- **Access to nature (biophilic design)** reduces stress and pain. In one study, subjects with garden views used fewer pain medications, had shorter lengths of stay, experienced fewer complications, and reported higher levels of emotional well-being.
- **Water features** such as fountains and aquariums have a calming effect and reduce stress. (On the other hand, they can pose a risk to patients with compromised immune systems.)
- **Works of art,** especially those featuring landscapes, induce relaxation responses.

Photo: Bruce Forster

At PeaceHealth in Eugene, Oregon, ceiling mounted lifts were installed on two units to test their effectiveness and safety with patient-handling activities. The pilot was so successful, reducing staff back injuries by 83 percent, that the design feature was adopted hospital-wide, according to a March 2006 article in *Healthcare Design Magazine*.

*Institute of Medicine. 2001. *Crossing the quality chasm: A new health system for the 21st century.* Washington, DC: National Academies Press.

Table 1

Impact of Design on Patient and Staff Outcomes

Health Care Outcomes	Single-bed rooms	Access to daylight	Appropriate lighting	Views of nature	Family zone in patient rooms	Carpeting	Noise-reducing finishes	Ceiling lifts	Nursing floor layout	Decentralized supplies	Acuity-adaptable rooms
	Design Strategies or Environmental Interventions										
Reduce hospital-acquired infections	■										
Reduce medical errors	●		●				●				●
Reduce patient falls	●		●		●	●			●		●
Reduce pain		●	●	■			●				
Improve patient sleep	■	●	●				●				
Reduce patient stress	●	●	●	■	●		■				
Reduce depression		■	■	●	●						
Reduce length of stay		●	●	●							●
Improve patient privacy and confidentiality	■				●		●				
Improve communication with patients and family members	■				●		●				
Improve social support	●				●	●					
Increase patient satisfaction	■	●	●	●	●	●	●				
Decrease staff injuries								■			●
Decrease staff stress	●	●	●	●			●				
Increase staff effectiveness	●		●				●		●	●	●
Increase staff satisfaction	●	●	●	●			●				

Key

- ● Indicates that a relationship between the specific design factor and health care outcome was indicated, directly or indirectly, by empirical studies.
- ■ Indicates that there is especially strong evidence (converging findings from multiple rigorous studies) indicating that a design intervention improves a health care outcome.

Source: Ulrich, R. S. , C. Zimring, X. Zhu, J. DuBose, H. Seo, Y. Choi, X. Quan, and A. Joseph. 2008. A review of the research literature on evidence-based healthcare design. *Health Environments Research and Design Journal* 1 (3): 61–125. Reprinted with permission.

The Value of Nursing

Centralized nursing stations were, for many years, an icon of the modern hospital. Although they continue to serve an important purpose, their popularity has declined as a result of research, including a landmark time-motion study that revealed that nurses walk an average of one to five miles over the course of a daytime shift and spend more time at the nursing station than they do at the bedside.* In response, many health care facilities are adopting decentralized designs, nestling mini-nursing stations in alcoves between patient rooms, for example, like at New Hanover Regional Medical Center in Wilmington, North Carolina (right). An article published in the *HERD Journal* last year provides some evidence to support this configuration.† One challenge with decentralized layouts is finding ways to keep nurses connected with the colleagues they rely on for clinical advice, backup coverage, and moral support. Strategies for combating isolation include setting up staff lounges, assigning buddies, and equipping employees with walkie-talkies or mobile phones.

Photo courtesy of HDR Architecture Inc.
© Anne Gummerson Photography

*Hendrich, A., M. Chow, B.A. Skierczynski, L. Zhenqiang. 2008. A 36-hospital time and motion study: How do medical-surgical nurses spend their time? *Permanente Journal* 12 (3): 25–34.

†Gurascio-Howard, L., and K. Malloch. 2007. Centralized and decentralized nurse station design. *Health Environment Research and Design Journal* 1 (1): 44–57.

OhioHealth

When OhioHealth, a network of faith-based, nonprofit health care providers in central Ohio, decided to build Dublin Methodist, a brand-new, nonreplacement hospital, the company selected Cheryl Herbert, RN, MBA, FACHE, EDAC, to oversee the planning, design, and construction. A former staff nurse, director of nursing, and hospital president, Herbert recognized the importance of engaging a wide range of stakeholders, including staff. "Any place nurses would be working—the emergency department, maternity, the medical-surgical intensive care unit—we made sure to include them in our advisory group for that area," she says. "Nurses were instrumental in designing patient rooms, including the headwalls behind the beds," she says. "We had budget constraints, of course, but we tried to use their input everywhere we could, especially when there was consensus about what to do."

Many evidence-based design features ended up being adopted. For example, the hospital has only private, single-bed patient rooms, to reduce the risk of contagion, enhance privacy, and support family involvement. Every room has its own hand-washing sink, and all of the medical-surgical ICU rooms are acuity-adaptable, sparing patients the need to move when their condition improves or deteriorates. Windows looking out onto interior courtyards bring plenty of natural light to almost every part of the facility, and carpeted hallways, acoustical ceiling tiles, and beveled ceilings reduce noise levels. Bathrooms are situated along the headwall, with handrails leading to beds to help patients move safely, without falling.

A partner in The Center for Health Design's Pebble Project, which supports research about the impact of the built environment on outcomes, Dublin Methodist is collecting data on patient satisfaction, noise level, family comfort, and staff retention. The hospital's RN turnover rate over the past year was 6.28 percent, lower than OhioHealth's rate of 7.7 percent system-wide. Herbert warns, however, that it is difficult to pinpoint design as a factor because there were other variables involved.

"If design can be tied to better patient outcomes or improved quality of work life, I think that's the way to get nurses engaged."

Cheryl Herbert, RN, MBA, FACHE, EDAC, president of Dublin Methodist Hospital

Best-Practice Design Features for Primary Care Facilities

- Proximity to residential communities being served, accessibility by public transportation, and ample parking
- Good wayfinding systems so visitors know where to go
- Comfortable waiting spaces with enough seats for patients and their families
- Well equipped procedure rooms that support good communication among patients, family members, and clinicians
- Natural light, views of nature, and other positive distractions
- Security features that protect patients and staff
- Privacy features that safeguard sensitive patient information
- Multiuse spaces that are adaptable as needs change
- Dedicated staff lounges, restrooms, lockers, and conference rooms

Adapted from Joseph, A., and A. Keller. 2009. *Improving the patient experience: Best practices for Safety-Net Clinic redesign*. Oakland, CA: California HealthCare Foundation.

Design Resources for Nursing Leaders

The Health Environments Research and Design Journal is coedited by Jaynelle F. Stichler, DNSc, FAAN, FACHE, RN, professor of nursing at San Diego State University, and D. Kirk Hamilton, FAIA, FACHA fellow, associate director of the Center for Health Systems and Design, and associate professor of architecture at Texas A&M University (www.herdjournal.com).

Safety-Net Clinics, a joint initiative of The Center for Health Design and the California Healthcare Foundation, has compiled several design resources for community health centers, including a literature review and an online forum to facilitate networking among providers (www.clinicdesign.healthdesign.org).

Many federal and state agencies refer to the ***Guidelines for Design and Construction of Health Care Facilities*** as a code or reference standard for proposed construction projects (www.fgiguidelines.org).

The **Green Guide for Health Care**, a project of Healthcare Without Harm and the Center For Maximum Potential Building Systems, integrates environmental and health principles and practices into the planning, design, construction, operations, and maintenance of health care facilities (www.gghc.org).

The U.S. Department of Veterans Affairs is currently updating its **design guide for community living centers** (www.cfm.va.gov/til/dGuide.asp).

The Center for American Nurses published ***Designing Better Work Spaces for Nurses and Patients: A Checklist and Resource Guide,*** written by Diane Scott, RN, MSN, in 2007.

The Sigma Theta Tau International Honor Society of Nursing published ***Evidence-Based Design for Healthcare Facilities,*** edited by Cynthia McCullough, RN, MSN, in 2010.

The Agency for Healthcare Research and Quality produced an instructional DVD entitled, ***Transforming Hospitals: Designing for Safety and Quality***, in 2007.

The **Center for Health Design** publishes reports covering all aspects of health care facility design and manages the **Pebble Project,** which supports research about the impact of the built environment on patient safety, quality of care, workers' safety, and other outcomes (www.healthdesign.org).

The **Luminary Project: Nurses Lighting the Way to Environmental Health** is an online clearinghouse of nursing-led efforts to create healthier health care environments (www.theluminaryproject.org).

Planetree promotes many aspects of patient-centered care, including physical environments that enhance healing, health, and well-being (www.planetree.org).

Although the impact of the built environment on patient outcomes is widely acknowledged, the topic is only beginning to work its way into nursing education. A few examples follow.

Design Concepts Incorporated into Baccalaureate-Level Nursing Course

RN students pursuing a BSN degree at Holy Names University in Oakland, California, learn about evidence-based design in a required course on healing environments taught by Fay Bower, DNSc, FAAN, chair of the Department of Nursing. "In the past, no one thought about the building. We figured it didn't make any difference. Now we know the dangers," says Bower. She discusses acuity-adaptable rooms and other design elements backed by research. She notes that in California, hospitals are being retrofitted to comply with new earthquake safety guidelines, creating opportunities for other improvements at the same time. "I tell my students to pay attention to their surroundings and to speak up if environmental factors get in their way of providing good care."

University-Industry Partnership Creates Unique Hands-on Learning Opportunities

Sandra Cesario, PhD, RNC, FAAN, professor and coordinator of the PhD program at the Texas Woman's University School of Nursing, has developed an innovative design elective for graduate students, in collaboration with Hill-Rom, a medical technologies company with design services. "My focus is getting nurses to speak the language so they can participate in decision making and articulate what they want in terms that architects, engineers, plumbers, and others can understand," explains Cesario.

Students develop spatial awareness, learn how to read architectural drawings, and review the literature about environmental factors that affect patient outcomes. Then they use magnetic boards provided by Hill-Rom to design a space to serve a specific population, such as renal transplant patients. Digital photos are forwarded to Hill-Rom, where computer-assisted drafting specialists create three-dimensional renderings. After another round of modifications, the students build a full-scale prototype of the health care delivery space, set up equipment, and try it out. "This gives them a chance to see what the line of sight is like from the nurse's charting station and whether they can move a wheelchair around," Cesario explains.

Last year, they developed a senior-living apartment to support "aging in place" and help older people stay in their own homes. Features included an adjustable wall to create an extra room for a caregiver and windows on interior walls separating rooms to allow monitoring by nursing staff. Hill-Rom was so pleased with the prototype the company invited some builders in to take a look.

Cesario's creative approach to preparing nurses to be more active participants in design earned her an innovation in teaching award from the Texas Organization of Baccalaureate and Graduate Nursing Education in 2007. She believes all nurses need some understanding of the impact of design. "It's a matter of safety, really," she says. "No matter what setting you work in, the physical environment is going to affect your patients, so it's important to pay attention to your surroundings."

Interprofessional Program Emphasizes Integration of Knowledge and Skills across Disciplines

At Arizona State University (ASU), the College of Nursing and Health Innovation has partnered with the Herberger Institute for Design and the Arts to offer master's- and doctoral-level interprofessional health care innovation and healing design courses for nurses, architects, designers, and others. The programs emphasize problem-solving skills grounded in an understanding of the interplay among clinical practice, technology, architecture, finance, and other aspects of health care delivery.

The faculty includes Gerri Lamb, PhD, RN, FAAN, and James Shraiky, an architect, both of whom hold joint appointments in nursing and design. Before she came to ASU, Lamb was involved in a joint effort between Emory University's School of Nursing and Georgia Tech's College of Architecture to develop an interprofessional curriculum, with support from the Robert Wood Johnson Foundation (RWJF), including a course in which students designed "the hospital room of the future" by reviewing the literature, interviewing clinicians in the field, and applying collaborative problem-solving skills. Lamb also spearheaded an effort, with Craig M. Zimring, PhD, to identify interprofessional competencies for systems integrators—leaders capable of bringing together experts

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The Value of Nursing

Sandra Cesario, PhD, RNC, FAAN, professor and coordinator of the PhD program at the Texas Woman's University School of Nursing, shows nursing students how to read architectural drawings in preparation for designing and building prototypes of patient spaces at Hill-Rom's Customer Experience Center in Indiana. Cesario describes the university-industry collaboration as a "win-win" because nursing students gain exposure to design concepts, and the medical technologies and design services company benefits from the students' clinical expertise.

from different disciplines, including nursing. The team came up with seven domains:

- **Science of health care design**—applying and extending evidence-based research;
- **Health care systems and environments**—describing and influencing the context in which services are planned, delivered, and evaluated;
- **Patient- and family-centered care**—engaging patients in their own care and mobilizing and leveraging support systems;
- **Teamwork**—facilitating collaboration and communication among different stakeholders;
- **Professional cultures**—identifying and capitalizing on expertise of designers, architects, engineers, clinicians, etc.;
- **Innovation**—thinking creatively to solve problems.

"We need to understand what each group brings to the process, but awareness isn't enough," says Lamb. "The real challenge is to integrate knowledge from different professional disciplines to create better and safer health care environments."

Another RWJF grant enabled Lamb and colleagues to develop strategies for helping design professionals better understand the work of nurses. "We shared our research on nurse care coordination with architects and asked them how to translate it to make it more useful to them. They recommended we use our findings to prepare questions for architects to ask nurses during the design process," says Lamb. Nursing research, she emphasizes, is another vehicle for improving patient outcomes through design.

Continuing Education for Nurses

The Center for Health Design offers an accreditation program for nurses and others interested in health care design (see "Evidence-Based Design Accreditation and Certification," right), and the Vendome Group's Healthcare Division (www.vendomegrp.com/healthcare.html) broadcasts webinars and convenes an annual conference.

The Nursing Institute for Healthcare Design (www.nursingihd.com), cofounded in 2005 by Debbie Gregory, RN, BSN, and Laura Hayes, RN, BSN, MBA, has developed an educational curriculum to help nurses understand the design and construction process as it relates to specific clinical settings. The nonprofit association also hosts a virtual discussion forum, to facilitate networking.

The Joint Commission Resources (JCR), the publishing and educational affiliate of the Joint Commission, has partnered with Herman Miller, a furniture design and manufacturing firm, to create its own curriculum to equip clinicians to help design safer facilities. Modules covering the basics of building—architectural drawings, spatial awareness, phases of construction—as well as principles of change management, evidence-based design, and process reengineering are being developed by a JCR team led by Kathy Reno, RN, PhD, assistant clinical professor and coordinator of the doctoral Executive Leadership Program at the University of Illinois–Chicago's College of Nursing. "Facility design is not just about fire safety codes," says Reno. "It's about supporting the provision of good care."

For More Information

- Lamb, G., C. Zimring, J. Chuzi, and D. Dutcher. 2010. Designing better healthcare environments: Interdisciplinary competencies in healthcare design. *Journal of Interprofessional Care* 24 (4): 422–35.

Evidence-Based Design Accreditation and Certification

More than 500 architects, builders, designers, and health care professionals—including several nurses—have completed the cross-disciplinary Evidence-Based Design Accreditation and Certification (EDAC) to become more informed consumers of research about the impact of the built environment on patient outcomes.

The curriculum (www.healthdesign.org/edac) focuses on strategies for finding and using data to inform decision making, rather than memorizing recent study findings, explains Debra J. Levin, president and CEO of The Center for Health Design, which launched EDAC in 2009 with financial support from the Robert Wood Johnson Foundation. "It's not about how many square feet a patient's room should be. It's about defining your own goals and designing spaces in a way that helps you achieve them," Levin says.

"These are multimillion dollar decisions that will affect how patient care will be delivered for the next 30 to 50 years. Nurses are accustomed to consulting evidence. Design should not be an exception."

Jaynelle F. Stichler, DNSc, RN, FACHE, FAAN, EDAC, professor of nursing at San Diego State University and coeditor of the *HERD Journal*

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