



RESEARCH HIGHLIGHTS

DESIGN'S EFFECTS

ON HEALTH

BY MARGOT PATTERSON

It's a term not yet widely known to the general public or even to everyone in the medical community, but evidence-based design is having a growing impact on health care facilities across the country. Evidence-based design takes what has been learned about how the design of a building affects the people who use it and applies this knowledge to the construction of new facilities and the renovation of old ones. In health care, the intention is to construct or alter the physical environment of hospitals and clinics to create better outcomes for patients, their families and staff.

We saw a massive growth in the number of studies conducted between the years 2004 and 2008, said Jennifer DuBose, a research associate at the College of Architecture at Georgia Institute of Technology and co-author of two reviews of the literature on evidence-based health care design.

There are now hundreds of studies on a wide variety of environmental factors in health care facilities, ranging from hospital layout, noise and light to the healing effects of gardens and nature. To be sure, many of the studies are quasi-experimental rather than randomized with controls, and there continues to be a need for rigorous research, said DuBose, who specializes in evidence-based health care design. Locating funding to pay for research is always a problem, she added, but the field today is not so much in its infancy as "in its toddlerhood," she said.

"It has reached that point of maturation that there are full-fledged pro-



DuBose

grams in schools where you can actually get degrees," she said. "There's a Center for Health Design that has developed a certification program where architects, planners and designers can show that they are proficient in [evidence-based design]."

DuBose said a number of factors are converging to bring evidence-based design to the forefront. Among them, hospitals are no longer being compensated by Medicare and Medicaid for patient falls and hospital-acquired infections, making evidence about how the environment can contribute and correct for them that much more valuable to administrators, she said.

DuBose said she will shortly undertake a study funded by the military of the role of the environment in patient

falls. "The military health system is making a huge investment in [evidence-based design]," she said. "I would say that in the last 10 years, it has acquired a lot of momentum."

DuBose dates what may be the beginnings of evi-

dence-based health care design to a 1984 study conducted by behavioral scientist Roger Ulrich that found patients who had rooms with a view of nature used less pain medication than patients whose rooms looked onto a brick wall. "That was one of the first 'aha's,' where something we understood intuitively was shown quantitatively," DuBose said.

Indeed, much of what is considered evidence-based design seems intuitive, but it puts scientific grounding under what people often assumed but did not substantiate — for instance, that noise in hospitals disturbs patients' sleep and increases stress.

DuBose co-authored a 2008 review for the Healthcare Leadership Project, a collaboration between Georgia Tech and the Center for Health Design based in Concord, Calif. She found the research indicates that around the world, hospital noise levels have been rising steadily since the 1960s. Voices,

paging systems, alarms, telephones, ice machines, trolleys, bedrails moving up and down, etc. make hospitals noisy places, a condition worsened by the fact that many surfaces in hospitals are sound-reflecting, not sound absorbing. Improving the acoustic environment by installing high performance sound-absorbing ceiling tiles, reducing noise sources (adopting a noiseless paging system, for example) and providing single-bed rather than multi-bed rooms have been found to enhance patients' sleep and their physiological and psychological health.

Other findings on the effects of the environment on patient health has turned up more unexpected results. That gardens are restorative settings for patients is no surprise, but reliable research indicates that viewing pictures of nature for even a few minutes can ease stress, anxiety and even pain. Patients prefer views of nature, whether paintings or photographs, even to well-known paintings by such masters as Chagall and Picasso. Many patients are uncomfortable with abstract or ambiguous art.

The evidence suggests that auditory distraction combined with visual distraction is even more powerful in alleviating pain and reducing patients' need for medication. In one randomized clinical trial, patients who listened to classical music while looking at scenes of nature obtained more pain relief and took less sedation than patients who were shown scenes of nature alone.

According to the 2008 review of evidence-based design studies, rigorous and ample evidence has accumulated demonstrating the positive effects of light, both natural and artificial, in health care facilities. Exposure to sunlight can both shorten patient stays and diminish depression, suggesting that hospitals and mental health facilities should be sited to ensure that depressed patients have abundant natural light.

Perhaps the clearest conclusion of

the research is the benefit associated with single-bed patient rooms. Single-bed rooms not only improve patients' sleep, studies show, they also reduce the risk of hospital-acquired infection, improve communication between patients and medical staff and better accommodate family and friends, thus fostering social support.

In terms of patient safety, the evidence related to hospital-acquired



infections is particularly important. Infections acquired in a health care setting while being treated for other conditions are among the top ten causes of death in the United States, according to the Centers for Disease Control and Prevention. Such nosocomial infections can be spread by contact, air and water. Research has been done on both airborne and waterborne hospital-acquired infections and ways to control them, but hand contact is the principal means of transmission — so hand hygiene is the single most important means of control. Mounting evidence indicates that alcohol-based hand rub improves hand-washing compliance among hospital staff more than

soap and water, particularly when the hand rub is placed by the patient's bedside as opposed to in the hallway.

DuBose said many hospital owners and administrators are showing interest in evidence-based designed health care, but there is push-back when it comes to taking on the extra costs that may be involved. Owners are used to seeing the hospital building as a capital project rather than as part of the treatment plan for patients, she said.

The beneficial effect of sunlight is a case in point. "If you just keep your focus on just the building, adding more windows costs more money, but if you expand your scope and realize that the whole budget includes the cost of pain medication and the length of hospital stay, then you realize that the extra windows may result in reduced operating costs in the long run, which is more compelling to CEOs," she observed.

DuBose said the use of acuity-adaptable rooms — rooms designed to be adjusted for a patient's needs throughout his or her hospital stay — could potentially have the greatest impact on the provision of health care.

Moving patients from one room to another takes time and resources and increases the risk of handoff errors due to delays, communication discontinuities among staff, loss of information and changes in computers. Adopting acuity-adaptable rooms is a move to patient-centered care, said DuBose, but it takes real buy-in from staff, who are often used to specializing in a particular type of nursing care and don't wish to change. DuBose cited Dublin Methodist Hospital in Dublin, Ohio as an institution designed to use acuity-adaptable rooms and in which staff were hired with that expectation. "They've been very successful at Dublin Methodist," she said.

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