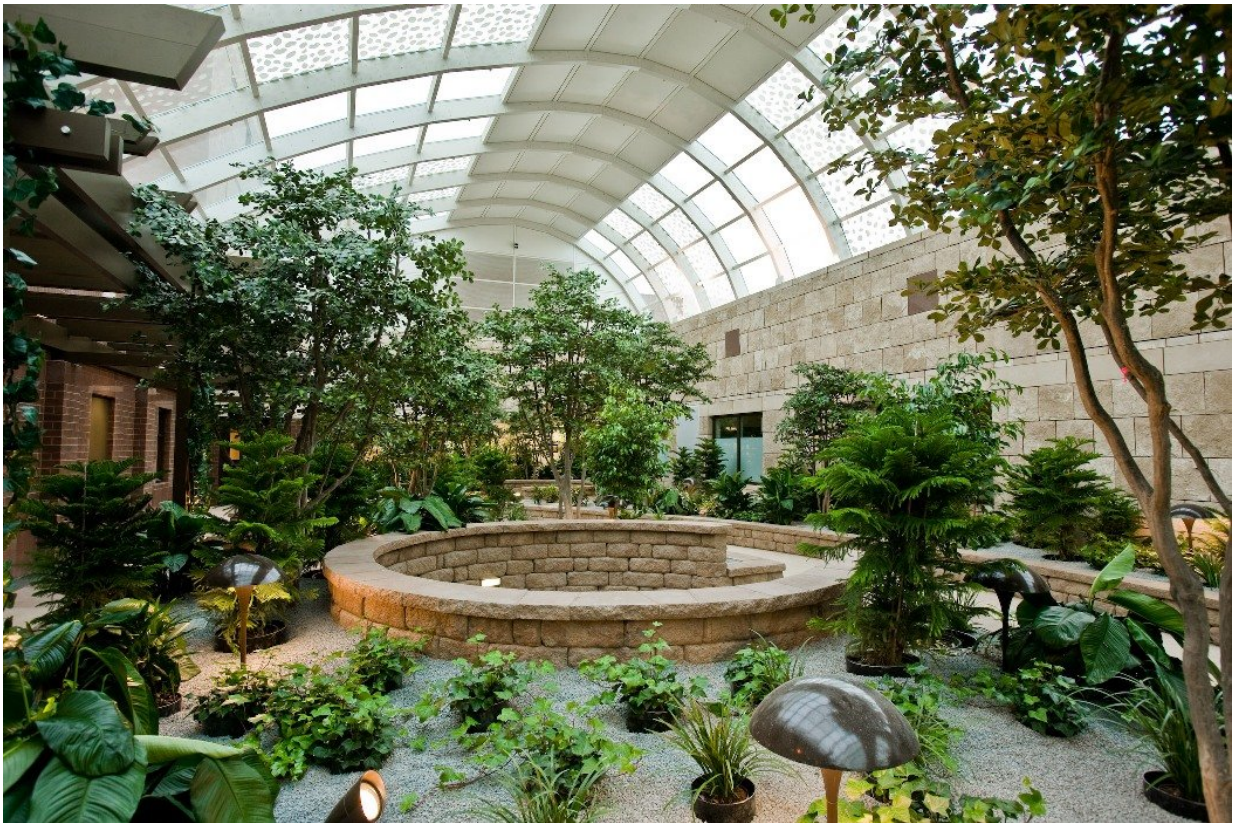


How to build a better, safer, more welcoming hospital

July 3 2018, by Leonard L. Berry And D. Kirk Hamilton



A healing garden at Mayo Clinic in Eau Claire, Wisconsin. Credit: Mayo Clinic Health System, CC BY-SA

We spend much of our time in buildings, and they can have a profound effect on our well-being, for better or for worse. As long ago as 1943,

Winston Churchill [told](#) Britain's House of Commons that "we shape our buildings, and afterwards our buildings shape us."

Research is showing that effective building design is especially important in hospitals, the potential of which is often overlooked. For example, a [recent study of the design of operating rooms](#) – one of the most critical areas in a hospital – reveals how research-informed design can improve safety and performance.

We have studied for years how to improve the delivery of [health care](#), including through better design of health care buildings. Based on our studies and those of others, we are advocates for using evidence-based design to benefit hospital [patients](#), staff and patients' families.

Guiding design with evidence

People in hospitals often are exposed to needless harm and trauma. Hospitals technically support modern medical care, but too often vulnerable patients are harmed by avoidable infections, falls and medication errors, among other [calamities](#).

Hospitalization is a "need" service, not a "want" service, that generates [considerable stress](#) due to some combination of reduced physical capability, pain, fear of medical procedures and uncertainty about future well-being. Hospital facilities that are noisy, drab and dark, and unwelcoming to families further intensify stress.

Because hospitals exist for a long time and are expensive to build and to operate, it is crucial to use the abundant, available empirical evidence to guide design. "[Evidence-based design](#)" has documented how to make hospitals safer and less stressful. We know how to design better hospital buildings; building them is the challenge.

Hospital architects have long used evidence from engineering and other hard sciences to guide their work. In 1984 professor Roger Ulrich published a paper in [Science](#) arguing for research-based designs to improve patient outcomes. Ulrich found that randomly assigned surgery patients with a window view of trees used less pain medication and were discharged earlier, among other positive results, compared to patients with a brick wall window view.

Evidence-based design operates in tandem with architect and designer imagination, creativity and judgment by providing empirical data on design elements that actually work.



Credit: AI-generated image ([disclaimer](#))

From its initial focus on reducing patients' stress, evidence-based design

evolved to include patient and staff safety; staff morale and productivity; and environmental sustainability. Hospital design variables include nine categories, as discussed in detail in a [2010 paper](#):

- Audio environment, which includes sound-absorbing ceiling, walls and flooring; equipment noise; and music.
- Visual environment, such as natural light and nature views from windows, and artwork.
- Safety, including air quality and ventilation, easy-to-clean surfaces, staff's visual access to patients; and ceiling hoists for lifting patients.
- Wayfinding, including the building entrance, signage, floor plans and the information desk. Sustainability, which refers to energy-saving features, waste management and building materials.
- Patient rooms, including consideration of single versus multi-bed rooms; patient control of light and temperature, and acuity-adaptable rooms to eliminate moving patients as their condition changes.
- Family support spaces, such as comfortable waiting areas, an overnight bed in the patient room, and outdoor gardens with seating.
- Staff support spaces, such as decentralized nurse workstations, proximity of supplies and medications, and comfortable break areas.
- Physician support spaces, such as the quality of meeting rooms, acoustics of operating rooms, and quality and location of workstations.

Evidence-based design applies to other health care facilities, but the concept is most important for longer-term hospital stays in contrast with short outpatient care.

Cost considerations

We and others introduced Fable Hospital in a [2004 article](#) and an [updated version](#) (Fable 2.0) in 2011. We devised Fable Hospital as a composite model of recently built or renovated hospitals that had implemented multiple facets of design based on evidence, and we made data-based estimates of the financial impact. Unless a solid "business case" could be made for implementing evidence-based design, wider use of its principles would be stymied by the financial pressures engulfing health care. Spending more upfront to build a better hospital would be vulnerable to the pressure to spend less.

The author team, comprised of hospital CEOs, hospital architects, academic researchers and others, served on the board of the nonprofit Center for Health Design, based in Northern California. Fable Hospital was a new 300-bed urban facility designed to replace a 50-year-old building with 250 beds. In the [article](#), we conservatively estimated that Fable would add US\$12 million to construction costs by fully implementing evidence-based design elements which were then well-documented. Fable would earn back the added investment in one year through operational cost savings, such as reduced patient falls, infections, room transfers and nursing turnover, and through higher revenue from market share and philanthropy gains.

Our estimates were vetted by hospital financial specialists, and the article was republished by the Healthcare Financial Management Association. These positive pro forma estimates surprised us and many others. Our analysis showed that you could build a hospital that benefits all stakeholders, repay the additional investment in a year, and sustain these benefits for years to come.

Whereas the cost premium for the 2004 Fable Hospital was about 5 percent of total construction costs, the premium for [Fable 2.0 in 2011](#) was 7.2 percent because a longer list of evidence-based design features, such as ceiling-mounted patient lifts and an electronic intensive care unit

monitoring system, had been empirically documented.

For Fable 2.0, the payback period estimate was within three years – still an attractive return by any business standard. Also, we used only operational cost reductions in our Fable 2.0 calculations to be even more conservative – and persuasive – that building a hospital the right way is the proper thing to do. We didn't include revenue projections as we had previously, even though we are confident that excellent design typically will produce substantive revenue improvements.

The lessons of research-informed design

Evidence-based design, properly executed, benefits all stakeholders. The economics of Fable Hospital are important because they clear a path for decision-makers to build or renovate a [hospital](#) that is safer and less stressful for patients, more welcoming to families, improves the quality of work and work life of the staff, and improves environmental sustainability. Hospitals will never be places that patients enjoy. But we can [design](#) them to be better, much better.

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