

Better Healing from Better Hospital Design

BY YUHO YAMAGUCHI

Bright, beautiful lobbies featuring an atrium filled with local flora. Rooms with big windows and access to outdoor gardens. Dining options served up by one of the top chefs in the world.

Innovative new hospital designs have changed patients' experiences and expectations of what a hospital should be. These sleek buildings have design features found in many high-end hotels—and they are built with the express intention not just of increasing patient satisfaction but of reducing costs and improving outcomes.

Research has shown that hospitals that feature new designs and amenities send patient satisfaction scores vaulting skyward. In fact, one study, conducted by Professor Dana Goldman and Associate Professor (Research) John A. Romley at the Schaeffer Center for Health Policy and Economics at the University of Southern California, showed that amenities are a larger factor in driving traffic to hospitals than clinical quality. As a result, amenity-rich hospitals with modern design features are attracting more patients, which is good for the hospital's top line.

It's clear that newly designed hospitals with hotel-like perks increase patient satisfaction and traffic. But are these newly designed hospitals having a desirable impact on value? Measuring before and after costs and outcomes shows that they can.

Fewer Infections

Hospital-acquired infections continue to plague hospitals. They occur in about 30% of patients in intensive care units (ICUs), leading to substantial illness and fatalities. When one of two McGill University hospitals in the Montreal region of Canada redesigned its ICU from shared to private rooms, the rate of bacterial infection decreased by more than

50%. The new ICU design also decreased the length of stay by 10%.

This impact was measured over five years by collecting information across three hospital databases. One database tracked each patient's length of stay, and another tracked every patients' infectious organism screening results upon ICU admission. The third database recorded any infections acquired from 48 hours after admission (patient likely arrived with an infection) to 48 hours after discharge (patient likely left with a hospital-acquired infection). By simply measuring infection incidence over time between a control and intervention hospital, these two facilities were able to accurately measure, using over 19,000 admissions with a 95% confidence interval, the impact of the newer hospital's design. Thanks to the results of studies like this, private patient rooms, seen historically as a luxurious amenity, are now a standard, accepted design for reducing the transmission of infectious organisms in hospitals.

Therapeutic Benefits

Roger Ulrich, a visiting professor at Center for Healthcare Architecture at Chalmers University of Technology in Sweden, has been a thought leader in the evidence-based design movement for 30 years. In 1984, he wrote a seminal paper that significantly affected how hospitals are designed today. In "View Through A Window May Influence Recovery From Surgery," he famously compared two sets of patients—one with "tree views" and one with "wall views." He showed, using clinical data, that patients with tree views had "shorter postoperative hospital stays, fewer negative evaluative comments from nurses, took fewer moderate-to-strong analgesic doses, and had slightly lower scores for minor postsurgical complications."

Today, many hospitals feature gardens of various types, and their impact on care has been studied more rigorously. One study reports that 95% of people who walk through hospital gardens report a therapeutic benefit from simply being in them. Contact with nature not only speeds patient healing, it also helps family members and hospital staff more effectively deal with the stress of providing care. And that enables them to better serve their recovering loved ones and patients.

But what if your geographic location makes having a beautiful outdoor garden impractical? That was the challenge posed to Bronson Methodist Hospital in Kalamazoo, Michigan. Because it is located in the "snow shadow" of Lake Michigan, it receives an average of 80 inches of snow each winter. So they created a giant, drum atrium "full of nature" in the middle of the hospital. The wings of the hospital radiate out from it, making it easily accessible to everyone.

When hospitals provide easy access to nature, patients, employees and family members can all enjoy the benefit it provides, including reduced stress, reduced blood pressure, reduced pain and increased pain tolerance, faster recovery times, and, simply, pleasant escape from stressful situations.

Reduced Pain

The design of environments inside clinical settings has also demonstrated positive impact on patient outcomes, particularly for children. A study by Sunitha and Santhanum Suresh showed that after surgery, children who listened to music or a story of their own choosing for 30 minutes reduced their pain score by one point on a ten-point scale, compared to the children who listened to nothing. Because children suffer more side effects of pain medication—such as trouble breathing and nausea—than adults, reducing the amount of medicine administered to kids can have a positive impact on outcomes as well as cost of care.

At a multi-purpose lounge of an acute psychiatric clinic in the U.S., "as needed" injections of antipsychotic drugs are used to manage patients who exhibit "aggressive and agitated" behavior. In a study conducted in this

space, during the weeks that posters of realistic nature scenes were hung in the lounge, the administration of as-needed injections was 70% lower than when the walls were blank. Taking into account the cost of drugs and the labor from doctors, nurses, and security staff, each injection cost the hospital over \$60. But only the \$20 cost of the drug could be billed. By reducing the number of as-needed injections by hanging nature images in the lounge, the hospital projected a potential cost savings of over \$30,000.

Shorter Hospital Stays

“Design your organization before you design your building,” wrote D. Kirk Hamilton, professor of architecture at Texas A&M University. It sums up nicely the symbiotic relationship between culture, process and architectural design.

Karolinska University Hospital in Sweden wanted to change their protocol for caring for prematurely born infants in the neonatal ICU. Before the hospital brought in their architect, the care team devised its strategy and process for providing a new care model to mothers and their premature infants.

“The staff had a good idea that coupling should be their new protocol, but it no idea what the care environment should be like to support it,” said Ulrich. The existing design of the unit didn’t allow coupling — in which mothers hold their babies against their skin as early as possible after birth — as mothers recovered in a completely different ward from the infants, and existing rooms weren’t large enough to accommodate infants, mothers, and the equipment they both needed to recover. So the architect, Peter Fröst, worked alongside the care teams to clearly understand the new strategy, goals and processes, and shared “architectural expressions” of the space with the team to ensure alignment. After the new protocols and architectural space were designed and built out, the hospital reported that length of stay was 10 days shorter for the most premature infants, morbidity rates were lower, fewer infants required ventilator assistance, and long-term mental and physical prospects were higher.

“The combined impact of protocol and space design was a ‘game-changer,’” according to Ulrich. “One of the most effective ways to impact outcomes is to design an integrated cluster of architecture changes and care process changes.”

When many people think of hospital design and its impact, they often believe it’s a superficial, touchy-feely, and subjective endeavor. But there are numerous examples throughout the world that have demonstrated—with clinical data—that design has a measurable, desirable impact on clinical outcomes and cost. These evidence-based designs have saved lives, reduced pain, improved clinical outcomes, and made less painful (and even provided some delight during) some of the most difficult moments in people’s lives.

SPONSOR'S PERSPECTIVE

Improving Outcomes by Erasing the “Integration Deficit”

How the Application of Technology and Use of Data Will Lead to Gains in Patient Outcomes While Reducing Costs

We live in a world where our personal devices—whether they're in our pocket, car or home—can seamlessly share real-time data with each other. But the same cannot be said for a much more important area of our lives—healthcare. That's because many of the systems that record and store healthcare data across the care continuum are not integrated. Erasing this so-called integration deficit is a critical next step in healthcare's evolution as we transition to value-based healthcare.

While many stakeholders see the potential for improved collaboration, the misaligned incentives of many healthcare systems make the prospects for integration a significant challenge. Repeated tests, recurring readmissions, and an incomplete picture of a patient's overall health are often the result. By working together to manage patient care holistically, the healthcare industry can improve clinical and financial outcomes.

So if the lack of integration is the problem, how do we start working toward a solution? More connected medical technologies—implanted and otherwise—can and should play a crucial role, as will better use of data to help healthcare professionals see a broader view of their patients. Today, many of Medtronic's technologies are actively generating data, and we are working with the global healthcare community to take our technology, services, and insights and fashion them into solutions that either augment the delivery of care through better patient care management or improve overall system efficiency.

In the spirit of progress and partnership, our work includes:

- Utilizing insulin pump technology, sensors and mobile applications to better manage patients outside of the hospital setting in the Netherlands,
- Combining implanted heart failure technologies, diagnostic sensors, and nursing support to keep heart failure patients out of VA hospitals,
- Collaborating with IBM Watson to identify better care management for diabetes patients by using the patient's own data,
- Working with hospitals to allow quicker patient discharges by giving doctors and nurses the ability to monitor patient care and progress remotely,
- Partnering with hospitals to manage their cath labs for better patient throughput and outcomes, and
- Working on-site at hospitals to drive improvements in efficiency, quality, clinical outcomes, and patient experience, all within an outcomes-based payment model.

As we've seen in our efforts, the successful integration of patient care will require collaboration between providers, suppliers, physicians and payers. At Medtronic, we believe we have an important role to play in the integration of healthcare. There's an opportunity to harness the data and insights our technologies produce to create a more integrated, patient-centered healthcare system—one that ultimately is set up to achieve and reward the long-term outcomes that are central to a value-based healthcare system.

Learn more about our perspective on integrating care and value-based healthcare [here](#).

Medtronic

ABOUT MEDTRONIC

Through innovation and collaboration, Medtronic improves the lives and health of millions of people each year. Learn more about our technology, services and solutions at Medtronic.com.