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*Ounce of Prevention*  
**To Reduce Errors,  
Hospitals Prescribe  
Innovative Designs**

**Newest Layouts Stress Safety  
With Identical Rooms,  
No-Slip Floors, Glass Walls  
St. Joseph's Team Approach**  
By GAUTAM NAIK  
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WEST BEND, Wis. -- In May 2003, St. Joseph's Hospital hired a local accounting firm to install a hotline for staff to anonymously report medical errors and near-misses, either their own or those of colleagues. Before the system was set up, the hospital collected 250 reports per month. Afterward, the number shot up to 3,000 per month.



**John Reiling**

The cases confirmed what administrators at St. Joseph's had suspected: The hospital wasn't adequately addressing safety issues. At the same time, the cost of the preventable errors was escalating. St. Joseph's paid more than \$70,000 in malpractice insurance premiums in 2000. In 2004, the figure exceeded \$440,000.

Rather than merely overhaul medical procedures, the hospital decided to try a different approach. St. Joseph's then-chief, John Reiling, was already leading a \$55 million effort to build a new facility. His idea: cram the new building with innovative design to help staffers do their jobs more precisely, more carefully -- and, he hoped, prevent errors in the process.

"We decided to use patient safety as the guiding principle," he says.

Many hospitals aim to improve safety by focusing on ways to reduce human error. They encourage nurses to wash their hands more often to prevent the spread of infections and push doctors to write prescriptions more legibly in order to avoid mix-ups. A growing number of administrators are now factoring hospital layout and

design into the patient-safety equation.

Traditionally, architects designed hospitals much like any other building -- making adjustments along the way for things like toilet location, medical equipment and ventilation. Mr. Reiling persuaded the facility's architects to draw up blueprints with specific medical benefits -- such as slip-proof floors and soundproof walls -- already built in.

The old St. Joseph's suffered from all the faults of a typical U.S. hospital. Lighting varied from one area to the next, making visual diagnoses inconsistent. Noise levels were higher than those recommended by health experts, making it harder for patients to rest.

At the new 80-bed facility, which opened its doors in August, the size and set-up of every room is identical. That means doctors and nurses quickly can find everything from syringes to emergency oxygen lines. Nurse stations are placed so that all patients are visible -- without pillars to block the view. Filters and ultraviolet devices trap and kill germs and other particles, making for healthier airflow throughout the hospital.

Though the changes are relatively new, the hospital says it is reaping benefits on both safety and financial fronts. Anecdotal evidence suggests that infection rates, injuries from falls and medication errors are lower than at the old facility. The hospital expects that over the next year, the average length of stay could decline by as much as half a day -- freeing up beds more quickly and allowing St. Joseph's to serve more patients.

"Many people are now aware of the impact that environment has on patient safety," says Craig Zimring, an environmental psychologist and a professor of architecture at the Georgia Institute of Technology in Atlanta. He is also a member of the board of the Center for Health Design, an advocacy group whose main goal is to provide "researched and documented examples of healthcare facilities whose design has made a difference in the quality of care." The group has identified at least 35 health organizations that are building such new facilities.

Concerns about hospital safety intensified in 1999, when the Institute of Medicine reported that between 44,000 and 98,000 patients die each year because of medical mistakes, making them a bigger killer than breast cancer or car accidents. The institute, part of the National Academy of Sciences, estimated the annual cost of those preventable errors -- including corrective treatments and disability expenses - - at between \$17 billion and \$29 billion.

Federal and state regulators are pressuring hospitals to reduce medical errors, too. A recent impetus is the Patient Safety and Quality Improvement Act, which President Bush signed into law in July. Borrowing an idea from the aviation industry, the new law allows doctors and nurses to report medical errors voluntarily

and confidentially.

Insurers are also taking a tougher safety stance. Many health-maintenance organizations, as well as Medicare, now refuse to reimburse doctors for certain procedures that merely rectify a physician's mistake. Some insurers, such as Blue Cross and Blue Shield of Minnesota, are granting easier patient access to hospitals' records of medical mishaps.

The emphasis on safety helps explain why design has been enlisted in the battle to reduce hospital errors and insurance rates.

The University of Michigan Health System has made patient safety its main priority at its new \$523 million children and women's hospital in Ann Arbor, Mich. Virtually all corners in the hospital interior are being built with round edges. And while most hospitals recycle their air up to eight times -- thus increasing the risk of spreading infectious germs -- the new building won't recycle air at all.

A big benefit of the system: "Our terrorism expert advised us that if a biological or chemical outbreak or attack occurred, the agent would be confined to one room," says Robert Merwin, CEO of the hospital's owner, Mills-Peninsula Health Services in Burlingame, Calif.

**HCA** Inc. of Nashville, which runs more than 180 hospitals, says it will no longer use vinyl coverings on exterior walls because the material attracts infection-causing mold. At SSM Health Care's new hospital in St. Louis, Mo., set to open in 2008, nurses will pass medicines to patients via a small sliding drawer from an adjoining alcove. This limits the number of times a nurse enters the room, thus lowering the infection risk for a patient.

Few efforts are as ambitious as those at St. Joseph's. Mr. Reiling, who until recently served as CEO, says that personal experiences with medical errors "sparked" him to push for a much safer facility. In the early 1990s, the young daughter of a friend had a curable form of cancer but died from an overdose of chemotherapy at another hospital. Soon afterward, the father of the girl, who was chairman of a Minnesota hospital, was shaken by the death of another child who died in his hospital due to a surgical error.

In February 2003, Mr. Reiling approached architects Gresham Smith and Partners of Nashville, Tenn., and asked them how they might design a safer hospital. "I admitted I didn't know how," recalls Tom Wallen, a veteran health-care architect at the firm. "But we knew that the automotive and aerospace industry had improved safety for its customers, so we tapped into those resources."

One key idea was standardization. Airplane pilots and car drivers know precisely where to find emergency controls; the designers aimed to create a similarly familiar hospital set-up.

Mr. Reiling had to rally his board. He brought in patient safety experts for talks. At the board's annual strategy meetings, he screened patient-safety films, such as one that recreated a malpractice case. He persuaded the chairman and other board members to attend a big brainstorming meeting in April 2003 that included safety-minded representatives from the American Medical Association, Johns Hopkins Hospital in Baltimore, and the Mayo Clinic in Rochester, Minn. Their goal was to answer a single question: How could a hospital be designed from the ground up to maximize patient safety?

Not everyone embraced the concept. Dan Johnson, vice chairman of St. Joseph's board, expressed doubt to other members that Mr. Reiling could pull off his bold idea in tiny West Bend, Wis. "I thought that there was no way we could do this," says Mr. Johnson. "We'd be engineering huge expenses into the project."

Many ideas came from doctors, nurses and patients. At the old facility, architects built life-size mock-ups of what the new rooms would look like, and invited the medical staff to stick notes or scribble suggestions on the walls. One such test room went through more than 30 revisions before the final design was pinned down.

Mr. Reiling did considerable legwork on his own. He visited General Electric Corp.'s Lighting Institute in Cleveland, and ordered lighting that best simulated natural light. Today, doctors no longer have to wheel newborns to a window to check for jaundice.

Since window blinds are a known breeding ground for germs, the hospital installed windows that enclose the blinds within the glass. Heating vents above the windows reduce the condensation that usually lets germs thrive.

Mr. Reiling pushed to make every patient room look the same, so that in an emergency doctors and nurses would know exactly where to find things. The standardized, pre-fabrication approach enabled the hospital to get discounts from vendors, and whittled down the budget.

The savings allowed the hospital to build other facilities it hadn't previously planned: a postpartum recovery room for new mothers, a new diagnostic area and an education center. Even with the additions, the hospital came in \$500,000 under budget.

For the labor delivery room, the architects wanted to stick with the standard of placing the patient toilet along the headwall of the bed, so patients could get there easily and would be less likely to take a tumble. But nurses and doctors argued that they and family members are often milling around the patient's head, so it was safer to place the toilet door away from the traffic, on the opposite wall. Their approach prevailed.

Next to each room is a glass-fronted alcove with a computer, allowing nurses to

order drugs or enter medical data while the patient is constantly in view. Based on an idea known as "continuous flow" that's popular in manufacturing, the approach lets a nurse complete all tasks related to one patient before moving on to the next.

Not everything has gone smoothly. Because the new rooms are larger, some of the corridors in the new facility are long, so it can take a while to reach a patient. And since every floor looks alike, some disoriented patients can get lost.

Much of the artwork is bland, and few walls are cheerily painted. "They put most of their budget into safety and had little left over for aesthetics," says Sara Marberry, spokeswoman for the Center for Health Design, who has visited the new facility. Serene designs can be less stressful for patients, she says.

Nonetheless, St. Joseph's is attracting plenty of attention. Mr. Reiling has been invited to describe the design at conferences, while several health administrators from the U.S. and overseas have visited to take a firsthand look. Denver Health, a big public hospital, has hired architects Gresham Smith to apply St. Joseph-style concepts at a new pediatric and maternity wing in Denver. Pembury Hospital in Tumbidge Wells, England, plans to incorporate many of the St. Joseph's ideas into a new 512-bed facility.

Mr. Reiling is determined to help keep up the momentum. Earlier this year, he left St. Joseph's to become project manager of another safety-driven project, the design of a \$700-million facility for Boca Raton Community Hospital in Boca Raton, Fla.

## Medical Makeover A patient room at St. Joseph's Hospital:



- 1 Sound absorbing tiles** to make room quieter
- 2 Special lights** simulate natural light for better diagnosis
- 3 Bathroom** located near the bed to prevent falls
- 4 Standardized panel** with oxygen and gas outlets
- 5 Nonslip flooring**

Source: St. Joseph's

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