A concept drawing for the expansion of Seattle Children's includes "neighborhoods" of patient rooms with transparent sliders that provide visibility between families and their care team, for better communication and connection. Carts of supplies can be wheeled into supply doors at each caregiver "porch," for better ease of delivery and access to rooms. This also keeps central open areas more clear and usable.

Conor Mitchell rendering/ZGF Architects

The bionic hospital

Race is on to build patient-centered, robot-friendly, energy-sipping, cost-efficient medical centers for aging populace

By **BRAD BROBERG**
CONTRIBUTING WRITER

The hospital of the future will be built out of spandex and Silly Putty.

OK. So that's a stretch. But it's no lie that the spaces within the next generation of hospitals will be more elastic and adaptable than hospitals of the past.

Stellmacher

"Buildings must be flexible to allow for health care to change," said Allyn Stellmacher, an architect with Zimmer Gunsul Frasca. "We call it future-proofing."

You can also call it essential. In the time it takes to build or expand a hospital, the practice of medicine will make a giant leap forward.

"I can almost guarantee ... that you'll have gone though at least one technology change and one change in care delivery," said Rich Dallam, an architect with NBBJ.

How will the next generation of hospitals — some of which are popping out of the ground right now — achieve flexibility? Examples range from minimizing the use of columns, to substituting modular furnishings for permanent casework, to locating major mechanical systems away from areas that someday may need to be reconfigured for new equipment or a new type of therapy.

Flexibility wasn't such a priority when most existing hospitals were designed.

"It was a very tight glove on the hand," Stellmacher said. "Now, we're trying to design hospitals with a much looser fit to allow for change."

The un-hospital

Giuntoli

Flexibility isn't the only characteristic that will distinguish hospitals of the future from hospitals past and present. The next generation of hospitals will be sunnier and more energy efficient, will feature larger rooms and may not be called hospitals at all.

"I'd use the term health-care-delivery systems," said Phil Giuntoli, an architect with Collins Woerman. "Hospitals will continue to expand, but the expansion will occur off of the main campus (and include) inpatient and outpatient facilities that will operate as a network to provide multiple levels of care."

Advances in telemedicine and robotic surgery — which will make it more and more possible for hospitals to extend specialty care to locations beyond their walls — will only accelerate this trend in the years ahead, as will the opportunity to boost the bottom line.

"It's a very conscious decision (by hospitals) to expand their market share and referral base," Giuntoli said.

Joel Loveland has seen the hospital of the future. It's under construction in Trondheim, Norway, where aging St. Olav's University Hospital is being replaced with a collection of mid-rise buildings rather than a single tower. At street level are stores, restaurants and coffee shops.

"Bringing down the scale and becoming an amenity in a neighborhood is something I know forward-thinking architects in the U.S. are thinking about, and it's something that's being built right now in Northern Europe and the U.K.," said Loveland, director of the BetterBricks Daylighting lab and architecture professor at the University of Washington.

The vision is to turn hospitals into "great urban places," Loveland said. "They are places you want to go to experience urban amenities whether or not you are sick."

Yet the fact remains that hospitals exist to provide medical care. Another fact: With more and more care being provided in outpatient settings, the mix of patients admitted to hospitals will become more dominated by the gravely ill.

"Acuity adaptability will be very important," says Giuntoli. "While patients may be in the hospital less time, they will be sicker."

Translation: The standard patient room will be designed and equipped to provide for higher levels of care as needed. The result: Fewer patients will be shuttled from one type of room to another as they recover.

People and machines

Rooms also will be larger to accommodate the additional equipment needed to provide more intense care — and to accommodate overhead lifts to help nurses get portly patients out of bed. One hospital that Dallam worked with reported that its count of patients weighing 250 pounds

See **HOSPITALS, 6A**

HOSPITALS: Machines gain ground, while humans work in teams

FROM 4A

or more had increased from 24 percent to 40 percent over the past five years. Another reason to expand rooms is to make families feel more welcome. Expect to see sleeper sofas as well as small alcoves so families won't be underfoot when nurses and doctors are caring for the patient.

"Before, the family was kept out of the room," Dallam said. "Now, hospitals say, 'We want them in the room so we can educate them so they know what to do when the patient goes home.' That's a total paradigm shift."

Patient rooms aren't the only spaces being super-sized. The advent of team medicine requires larger areas for various caregivers – doctors, nurses, physician assistants – to confer about a patient's care.

"Nothing beats sitting right next to the person you're supposed to be coordinating with," Dallam said.

The environment outside patient rooms is also due for change. Typically, the hallways outside patient rooms bustle with supply carts and other everyday traffic, which makes it difficult for patients to walk the hallways as they recover.

An addition to Virginia Mason Medical Center that is currently under construction borrows a page from Disney theme parks, where everything visitors are supposed to see occurs in "on-stage" zones, and the maintenance and operations activities occur off-stage. The hallways outside patient rooms are designated as patient zones, and carts are unloaded outside those zones.

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The hand of Dr. Jim Porter controls a robot that conducts the surgery. Porter uses both hands to move toggles that control the surgical tools.

"We've seen places where supplies are delivered through a trolley system in the ceiling, (but) that was not affordable," said Sarah Patterson, executive vice president and chief operating officer at Virginia Mason. Instead, staff will pass supplies from the hallway into the room through a portal without having to enter the room.

Seattle Children's is sketching out similar innovations to weave into the long-range expansion just approved by the City Council. Designers are exploring the idea of putting patient rooms in pairs with a nursing care "porch" in between, to provide closer access for the care team. Supplies can be wheeled into cupboards at each porch, for better ease of delivery. This also keeps central open areas more clear, safe and usable.

Of course, all those human touches will be accompanied by increasingly elaborate — and costly — machines.

A four-armed robot called Da Vinci, for example, already performs surgery under the direction of a human surgeon sitting at a console several feet away from the patient. A 3-D viewfinder gives the doctor a magnified view of the surgical site — up to 12 times closer than human vision allows.

BUSINESS JOURNAL PHOTO | Dan Schlatter

Terecita Hurst, right, a surgical technician at Swedish, prepares to load a tool onto a plastic-wrapped robot arm during a recent prostate surgery, with another technician behind her. Unseen at a console in a corner of the operating room, Dr. Jim Porter uses toggles and foot pedals to control the Da Vinci surgical robot. Hospitals are designing more spaces to accommodate such devices, which can allow greater precision and smaller incisions..

Energy cures

In the past, hospitals sighed and accepted their fate as energy hogs, but future hospitals won't be such porkers. Why? Because improved mechanical-control technology will allow them to better regulate temperatures in individual spaces and because they will decouple ventilation systems from heating and cooling systems, said Loveland.

Right now, the fresh air hospitals inhale and circulate throughout the building for ventilation is cooled to the temperature required in core spaces that are filled with computers and other heat-producing equipment. However, that's too chilly for spaces outside the core, such as patient rooms, so it has to be reheated.

"It's like having one foot on the gas and one foot on the brake," Loveland said.

By separating ventilation systems from heating and cooling systems, hospitals will reduce the volume of air that needs to be reheated.

Lighting is another big energy drain. The next generation of hospitals will have smaller footprints and more windows so that greater amounts of daylight can penetrate deeper into the building. Besides cutting energy bills, daylight has been shown to support patient healing.

Plus it creates a more pleasant work environment for staff. In the hospitals of Northern Europe, Loveland said, even operating rooms have windows.

SEATTLE@BIZJOURNALS.COM | 206.876.5437