

HEALTH CARE DESIGN & CONSTRUCTION



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HOSPITAL ADDITION ZEROES IN ON BETTER PATIENT CARE

New inpatient wing at Whidbey General will have 39 beds and decentralized nursing stations that will let nurses spend more time tending to patients.

Whidbey General Hospital is building a new inpatient wing and perioperative unit at its main hospital in Coupeville. The funding was approved by voters in 2013, and the project will be completed in 2017.

The new 60,000-square-foot inpatient wing is focused on patient-centered care, and provides all-new inpatient beds, as well as space for a new pharmacy, lab and materials management facilities on the lower level. The existing patient wings will be renovated for other needs, including a new perioperative unit.



BY PHIL DUFF
HDR

WHIDBEY GENERAL HOSPITAL

Location:

101 N. Main St., Coupeville

Size:

60,000-square-foot new patient wing;
10,000-square-foot renovation

Substantial completion:

January 2017

Opening:

Summer 2017

The main floor of the new inpatient wing will cantilever over the lower-level base. The design was inspired by a fort built by local settlers in 1855.



IMAGE COURTESY OF HDR

Greater efficiency

The new inpatient beds include 12 acuity-adaptable rooms that can be used for intensive care or medical surgical services, 21 medical surgical rooms, and six labor and delivery rooms.

The layout of the new rooms is

identical, or "same-handed," which has been proven to improve efficiency of care. In all of the new inpatient rooms, there will be dedicated spaces for the caregiver, patient and family members. The caregiver's zone, for example, provides immediate access to the patient and his or her care supplies.

Care is delivered to the patient

rooms from decentralized nursing stations and nurse servers that are dedicated to each room. The elimination of the traditional central nurses' station enables the nursing staff to spend a significantly greater percentage of their workday delivering care since their work area is adjacent to each pair of rooms, resulting in

better patient outcomes.

"HDR designs, based on superior understanding of inpatient care, have led to documented increases in how much time nurses can spend at the bedside," said Linda Gipson, Whidbey General's chief nursing officer.

Natural light and views of nature have been proven to help the healing process, and both are emphasized with large windows in the inpatient rooms. The windows afford patients beautiful views of the community and landscape surrounding Whidbey Island.

The new 10,000-square-foot perioperative unit renovation is in space vacated by the former patient rooms, and is the first step in allowing for future expansion of the hospital's operating rooms.

Designed on budget

Andersen Construction joined the project early in the schematic design phase as the general contractor/construction manager.

Andersen completed an initial construction estimate based on the approved pre-design completed by HDR, and company representatives collaborated with HDR's design team through the completion of the bid packages. Jon Bayles of JMB Consulting prepared cost estimates for the design team as well.

With the initial Andersen estimate, the design phases were completed using a target value design process. This process allows costs to be tracked to the initial estimate, which ensures that the project is designed on budget.

The design team also worked closely with the hospital's staff. The team created temporary full-size cardboard mock-ups of the patient rooms in order to finalize design decisions. Actual beds and equipment were rolled into

these cardboard mock-ups for the work sessions.

"The full-scale mock-ups gave the hospital staff the best possible understanding of the proposed room layouts," said Annette Himelick, an HDR health care designer.

There was only one option for the location of the new addition that allowed for a seamless expansion of inpatient services. The south side of the existing building contains the emergency department and operating rooms, and with the new addition directly to the south, will serve as the inpatient hub of the hospital campus.

Historical inspiration

The project is located in Ebey's Landing National Historic Reserve, and it's the first major institutional project to apply the required design guidelines for properties within the reserve since they were adopted in 2011.

As a result, the new wing is broken into three masses, which are divided by a circulation space that provides connections to the existing hospital. Another design feature is that most of the main floor of the new patient wing cantilevers 7 feet beyond the lower-level base. This design element was inspired by the Alexander Blockhouse, an 1855 defensive structure in Coupeville built by the first settlers of Whidbey Island.

The project was approved by the Historic Preservation Commission last month.

The new addition and renovation will serve patients from across the entire island and neighboring counties.

Phil Duff is vice president and managing principal of the HDR architecture office in Seattle. Duff has more than 27 years of experience on health care and academic projects.

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HIGH-TECH LIGHTS CAN AID PATIENTS BY MIMICKING THE EFFECTS OF NATURE

Light therapy has been shown to treat seasonal affective disorder, improve infant health and help Alzheimer's patients sleep better at night.

It is in our nature to heal. As soon as skin is punctured, coagulants and antibodies immediately rush to the scene to stop the bleeding and protect against infection.

A bone will strive so desperately to rebuild itself after a break that medical intervention is often necessary in order to ensure that it heals correctly. We sleep each night in order to restore our energy and health.



BY JULIE ALLEN
COFFMAN
ENGINEERS

Nature helps us heal. Evidence has shown that exposure to nature and fresh air helps our bodies to heal and helps our spirits to embrace more positivity.

We incorporate design elements into buildings where healing must happen in order to trigger that response.

Interacting with light

Light is an element of nature that helps our bodies heal, and is an element of design that has thus far been underutilized as a tool to help improve the healing process. That is precisely what

light can do — speed up and enhance the healing process.

A life predominantly lived indoors under the glow of artificial light is a fairly recent phenomenon. Daily life traditionally revolved around the sun. Work and play could only be accomplished when ample light was present, and the darkness of the night meant that the only safe activity available was rest.

Because of this, our bodies have evolved in such a way that a specific set of neuron cells at the back of the eye are constantly interpreting the information that is present in light. These cells are called intrinsically photosensitive retinal ganglion cells (IPRGs). They live in the very back of the eye by the “rod” and “cone” cells that interpret signals for our visual system.

IPRGs sense the color composition, intensity and quality of light, but have nothing to do with vision. These cells are connected directly to hypothalamus, a neurological and hormonal command center deep in the center of the brain. From here, countless processes and catalysts are orchestrated. This portion of the brain regulates certain metabolic processes, synthesizes and secretes hormones, controls body temperature, hunger, certain aspects of parent-

ing and attachment behaviors, thirst, fatigue, sleep and circadian rhythms.

Each morning, as we spin toward the sun, light is presented to us in short wavelengths, which appear to the eye as a white light saturated in blues. In the evening, as we turn away from the sun, the blue is filtered out, and long-wavelength light appears much warmer in color, almost orange.

The content of wavelengths present in the light around us tells our body what time it is, which then tells our body which processes it should be triggering. The blue light in the morning triggers the brain to stop producing melatonin, the hormone that makes us tire and helps us relax. The orange light in the evening tells our body to start producing melatonin again so we can sleep soon.

LED technology

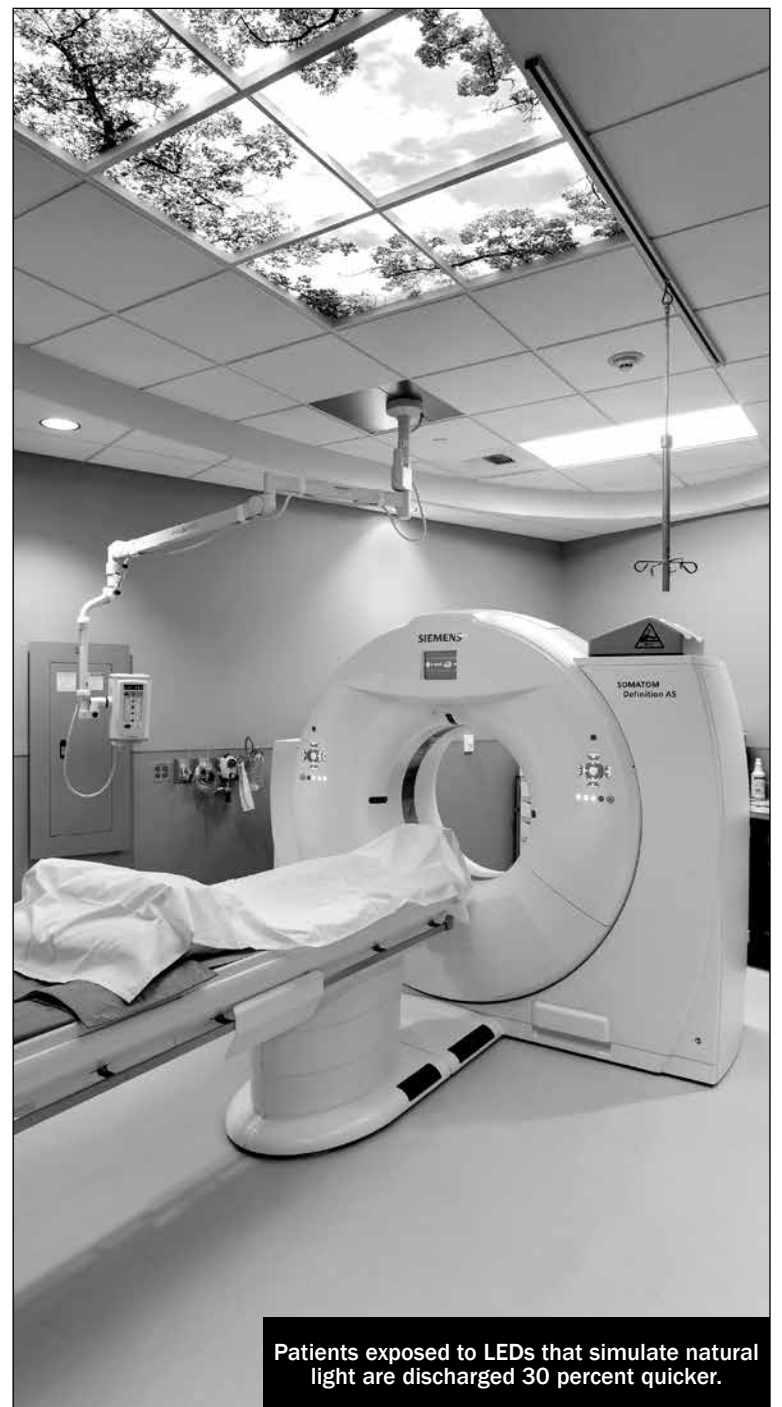
Light-emitting diodes (LEDs) now enable us to create electric lighting systems that mimic the natural shifts in the light that makes its way through our atmosphere from the sun. Because of the way white light is created in each diode, controls can be programmed that will take the light in a given space through the spectrum from blue to orange and can time it to happen at the same time every day.

We can now specify luminaires that are able to shift from short-wavelength, cool white light in the morning to long-wavelength, warm white light in the evenings. Creating lighting systems in this manner has real impacts on the health and well-being of those who experience it.

Patients who are allowed to heal in light that mimics nature are discharged 30 percent quicker and ask for 20 percent less pain medications. This type of light treatment is the most effective way to treat seasonal affective disorder.

Infants who spend time in neonatal intensive care units that incorporate this design gain weight faster, breathe on their own quicker and are discharged sooner than infants who don't. Alzheimer's patients have been proven to get better sleep at night, which leads to less nighttime wandering and falls.

This type of lighting system can also be used to help staff who work unconventional hours stay healthy. If night staff are exposed to short-wavelength, cool white light, they can stay alert and



Patients exposed to LEDs that simulate natural light are discharged 30 percent quicker.

PHOTO COURTESY OF COFFMAN ENGINEERS

focused throughout the night because their bodies will not be trying to produce melatonin.

As the cost of LED luminaires continues to drop, this exciting technology continues to have an increasing potential to greatly impact healing environments for the better. Lighting manufacturers are releasing products and systems that will make designing systems like this a more straightforward, accessible process.

As we work to improve the design of healing environment, let's utilize human-centric lighting technologies to bring the nature of light into our buildings

and let it connect with patients and staff. Understanding the nature of light will help us design healthier environments.

We can create spaces where the natural rhythms of healing are supported. Lighting that reinforces that process will only serve to let the body do its job and heal.

Julie Allen is a lighting designer at Coffman Engineers, and has nine years of experience providing award-winning lighting and electrical design services for health care, educational and civic projects throughout Washington.

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ON THE COVER

Harrison Medical Center opened its \$29 million, 54,000-square-foot Orthopaedic Center in 2013 in Silverdale. Rice Fergus Miller was the architect and Andersen Construction was the general contractor.

PHOTO BY AUSTIN FLINK/RICE FERGUS MILLER

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WHAT WE'VE LEARNED ABOUT MAKING HOSPITALS BETTER FOR SENIORS

A new orthopedic hospital in Silverdale draws on lessons from other senior living projects.



BY MIKE MILLER



IVI GABALES

RICE FERGUS MILLER

Today, seniors represent over 25 percent of the U.S. population, and the percentage will only go up as baby boomers age.

This means one in every four people entering our health care facilities seeking care is a senior. With access to information on how to live healthy, active lifestyles, these seniors are also living longer. These trends have fueled the rise of orthopedic facilities nationwide.

According to the American Academy of Orthopaedic Surgeons, as of the first quarter of 2014, there are at least 2.5 million Americans living with an artificial hip and 4.7 million with an artificial knee. This is a 188 percent increase in knee replace-

ments and 123 percent increase in hip replacements for patients age 45-64.

With advances in technology resulting in quicker stays and faster recovery times, these types of surgeries are on the rise. It is imperative health care facilities, not just orthopedic ones, be designed with seniors in mind.

Rice Fergus Miller is a leading architectural firm in senior living design in Washington state. Two of our current projects, phase two of Timber Ridge at Talus in Issaquah, and Trillium Woods in Plymouth, Minnesota, are in the final stages of construction. Between these two projects are 1.6 million square feet of independent living, assisted living, skilled nursing, acute rehab and memory care.

Rice Fergus Miller also designs health care settings. We are in the early stages of design of a new standalone behavioral health hospital, and are awaiting bids for the construction of Olympic Medical Center's Medical Office Building and Urgent Care in Port Angeles. Two years ago, we welcomed the first patients to the FHS-Harrison Medical Center's new 24-bed orthopedics specialty hospital in Silverdale.

Drawn from experience

When designing the Orthopaedic Center at Harrison, our health care team relied heavily on lessons they learned while working on other senior living projects. The team made sure to include the following in the design:

- **Safety of movement for the patient and staff.** Post-operative

patients have a higher risk of slips and falls. This is only heightened for seniors due to their relative lack of strength, lessened in both the upper and lower body musculoskeletal systems.

Getting in and out of bed and safe movement within the patient room are critical to patient safety. Locating the toilet on the head wall allows the

patient to reach the toilet room in three easy steps. Continuous handrails, from bedside into the toilet, provide added support to the patient and further minimizes chances of injury.

Zero clearance, no step-over showers are a priority. Adequate space at the wall side of the toi-

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Rooms are designed so patients can reach the bathroom in three steps.

PHOTOS BY AARON LEITZ PHOTOGRAPHY



Color palettes were selected to appeal to seniors, whose color perception tends to change with age.

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IT'S NEVER TOO EARLY TO CONSIDER TECH IN YOUR NURSING HOME PROJECT

When Granny wants to Skype the grandkids, long-term care centers need to be ready.



BY BERRY BRUNK
SPARLING, A
STANTEC COMPANY

The collision of two societal mega-trends, technology and the aging of America, is fueling the need for developers of long-term and post-acute care facilities to invest in a full range of cutting-edge technology in their buildings. Owners are finding that robust technology platforms improve business returns and make life better and healthier for the residents.

Broadband in demand

Modern senior living centers are influenced by a multitude of factors that are revolutionizing the way we serve our seniors in long-term care settings.

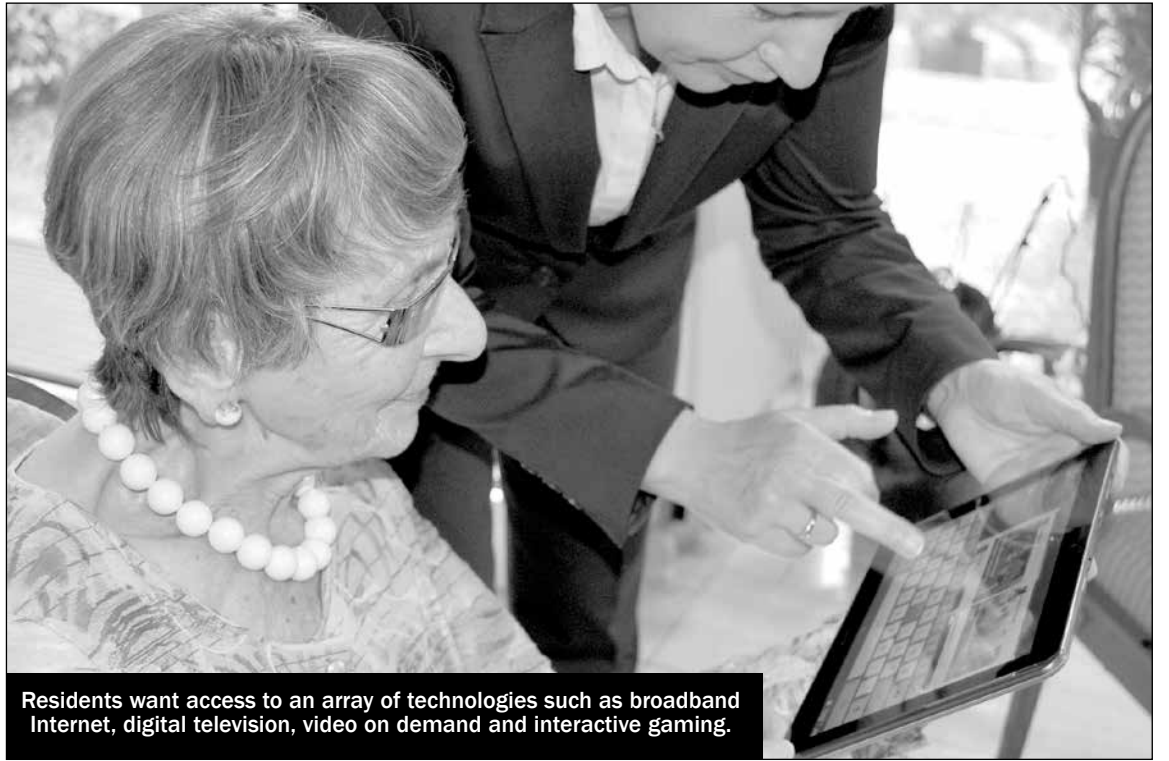
The increased demand for connectivity from seniors and their

family members is a driving force toward incorporating technology in today's centers. It has been found that broadband connectivity has a positive impact on the health, well-being and satisfaction of seniors.

Technology provides operational advantages, cost savings, efficiencies and revenue-generating possibilities that come with taking a holistic approach to business operations, resident care, quality of life and customer satisfaction. Facilities today must also meet Affordable Care Act requirements that address HIPAA compliance (referring to patient confidentiality), "meaningful use" of electronic health records, and interoperability with acute care hospital partners.

Assessing needs

In today's hyper-competitive senior living marketplace, owners who plan to distinguish them-



Residents want access to an array of technologies such as broadband Internet, digital television, video on demand and interactive gaming.

PHOTO BY SIGISMUND VON DOBSCHUTZ/WIKIMEDIA COMMONS

NURSING HOMES — PAGE 7



Photo by: Lara Swimmer

Virginia Mason Jones Pavilion



Photo by: Ben Schneider

University of Washington Medical Center Montlake Tower

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VACANT BIG-BOX STORE FINDS NEW LIFE AS CHILDREN'S CLINIC

The health care industry is reusing abandoned suburban retail spaces to provide care for patients closer to where they live.

Health care real estate needs are changing as our local medical providers and hospitals seek to administer comprehensive care to patients in convenient retail locations. To address changing patient demographics and care preferences, the health care industry is shifting from centralized to decentralized care that delivers services closer to patients' homes.



BY GEORGE WARD
ALDRICH +
ASSOCIATES

Today's care model focuses on treating the whole patient while meeting their desires for whole-person preventive care and providing ready access to providers they need. As a result, fewer standalone health care campuses are needed as these clinics become integrated into local communities.

Retail clinics help meet a growing need for primary health care services. They will be an important delivery mechanism as health care providers seek to lower costs and handle the

This former Circuit City in Federal Way received a colorful face-lift and covered entry.



PHOTO COURTESY OF ZGF ARCHITECTS

surge of newly insured patients with the implementation of the Affordable Care Act.

But these new clinics also need to be affordable. As local medical facilities seek reasonably priced real estate options, they are reaping the benefits of

coincidence: In bringing community-based health care to communities, they are finding the opportunity to breathe new life into suburban retail cores by redeveloping some of the 5 million square feet of vacant retail infrastructures within the Seattle

area.

Adaptive reuse

As retail spaces stand empty from overbuilding prior to the recession and an increase in online sales, high vacancies are generating new opportunities for health care tenants.

In particular, abandoned big-box stores are inspiring the reinvention of underperforming real estate as value adds to the surrounding community. Once destinations for convenience products, these converted facilities provide access to a range of health-oriented services.

In addition, this kind of adaptive reuse represents one of the country's largest and quirkiest recycling efforts. From a sustainable development perspective, it is most often more efficient to modify an existing building than it is to construct a new building, even an energy-efficient or LEED-certified one.

A blank canvas

Where others saw an abandoned and neglected Circuit City building within Federal Way's West Campus Square retail complex, Seattle Children's Hospital, Aldrich + Associates, and ZGF Architects envisioned a modern facility aligned with the medical community's demand for efficient medical space.

Todd Johnson, vice president of facilities at Seattle Children's explained that the hospital was seeking both a blank canvas in a strategic location and an established community integrated with existing public transportation, highways, sidewalks, parking and urban utilities.

These kinds of reuse projects come with challenges and costs that are not normally present in a typical health care tenant improvement project. Electrical and water utility service upgrades were needed to meet the demands of equipment and plumbing fixtures. All-new HVAC equipment was installed to meet the increased zoning requirements.

But one of the biggest challenges to the team was working with the 25-foot high space between the floor and roof structure. The solution was to build an internal frame to support the HVAC, plumbing, electrical, low voltage and metal stud framing. This eliminated the thousands of man hours in lifts for trades installing long ceiling wires and seismic support to the structure above.

"Aldrich not only kept us on time and on budget," Johnson said, "but their detailed mock-ups and simulations gave us the tools we needed to create a facility that will continue to be successful in Federal Way for years to come."

A chance to stretch

Johnson said he believes the building will set a new standard for efficient, patient-centered health care facilities.

"The building was designed with flow in mind," he said. "Our providers, nurses, and therapists need to operate efficiently in the space. If we do it right, and I think we did, we can see more patients and offer higher-quality care. We are making an investment in the community, and we believe that this will inevitably increase



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NURSING HOMES

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selves are making decisions very early in their development's design process to incorporate leading-edge infrastructure technologies as part of the construction costs, as this is the best time to consider investments that will be part of the project and property for many decades to come.

Information technology planning builds on an organization's strategic goals and the technology applications that are relevant to each of those goals. Critical items to assess include:

- The existing or potential IT infrastructure and how it supports current operations.
- Existing or potential technology applications and future technology-related needs.
- Information technology competencies among staff and IT teams.
- The need for an IT team to update or upgrade technology applications in order to support new business models and operations, as identified in the strategic plan.

This assessment should include interoperability, integra-

tion, interfacing, meaningful use requirements and health information exchange (HIE) needs, including the HIE needs of strategic health care partners.

Making a plan

Once the assessment phase of the strategic IT plan is completed, the executive team, with the help of IT leadership, should formulate a plan to update the IT infrastructure.

That infrastructure should support all potential technology applications needed now and in the future, including applications that support staff, operations and management, as well as those that serve residents/clients. Applications serving residents/clients might include Internet access, telephone, television, social connectedness technology, concierge services, energy management and maintenance requests.

The strategic IT planning process will provide the organization with guidelines it can use to develop detailed specifications for the IT infrastructure, as

well as for the selection of, and operational planning for, specific technology applications.

Network infrastructure has always played a critical yet inconspicuous role as the highway over which data flows within an organization and between organizations.

Software applications must run efficiently on this network highway using data in countless ways to give care providers the tools they need to improve the quality of care. Today's organizational leaders must align costs, simplicity, scalability and redundancy to ensure environments can meet and exceed resident/patient safety and end-user demands.

To ensure that the technology infrastructure will support the building's day-to-day operations and also ensure complete broadband connectivity to every resident, some of the many issues that the owners are reviewing before making final decisions include:

- What kind of hardware and software and what quantities should be provided to support

operations, resident/patient care and marketing?

- What kind of hardware and clinical systems will support the care staff, including whether such devices should be wired or wireless?

- Do we need to outfit an on-site telemedicine suite with high-speed videoconferencing capabilities?

- What is needed for HIPAA-compliant software, encryption, messaging and training?

- The need for video and Web conference capabilities for the residents to communicate with friends, family and health care providers.

- The potential build-out into resident rooms, including an always-on IP-based broadband network, digital television, Internet access, phone lines, video-on-demand services, digital music and interactive gaming.

- Remote monitoring of residents in the memory care unit via Web cams and remote-monitoring medical devices.

- The creation of an interactive website that will market the facility using social media, video,

virtual tours, and 360-degree photos.

Health care and aging-services organizations are driven by high service expectations more than ever before and are seeking to transform themselves by providing higher-quality care, becoming safer and more efficient, and providing better experiences for seniors, families and staff.

Successful senior living organizations are partnering with experienced architects, technology consultants and nationally known experts in senior living communities, and together are making a winning combination that is helping usher in a new type of senior living community.

Berry Brunk is the health care technology practice leader at Sparling, a Stantec Company.



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CONTINUED FROM PAGE 4

let fixture to allow a two-person assist for toileting is also important. Patient rooms are designed in a way as to allow generous space for equipment, staff and family.

• **Senior-friendly color palettes, signage and wayfinding.** Eyesight deteriorates with age, and the aging eye lens tends to “yellow,” causing a misperception of colors, especially those in the yellow and red tones, which tend to blur together.

To overcome this, we chose colors using yellow-lens glasses to assure the colors in the hospital would not only be pleasing, but also, where signage is concerned, be readable. Additionally, we chose larger text for signage that is easily readable to older eyes.

Another area of concern for aging eyesight is the misperception of contrast in the floor as a potential step, which when perceived, can cause the patient to misstep and potentially fall. Heavily contrasting colors in the floor should be avoided for this reason.

Contrasting colors and textures were used to give patients additional visual cues, such as in flooring transitions. All text for signage and wayfinding are contrasting, larger and of appropriate color in order to be seen accurately and quickly.

• **Accommodations for low dexterity.** Hand grabs, rails, door hardware and casework pulls were chosen to be easy to grasp, turn, push or pull.

This allows the elderly patients, as well as staff, to do fine and gross motor operations even with weak muscles or arthritic joints. Where possible, sliding doors are preferable to swinging doors as they are safer to transition through during the operating motion.

With the focus on patient care and positive patient experiences, it is important for health care designers to consider a wide demographic for their facilities. An understanding of how seniors move, behave and even see is critical to successful facility design, be it new construction or a retrofit.

Mike Miller is a senior principal at Rice Fergus Miller. He has been active in the design of senior living and health care facilities nationwide for the past 35 years. Ivi Gabales is a member of the firm's marketing staff and has over 20 years of design, construction, and marketing experience in several markets.



A steel frame was built to support the HVAC, plumbing and other systems.

PHOTO COURTESY OF CHARLES H. PORTER

BIG-BOX STORE

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patient satisfaction.”

The city of Federal Way was a supportive partner throughout the project.

“From the start, the city helped us evaluate the site, meet regulations, and assisted in navigating the permitting process,” said Taka Soga, principal and project manager at ZGF.

“Architects always want to create a project from the ground up, but this reuse project offered us the opportunity to stretch our creative minds and find solutions that we may not

have considered before,” Soga said.

As the popularity of decentralized, comprehensive and convenient health care grows within our retail communities, adaptive reuse may prove to be an industry trend that shapes the future of health care.

George Ward is vice president of Aldrich + Associates, a general contractor specializing in the construction of sophisticated health care and institutional projects in the Pacific Northwest for over 40 years.



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NEW CLINIC AT SWEDISH WILL TREAT PATIENTS WHO SUFFER FROM CHRONIC PAIN

Designers wanted to create a quiet, relaxing environment so patients would be more receptive to treatment.

Chronic pain affects more than one might think. For many people, chronic pain can negatively impact their mood and their ability to function, work and participate in their lives.

With a growing awareness of the undertreatment of chronic pain, skyrocketing costs of what is often less-than-optimal treatment interventions, and a growing abuse of prescription pain medications, patients, payers and hospitals are looking for better long-term solutions.



BY MARGUERITE JAMIESON
MAS
ARCHITECTURE

An important shift from techniques focused primarily on eliminating pain to a more holistic team approach has emerged emphasizing the biologic, psychological and social consequences of a patient's pain experience. Swedish Medical System is looking to provide more solutions for its patients.

Swedish Medical Center is relocating its long-established Pain and Headache Center, a clinic that has provided traditional pain services offered in most hospital settings, to a more comprehensive center with more collaborative, team-based pain rehabilitation programs.

A rebirth is now seen with the development of a new home and name for Swedish pain medicine, Swedish Pain Services, which is set to open in a 12,500-square-foot space on July 27.

This renewed vision comes from medical director of Swedish Pain Services, Steven Stanos. His focus is to provide patients with a "biopsychosocial" assessment and team-based management programs in addition to state-of-the-art injection therapies and an expanding role for complementary and alternative medicine, such as acupuncture and mind-body medicine.

The new clinic will comprise two distinct areas. One, a Pain Management center, which is a traditional clinic environment with exam rooms, injection suites and infusion bays. Second, a Functional Restoration center, which will provide highly integrated space for structured multiple-hour-per-day outpatient care, incorporating physical and occupational therapy, relaxation training and psychological counseling. Also included



Swedish will open its new 12,500-square-foot pain services center on July 27.

IMAGE COURTESY OF MAS ARCHITECTURE

within the clinical site is studio therapy space for group discussions, educational classes, family meetings, movement-based therapies and aerobic exercise.

Over the last decade or so, health care design has focused on flexibility of design to accommodate future uncertainties, whether it be new treatments, technologies, procedures or equipment. Emphasis has been on creating the universal room, designed to host a wide range of future uses, and in most instances this approach has been effective. This pain clinic, however, required special consideration for its unique combination of services and dynamic, complex patient population.

A focus on atmosphere

After some of the first user group meetings, it was clear that the one-size-fits-all approach simply was not going to work. Our team went beyond the traditional task of listing room types and square footages and really focused on the atmosphere that would create the best patient experience for each type of therapy, not only on a room-by-room basis, but the clinic as a whole.

Pain Management maintains a traditional clinic atmosphere where a universal exam room made sense. All rooms are configured the same and are similar to other Swedish musculoskeletal clinics to allow providers to transition easily between clinics.

Patients and visitors are greet-

ed in a central location. New evaluation patients are guided to one side of the clinic and patients receiving X-ray-guided injections, infusion therapies treatments and device management are escorted to another area. Careful attention was paid to lighting and sound control, particularly in the infusion bays, as this treatment can last for several hours.

Functional Restoration is a comprehensive program where patients can be in clinic for several hours at a time to even a full day, rotating through various activities. The desire was to create a more social atmosphere where people feel energized and engaged in their treatment.

Incorporating interactive areas for patients to gather between sessions became an important part of the program. Space for personal belongings is necessary, but a place for people to relax and have informal conversation is also a key feature in creating a supportive, collaborative environment that encourages patients to share their issues, challenges and successes.

The physical environment had to be conducive to the planned activities. We started with the industry standards for outpatient facilities, but the team felt that additional details were needed to provide the right atmosphere for each space. Sound control rose to the forefront of the discussion.

Relaxation therapy uses special equipment to monitor heart rate and breathing, and is best per-

formed in a space with minimal sound interruptions and outside stimuli. To create this environment, walls that typically would merely penetrate the ceiling and use insulation and sound masking to achieve required acoustic levels were extended further and

constructed with extra thickness to minimize the infiltration of external noise.

In addition to traditional room lighting for intake purposes, dimmable indirect lighting was

CHRONIC PAIN — PAGE 15

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WHIDBEY HOSPITAL'S HYPER-EFFICIENT HVAC SYSTEM MAY BE THE FIRST OF ITS KIND HERE

Variable refrigerant flow systems save energy and use less ductwork than traditional systems. Although they are becoming more common in the U.S., they're new to hospitals.

In an era when hospital heating, ventilating and air conditioning systems are getting more complex and expensive in the interest of energy efficiency, Whidbey General Hospital in Coupeville chose to pursue a simpler approach to energy efficiency for its 60,000-square-foot patient care addition. The end result may very well prove to be a guiding light for many hospital projects in the future.



BY DON IVERSON
COFFMAN
ENGINEERS

Traditionally, hospitals rely on a temperature control concept known as "reheat" where large, centrally located ventilation equipment delivers cold air (24 hours per day, 365 days per year) to hundreds of rooms simultaneously. The air must be delivered cold, as some interior rooms will always need cooling. Rooms that don't need cooling have individual heating coils that heat the cooled air back up to room temperature, hence the term reheat.

Reheat became popular decades ago when energy was cheap and labor was expensive. A primary benefit of this traditional concept is that much of the required maintenance, such as filter changing, greasing of bearings and adjusting fan belts, can be done centrally and efficiently. Maintenance staff were often stationed near central equipment rooms so they could keep an eye on things.

The concept is not energy-efficient. Energy is required to

cool massive amounts of air at the central equipment and then additional energy is required to heat much of that air back up at individual rooms.

As much as 40 percent of all energy consumed by a hospital is used for reheating. Newer hospitals with ample budgets have invested additional funds on complex airflow-reduction strategies and more efficient condensing gas boilers and/or industrial heat pump systems to produce the heat.

Another disadvantage of the traditional concept is the thousands of feet of ductwork needed to transport air between distant rooms and central equipment, typically requiring hundreds of kilowatts to power fan motors. The large ductwork requires space, adding more floor-to-floor building height and construction cost. Lint and dust accumulates (sometimes as much as a half-inch thick) inside the "return" ductwork that transports unfiltered air and contaminants from individual rooms back to central equipment.

An alternative system

Whidbey General cannot afford to waste energy nor can it afford the expensive add-ons to improve the efficiency of a traditional system. It was time to get creative!

HDR Architecture's engineering consultant, Coffman Engineers, suggested an efficient alternative to the traditional system. While this alternative system will meet hospital codes and use much less energy, the hospital was advised that this may be the first significant hospital project to employ the concept in the United States.

The hospital was still interested, especially its sustainability coordinator. The hospital's contractor, Andersen Construction, then confirmed that the alternative fits the budget, and the green light was given.

This alternative concept is commonly referred to as a "variable refrigerant flow" (VRF) heat-pump system, and has rapidly become popular for smaller commercial (non-hospital) buildings throughout the United States. The VRF concept was developed in Japan decades ago and caught on in Europe long before the United States.

Coffman started specifying VRF for hotels 10 years ago when it was still virtually unknown here. The concept employs localized heat pump condensing units mounted outdoors or in closets linked with small refrigerant pipes to fan coil units in or near rooms being served.

Each condensing unit can serve multiple fan coil units. Each fan coil unit offers occupants independent temperature control and requires minimal ductwork since it is located in or near the room(s) served.

A condensing unit only provides heating or cooling to a fan coil unit if needed, no continuous central cooling or reheating. As an added benefit, the condensing unit will use the heat removed from one fan coil unit that is cooling and transfer it to another fan coil unit that is heating, essentially providing free heating with no added energy.

The VRF concept is economically scalable. Large hospitals could have a hundred closet-mounted condensing units networked together with a water loop, allowing heat to be shared across an entire campus.

This same water loop could also be used to cool computer servers and medical equipment, allowing traditionally wasted energy to be used to heat patient rooms. Hospitals fully utilizing VRF may burn little or no fossil fuel.

VRF advantages

Breaking an industry of old habits means confronting objections upfront. Every concept has disadvantages that traditionalists are quick to point out. The trick is to turn some or all of those disadvantages into advantages. For example:

- **Difficult service access.** Individual VRF systems must be kept small to comply with refrigerant codes. A small hospital may need a couple of dozen localized VRF systems, which means more equipment to maintain, distributed across the facility, and often in areas with difficult access.

A valid concern, but one needs to consider the overall reliability of modern, highly engineered products assembled and tested in a climate-controlled manufacturing facility. One must also consider how maintenance-free products have become in recent years.

The advantages of distributed small systems are many: A failure of a system would impact only a small portion of the hospital. Small equipment is typically deemed "rugged" by building officials and not in need of expensive seismic certification required for larger equipment in hospitals.

Seismic bracing is not needed for the small ductwork and durable refrigerant piping in a VRF system. VRF systems employ reliable, self-diagnosing controls

that communicate directly with central work stations.

- **Filter replacement.** Each fan coil unit has a filter that requires frequent replacement. Filters are typically located above ceilings, adding maintenance cost.

But is this really necessary? For Whidbey General, Coffman minimized this disadvantage by locating return air filters above convenient, hinged grilles at the entrance to each patient room. It is possible to replace the filter in less than 60 seconds using a small step stool.

Coffman further refined the design by oversizing the filter, a trick that reaps huge rewards. By doubling the size of filters they will actually last four times longer, virtually eliminating the maintenance "disadvantage" and reducing overall filter cost.

- **Air quality.** Hospital codes require more stringent filters for large central systems (MERV 14) than for patient room fan coil units (MERV 6). MERV stands for minimum efficiency reporting value. The higher the number, the higher the filtration effectiveness.

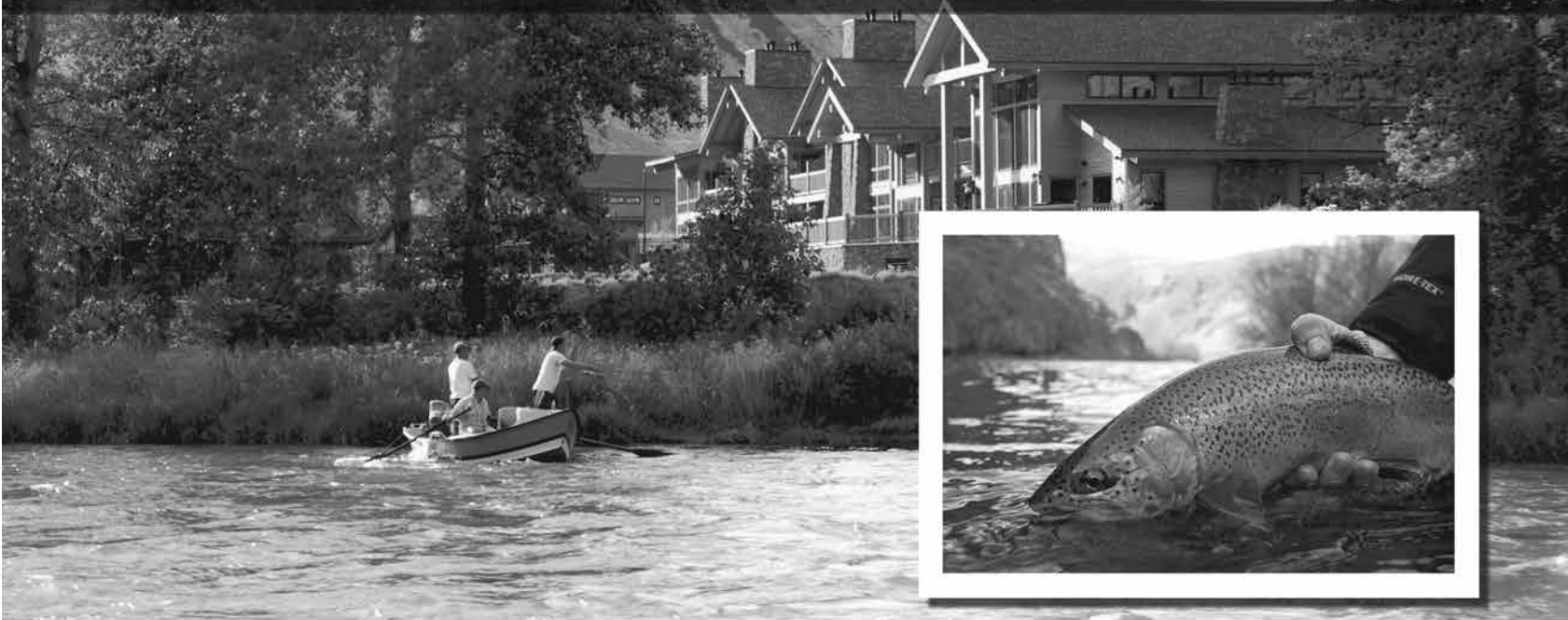
Why not raise the bar? Coffman specifies new filter technology that has made inexpensive MERV 11 filters available for small applications like fan coil units. MERV 11 filters are very effective, so dust accumulation is not a problem inside return ducts and the fan coil unit.

Patients at Whidbey General will breathe air that was recirculated only from their own rooms through short, clean ducts filtered to MERV 11 standards. Compare this to patients at other hospitals who must breathe air that is recirculated from other



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HOW A PHARMACY WAS DESIGNED TO LIMIT EXPOSURE TO TOXIC DRUGS

Health care workers can be harmed by cancer-fighting drugs, so Swedish built a pharmacy with a specially ventilated clean room.

In October 2012, an outbreak of fungal meningitis was reported in the United States. The infection was traced to fungal contamination in IV fluid epidural steroid injections prepared by New England Compounding Center, a compounding pharmacy in Framingham, Massachusetts.



BY R. DAVID FRUM
SALUS
ARCHITECTURE

By March 10, 2013, 48 people had died and 720 were treated for persistent fungal infections. Subsequently, former NECC executives and technicians were indicted on a host of federal charges related to the outbreak.

This case illustrates the pivotal nature of infection control on compounding pharmacies. That's where a regulation called USP-797, which focuses on sterile drug preparations, was shown to be critical.

Local compounding pharmacies, such as Seattle Children's, Group Health and Virginia Mason began incorporating USP-797 as far back as 10 years ago. The

state of Washington adopted it in 2013.

USP is an abbreviation for the U.S. Pharmacopeial Convention, a scientific nonprofit organization that sets standards for the identity, strength, quality and purity of medicines, food ingredients and dietary supplements. Its drug standards are enforceable in the U.S. by the Food and Drug Administration.

New rules

Swedish First Hill asked Salus Architecture (then the Seattle office of Clark/Kjos) to plan a new inpatient pharmacy, incorporating USP-797. Top on the priority list for the new facility were product safety, staff safety and improved efficiency.

The design team started by sketching the flow of medicines from receiving bulk medicines to dispensing them to the patients.

The project was directed to address the handling of hazardous drugs such as chemotherapy drugs in a similar fashion. However, midway through construction, the leadership of the pharmacy participated in a national conference that introduced a new proposed regulation for the han-



An airlock allows workers to safely transfer chemotherapy drugs between the hood room and storage.

PHOTO COURTESY OF SALUS ARCHITECTURE

dling of such drugs: USP-800. Specifically, the proposed USP-800 regulation has been created to identify the requirements for receipt, storage, compounding,

dispensing and administration of hazardous drugs, including chemotherapy drugs.

This standard calls for a "containment segregated compound-

ing area" — a separate, negative-pressure room with at least 12 air changes per hour for use

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THE WAY WE DESIGN HEALTH CARE PROJECTS IS CHANGING IN A BIG WAY

Big health care providers are rethinking their practice of designing one project at a time.

Designing medical facilities well is a specialty that is earned with many years of experience. Just learning the language of our clients requires years of active listening.

Interpreting the goals of providers is an art, as often as much is left unsaid as is said openly. What we notice now is a shift in how we design these facilities. It is a subtle departure of a relatively accepted, standard process. The timing seems right.



BY PHIL GIUNTOLI
COLLINSWOERMAN

It is understandable that the design process is changing just as the delivery of care and reimbursement structure is about to be dramatically altered.

Many of us who have designed health care facilities for a long time have incorporated user group design sessions as a basis for receiving input and affirming project direction. As I recall, this idea was first popularized by the architecture firm Caudill Rowlett Scott in their well-branded "Problem Seeking" approach to design. Their so-called "squatter sessions" were designed to get a local team of end users — physicians, staff, allied caregivers — in the room to develop the design concepts associated with their normal work processes.

Design events were often spread across several days during weekly forays, and the department-level meetings were quite siloed in their approach to input and reach. These events often carried through multiple phases of design and finalized in the identification of the most intimate detail.

Prior to this new process the architects were the experts. They listened generally to volume or scale assertions provided by the owner and developed a design based on their experience.

The architects used what had been successful solutions for them in the past as a basis of design. The Caudill Rowlett Scott approach capitalized on the disconnect between the architectural solution and medical operations personnel. They found that users who participated in the design process felt a greater degree of ownership, and therefore user group-driven design had less white noise associated with opening and startup.

Medical clients were willing to accept the disruption to their current operations, giving staff freedom to participate as a beneficial trade-off with improved employee acceptance.

A better process

It was 30 years before the process changed. User groups remained deeply involved. The difference was significant, however, as providers, staff and administrators began to realize that user group input wasn't enough.

What if designs were being created in support of suboptimized work processes? In this new model great attention was given to optimized work processes and standard work.

The patient's perspective became as important as the provider's. User group design sessions were transformed into lean design events, modeled after the Toyota production method, with broad cross sections of horizontally and vertically stratified teams.

These events can often last four to five days. A major difference in this model is recognition that work flow transcends traditional departmental organization. While groups of users still huddle to give input and affirm direction, everyone would now be in the room together in the same meeting.

The challenge is not just to create a great space in support of the current patient flow, it is now to describe the best possible flow of patients, staff and materials, thus increasing throughput or enabling additional time with the patient. Handoffs became the enemy of process, and the most successful design solutions were often accompanied by a new look at who did what work tasks in the standard work process. A healthy overlay of the positive patient experience assisted in the destruction of silos in the best of solutions.

This approach remains very popular today. It does have its drawbacks.

It is incredibly labor intensive and requires extensive commitment of staff outside their normal jobs. What is more problematic, particularly for larger institutions, are that variability can still persist throughout the system if local delivery is allowed to design their own space around their own parochial local processes.



Design workshop participants are being asked to widen their focus.

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HOSPICE BRINGS COMFORT TO DYING PATIENTS

A new inpatient center at Providence Regional Medical Center in Everett will have a fireplace and other familiar touches to make it feel more like home.

Much of health care is focused on healing and restoring patient health. But for those facing a serious or terminal illness, hospice care helps patients enjoy the gift of time with loved ones while maximizing the quality of living that remains.

When designing and building hospice facilities for patients, there are ways to approach design that considers the well-being of the individual while conveying a soothing and peaceful environment.



BY MARK
BAUGHMAN
MORTENSON
CONSTRUCTION

Many people think "hospice" refers to a specific place. Rather, hospice is specialized care to support

patients and their loved ones during an advanced illness at the end of life. It can be provided almost anywhere: at the patient's home, in a retirement home, in an adult family home, at an assisted-living facility or a skilled nursing facility.

The focus of hospice care centers on comfort and quality of life when options for a cure are no longer available or no longer desired by the patient. The primary goal of hospice care is to help people have an alert, pain-free life while living each day fully.

Inpatient hospice care

Those receiving hospice care have a strong desire to enjoy the comforts of home. For this reason, most hospice care — whenever possible — is provided at home. In some instances, the patient's fragile or medically complex state requires a higher degree of care in a hospital or a hospice-care facility where 24/7 registered nursing staff is available.

Hospitals have not traditionally been designed or built with the goal of making a patient feel at home. Further, hospitals are costly to build and operate, so the typical hospital facility is geared toward health and healing.

There are also instances when a patient is being treated in the hospital for a condition that is not improving, or suddenly takes a turn for the worse. In these scenarios, a family must choose whether to keep their loved one in the hospital, or to attempt to transport their family member to a hospice care facility, which can pose a risk to fragile patients.

For this reason, Providence Hospice and Home Care of Snohomish County is partnering with Providence Regional Medical Center Everett to create a hospice care setting within an existing portion of the hospital's Colby campus in Everett.

Founded in 1978, Providence Hospice and Home Care of Snohomish County provides compassionate and high-quality care to meet the physical, spiritual and emotional needs of patients and families facing the end of life. In addition to its core hospice services, the agency also offers specialized pediatric and palliative care services, and an ambulatory palliative care program.

The goal of the new inpatient care center in Everett is to provide pain management or acute symptom management to hospice patients, allowing patients to enjoy the comfortable feeling of home during their time in hospice.

Homelike setting

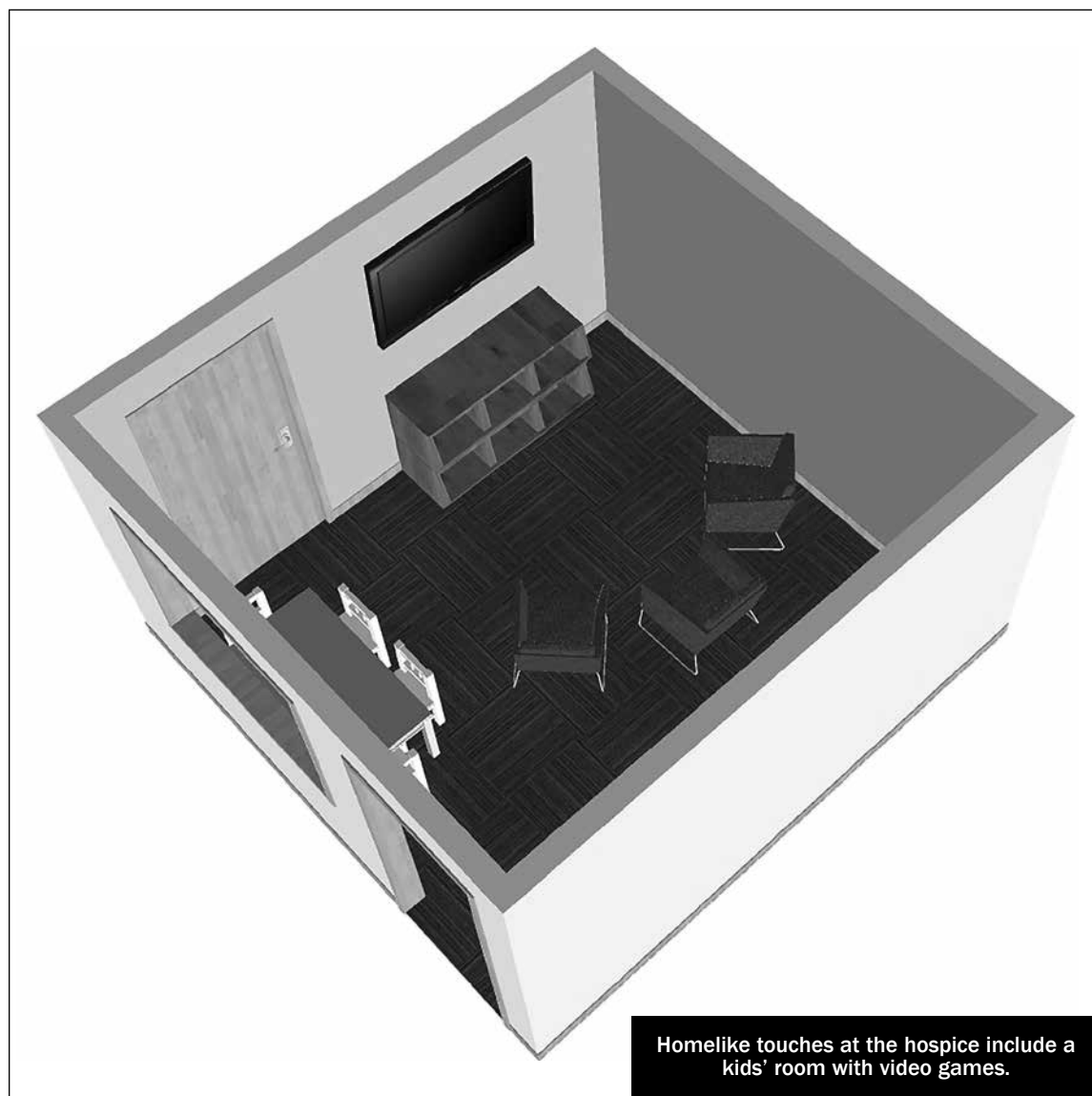
The Providence inpatient hospice care center is currently in construction, with a targeted completion date of December 2015.

The project consists of a full renovation of the eighth floor of the A wing at the Providence Everett Colby campus to provide 16 private patient rooms for hospice care.

The facility allows close access to Providence Regional Medical Center Everett while also creating an environment specifically designed to convey a feeling of home. To that end, project designer MG2 and builder Mortenson Construction have worked closely with Providence Hospice and Home Care of Snohomish County to choose materials, colors, furniture and amenities to minimize the institutional feel common to hospital settings while projecting a sense of home.

Amenities include a residential-style kitchen in the common area for use by patients, families and friends, as well as a common family living room area with a fireplace on a ledge-stone wall, a kids' room (complete with video games) and a tub room with a soaking bathtub. Finishes and materials include gypsum ceilings instead of the acoustical tile ceilings typical of a hospital, along with residential-style light fixtures, comfortable furniture, wood finishes including cabinets and floors, soft colors and wall surfaces, and a welcome station rather than a traditional nurse station.

The eighth-floor location on the Colby campus also provides exceptional views of the



Homelike touches at the hospice include a kids' room with video games.

IMAGE BY MG2

Cascades, Puget Sound and the surrounding Everett community.

Thoughtful design

Also important to the project is how necessary systems are seamlessly blended into the space.

Examples include medical gas and nurse call systems at the headwall of each bed. These systems are incorporated into this headwall in a way that is less visible in the room, further reducing the institutional feel common to hospitals.

In addition, standard building systems such as signage are either minimized or adjusted to blend into the hospice setting. Even small items, like cubicle curtains, are custom-designed since they are common in hospitals, but not in homes.

The design, planning and construction of this project required sensitive considerations due to the project's location above the

seventh floor of the A wing, an inpatient bed floor with many oncology patients undergoing difficult treatments and experiencing suppressed immune systems. Careful planning and arrangements for the demolition of existing eighth-floor materials, as well as tie-in of plumbing and electrical systems, were critical to ensuring patient safety and project success.

Close coordination among the designer, builder, the hospice agency and hospital have been

essential to maintaining progress toward completion of the project. When designing and building for hospice care, there are ways to help make patients feel comfortable and at home and to create a more calming environment.

Mark Baughman is a construction executive who focuses on health care for Mortenson Construction, a national general contractor with a local office in Kirkland.

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CHRONIC PAIN

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added to promote calmness during treatment and eliminate any bright spots that might cause disturbance. A similar environment was created for the acupuncture rooms.

Private surroundings

Behavioral therapy, which includes one-on-one and group psychological counseling, has an increased focus on patient privacy and staff safety. Ambient noises might create a feeling of being overheard and discourage patients from fully expressing their thoughts and issues.

Surrounding walls are full height, and ceilings have higher acoustic qualities than typical ceilings. The room layout positions the provider in a place best suited for personal one-on-one interaction with the patient, but also for easy access to the door, promoting a sense of security.

The studio therapy area is a flexible space designed to function in multiple capacities. The space can support large conference or educational activities with full video conferencing capabilities or be divided into two smaller rooms for group sessions

with multiple patients and caregiving teams.

Storage space is available for exercise mats and equipment for motion therapies. Multipurpose flooring was used as well as thicker wall construction to allow for the variety of uses and to isolate sound. The physical therapy gym is also a multipurpose space with mat tables, parallel bars, weights, mirrors and open exercise space.

Swedish Pain Services' new space is the next step in its endeavor to treat patients' pain issues holistically, offering a variety of services tailored to each patient's needs. As the program expands, the hope is that there will be more types of therapies available and increased access for a growing number of patients of all ages to better manage their pain, improve their function and increase their quality of life.

Marguerite Jamieson is the senior medical planner at Mas Architecture with over 20 years of experience creating thoughtfully planned and designed health care spaces. Jamieson served as project manager and medical planner for Swedish Pain Services.

WHIDBEY HOSPITAL

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patient rooms through hundreds of feet of potentially dirty ductwork before it is filtered centrally to MERV 14 standards.

MERV 14 filters are better than MERV 11, but they are not perfect so one needs to ponder which concept is more desirable considering the potential source of contaminants that could get past the filter.

What's next?

The Whidbey General addition is now starting construction. The University of Washington's Integrated Design Lab and Solarc have now joined the project team and are doing computer modeling to determine just how much energy will be saved.

The team has targeted the maximum rebate from Puget Sound Energy, which requires a 25 percent reduction in energy usage from code requirements. The Integrated Design Lab has developed energy reduction strategies specifically for hospitals in their research to target an energy use index, or EUI, of 100 or less, compared with conventional hospital construction, which runs in excess of an EUI of 200 or more.

The mechanical and electrical systems will be bid in August. Stay tuned!

Don Iverson is a LEED-accredited mechanical engineer and principal at Coffman, with more than 37 years of award-winning design experience in the health care industry.

PHARMACY

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when compounding hazardous drugs. In addition, it requires a low- or medium-risk "compounded sterile preparation area," which serves as an anteroom for cleaning supplies and putting on protective gear.

The prepared drugs coming out of the compounding area are required to be transferred through the low- to medium-risk anteroom prior to being brought into an open air.

A change of plans

The team adjusted the plan to reflect this new reality.

The mixing process for chemo drugs (USP-800) parallels that of the clean drugs (USP-797). The chemo side operates under negative pressure to prevent contamination of adjacent spaces, while the clean side utilizes positive pressure to prevent contamination of the clean drugs being mixed.

The Swedish First Hill design included a combined anteroom for both. There is also a separate chemo storage room with an airlock pass-through

to the chemo hood room. Since the clean/chemo rooms cannot be entered from this room, gowning is not required — allowing a great deal of flexibility for the pharmacists.

The new pharmacy layout resulted in work processes where product moves logically from one step to the next, staff minimizes walking distances, and orders are responded to in an expedient manner. Since all product must be reviewed and signed off by the pharmacists, the location of their work desks is pivotal to the pharmacy design.

Once signed off, drugs are dispensed through various methods: delivery to floors and clinics, tube system and stocking of automated dispensers.

Clearly, USP-800 has significantly impacted the space allocation of hazardous drugs and design of pharmacies, improving staff safety. The new pharmacy layout has also improved efficiency by creating a continuous flow from the raw stage to the final product.

R. David Frum is president of Salus Architecture, a firm specializing in design for health care.

DESIGN

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In this case can the design be optimized? Is best practice being elevated at a system level?

Lean gives way

For several reasons we are seeing lean user group sessions changing to prototype design and standards development. While lean remains embedded in the development of optimized standard work, it has given way to prototyping of best practice.

The goal is to create a system of standards that enhances predictability, speeds delivery to market and standardizes the best practice methodology the organization can muster. Recently we have worked with several of the Puget Sound region's largest providers using facilitated workshops not just to design a facility, but to design standards that can be used to develop an entire delivery system.

The standards are designed for use at multiple scales. From entry to market retail facilities through large multispecialty centers, the standards make future development easier and capital planning more predictable. It should be noted, probably with no surprise, that the standards are focused exclusively on outpatient facilities.

During these prototyping ses-

sions it is not just front line staff that is involved. It is the leadership of the organization that thinks through standard work and conceives of the spaces and work flows to be propagated. Except for the individuals in the room the sessions look much the same as the lean workshops of the earlier generation of design meetings.

Rather than a single facility focus, the focus is on the system and the system's leadership develops the detail. The sessions are normally shorter. The involvement of key stakeholders can be broader or more narrow, dependent on the organizational culture. Perhaps ironically the process champions are often departments within organizations focused on real estate, not operations.

The architect is once again looked to as an expert. Rather than look to themselves as experts they turn to their design partner. The question most often asked at critical decision junctures: What is everybody else doing?

We are currently working on the next generation of design process with that question in mind.

CollinsWoerman Principal Phil Giuntoli has over 30 years of experience focused on the design of health care facilities.



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