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People, Places, Processes & Products that Influence the Supply Chain

INSIDE THE CURRENT ISSUE

September 2007

Operating Room

If high-tech beds could talk...

by Jeannie Akridge

Are your beds trying to tell you something? They're certainly getting smarter by the minute. Many of them know how much a patient weighs. Some of them can tell you when a patient moves or tries to get out of bed. They help automate processes for time-stressed nurses with patient safety and back-saving features available at the touch of a button. While they're doing all of that, a select few can generate valuable data that caregivers can use to make sound clinical decisions and drive true process change.

"There is so much information on that real estate under the patient," said Mitchell Smith, director of marketing for critical care and maternal care, [Hill-Rom](#), Batesville, IN. "The bed of the future is really an extension of the caregiver's hands and increasingly their eyes and ears," Smith added.

Suddenly the bed is playing a much more active role in patient

Out Patient Connection

Fall prevention gains new ground

Falls in healthcare facilities continue to be a problem. "We know the average facility incurs one-and-a-half falls per day," said Ed Winiarski, OEM distribution manager, RF Technologies (Brookfield, WI). However, "facilities are very hesitant to admit they have a falls issue or that they could improve their processes, yet there are three people falling every two days, based on widely accepted standards."

RF Technologies' new Sensatec Care 3 solution incorporates enhanced functionality into its fall management system with the addition of pressure ulcer protection and incontinence detection capabilities. Featuring reliable, oversized and sensitive sensor pads, the three-in-one alarm system can integrate with a nurse call system for example to alarm at the bed, a nurse's pager, and/or a nurses' station.

The Care 3 Motion pad detects how many times a patient moves in a given period of time in order to assist caregivers in their efforts

care at a time when it's needed most, and hospitals are reaping the financial rewards from these necessary capital investments. In a way it's like finding cash under the mattress.

"Here's the ominous situation," described Chad Rohrer, marketing manager for [Stryker Medical](#) (Kalamazoo, MI). "We have patients getting sicker, while hospitals have strained resources, and increased expectations

to improve patient outcomes. We have less nurses and the government, insurance companies, other governing bodies, are expecting the hospitals to do more, and follow increasing numbers of best practices. As healthcare is becoming more demanding, how can we provide a product that is a true tool to help healthcare providers keep up with all of these demands?"

Vendors are responding with high-tech beds that are intelligent, interactive, intuitive, and "connected".

Rohrer described the data integration capabilities available through Stryker's new InTouch bed. "The bed today, with a PDA-like intelligent touch screen provides more and better information displayed in an easier to use format," said Rohrer. "And the bed is being built and constructed in a way that it is going to be upgradeable for future applications."

InTouch features Stryker's iBed Awareness option which Rohrer described as a tool to help nurses organize their day through "protocol reminders that will help them stay compliant with clinically proven, evidence-based practices." Caregivers select what they deem as "safe" parameters for an individual patient. The bed then remembers the setting and will "alert caregivers when the bed deviates from that protocol." The bed can also be set to remind caregivers to perform a specific task, such as turning a patient, he said.

An Event Manager feature on the bed displays event-specific information on the touch screen so nurses don't have to remember what to do next. Helpful features



Stryker InTouch bed shown in chair position

to continuously vary the position of a patient in bed to help prevent pressure ulcers. In addition, if pressure is removed from the pad it automatically generates audio and visual alerts to warn staff of potential falls. A disposable fluid sensing pad detects electrolytes that are present in urine to alert caregivers of an incontinent patient. The company offers a 30 day trial with in-service training.

"When I walk into a facility, I know two things are going on," said Winiarski. "They're probably having problems with alarms, there's a lot of downtime due to breakage. Secondly, they're having a lot of false alarms based on the fact that all pads are not created equal." The Sensatec pads will detect as low as 50 lbs. of pressure versus 80 or 120 lbs. common on many units. "It will allow even the most frail person to activate the system," said Winiarski.

Fall prevention systems are not only beneficial for preventing falls in elderly patients, they can also be used to alert caregivers when a patient begins to stir after regaining consciousness from surgery for example. They can also be used to remind caregivers to turn the patient every 30 minutes following surgery to prevent a pressure ulcer from forming.

Winiarski noted that Sensatec works as part of a broader fall management initiative that should include: education/awareness programs for staff, patient risk assessment tools, patient environment/setting, assignment of assistive technology/aids, and post fall procedures and administration.

Of course, any fall prevention system is only as good as the staff's response time. "In cases where the staff is attentive and responsive, it almost guarantees

such as unit conversion tables, calculators and foreign language translation keys are also available through the easy-to-use touch screen featured on InTouch. "All of what this bed can do is operated essentially by seven buttons on the touch screen," said Rohrer. "You can have a lot of information but that information is not useful unless it's intuitive," he added.

Hill-Rom's NaviCare Patient Safety software module builds a workflow around the company's successful data-centric smart beds to help improve patient safety and optimize care.

Adam McMullin, vice president, marketing and strategy for Hill-Rom's IT Solutions group explained: "The NaviCare Patient Safety Application sits centrally, and centrally allows you to configure the bed in the appropriate way for the condition of that patient." Central administration not only saves nurses' time it also means protocols are administered more consistently, and nurses stay connected to the bedside from wherever they are.



A nurse uses the Hill-Rom interface

"When a condition that you want the caregiver to know about occurs, you automatically route an intelligent alert directly to the caregiver," said McMullin. "You've really provided a connection between the patient and the bed and the caregiver that's real time and it's intelligent to know something about that patient around which conditions are important to notify the caregiver so they can make a decision on what to do."

"The bed of the future is really part of the system," Smith emphasized. "It's just another interoperable medical device, capable of sharing information

with any other piece of equipment, or electronic medical record (EMR) or nurse communication system," said Smith.

Jack Barr, manager of operational marketing, patient support systems, Hill-Rom, described the company's integrated approach to patient care. "A bed is not just a bed anymore. It's a vital part of the technology that goes with the people and the processes that help deliver the outcomes that a customer is trying to deliver to a patient."

Safe is smart

that their fall rates are going to be much below the normal," said Winiarski.

Fall prevention resources:

National Center for Patient Safety
2004 Fall Prevention Toolkit,
<http://www.va.gov/ncps/SafetyTopics/fallstoolkit/index.html>

Joint Commission 2007 National
Patient Safety Goals,
www.jointcommission.org

RF Technologies, www.rft.com

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Contemporary bed technology is centered around features that help caregivers to comply with protocols and best practices being publicized by organizations such as the Joint Commission and the Institute for Healthcare Improvement (IHI).

"The reason why they're gaining so much emphasis is because it's been proven that if they're done and they're done properly, you're going to reduce the incidence of adverse events, maximize your reimbursements and overall improve patient outcomes," said Rohrer.

Features that help caregivers comply with protocols such as keeping the patient's head elevated above a 30-degree angle to prevent ventilator-associated pneumonia (VAP), using bed exit alarms to reduce the risk for patient falls, and turning the patient regularly to prevent pressure ulcers are becoming integral to the modern hospital bed.

Said Ron Dzedziula, director of marketing for therapeutic surfaces at [Kinetic Concepts Inc.](#) (KCI), San Antonio, TX, "There are a lot of things that we and other manufacturers are doing to really address patient safety, caregiver safety, and risk mitigation strategies."

"The bed is the center of patient care," he added. "That's where the patient is going to spend the majority of their time while they're in the facility. When a clinician is interfacing with the patient, the bed and the technology in that bed can help make the interface easier and safer for both the caregiver delivering the care and the patient receiving it."

KCI rents and sells a complete continuum of full-framed beds, mattress replacements and overlays providing a wide range of therapy options and price points in the areas of bariatric, wound care or pulmonary therapy. The good news for facilities looking to minimize both prevention and treatment costs associated with surfaces, according to Dzedziula, is that "generally the sophistication and quality of therapy provided is increasing at a lower cost for facilities to acquire. KCI as well as other vendors can now provide a pretty significant level of therapy in simple, easy-to-use, relatively inexpensive surface options for the hospital and/or nursing home to consider."

"That becomes incredibly important not for just treating patients but, for preventing wounds or pulmonary complications from happening. These complications are areas of high concern for facilities," he continued. "If a KCI surface can help a facility prevent a complication from occurring then that facility doesn't have to spend additional healthcare dollars to treat that complication."

KCI's AtmosAir with SAT is a non-powered dynamic pressure-relieving mattress replacement system. Dzedziula described it as "an advancement in technology

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[Messe Dusseldorf](#)

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[Raven Biological Labs](#)

[Retrofit Devices, LLC](#)

[Ruhof Corporation](#)

[Skytron](#)

[Spectrum Surgical Instruments](#)

[Stretchair](#)

[Tektone](#)

[Tronex Healthcare Industries](#)

[TSK Products, Inc.](#)

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[VHA](#)

that really works by itself." "There's nothing that the clinician has to do to set it up. There's nothing that the clinician has to do to adjust it. You just put the patient on it and the patient gets great therapy."

One advantage of a non-powered therapeutic surface is that it doesn't require electricity to work. "In areas where you have power surges, brown-outs, hurricanes, etc., at least the patient's skin continues to be protected or receives treatment through that period," said Dzedziula.

The new First Step All-In-One powered mattress replacement system (MRS) from KCI "ensures the right amount of air is always in the surface by using an infrared light system so that the nurse literally just has to put the patient on it and it provides pressure relief and moisture management therapy. There's no setup required, there's no adjustment required. You just plug it in, place the patient, and it works," said Dzedziula. "When you think about the nursing shortage, we (KCI) become more interested in using technology to ensure the product functions properly almost by itself. We utilize technology to help clinicians get a good outcome with less interface required."

First Step All-In-One also has inflatable air rails that are meant to close the gaps between the mattress and side rails, thus helping to minimize the risk of patient entrapment.

Mattress replacement systems from KCI are an example of how facilities can easily upgrade the therapeutic capabilities of their current beds with a low-cost investment. For example the hot-selling AtmosAir surfaces sell for around \$1,000 apiece, noted Dzedziula. Besides providing a more comfortable mattress for patients, "if an AtmosAir surface can help prevent a wound from occurring, it can do quite a bit to help reduce their expenses," he



KCI First Step All-In-One

said. He notes that many facilities prefer to rent therapeutic surfaces and beds on an as-needed basis in order to keep from being locked into a specific technology or when capital dollars are not available. "When we get into the balance of outcomes and costs, that balance comes in a lot of different ways depending on each facility," he said. "It comes as an operating budget vs. a capital budget, or as rental vs. sales. It also comes as frame vs. overlay, or as low-end therapy vs. high-end therapy. And what we try and do is work with each facility to understand what they are trying to accomplish and then we match the part of our

continuum that helps them accomplish their goals."

Hill-Rom's Patient Safety Program is focused on maintaining three principals: No Falls, Clear Lungs, and Safe Skin through a system consisting of Hill-Rom's beds, the NaviCare Patient Safety software, and consultative services to help facilities put optimal processes in place.

The TotalCare high-acuity bed and the VersaCare medical surgical bed from Hill-Rom both have features designed to minimize risk. For example, therapeutic surfaces provide pulmonary therapies that move a patient from side to side to help keep lungs clear. The company's smart mattresses adjust pressure relieving capabilities according to the patient's weight and position to deliver optimal therapeutic pressure.

The Hill-Rom bed exit alarm can be configured for patients at different levels of risk for falls. Because it has different sensitivities, you can set it to alarm at varying levels of patient activity.

Another safety advantage of the Hill-Rom surfaces is that they are integrated into the bed frame, or as Barr described, the "therapeutic surface talks to the bed frame. For example if the mattress is inflating and deflating to move a patient side to side, and someone lowers a side rail, the surface will automatically stop because it knows what the frame is doing."

The XPRT surface from Stryker provides rotation, percussion and vibration therapy along with low air loss. While Stryker's beds and surfaces are based on an open architecture platform that allows customers to use whatever surface they want, the company is now offering its XPRT wound care surface on a semi-integrated platform, meaning the mattress gets plugged into a data port on the bed and the surface interface is displayed on the bed's touch screen. Customers get the benefits of open architecture without having a separate pendant to control the surface.

Stryker's BackSmart product design solution addresses nurse injuries with features designed to protect nurses and encourage safe patient handling. For example, Stryker's patented electric brake technology allows nurses to ergonomically engage the brakes on the bed with just one touch on the control panel and without reaching or bending.

Low bed height is another important feature not only to protect the nurse's back, but also to help enable safe mobility for patients. Stryker's InTouch is able to be lowered 16 inches from the ground even with a motorized transport system, which is yet another back-saving feature. Stryker's sturdy patient positioning side rails are designed so that the patient can easily grip the rails to reposition

themselves and get in and out of bed. In addition, "Back Smart Pivot cradles a patient's back side so when the head of the bed is raised it doesn't push him or her forward nearly as much. This can help reduce the amount of times that the nurse has to boost the patient back up in bed," said Rohrer.

Hill-Rom's Smith noted, "One of the primary jobs of the bed of tomorrow is to get that patient out of bed. The earlier you get patients mobile, the shorter their stay is going to be overall. And length of stay is one of the primary drivers of not only profitability for a hospital but also patient satisfaction."

To help get patients mobile, Hill-Rom's TotalCare bed is able to achieve a "full chair position." We can achieve a full seated upright position, at the push of a button, enabling one caregiver to do it in the place of two," said Barr. "If a caregiver wants to exit the patient from the foot end of the bed, they can bring that foot end down to the floor, and help the patient stand upright."

KCI's BariMaxx II bed helps facilities to minimize risk when caring for bariatric patients. Featuring 1,000 lb. capacity, in-bed scales, a pressure-relieving surface option with turn assist capabilities, and power drive, the bed expands and retracts for patient comfort as well as to allow the bed to fit through standard doorways.

Capital gains

The more your beds can do to help drive best practices and minimize risk of patients getting hurt, acquiring an infection or worse, the more your investment will pay off. "If you cannot prove and document that you have done everything in your power to drive home evidence-based practices, you're not going to get reimbursed for possible adverse events that could occur to the patient, like pneumonia or pressure ulcers," said Rohrer.

Though quality of care and patient safety should always be at the forefront, nursing efficiency should also not be discounted. "The first level of efficiency is that real-time connection of the patient to the caregiver," said McMullin of the capabilities that are enabled through Hill-Rom's NaviCare platform.

"The second way this adds a lot of value from an efficiency perspective is you're automating documentation. This is a huge issue if you talk to nurses. They look at all of this documentation as extra work. We are striving very hard not to create more documentation but to find ways to make the documentation a byproduct of the work, rather the work itself."

He added, "That stream of data is then going into the documentation and can automatically be sent into the EMR. It can be used via our reporting and analytics

capability to ensure that people are actually complying to the protocols and then give you the data to make sure it's driving the outcomes that you want. We're synchronizing the right information at the right time for the patient so you can do something actionable. You can actually now look at the data and say did this set of patients get the right therapies for the right duration. And now, by the way, are we seeing results?"

Dziedziula said he envisions that tomorrow's bed will integrate even more ancillary features into the bed itself, for example, monitoring equipment and patient lifts. "I see a lot of these features incorporated into the bed going forward so that the nurse doesn't have to use ancillary equipment, it's already there for them."

Patient flow technology



StatCom Bed Management dashboard

Bed capacity management is quickly becoming a hot button in new technology developments as hospitals struggle with capacity restraints. While the majority of facilities continue to rely on manual methods to manage the flow of patients in and out of beds, there is a better way.

"The problem is lack of flow – and that results in delays and waits and bottlenecks," said Ben Sawyer, executive vice president of market

and client development for [StatCom](#), Alpharetta, GA. He recalled a recent symposium during which Institute for Healthcare Improvement (IHI) president Donald Berwick grabbed the audience's attention by saying, "flow is the primary common cause for what ails the healthcare system."

Sawyer described how rising populations in the ten years between 1993 and 2003 led to a 13 percent increase in hospital admissions along with a 26 percent rise in emergency department visits, while at the same time, 703 hospitals closed "largely because of the managed care era in the 1990s." In the end, 198,000 hospital beds were lost.¹

"By 2001, 60 percent of hospitals were operating at or over capacity," said Sawyer. "Today most metro hospitals and many rural hospitals are at or over capacity. So flow has become a societal issue largely because of those statistics."

Christopher Anderson, director of marketing for Tele-Tracking Technologies Inc., Pittsburgh, PA, noted, "The tremendous increase in baby-boomers reaching an age where they require more care, population increases in certain geographies (i.e. Southeast and Southwest), and general inefficiencies of many hospitals operations, have created the current state of demand for in-patient treatment that is outstripping the current perceived bed capacity. This is manifest in hospitals going on emergency department diversions, long wait times for in-patient admissions and delays getting a bed when coming out of surgery."

"Having patients not being able to efficiently get through an ED, having patients sitting on stretchers in hallways is just dangerous and it diminishes the level of care that could be delivered and it results in needless pain and suffering and harm," said McMullin.

System-wide solutions

While the problem may present in the emergency department, that's only the tip of the iceberg when it comes to poor patient flow management. Said Sawyer, "Emergency departments are an early indicator. Ambulance diversions in which overcrowded EDs close their doors to incoming ambulances, has become a common, even daily problem in many cities."

According to Sawyer, the StatCom patient flow logistics and tracking application "brings process optimization and logistical management to healthcare in a fashion similar to what FedEx and UPS did in the package express industry."

He explained, "When a patient presents to a hospital that uses the StatCom application, a patient itinerary is set up that identifies the expected date of discharge, based upon the patient's presenting condition. As an example, if you came to the hospital with community acquired pneumonia (CAP), there is formulated data that we have in our software system that will estimate your date of discharge based upon that presenting condition. Then ideal room placement is facilitated using advanced bed management functionality. Room cleaning and transportation responsibilities are then prioritized and coordinated. When a doctor orders tests and procedures for the patient, StatCom facilitates effective cross-departmental hand-offs so that patient throughput and flow are optimized."

"Efficient cross-vertical handoffs are the key to any good patient flow effort," Sawyer emphasized.

"A problem in the ED could quickly spread to a problem in the med-surg area if you don't have the beds," McMullin added. "And what happens then, think about where revenue comes in – the high dollar customers are paying for elective surgeries and they get canceled as the ED gets backed up and people have to

come in for emergency surgery. So having that real-time, system-wide view you can start to manage this." Hill-Rom's NaviCare Patient Flow solution includes a Bed Manager module, along with transport, environmental services, OR and ED modules.

"The Joint Commission concerns itself with the qualitative aspects of flow," said Anderson. "It is precisely because flow affects the quality of care that JCAHO has inserted itself into the assessment process. After an initial focus of managing flow in the Emergency Department, they expanded its focus organization-wide realizing that flow is a systemic concern and needs to be addressed holistically."

Anderson suggested that increasing capacity is not the answer. "Many are addressing the problem by adding new capacity—either beds, ED treatment areas or both. This may be appropriate, but it is costly and a longer term solution. In all cases, however, the first step toward solution should be to examine existing work flow processes affecting patient flow, understanding them and improving them to assure optimal use of existing ED treatment areas, in patient beds and staff. To build without doing so is not just costly and not immediately responsive, it is also misguided in that it pushes the underlying problem of poor flow to another day.

"By improving patient throughput, hospitals can maximize their capacity and increase their annual patient admissions without adding additional capacity/cost," he added.

[Tele-Tracking Technologies](#) offers a fully integrated suite of capacity management solutions including a Bed Management Suite and an electronic bedboard. "With all of this real-time information, this means that patient placement/bed control department can actually plan ahead to re-occupy a room even before it is available versus reacting to it once a patient has left," Anderson said.

The Wi-Fi based active RFID and asset tracking solution from [AeroScout](#) is being used by hospitals to track beds, most notably specialty beds that facilities often only have a handful of, or that they rent as needed and share between floors and units of the hospital. Noted Josh Slobin, director of marketing, AeroScout (Redwood City, CA), "The reason for tracking beds, and in particular specialty beds, is that they're mobile, they're shared between units, and there are few of them. They're unique, and when a patient needs a particular bed that's the only bed that will do." He added, "As the technology on the beds themselves becomes more and more valuable these beds are a larger piece of the asset value that resides in the hospital. They're also becoming more and more mobile. Making sure that you have control of those assets and that they're being utilized in the way that you want them to be utilized is something that's becoming very important to hospitals."

"In a hospital, patient flow is everyone's business," concluded Anderson. "It involves housekeeping, patient transport, pharmacy, radiology, lab, nursing, etc. The more connected and 'transparent' a hospital is, the more that information can be shared and utilized when needed, by whomever, whenever, when appropriate." [HPN](#)

Reference:

1. Institute of Medicine, "The Future of Emergency Care", June 2006.

Safe restraint

Sometimes it's necessary to use restraint on patients in order to keep them from harming themselves or others. Mental health units and emergency departments are two areas where restraining methods are often needed.

"Violence in the emergency rooms is soaring," said Stacy Schultz, Humane Restraint, (Waunakee, WI). "Some emergency rooms when they go to remodel, they'll actually have a seclusion room off their ED."



*Humane Restraint Duramax bed
shown with leather restraints*

The Duramax bed from [Humane Restraint](#) is specially designed to accommodate a variety of locking and non-locking restraints and can be bolted down to the floor or transported on casters. Made of a heavy-duty fiberglass, the Duramax bed can be equipped with a mattress pad for patient comfort.

Schultz noted that when using restraints, it's important to start with the most passive method possible and gradually add what is needed to safely control the patient. "The rule of thumb for that is the least restrictive restraint should always be used. If you have someone who's mildly aggressive you might just want to use a nylon or web restraint. But if you have someone who's really agitated and aggressive and you're concerned that this person is so violent and strong, you would want to use a heavy duty restraint like one of our locking restraints."



