

TRANSFORM

for better health outcomes

Digital Hospital decision delivers in Norway

Some changes you can't help but notice when you step inside the newly constructed Akershus University Hospital (AHUS) in Oslo, one of two Digital Hospitals now up and running in Norway.

The automated guided vehicles (pictured on last page)—small robots that travel the elevators and corridors using a virtual 'track' to deliver supplies—and the multimedia patient terminals—small bedside computers that provide access to radio and television programming, the Internet and e-mail, all while doubling as a telephone—are hard to miss.

Other transformations aren't so readily apparent. Who would guess that every physician and nurse now carries a wireless IP phone and smart card in addition to their stethoscope, or that a fully digital surveillance system is enabling fewer employees to provide a higher level of security?

Yet, seen and unseen, the changes are there, and underlying each one is a Digital Hospital infrastructure based on a highly integrated data and communications environment supplied by Telenor, HP and a consortium of partner vendors.

"We embarked on three major transformations simultaneously," notes Stein Vaaler (pictured on right), AHUS vice-deputy managing director and director of the Medical Division. "We changed from an old way of organizing hospitals to a more modern one, we moved into a new, state-of-the-art building complex, and we began to use a lot of new technical devices as part of our Digital Hospital strategy."

While it's difficult to isolate the effectiveness of one over another, all three changes are generating improvements as AHUS continues on its Digital Hospital path. In the





1. AHUS's Borthne (left) and Vaaler (right) display the fully automated pharmacy system, a new approach to unit dose packaging that reduces error.

2. Medication management is fully automated at AHUS, from storage through to dispensing.

3. St. Olavs' Sunde sends soiled linen for laundering in the newly automated environment.

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AHUS's Kjell Borthne (left) and Stein Vaaler (right).

two years since moving into its new facility in 2008, AHUS has shortened its average length of stay by 20 percent, reduced the number of adverse events by 50 percent, shortened report turnaround time, and substantially increased overall staff productivity.

Integrated infrastructure improves communication

Perhaps the single most important change, says Vaaler, is the use of wireless smart phones. The integrated ICT infrastructure at AHUS has some 1800 access points for wireless communication. Instead of wearing pagers, clinicians are equipped with IP phones that not only support two-way communication with patients, but also notify them when supplies or medications are delivered.

"Communication between the various levels of staff has increased dramatically," says Vaaler. "We are communicating in a more efficient way that saves time."

Other technologies facilitated by the digital infrastructure include wireless handheld PCs to access hospital information systems, patient records and other

applications; smart cards to control access to buildings as well as computers; speech recognition to reduce reliance on medical transcriptionists; and, use of automated guided vehicles (AGVs) to improve the entire supply chain of ordering, receiving and transporting goods throughout the hospital. According to AHUS chief medical and information officer Kjell Borthne, the efficiency of the 22 robotic vehicles alone has led to a significant reduction in staffing costs, while the number of full-time positions overall has decreased from 4800 to 4600 since the digital transformation began.

"Many of our personnel are seeing that working in this new hospital is wonderful," says Borthne, noting that with the fully automated ordering system, robots always know where to find things, reducing the frustration associated with misplaced items. "At the same time, there can be stressful moments and the demands on them are set very high so it's a bit of a mixed picture in a sense," he adds.

Joining AHUS in reaping the benefits of a Digital Hospital strategy is St. Olavs Hospital in Trondheim, which moved more than half of its patient care areas into its new facility in 2006 and the remainder in 2010. Over the last few years, St. Olavs has operated with a



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1. St. Olavs' Sunde demonstrates the use of smart cards as secure access points.
2. The use of handheld voice recorders and automated speech recognition speeds the transcription process.
3. A tightly integrated communications network facilitates mobile nursing stations at St. Olavs.

balanced budget, reduced its average length of stay from 5.8 to 4.8 days, decreased turnaround time for discharge reports, and experienced an overall staff productivity gain of six percent per year.

The hospital-wide digital network at St. Olavs is wireless, supports a range of devices including IP-based patient terminals and nurse call systems, and is integrated with all notification and alarm systems. If there's an emergency on the cardiac ward, code blue teams are automatically alerted and elevators arrive at the correct floor. If a cough turns out to be the result of an infectious disease, a special access card can be waved in front of a card reader to automatically deactivate the ventilation system, lock doors, restrict access to certain areas and generate a list of all staff members who may be at risk of exposure.

Benefits outweigh challenges

Similar to AHUS, staff members at St. Olavs are required to carry smart cards at all times in order to gain access to rooms and buildings as well as for secure logon to computer systems. System access is determined by department with user profiles controlled by the salary system to ensure only valid employees are issued cards.

At first, staff complained about the reliance on the access cards and the need to return home if a card was forgotten, leading the hospital to provide loan cards which were jokingly dubbed "forgetfulness cards" or "senility vouchers." Despite the grumblings, however, the organizational gains are numerous, says Fredrik Sunde, St. Olavs deputy director of Human Resources.

"Not only are user sessions preserved when someone steps away from their desk, but we also receive fewer help desk requests related to user name and password," he says. "In addition, we now have the added security that only valid employees will have system access rights, and that access will be limited based on their job description."

Another notable change in the Digital Hospital is that nurses are able to manage their own lab work, creating work orders, printing labels and using a pneumatic tube system to send samples to the lab. "The ease of work on the ward is quite improved," says Sunde. "I haven't met any nurses who would go back to the old way of doing things."



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1. St. Olavs' Fredrik Sunde wirelessly updates his status using his IP phone.
2. AHUS's Borthne and Vaaler alongside an automated guided vehicle.

That said, the Digital Hospital transformations at AHUS and St. Olavs have had their challenges, and they continue to work through them. For example, they've encountered cultural resistance to change, integration issues between existing and new software systems, and in one instance had to delay implementation of an automated drug management system. To overcome these complex hurdles, both organizations rely on ongoing support and open communication from trusted partners like HP as they continue their journey.

Moving forward, both hospitals are hoping to leverage the HP Health Center of Excellence, which plans to relocate at AHUS this fall, as a way to test new technology, provide continual employee education and resolve any "technology wrinkles" they encounter along the way.

"As we continue to introduce new technology, we really need a Digital Hospital test bed like the center," notes Vaaler, adding that AHUS expects to introduce unified communications on electronic whiteboards this fall.



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"We haven't reached all of our goals yet, but our continued improvements related to patient outcomes show that we're on the right track with our Digital Hospital initiative."

For more information on HP Digital Hospital solutions see Healthcare Providers at: www.hp.com/go/healthcare

Norwegian healthcare at a glance

- **Norway** is a constitutional monarchy in Northern Europe
- **The population** of Norway is 4,801,000
- **All public hospitals** are state-owned via four regional health authorities
- **In 2007**, the Norwegian Ministry of Health and Care Services, and the Ministry of Trade and Industry, launched a five-year plan to strengthen innovation in the healthcare sector

This article first appeared in the Winter 2010 Health and Life Sciences Special Edition of HP's "Transforming Your Enterprise" magazine - available for download after registering [here](#).

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