



Redefining workflow with wireless technology

Virginia Commonwealth University Medical Center and IntelliVue Telemetry System

Virginia Commonwealth University Medical Center at a Glance

- A not-for-profit teaching institution with Magnet Status
- Region's only Level 1 Trauma Center.
- 780-bed MCV Hospitals and outpatient clinics, MCV Physicians
- 600-physician-faculty group practice, and the health sciences schools of Virginia Commonwealth University
- New state of the art Critical Care Hospital with:
 - 232 beds
 - 15 level, 367,000 square foot facility
 - ICUs for surgical trauma, neonatal, burn center, cardiac, neuroscience, medical respiratory and oncology patients
 - 250 square foot private patient rooms

Virginia Commonwealth University Medical Center, located in Richmond, VA, is one of the nation's leading academic medical centers offering care in more than 200 medical specialty areas. It is the only hospital in Central Virginia included in U.S. News & World Report's top hospital listings and among about 200 healthcare organizations worldwide that have been awarded Magnet status for nursing excellence in national and international health care.

In October 2008, VCU Medical Center opened a state-of-the-art Critical Care Hospital focused on treating seriously ill and injured patients who require highly specialized care and treatments. The 15-level, 367,000-square-foot facility increases critical care capacity at the medical center with intensive care units for surgical trauma, neonatal, burn center, cardiac, neuroscience, medical respiratory and oncology patients. It incorporates private patient rooms averaging 250 square feet in size, which is large enough to accommodate patients' families and multidisciplinary medical teams.

Nursing workflow processes adapted for new hospital

Nursing staff was engaged during the design and planning stages of the new Critical Care Hospital to better understand how nursing workflow processes would have to be adapted for the new facility. Some of the key workflow challenges included:

- **All patient rooms are private**, making it more difficult for nurses to easily check on patients or locate other care-team members
- **Patient care areas are reconfigured** from a hub-and-spoke model where semi-private patient rooms surround a large nursing station, to a patient care area resembling a football field with private rooms lining both sides of a long hallway. The design has become more linear in nature
- **Patient care areas are significantly larger** compared to the nursing units within the existing facility. This makes it less practical for nurses to make repeated trips to/from the nursing station to access patient information, medications, and supplies
- **Overhead paging use has been restricted** to create a quieter care environment that is more conducive to patient rest and healing. This makes it more challenging for the nursing staff to communicate with patients and other care team members accustomed to the conventional overhead paging system

Nursing staff redefines workflow by embracing wireless technology

Clinicians worked with the IT department to develop a comprehensive wireless strategy, enabling the nursing staff to simplify clinician workflow in the new, reconfigured facility. They identified ways in which wireless communications and mobile devices could be leveraged at the point of care to:

- Enhance patient care
- Increase patient satisfaction
- Streamline communications and collaboration
- Improve patient information access

By understanding workflow and the broader context of the clinical use of wireless solutions, the information technology department could incorporate clinical needs into their overall wireless strategy.

“From an information technology point of view, we were concerned about architecting a system that didn’t have coverage gaps, wireless interference and insufficient client capacity. These issues can all cause dropped data and voice connections which can impede nursing productivity at the point of care. We also wanted to ensure that the technology we deployed enabled nursing care and patient mobility, without putting patient safety at risk,” said Rich Pollack, MS, CTO at VCU Health System. “We are very interested in collaborating with our clinicians as we believe this type of approach yields better outcomes.”

Wireless medical telemetry improved patient mobility

“In the existing medical facility, the medical telemetry unit occupied a dedicated floor, providing specialized care for cardiac patients who required 24x7 heart monitoring. Telemetry patients

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were physically tethered to monitors mounted on poles and their movements were restricted to the room. Monitoring technicians (residing on a different floor) monitored telemetry patients and notified nurses via the overhead paging system if a patient required attention. This inefficient method of communication resulted in unnecessary patient care delays,” said Heather Craven, RN, MS, CMSRN, a Nurse Clinician in the Acute Care Medicine department at VCU Health System.

The IntelliVue™ Smart-hopping 1.4 GHz wireless medical telemetry system from Philips Healthcare deployed within the new hospital has improved mobility for telemetry patients. Philips Smart-hopping 1.4 GHz telemetry access points work with the InnerWireless distributed antenna system (DAS) platform, providing more than 100,000 square feet of coverage which encourages patients to get out of bed, if they are able, and ambulate without being hardwired to a medical monitor. If a patient’s heart rate or cardiac rhythm deviates from set limits, the Philips telemetry system not only alerts at the central station, the IntelliVue Information Center, but it will also generate and send a text-based secondary alert, using Emergin software, to the nurse’s Ascom VoWLAN

handset. In the future, VCU plans to offer mobile telemetry support to additional categories of high-risk patients requiring continuous medical monitoring.

The Emergin alarm management and automated event notification solution from Philips Healthcare, deployed within the new hospital, has not only enhanced patient care but also clinician productivity. Both the Philips IntelliVue Telemetry System and the Philips Emergin software utilize the InnerWireless infrastructure, as does the wireless voice over IP communications system which the hospital deployed.

Converged Wireless Solution utilizing a broadband DAS addresses network integration complexities

The InnerWireless’ Horizon™ Converged Wireless solution was selected by VCU to deliver enterprise-class wireless support for all mission- and life-critical wireless services and applications including Wi-Fi data and voice, cellular/PCS, medical telemetry, emergency response and paging. “InnerWireless’ professional services organization helped us plan and deploy the network. They conducted a comprehensive assessment of the new hospital, enabling us to better understand how RF signals propagated room-to-room, floor-to-floor and across

the entire building. The wireless platform was engineered and deployed to address the unique requirements for each wireless service, device and application. In addition, InnerWireless' unique WLAN topology enabled us to map client traffic to different Wi-Fi channels to minimize data contention and optimize network throughput and performance," said Greg Johnson, Director of IT at VCU Health System.

Wireless connectivity for better patient care

The clinicians at VCU have discovered that the new found mobility enabled for patients and clinicians has provided significant benefits. By using Philips IntelliVue Smart-hopping telemetry which uses the wireless medical telemetry service (WMTS) spectrum, concern over interference is minimized, which is critical to ensure uninterrupted delivery of waveform data. Philips patented Smart-hopping technology is key to this capability. Now, patients are untethered and are able to get up and move around, which can help improve recovery times. Caregivers can be connected to patients anywhere in the hospital through a variety of communications mechanisms, whether their VoIP phone or their Emergin alert management system. This empowers clinicians to provide faster response towards patient care, eventually contributing to improved patient care.



Key features of Philips IntelliVue Telemetry System

- Lightweight, compact water-resistant patient worn device
 - Contour design helps to support patient comfort
 - Long battery life using 2 AA batteries
 - Shower Shield eliminates dirt collection
 - Plastic case supports a wide variety of disinfecting agents.
- Lead diagram to aid placement compliance
- ECG monitoring supports varied patient acuity
 - 3-, 5- (single V), and 6-wire (dual V)
 - EASI 12-lead (using 5-wire lead set)
 - Optionally add Philips motion-tolerant SpO₂ for spot-check or continuous pulse oximetry
 - Philips, Nellcor, or Masimo SpO₂ sensor support
- Non-recessed lead set enables easy patient setup
- Out-of-range audio indicator alerts patient when ambulating too far from monitored area.
- Battery status and leads-off indicators
- Auto-resume monitoring enables monitoring to automatically continue when patient returns to monitored area
- Alarm suspend can be initiated from device
- Low-power standby mode conserves power when patient is not connected to the device
- Colored lead set is Bedside compatible for fast switching between telemetry and IntelliVue bedside monitors
- Device Find and Device Location help reduce the number of lost transceivers
- Wired (TAAP) and Wireless (WTAAP) telemetry connectivity options provide additional parameters and display on patient's bedside monitor
- Telemetry network utilizes Philips Smart-hopping wireless technology for optimum reliability and performance

Key features of Philips Emergin Solution

- Acquires, analyzes and presents patient information from medical devices and other information systems where and when clinicians need it
- Event notification to the right caregiver at the right time, alert tracking & quality reports, auto escalation, improved staff response time, optimized workflow

Key features of InnerWireless Horizon Distributed Antenna System

- **Guaranteed coverage and signal strength** to ensure reliable wireless device connectivity throughout the new hospital
- **Sufficient network bandwidth and capacity** to support the deployment of high-quality wireless data and voice communications today and accommodate new clients and wireless services in the future
- **Flexible network architecture** to successfully accommodate (with minimal modification) third-party wireless applications and devices, creating a seamless wireless environment

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Printed in The Netherlands
4522 962 51851 * NOV 2009

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