

OF VITAL IMPORTANCE

Transforming the Nursing Work Environment



3:10 P.M.

Susan, an RN on the med/surg floor of a midwestern hospital, has just begun her shift. She's been off for a few days; tonight she'll have nine patients, one-third of whom were admitted in the last 24 hours—and there are no nursing aides to assist her tonight. Susan's patient load has grown steadily throughout the past few years, and this has been a source of some concern to her. Still, the hospital seems to be heading in the right direction in other ways. For example, it has been using electronic medical records (EMR) for over two years now.

First on Susan's to-do list: check in on George S., a 68-year-old diabetic who was admitted to the floor just two hours ago following hip-replacement surgery.

3:35 P.M.

George appears stable, though he is complaining of thirst. Susan gives him a sip of water, then proceeds to check his IV and take his vitals: blood pressure (120/90), heart rate (95 bpm), SpO₂ (96%) and temperature (98.7 °F). They all seem reasonable, but his heart rate's a little high. She makes a mental note to "keep an eye on him." Susan scribbles the vitals data onto a scrap of paper; she'll enter the data into the computer later.

5:05 P.M.

Susan is delivering meds when she's interrupted by George's wife—frantic because she's been unable to wake George. Susan hurries down the hall to find George unresponsive; he looks pale—and grabbing his hand, she sees there is a lack of perfusion to his fingers. She suspects dehydration or hypovolemic shock due to post-op hemorrhage. Susan pages the attending, who orders an ECG. The attending is busy and a second-year resident arrives just as the first ECG traces scroll across the monitor's display. George is tachycardic.

The attending immediately orders George moved to the ICU for monitoring and treatment. And there's a very real chance he'll be back in the OR shortly.

6:36 P.M.

While in the ICU, George is continuing to receive fluids intravenously. Fortunately, he has also responded to the cardiac meds—his heart rate has dropped and his condition has stabilized. George will be okay. But back down on the med/surg floor, Susan is visibly shaken and confounded—what went so terribly wrong?





Vitals Are Vital

What Susan didn't know when she recorded George's vitals at 3:35 P.M. is that George is severely hypertensive; as such, his blood pressure of 120/90—a "normal" reading for most of us—was dangerously low, and an indicator of a critical change in his condition. If Susan had had access to his most recent vitals at the bedside, she would have seen that his blood pressure at admission to the floor was an elevated 170/80. Armed with that information, Susan would have immediately called a consult with the attending for probable causes.

In this instance, George was suffering from severe post-operative dehydration; the extensive time delay in treatment resulted in lowered blood pressure and tachycardia—and a potentially catastrophic outcome.

According to Hal Wasserman, M.D., eICU medical director at Columbia Presbyterian Hospital, vitals can be an important leading indicator of health. "Clinical deterioration caused by serious infection, internal bleeding or respiratory failure is often preceded by subtle alterations in blood pressure, heart rate, and oxygenation. When such basic indicators drift toward the abnormal, they may be signaling a dangerous new direction in a patient's clinical course."

The unfortunate reality is that near misses (and far worse) due to inaccurate or missing vitals data occur far too frequently in the clinical environment. And ironically enough, the overriding reasons are often preventable. Consider the following:

- Today, nurses are handling more and sicker patients. In fact, patient workloads are a full 25% greater than just 10 years ago.
- At the same time, nurses are spending more and more of their workday documenting clinical data, due to larger patient workloads and more stringent regulatory requirements (e.g., JCAHO). Some estimates show nurses spend 25% of their time collecting data or transcribing it.

The dire consequences—a decrease in data integrity (with nurses relying on scraps of paper and their memory), coupled with an increase in data latency (the time lag from when the data is captured to when it is available in the medical record)—both contribute to poorer patient outcomes.

And if you think the introduction of point-of-care computing and electronic medical records (EMR) are the answer to the nursing documentation dilemma—think again. Because the vitals often are not integrated with the EMR, the piecemeal introduction of technology in the clinical environment can have the unintended consequence of expanding the nursing staff's workload. On Susan's floor, vitals data are first written on paper, then later manually transcribed to the EMR—producing a "double documentation" scenario and all the concomitant opportunities for transcription, patient identification and clinical errors due to data latency.

At a Minneapolis hospital, Clinical Engineer Mike P. shared his thoughts on the data capture and documentation dilemma: "We need a point-of-care workstation that provides the total solution—one that incorporates vitals to make patients safer, improves workflow, and integrates with our [electronic medical record] system."

And so it was with a clear understanding of the critical and pervasive need for a better way to capture and record clinical data at the bedside that Welch Allyn embarked on a groundbreaking project. The objective: to identify and quantify the improvement in patient care in various hospital settings through automated vitals capture and integrated data access.

In collaboration with clinicians at two mid-sized hospitals, a team of engineers from Welch Allyn took on the daunting task of identifying, measuring and fully characterizing the complexities of the nursing workflow in various patient care settings. Then, armed with this systems view of the nursing environment, the team set out to marry technology, process modifications and a truly interdisciplinary mindset to produce an automated point-of-care data capture technology that fully integrates with hospital information systems (HIS).





According to Doug Linquest, group vice president of Monitoring & Defibrillation, “While much attention is being paid to automated vitals capture and point-of-care computing solutions—particularly for the OR and Intensive Care units—Welch Allyn is unique in its commitment to understanding and optimizing the entire nursing workflow in the medical/surgical clinical environment. We can say with confidence that few if any of the other major medical device manufacturers are as keenly focused on improving the workflow for this critical segment—where 80% of the hospital patient care is delivered.”

Through its two pilot projects—each spanning many months—the Welch Allyn team demonstrated how the judicious use of technology can significantly reduce errors (including patient identification, transcription and data latency errors) while improving efficiencies (in vitals data capture and transcription). The net effect: dramatically improved patient outcomes and a lightened workload for overburdened nurses.

Welch Allyn’s automated point-of-care data capture technology is embodied in Welch Allyn Connex: a state-of-the-art solution that seamlessly links vitals devices with software to completely document patient care at the bedside.

Welch Allyn Connex uses barcode technology for clinician and patient identification, and works with various vitals devices—often allowing hospitals to use their existing monitors. And Welch Allyn Connex can operate as a stand-alone database or can link to the hospital electronic medical record system.

To Err Is Human

The Welch Allyn team recognized that capturing a “snapshot” of the hospitals’ current vitals capture processes was a critical first step in optimizing the nursing workflow at the point of care. And by quantifying errors and latency problems, the team would have an unequivocal baseline from which to measure the improvements realized through Welch Allyn Connex.

For example, at one hospital the Welch Allyn team shadowed clinicians during their vitals capture and documentation

rounds, and studied 54 documentation events covering several departments and caregivers. In total, they witnessed 26 errors—implying that 48.1% of the actions had an error. In this study, all the errors were eventually corrected, but many in the real world are overlooked.

The types of errors (such as misidentifying patients and typing data into the wrong fields on the medical record) give a useful feel for the deficiencies of the vitals documentation processes typically used in most hospitals.

The Welch Allyn team also measured the time it took vitals data to make it from the measurement site to the electronic chart. In the study, 22% of vitals readings took more than 51 minutes to reach the official record, where all caregivers have access. And a sizable portion (10%) took longer than three hours. The “Susan Scenario” demonstrated just one of the many reasons why immediate access to the patient’s vitals data record is of paramount importance.

Said one nurse in the study (echoing the feelings of many), “I can recall many times taking vitals and scribbling them on a paper towel. They then went into my pocket where they often stayed until I got home. The reality was that many of these ‘pocket’ vital signs never got documented into the medical record.”

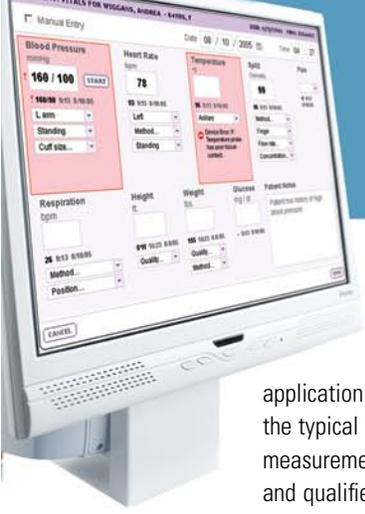
A Vital Solution

The nature of the data accuracy errors and latency problems revealed in the direct observation and time-trial studies—almost all of which were the result of human error and time limitations—convinced the Welch Allyn team to tackle the ambitious task of streamlining the complete bedside documentation process.

And Welch Allyn Connex does just that. Here’s an example of how Welch Allyn Connex transforms the entire vitals documentation workflow:

Vitals are often captured on standard rounds, several times per day (more often as patient acuity increases). Using the Welch Allyn Connex system, a nurse or aide captures vitals much as they typically do. But instead of having to document the readings manually, users can capture the complete patient data at the bedside through a focused software





application running on a wireless computer. In addition to the typical automated vitals data, users can capture manual measurements (such as pain or respiration rate) and modifiers and qualifiers of the results. These modifiers are important; for example, pulse oximetry readings will vary significantly—if the patient is on or off oxygen therapy—and will guide different types of care based on the complete information—both data and modifiers.

Additionally, since Welch Allyn Connex is wirelessly connected to a central database, previous readings and alert levels for specific patients are available at the time of measurement—immediately highlighting abnormal readings.

Through an easy-to-use interface, nurses can document their care as quickly as they capture it. And once they press *SAVE* the data is immediately sent to a networked database (e.g., an electronic medical record) for all to see.

Since information is no longer limited to those who have access to the single paper patient chart, nurses and physicians can always view the most complete and up-to-date data.

Through the automation of the vitals capture process and integration with the EMR, Welch Allyn Connex virtually eliminates transcription errors.

And the good news doesn't stop there.

The Welch Allyn team measured time saved through automatic patient identification and by eliminating transcription. The team studied 219 vitals capture events before and after Welch Allyn Connex implementation.

The study results revealed that Welch Allyn Connex saves 0.92 minutes for every vitals capture reading ($p < 0.0001$) through reduced documentation time. For a typical floor, these savings translate to nearly two hours per day—a \$19,376 savings per year in nursing time for a typical 30-bed floor. This can add up to over \$150,000 per year for a 300-bed hospital.

Nurses aren't trained as typists, and it's safe to say that documentation is among the least favorite parts of any nurse's workday. With Welch Allyn Connex, nurses can focus more on taking care of their patients, improving both patient outcomes and nursing staff morale.

Welch Allyn Connex provides other time savings as well, including reducing time spent tracking down data and transferring data between people, and the cost of repeated vitals capture events. Though not measured in these studies, these are not insignificant parts of the typical nursing day.

Says RN Sharon S., "[The system] automatically puts the vitals into [the EMR]—placing my patients' vital signs in a central location. The handheld we were using prior was very difficult to use. [The Welch Allyn system] is much simpler to use. Barcoding decreases errors in patient ID, and transcription errors have decreased."

The Susan Scenario Revisited with Welch Allyn Connex

3:35 PM

Susan begins her rounds by checking in on George S. First step—scan George's patient wristband, and George's vital record appears. Susan notices that George is hypertensive; his BP reading at 1:03 P.M. was 170/80. She captures current vitals with the attached device. An alert signals a precipitous drop in BP to 120/90.

Susan calls for a consult with the attending physician, who reviews the patient's data from another floor. Post-surgical dehydration is suspected; at the attending's request, Susan adjusts his IV flow rate for treatment for dehydration.

4:45 PM

George's BP has returned to normal. Patient is resting comfortably.

Patient crisis averted via Welch Allyn Connex.

Not exactly the spellbinding stuff of an "ER" episode, but in the real world, it's the perfect ending.

http://cpmnet.columbia.edu/news/in-vivo/Vol2_Iss07_apr09_03/patient_care.html

Due to the sensitive nature of the following error findings, the trial hospitals will not be disclosed.

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