

Surveillance Monitoring of General-Care Patients

An Emerging Standard of Care

PART TWO

NURSES, PHYSICIANS AND COST OF CARE

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Averting Failure to Rescue – Importance of Nursing Staff

As emphasized in an Institute of Medicine (IOM) report, nurses play a pivotal role in preventing and identifying complications and, therefore, are critically involved in identifying and rescuing patients from death following complications.¹ Failure to rescue (FTR) occurs when complications are not recognized and/or interventions are not activated. Surveillance—the purposeful and ongoing acquisition, interpretation, and synthesis of patient data for clinical decision-making²—is a nursing intervention used to help prevent FTR.

Successfully responding to rescue situations and preventing adverse events requires early detection and strong nursing skills, which are contingent upon continuous, immediate access to vital sign data.³ Despite vigilant nursing care, missing the early warning signs of patient deterioration continues to occur. Having a multi-parameter monitoring system that can aid nursing personnel is critical to improving surveillance and ensuring patient safety.

Traditionally, general-care areas have not been equipped with technology-based surveillance

systems. Overuse of cardiac telemetry monitoring is rampant in U.S. hospitals—even though studies have shown that up to 60% of telemetry patients do not meet the criteria developed by the American Heart Association.⁴ Physicians have historically overprescribed telemetry in a vain attempt to provide an incremental level of care for at-risk patients, using resources that have not been shown to improve outcomes for most patients.

Nursing staff recently surveyed at three different facilities⁵ indicated that in their opinion a significant percentage of patients on telemetry were not at cardiac risk. One registered nurse thought that “almost all patients” were receiving telemetry, simply because it was readily available in every room. Telemetry can be expensive, adding approximately \$80 per day to the cost of care for an average medical/surgical patient. In some hospitals, overprescribing combined with a lack of staffed telemetry beds creates real bottlenecks and contributes to throughput problems.

A new type of patient-worn, multi-parameter, patient monitoring system that provides continuous surveillance for general-care patients provides a more cost-effective alternative. In this article we present evidence that supports nurses’ key role in

identifying early signs of patient deterioration and triggering rapid response by other clinicians. The importance of nursing leadership and the impact of general-care patient monitoring on physicians and the cost of care are also discussed.

Nursing and the Afferent Limb

Nurses play a significant role in all aspects of rapid response systems (RRS), but most notably in detecting patients at risk and obtaining help. Nurses’ effectiveness in the “afferent limb” (monitoring patients, detecting deterioration, identifying risk and triggering a team response) has a direct correlation to patient outcomes.⁶ In one study, increasing nurses’ performance of surveillance functions to more than 12 times per day reduced FTR events by 50%.⁷ In one study, 78% of all clinical events were detected during surveillance interactions by the nurse, underscoring the important contribution of surveillance in recognizing deterioration.⁸

According to recent research, the capture and evaluation of vital sign data in medical-surgical areas is currently inadequate. Studies have documented incomplete observation sets, lack of knowledge of the meaning of abnormal values, and failure

to call for assistance.⁹ Failure to synthesize information and make decisions has been found to account for 57% of FTR events. When death was averted, 58% of patients suffered long-term disability, increasing the burden on the healthcare system.⁶

Effective nurse intervention to help prevent adverse events and FTR requires the following:

- Adequate frequency of vital sign observations;
- Development of evidence-based assessment protocols;
- Collaboration with physicians to determine the parameters for normal and abnormal vital signs;
- Participation in the management of vital sign alarm setting and nursing response;
- Identification of parameters for changing alarm settings based on individual patient and/or population data;
- Identification of systems of communication across all members of the team: physicians, rapid response teams, and other disciplines necessary for effective intervention; and
- Development of programs to educate nurses on the importance of the afferent limb in improving clinical, operational, and financial outcomes.

Nursing and the Efferent Limb

Engagement in a rapid response system enables nurses to exert independent judgment, bypassing the traditional hospital hierarchy in order to obtain help. A successful “efferent limb” (responding to calls for assistance) is highly contingent on a successful afferent limb. Nurses must be able to recognize patient deterioration, know the protocols for escalation, exercise evidence-based clinical judgment, and have confidence in using this expertise when they call other clinicians for help.

Reporting physiological deterioration is the weakest link in the chain for many reasons, including poor understanding of risk, cultural boundaries, and hierarchical thinking that prevents communication.² One reason for general-care nurses’ lack of confidence in reaching out to physicians or intensive care nurses may be the lack of access to patient data such as trends in vital sign values over a period of time.⁶ Frequently nurses have called for help based on only two data points (a normal vital sign followed with a significantly abnormal vital sign captured hours later), with no way of seeing whether the abnormal value is an isolated incident or part of a trend.

Continuous, multi-parameter wireless vital sign capture provides the information nurses need to detect early signs of deterioration and bring about successful intervention. Now a new system launched in 2013 offers a cost-effective alternative to telemetry for providing the information nurses need from continuous surveillance.

The ViSi Mobile® Patient Monitoring System

The ViSi Mobile® Patient Monitoring System from Sotera Wireless is an innovative platform for comprehensive physiological monitoring. It is designed with the patient’s mobility and comfort in mind and to meet the goal of keeping clinicians connected with their patients anywhere, anytime. Worn on the body, it allows freedom of movement and accurate, continuous monitoring of all vital signs, including beat-to-beat, noninvasive blood pressure in a majority of patients.^a Unlike traditional monitoring systems which require bulky expensive monitors fixed to specific bed locations and are tethered to patients by wires, the ViSi Mobile system is worn on the wrist and communicates wirelessly for full integration with the hospital’s electronic

health record (EHR), using the hospital's existing Wi-Fi network.

ViSi Mobile is the only Food and Drug Administration (FDA)-cleared monitor that permits continuous monitoring of heart rate (HR), pulse rate, respiratory rate (RR), oxygen saturation (SpO₂), skin temperature, and noninvasive cuffless blood pressure in a small device that can be worn by the patient. Blood pressure is measured using an FDA-cleared pulse arrival technique and does not require the ongoing use of a brachial pressure cuff. Vital signs data can be easily interfaced to the patient's EHR, thus avoiding time-consuming, error-prone manual entry. The nurse validates and documents the vital sign values in the EHR at intervals consistent with hospital policy. The vital sign data in the EHR is available whenever and wherever needed, and can be viewed at the nurse's station, via a central monitor, and on remote viewing devices. The flexible platform has been engineered to accommodate new sensors, new physiological measurements, and additional future functionality.

1. The platform is wearable, comfortable, and because the oximetry sensor is placed at the base of the finger, it allows full use of fingers, unlike traditional

oximetry monitoring. ViSi Mobile's ability to perform continuous noninvasive blood pressure without a cuff minimizes the need to arouse patients at night due to brachial cuff inflation.

2. Patients feel safer, which can help improve patient satisfaction scores on the Hospital Consumer Assessment of Hospital and Provider Services (HCAHPS). Patients and families are also more satisfied, knowing that monitoring is taking place even when a nurse is not in the room.

3. With EHR integration, ViSi Mobile provides an optimal nursing and physician experience by providing timely, accurate data. The raw vital signs data can be leveraged for advanced predictive analytics. Trend analysis coupled with activity information from the accelerometers is one example. Nurses experience less stress, knowing that no patient is left unmonitored. ViSi Mobile also reduces practice variation related to vital sign management and transcription errors that can occur during manual entry of vital sign data into the EHR.

High-fidelity data

Vital sign data are sent wirelessly to the EHR. Following review and documentation by the nurse, they can be integrated

with other data such as level of consciousness, medications, and laboratory results. Clinicians can easily access these data to gain a comprehensive, up-to-date view of the complete patient status. Positive patient outcomes have been strongly linked to access to integrated EHR data combined with clinical decision support.

ViSi Mobile vital sign data are stored independently of protected health information. The vital sign data can be aggregated 'in the cloud,' analyzed, and used as an invaluable tool to help customize alarm settings for a hospital, a unit, or an individual patient (see Part 3). The data are also available for ongoing research and development.

Monitoring and Quality Improvement Efforts

The monitoring data also serve as the foundation for continuous quality improvement (CQI) efforts. Data on specific events can be used to assess clinical practices and operational outcomes of care. Overall outcome data can be analyzed to identify opportunities to improve practices and protocols with regard to nursing intervention in deteriorating patient conditions. Potential areas for analysis include:

- Care escalation and outcomes

- (clinical, operational, financial)
- Rescue events and outcomes
 - Transfers to ICU and average LOS
 - Impact of changes in nursing protocols for early intervention

Vital sign measurements can be correlated with other data (level of consciousness, etc.) for trend analysis or integration into EHR-based Early Warning Scores (EWS). Detecting early signs of patient deterioration plays an important role in improved clinical, operational and financial performance. Data analysis can help organizations identify accurate markers of deterioration, so that clinicians can be notified proactively within the context of normal care delivery.

Nursing Governance and Leadership

The importance of nursing governance and leadership cannot be overstated. Research shows that when there is a response to abnormal vital signs or patient deterioration, the responsible staff often have inadequate skills, knowledge and experience.¹⁰ Nurse leadership is essential to ensure that the appropriate resources, evidence-based protocols, equipment and education are available to help medical/surgical nurses overcome any reluctance to act upon abnormal

vital signs. Data from continuous surveillance monitoring can be used to help document the need for additional resources and programs and to measure the impact of improvement initiatives.

Medical Staff

Continuous, multi-parameter, surveillance monitoring can improve physician satisfaction in several ways: satisfaction that their patients have better outcomes due to continuous monitoring; satisfaction that vital sign data are recorded accurately and in a timely manner within the EHR; and confidence transferring patients from higher to lower levels of care (potentially bypassing telemetry) with the understanding that their patients are being monitored closely.

Physicians will also need to make adjustments. Patients often have multiple co-morbid conditions, some of which may not be immediately apparent and, in the absence of continuous monitoring, may remain undiagnosed. As they become apparent, the medical staff will need to customize monitoring within the context of the individual patient's acute illness, in order to gain the most relevant information and avoid unnecessary alerts. For example, transient hypoxemia is common but often

non-actionable. Although no response is required, being alerted to this condition may cause concern among physicians previously unaware of its presence. For another example, heart rate, oxygen saturation, and blood pressure can show much more dynamic diurnal variability than most clinicians realize, requiring no specific response.

In light of such diversity, the Consensus Conference on the Afferent Limb recommends that each patient have an individual monitoring plan that includes a description of the parameters to be measured, assessment frequency, and the values that require some locality-specific, predefined action. The plan also should take into account specific patient factors such as severity of illness, co-morbidities, age, and therapies being delivered.⁶ Developing such a plan will require input from both physician and nurse.

Setting appropriate parameters to identify patient deterioration is essential. Most standing orders for notifying physicians are based on physiological thresholds developed for the ICU population, a group of patients with distinctly abnormal physiology and needs. Adoption of those same thresholds for the general-care population may be inappropriate and at a mini-

mum would require individual customization. All order sets should also be evaluated for the appropriateness of fixed vital sign thresholds (“Call MD for O₂ <92%”), and any related policies and procedures reviewed and amended, as needed.

Cost Benefits

Hospitals that have placed patients in the ICU simply to provide a higher level of surveillance can also benefit from a multi-parameter, patient-worn monitoring system. These patients who do not require intensive nursing support can now be cared for in lower-cost of care settings and still be continuously monitored. As a result, patients may be transferred out of the ICU earlier than previously expected. This also will be true for the ED, if its ability to efficiently admit patients has been compromised by an overreliance on disposition to telemetry beds. The ability to admit these patients to a general-care unit that provides continuous, multi-parameter monitoring can decrease wait times in the ED and improve the availability of real-time information about the patient’s condition.

Conclusion

The bedside nurse plays a critical role in the success or failure of most rapid response actions. The ability to acquire, interpret and synthesize physiological data within the context of a patient’s clinical condition requires appropriate training and ongoing support. Strong clinical-decision making skills are required, supplemented by knowledge of escalation protocols within the framework of a rapid response system. Because the ViSi Mobile system provides continuous reporting of a patient’s vital signs with integration into the patient’s EHR, nurses can use this information to detect patient deterioration even in its earliest moments, enabling rapid response. New technology now enables surveillance monitoring of patients in general-care units. Continuous monitoring of patients even outside the ICU can help increase patient and clinician satisfaction, improve clinical, operational and financial performance and, most importantly, save lives.

For further information about ViSi Mobile, please contact Mary Savoy, Clinical Director of Marketing at Mary.Savoy@soterawireless.com

Footnote

a. As of publication, continuous non-invasive blood pressure (cNIBP) technology had not been validated during patient ambulation.

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