Continuous Vital Sign Surveillance Monitoring for General Care Unit Patients

Sandra Emeott, RN, BSN, MBA
Chief Nursing Officer
Northwest Medical Center

Joy Erched, MSN, RN
Director, Advanced Clinical Applications
Northwest Medical Center

PN 6-000563-00 CO#02873 REL 6 NOV 2015

Disclosure

I. The presenters – Sandy Emeott and Joy Erched - have no conflicts of interest to disclose.

II. This program is presented by Sotera Wireless and HealthTrust

Program Objectives

I. Identify the elements of a culture of patient safety
II. Describe surveillance monitoring
III. Explain the aspects of surveillance monitoring parameters in general care unit patients
IV. Discuss nursing interpretation and management of surveillance monitoring data
V. Describe nursing actions for alarm management

I. Culture of Patient Safety

"It may seem a strange principle to enunciate as the very first requirement in a Hospital that it should do the sick no harm."

– Florence Nightingale (1859)

Culture of Patient Safety

* Empowers staff to take responsibility for safety in their work environment
* Open attitudes and willingness to discuss difficult safety issues
* Positive correlation between a culture of patient safety and:
  * Improved staff satisfaction
  * High staff retention
  * Improved patient satisfaction
  * Better patient outcomes

II. Surveillance

"The purposeful and ongoing collection and analysis of information about the patient and the environment for use in promoting and maintaining patient safety."

(From Bulechek, G. M., Butcher, H. K., & Dochterman, J. M. [2008]. Nursing interventions classification [NIC][5th ed.]. St. Louis, MO: Mosby.)

Goals of Surveillance Monitoring

* Early recognition
* Early identification
* Early prevention

* Required Skills
  * Psychomotor
  * Critical Thinking

Psychomotor Skills

* Physical Assessment
  * Inspection
  * Palpation
  * Percussion
  * Auscultation

* Patient Monitoring Devices
  * Temperature
  * Pulse
  * Blood Pressure
  * Respiratory Rate
  * Oxygen Saturation

Critical Thinking Skills

* Examine the Data
  * Review
  * Interpret
  * Analyze
  * Evaluate

* Place in Context of Patient Situation
  * History
  * Current Diagnosis
  * Current Medications
  * Age

Critical Thinking

* Thought
  * Creative thinking
  * Reflective thinking
  * Analytical thinking
* Inquiry
  * Questioning
  * Probing
  * Judging

The important thing is to never stop questioning!

-Albert Einstein

10 Key Questions to Ask

1. What major outcomes do you expect to achieve with the patient?
2. What issues must be managed to achieve these outcomes?
3. What are the circumstances of this particular patient situation?
4. What knowledge and skills are required to care for this patient?
5. How much room is there for error?

10 Key Questions to Ask

6. How much time do I have?
7. What resources can help?
8. Whose perspectives must be considered?
9. What's influencing your thinking?
10. What must be done to monitor, prevent, manage, or eliminate the problems and risks identified in question #2?

(From Alfaro-LeFevre, R. [2013]. *Critical thinking, clinical reasoning, and clinical judgment: A practical approach* [5th ed.]. St. Louis: Elsevier.)

What must be done to monitor, prevent, manage or eliminate identified problems and risks?

* Ongoing surveillance for complications including:
  * Initial assessment
  * Frequent focused reassessment
  * Ongoing monitoring of vital signs to provide real-time data for use in clinical decision support

Continuous surveillance monitoring enhances patient safety!

Time for A Change in Practice

* Old
  * Vital signs usually taken every 4 – 8 hours manually with an electronic vital sign machine
* New
  * Surveillance monitoring measures vital signs continuously
    * More efficient

Early detection of patient deterioration is essential to intervene early or respond rapidly!

III. Surveillance Monitoring

* Provides streaming live patient data
* Measures multiple patient parameters
* Transmits the right data to the right person, in the right format, via the right channel, at the right time
* Is a supplement tool for RRT/RRS
* Focuses on “actionable alarms”
* Can be used in any patient care setting
* Detects complications earlier, resulting in earlier intervention

Surveillance Monitoring

* Provides streaming patient information:
  * Allowing continuous monitoring of the patient from time of admission to discharge
  * Presenting "real-time" vital sign data to a central monitoring station, electronic health record, and/or stand-alone computer or tablet
* Vital sign data can be used to establish a baseline, manage situational conditions and provide trending information

Surveillance Monitoring

* Provides multiple measurement parameters
  * Heart rate
  * Pulse rate
  * Blood Pressure
  * Temperature
  * SpO_2
  * Respiratory Rate
  * Pain level
  * End-tidal CO_2

Surveillance Monitoring

* Integrates vital sign data into the clinical workflow utilizing the "Five Rights of Clinical Decision Support" to improve patient care:
  * The right information
  * To the right person
  * In the right intervention format
  * Through the right channel
  * At the right time in workflow

(Campbell, R. [2013]. The five rights of clinical decision support: CDS tools for meeting meaningful use. Journal of AHIMA 84[10],42-47.)

Surveillance Monitoring

* Focus on actionable alarms
  * Alarm thresholds must be set “wider” with longer delays than in ICU
    * Allows for patient self correction
    * Avoids nuisance alarms and reduces false alarms
    * Provides actionable alarms
  * Ability to customize alarms per patient need
  * Clinical leadership works with physician leaders to modify alarm limits, update order sets to reflect general floor patient population

Surveillance Monitoring

* Is a supplemental tool for the RRT
* Problems leading to failure to rescue
  * Failures in planning
    * Includes assessments, treatments, goals
  * Failure to communicate
    * Patient-to-staff, staff-to-staff, staff-to-physician, etc.
  * Failure to recognize a problem

Continuous surveillance monitoring can facilitate the early identification of a deteriorating patient and activation of the rapid response team.

Surveillance Monitoring

* Can be used in any patient care setting
  * ED
  * Med Surg and General Care Units
  * L&D
  * Outpatient
  * Infusion Center
  * Telemetry and Progressive Care
  * Oncology
  * Pediatrics

Condition Monitoring vs Surveillance Monitoring

- Done with individual patients in ICU
- Patients less mobile than on general floor
- Alarm limits are set tighter because patients are more fragile
- Most ICU monitors trigger 100-300 alarms per patient per day

- Large population monitoring on general floor and med surg units
- Patients more mobile than in ICU
- Alarm limits are set wider so that only actionable alarms are triggered
- Optimized alarm thresholds result in less than 8 alarms per patient per day

Characteristics of An Effective Patient Surveillance Monitoring System

* Accurate
* Evidence-based
* Sensitive
* Specific
* Continuous
* Ability to trend in real time
* Does not hinder patient mobility
* Does not impair patient comfort
* Multimodal (multi-parameter)
* Automated alert/alarm
* Directed alert/alarm to specific clinician
* Cost effective
* Upgradable at low cost
* Low maintenance
* Interfaces to electronic health record
* Failure mode recognition (detects when it is not working)
* Default modes
* Simple display in room and outside it

(From DeVita MA, and others. [2010]. "Identifying the hospitalized patient in crisis." --a consensus conference on the afferent limb of rapid response systems. Resuscitation. 81[4],375-382.)

Clinical Relevance of Routinely Measured Vital Signs in Hospitalized Patients: A Systematic Review

- Searched 15,947 citations
- Clinical relevance of vital signs in detecting adverse events:
  - Mortality
  - Septic shock
  - Circulatory shock
  - Admission to the ICU
  - Bleeding
  - Reoperation
  - Infection

(From Storm-Versloot, M. N. and others. [2014]. Clinical relevance of routinely measured vital signs in hospitalized patients: A systematic review. Journal of Nursing Scholarship, *46[1], 39–49.)*

Impact Of Pulse Oximetry Surveillance On Rescue Events And Intensive Care Unit Transfers

* Surveilled post-op patients with pulse oximetry
* Rescue events decreased from 3.4 to 1.2/1000 patient discharges
* ICU transfers decreased from 5.6 to 2.9/1000 patient days
* Estimated savings of 135 ICU days from that 36-bed unit
* Of those monitored to transferred to the ICU, their LOS was shortened by almost 2 full days, and total hospital stay by 3.5 days
* Annual cost savings due to reduced ICU use was ~$1.5 million dollars annually

(From Taenzer, A.H. and others [2010]. Impact of pulse oximetry surveillance on rescue events and intensive care unit transfers: A before and after concurrence study. Anesthesiology, 112[2], 282-287.)

The Impact of Nursing Surveillance on Failure to Rescue

* When nursing surveillance is performed an average of 12 times a day or greater, there is a significant decrease in the odds of experiencing failure to rescue.

(From Shever, L. L. [2011]. The impact of nursing surveillance on failure to rescue. *Research and Theory for Nursing Practice,* 25[2], 107-126.)

IV. Nursing Interpretation And Management Of Data

* Streaming data creates a wealth of information
* Clinical judgment/decisions based on "good data"
* "Real-time" data can be affected by:
  * Activities of daily living such as sleeping, going to bathroom, etc.
  * Physical therapy (chest PT, ambulation)
  * Patient emotions (emotional distress)
  * Technical issues (disconnected wire, battery)
  * Pharmacology (vasoactive medications, fluid bolus)
  * Environmental elements (light, temperature)

Nursing Interpretation and Management of Continuous Surveillance Data

* Information provided requires assessment and critical thinking skills:
  * Why is the BP high?
  * What is different about the HR?
  * Why does the patient's SpO_2 keep dropping?
* Data obtained elevated to higher clinical decision makers; MD and/or RTT involvement
* Now that information is being recorded, clinical staff are more knowledgeable/responsible
* Continuous vital sign data provides clinicians peace of mind knowing an extra "set of eyes" is on the patient when he/she is with another patient

Basic Surveillance Activities

* Look at trends in the patient's data
  * A one-shot look at vital signs is not enough
* Know the parameters for the patient's vital signs
* Notify the physician and/or rapid response team if:
  * Vital signs are outside of the prescribed parameters
  * Patient is symptomatic
  * You are not comfortable with a situation

V. Nursing Actions for Alarm Management

* National campaign on alarm reduction
* Set alarm limits appropriate for patient
* Collaborate with clinical team to modify alarms
* Establish alarm policy change parameters
* Become knowledgeable about technical aspects
* Educate patient on purpose/process/payoff
* Become familiar with alarm limits

The Demand for Change

AAMI
Advancing Safety in Medical Technology

AHRQ

Institute for Healthcare Improvement

NPSF
National Patient Safety Foundation®

NATIONAL QUALITY STRATEGY

CMS
CENTERS for MEDICARE & MEDICAID SERVICES

World Health Organization

Case Study # 1 - Overview

Ms. G is an 82-year-old patient admitted this morning for an elective hip replacement surgery. Ms. G's vital signs were stable pre-op, and she was transferred to the OR for surgery at 1000. After a successful surgery, Ms. G returned to PACU at 1200 and was transferred to the surgical unit at 1400. You are coming on shift and making rounds with the day shift RN. You look in on Ms. G who appears to be sleeping and the day shift nurse tells you that "the patient has been fine."

At 2015 the nursing assistant shows you the patient's vital signs. They are as follows:

Case Study #1 - Spot Check Vital Signs

Parameter	PACU	1200	1600	2000
Temperature	97.8° F (oral)	99.4° F (tympanic)	100.2° F (tympanic)	**100.2°F (tympanic)**
Pulse	84	98	96	**130**
BP	128/86	110/72	104/78	**79/55**
RR	16	18	20	**24**
SpO_2	96% RA	94% RA	92% 2L NC	**95% 2L NC**

Intervention Here at 2030

Case Study #1 - Continuous Vital Signs

Parameter	PACU	1200	1300	1400
Temperature	97.8˚ F (oral)	99.4˚ F (tympanic)	100.2˚ F (tympanic)	**100.2˚ F (tympanic)**
Pulse Rate	88	98	96	**120**
Blood Pressure	128/86	110/72	104/78	**86/58**
RR	16	18	20	**24**
SpO_2	96% RA	94% RA	92% 2 L NC	**95% 2 L NC**

Intervention Here at 1400

Case Study #1 - Actions

* Assess the patient for signs and symptoms
  * Level of consciousness
  * Pain level
* Evaluate intake and output
  * Oral fluid intake
  * IV fluid intake
  * Urine output
* Note last time the patient received pain medication

Case #1 - Actions

* Notify the physician using ISBARR
  * I = Identify Self
  * S = Situation
  * B = Background
  * A = Assessment
  * R = Recommendation
  * R = Read Back
* Prepare to administer a fluid bolus, increase the IV rate and encourage fluids

Case Study #2

Mr. B is a 62-year-old patient admitted last night with pneumonia and started on antibiotics. He is breathing through his mouth, taking rapid shallow breaths and using his accessory muscles to ventilate. Auscultation reveals crackles over both lower lung fields. You have been caring for Mr. B all day and he has been growing more anxious and irritable as the day goes on. You are finishing your charting and you pull up his vital signs on the computer. They are as follows:

Case Study #2 – Spot Check Vital Signs

Parameter	Baseline	0800	1200	1600
Temperature	101.3°F (oral)	99.8°F (tympanic)	100.8°F (tympanic)	102.2°F (tympanic)
Pulse	88	96	104	118
BP	140/84	136/82	108/70	84/50
RR	24	20	20	28
SpO2	92% RA	93% 3L NC	92% 4L NC	85% 4L NC

Case Study #2 – Continuous Vital Signs

Parameter	Baseline	0800	0900	1100
Temperature	101.3°F (oral)	99.8°F (tympanic)	100.8°F (tympanic)	102.2°F (tympanic)
Pulse	88	96	104	118
BP	140/84	136/82	108/70	84/50
RR	24	20	20	28
SpO2	92% RA	93% 3L NC	92% 4L NC	85% 4L NC

Case Study #2 - Actions

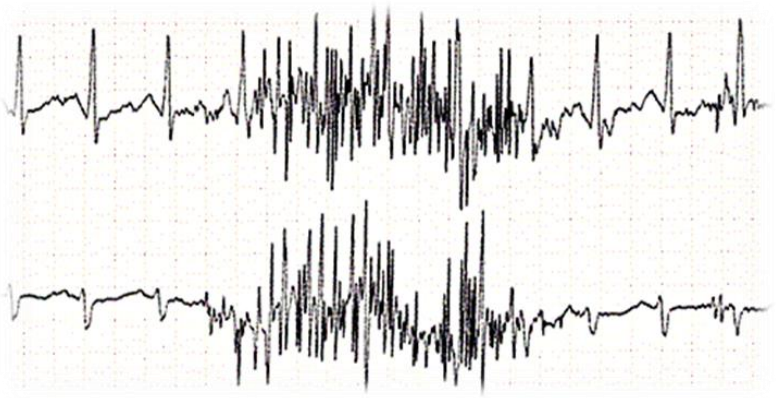
* Call the Rapid Response Team to come and assist you
* Place the patient on 15 L non-rebreather oxygen mask
* Initiate a bolus of 500 ml Normal Saline
* Prepare the patient for transfer to a higher level of care
* Notify the physician:
  * Change in patient's condition
  * Request a transfer order

Case Study #3 - Overview

* Ms. Z is a 42-year-old patient in the medical-surgical unit who is on a surveillance monitor. The monitor provides continuous monitoring of skin temperature, heart rate, respiratory rate, blood pressure and oxygen saturation. You are very frustrated because the high heart rate alarm keeps going off every time the patient gets out of bed. What should you do next?

Case Study #3 – Overview Alarm Management?

* Upon reviewing the ECG tracing, you see the following tracing every time the alarm goes off:



* What do you think is happening?

Case Study #3 - Actions

* Proper Skin Preparation
  * Clip excess hair
  * Wash the isolated electrode area with soap and water
  * Do not use alcohol for skin preparation; it can dry out the skin
  * Wipe the electrode area with a rough washcloth or gauze, or use the sandpaper on the electrode to roughen a small area of the skin

Case Study #3 - Actions

* Correct ECG electrode placement
  * Avoid bony prominences
  * Avoid fatty areas
  * Avoid major muscles
* Change the electrodes daily
  * Always change all electrodes at one time
    * Do not just change one if it is loose – replace them all

Case Study #3 - Actions

* Set alarm parameters based on the patient's needs
  * Diagnosis
  * Medical history
  * Plan of care
* Alarm parameter should be set to limits that require clinical intervention
  * Set within first hour
  * Adjust with changes in the patient's condition

Summary

* Nurses must maintain surveillance for complications and other events that could result in harm to the patient
* Continually monitoring the patient's vital signs, evaluating their significance and responding appropriately are critical nursing interventions for keeping the patient safe
* New technology is available to assist the nurse with continuous monitoring of the patient's vital signs

References

* American Association of Critical-Care Nurses (2014). Alarm management. Retrieved January 30, 2015 from http://www.aacn.org/wd/practice/docs/practicealerts/alarm-management-practice-alert.pdf
* Alfaro-LeFevre, R. (2013). *Critical thinking, clinical reasoning, and clinical judgment: A practical approach* (5th ed.). St. Louis: Elsevier.
* Bulechek, G. M., Butcher, H. K., & Dochterman, J. M. (2008). *Nursing interventions classification (NIC)* (5th ed.). St. Louis, MO: Mosby.
* Campbell, R. (2013). The five rights of clinical decision support: CDS tools for meeting meaningful use. *Journal of AHIMA 84*(10),42-47.
* Committee on Quality of Health Care in America. (2000). *To err is human: Building a safer health system.* Washington, DC: National Academy Press.
* Committee on the Work Environment for Nurses and Patient Safety. (2004). *Keeping patients safe: Transforming the work environment of nurses.* Washington, DC: National Academy Press.
* Craig, Margaret. (1996). Critical thinking, cultural competence and caring. In P. Hamilton. (Ed.). *Realities of contemporary nursing* (2nd ed.) (pp. 117-140). Menlo Park, CA: Addison-Wesley.
* DeVita, M.A., and others. (2010). "Identifying the hospitalized patient in crisis." --a consensus conference on the afferent limb of rapid response systems. *Resuscitation. 81*(4),375-382.

References

* Dougherty, C. M. (1999). Surveillance. In G. M. Bulechek & J. C. McCloskey (Eds.), *Nursing interventions: Essential nursing interventions* (3nd ed.) (pp. 524-532). Philadelphia: W. B. Saunders
* Henneman, E. A., Gawlinski ,A., & Giuliano, K.K. (2012). Surveillance: A strategy for improving patient safety in acute and critical care units. *Critical Care Nurse, 32*(2), 9-18.
* Johnson, B., & Webber, P. (2014). *An introduction to theory and reasoning in nursing.* Philadelphia: Wolters Kluwer Health | Lippincott William & Wilkins.
* Meyer, G. A., Lavin, M. A., & Perry, A. G. (2007). Is it time for a new category of nursing diagnosis? *International Journal of Nursing Terminologies and Classifications, 18*(2), 45-50.
* From Shever, L. L. (2011). The impact of nursing surveillance on failure to rescue. *Research and Theory for Nursing Practice, 25*(2), 107-126.
* Taenzer, A. H. (2011). A review of current and emerging approaches to address failure-to-rescue. *Anesthesiology 115*, 421-31.
* Taenzer, A.H. and others (2010). Impact of pulse oximetry surveillance on rescue events and intensive care unit transfers: A before and after concurrence study. *Anesthesiology, 112*(2), 282-287.

Questions

Need More Information or Help?

Contact Joy.Erched@hcahealthcare.com or Sandra.Emeott@hcahealthcare.com for more information

Program Developed by Kathleen M Stacy, PhD, RN, CNS

PN 6-000563-00 CO#02873 REL 6 NOV 2015