

Organization: Northwest Hospital

Solution Title: Alarms Reduction – Bring Down the Noise!

Project Description:

The Problem: Staff desensitization to clinical alarms has become a growing concern. Desensitization places patients at unnecessary risk when potentially actionable and life threatening alarms are missed. Customization of clinical alarms is a key strategy in enhancing staff awareness of alarms yet this practice has not been embedded or culturally accepted in our organization. Additionally, patient complaints about alarm noise leads to deterioration of patient satisfaction.

Identification: Two sentinel events, within the past 3 years, and previous work on our Heart Care Unit (HCU) related to alarms spurred us to convene a workgroup in December 2013. Leadership identified alarm management as a priority and charged the group to proactively address the Joint Commission Sentinel Event Alert. Since the start of our work, alarm management has become a National Patient Safety Goal.

Baseline Data: We collected alarm data in 2012 and 2013 which revealed >40,000 alarms in a week period of time across the telemetry units. HCAHPS scores and patient survey comments related to Quietness of the Hospital were less than favorable at the start of our work.

Goals:

- Hardwire alarm customization of alarms on telemetry units
- Reduce alarms paged out to the Emergin Pager system by 30% across all telemetry units
- Reduce noise and patient complaints of noise

Process: The workgroup convened as an interprofessional hospital wide group to evaluate and prioritize alarms to manage as well as facilitate an action plan to address identified opportunities. Membership included representation from all telemetry nursing units, education, clinical engineering, quality improvement, risk management, respiratory therapy, as well as a physician champion. The group is chaired by a Clinical Nurse Specialist (CNS).

Solution: Educated and competency validated the staff on the monitors and alarm customization. Identified and addressed equipment operational barriers and issues. Smart Alarms were deactivated on HCU to improve interference of nursing customization. Evaluated alarm default settings and parameters in preparation for adjustments to ensure alarms are actionable. Monitored noise levels and patient comments related to Quietness of the Hospital.

Measurable Outcomes: No sentinel events related to alarm management in over 1 year. There was a reduction in the number of pages/alarms by 65% in a 9 month period. We also noted improvement in HCAHPS scores related to the question “Quietness of the Hospital”.

Sustainability: Addition of alarm customization and familiarity in unit orientation. Competency validation will be on-going. There will be auditing to ensure nursing is reviewing and customizing alarms. The current workgroup will be maintained to continue to work on reducing the alarms and address any future issues that may arise.

Role of Collaboration and Leadership: Leadership was very supportive about and engaged in our endeavors. Since alarm management is a priority focus for Northwest Hospital we initiated a Failure Modes Effectiveness Analysis (FMEA) to additionally document our work. All data and progress is reported out to Nursing Quality, the Patient Safety Committee and our Multidisciplinary PI committee.

Committee members worked collaboratively to identify priority alarms, alert. This included identification of important alarms, alerting clinical engineering of issues, create meaningful education, review and development of policies, and validating staff competencies. The members of this workgroup are true champions of alarm management and vital to the success of the initiative.

Innovation: Frontline staff was the driving force behind creating a safer environment. This was innovative in the sense that we had active participation from many disciplines that collaborated to produce a significant reduction in the number of alarms. Their involvement in developing education and advocating for customization of alarms was crucial to the success of this project. Empowering front line staff to support the change was innovative for Northwest Hospital. Staff felt that they made a difference in how they work and patient safety.

Related Tools and Resources:

Northwest Hospital Developed Tools –

Education Packets

Commitment to addressing alarms “agreement” with nurses

Competency Assessment Tool

Badge Tags

Super users/ unit champions

Evidence Based Resources –

AACN, (2013). NTI ActionPak: strategies for managing alarm fatigue.

Retrieved from:

<http://www.aacn.org/dm/practice/actionpakdetail.aspx?itemid=28337&learn=true>

Allen, J.S., Hileman, K., & Ward, A. (2013). Safety innovations: Simple solutions for improving patient safety in cardiac monitoring – Eight critical elements to monitor alarm competency. AAMI Foundation. Healthcare Technology Safety Insititute.

Graham, K.C. & Cvach, M., (2010). Monitor alarm fatigue: Standardizing use of physiological monitors decreasing nuisance alarms. American Journal of Critical Care (19) 28-34. Doi:10.4037/ajcc2010651

IntelliVue Patient Monitor Instructions for Use Manual (MP 20/30, MP 40/50, MP60/70/80/90 Release G.0 with Software Revision G.0x.xx) Philips:Germany.

Pennsylvania Patient Safety Authority. (2008) Alarm interventions during medical telemetry monitoring: a failure mode and effects analysis. PA Patient Safety Advisory Supplementary Review

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Alarm Management Contract

Employee's Name: _____ **Clock #** _____

Employee Signature: _____ **Date:** _____

Responding to all types of alarms and pages is essential to patient care. I am aware of how to address alarms in a timely manner and will follow up with any questions I may have. If any concerns or questions arise related to care of a patient in response to telemetry monitoring, I will follow up immediately with the leadership team, charge nurse or medical staff. In addition, I am aware that responding to all red alarms, regardless of my patient assignment is an expectation.

ALARM MANAGEMENT

- A** -- Assess patient monitoring needs
- L** -- Learn patient baseline
- A** -- Adjust/Customize Alarms
- A** -- Acknowledge Alarms as they go off
- R** -- Readjust/Reassess Q4 and PRN
- M** -- Manage the patient, not Alarms!
- E** -- Evaluate the issues
- D** -- Document when appropriate



Red – high priority, potentially life threatening

Yellow – arrhythmia/parameter violation

Blue – inoperable

Front

Silencing Alarms – Check patient first, then silence. Silencing the alarm tells the monitor that you have acknowledged the alarm

Pausing Alarms (Available ICU/ED/PACU/IR/CL ONLY) – prevents the monitor from indicating any patient alarm. This pauses alarms for 1-3 minutes. Press the key again to switch on alarm indication.

Suspend (Available Tele areas ONLY) – suspends alarms for 10 minutes. Per policy should **not** be set for >10min.

Standby – Monitoring is suspended, patient data is retained.

Red Examples: V-Tach, Asystole

Yellow Example: "Irregular" alarms on a patient with afib

Blue Example: "Leads off"

Back

Alarms Management Self-Learning

Why Alarms Management (AACN, 2013) --

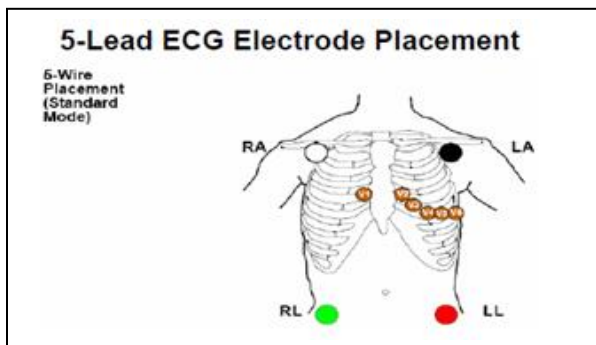
As acute and critical care nurses, we know firsthand how noisy the health care environment can be. Add in the multitude of audible and visual alarms, and the environment becomes even more chaotic. With an overwhelming number of alarms, it is not surprising that, at some point, alarm fatigue sets in. Unfortunately, this desensitization and fatigue can contribute to unintended patient consequences and even death. The following are evidence based practices to help reduce the alarms that result from our ECG Monitoring whether at the bedside or at a central monitor. Please use these to be part of the solution.

EKG Electrode Skin Prep

- ECG electrodes should be changed **daily** to reduce artifact (AACN, 2013)
- Date and time pads
- Remove excessive hair with clippers, not razors
- Prep the skin by vigorously washing the area with soap and water, allow to completely dry before applying the leads
- Do not use alcohol for skin preparation as it can dry out the skin
- Open packages will promote drying out of the gel so it is best to use a fresh package or apply gel directly to the dry lead's center
- When changing one ECG electrode, change them all.
- Limit monitoring interruption time during bathing by removing leads only long enough to prep the skin and change them
- Respiratory leads are the white (RA) and red leads (LL). If they are applied incorrectly, the monitor can't analyze the patient's breathing.

Monitoring Leads

- The Philips monitor defaults to monitoring in Lead II and V1
- If the QRS complex is not 2x the amplitude of the P and T waves, a different monitoring lead should be selected (otherwise you may experience the misery of double counting)
- To change the lead:
 - Select the HR numeric to open the "Setup ECG" menu
 - Use the arrow keys to scroll down to "Primary Lead"
 - Select the lead from the 7 lead choices that you want to use for primary lead
 - Repeat the steps to select secondary lead
 - Select "Analysis Mode" to select Multi-lead or Single-lead



Lead	AAMI Color	Placement
RA	White	directly below the clavicle and near the right shoulder
LA	Black	directly below the clavicle and near the left shoulder
LL	Red	on the left lower abdomen
RL	Green	on the right lower abdomen
V	Brown	on the chest, the position depends on your required lead selection. The default position is V1.

Arrhythmia Alarms

- "All Alarms on" is the default. The monitor will resume default settings for each new admission
- **Blue/INOPs** – conditions that cause monitoring to be interrupted.
 - Leads off
- **Yellow** – a lower priority patient alarm or an alarm specific to arrhythmia or parameter related conditions
 - Yellow alarms should not be turned off unless provider is aware of the arrhythmia.
 - For example, the "irregular" alarm should be turned off for a patient with known and current atrial fibrillation.
- **Red** – a high priority alarm that is potentially life threatening
 - The patient should be visualized before silencing the alarm
 - This alarm is dramatic, long and continuous

Acknowledging Alarms –

- Silencing Alarms – Check the patient first, then silence. Silencing the alarm tells the monitor that you have acknowledged the alarm
- Pausing Alarms (ICU/ED/PACU/IR/CL ONLY) – prevents the monitor from indicating any patient alarm. This pauses alarms for 1-3 minutes (setting can be changed). Press the key again to switch on alarm indication.
- Suspend (Tele areas ONLY) – suspends alarms for 10 minutes. Per policy should not be set for >10min.
- Standby – Monitoring is suspended, patient data is retained.

Alarm Limits

- To reduce alarm fatigue, alarms should be customized for the patient
- An Alarm limit is a Nursing Tool to be used to alert you of changes that you want to be aware of when you are not with your patient.
 - Ask yourself, “When do I want to be notified for an arrhythmia or vital sign change?”
 - *Example: Mrs. Smith has a baseline HR of 49. She is asymptomatic at this rate. The Provider is aware. To prevent the lower HR alarm from continuously alarming, decrease the lower HR limit to 45.*

Vital Sign Alarms	Default	Monitor Capability
Heart Rate Low	50	15-95
Heart Rate High	120	65-300
NBP Systolic Low	90	30-155
NBP Systolic High	160	95-270
SPO2 low	92	50-99
Resp Rate High	30	0-100
Resp Rate Low	8	0-100

Telemetry Strip Analysis

- Strips should be interpreted and documented every 12 hours (minimum), when there is a change in patient condition and upon initiation, discontinuation, and resumption of care.
 - Acute care -- Analysis includes HR, rhythm, and RN signature
 - Critical Care – Analysis includes HR, rhythm, PR, QRS, and QT intervals, and RN signature

Alarm Review

- Review alarm histories every 4 hours from the Central Monitor -- to view all alarms missed and customize alarms. Document in the Adult Assessment under Cardiac Rhythm:

Cardiac Rhythm

12 standard leads
 Other:

Rhythm Strip Obtained & Placed in Chart

Yes No

Alarm History Review

No significant alarm events noted
 Significant alarm events noted, see Progress Notes

- Remember; notify Provider for changes in rhythm. Print, interpret, and place the strip in the Interdisciplinary Notes.
- Select “Patient Window”
 - Select “Alarm Review” (the 120 most recent alarms display here)
 - Click on the “Tabular Display” Box
 - “All alarms” should be pre-selected from the drop-down box. This includes all yellow and red alarms.
 - Click on alarm to see the strip.
 - Select “Record” to print a strip

****Always -- Inform and educate patients and families about alarms and what each alarm means. ****

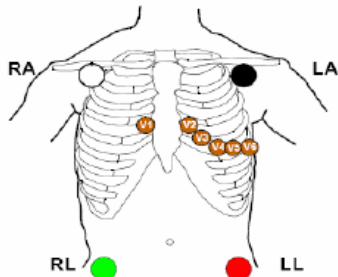
Alarms Management Self-Learning (Tech)

EKG Electrode Skin Prep

- ECG electrodes should be changed **daily** to reduce artifact (AACN, 2013)
- Date and time pads
- Remove excessive hair with clippers, not razors
- Prep the skin by vigorously washing the area with soap and water, allow to completely dry before applying the leads
- Do not use alcohol for skin preparation as it can dry out the skin
- Open packages will promote drying out of the gel so it is best to use a fresh package or apply gel directly to the dry lead's center
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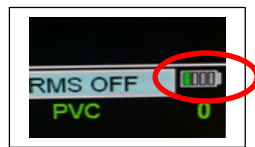
5-Lead ECG Electrode Placement

5-Wire Placement (Standard Mode)

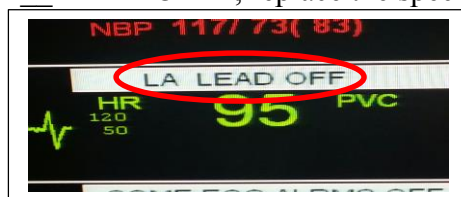


V | Brown | on the chest, the position depends on your required lead selection. The default position is V1.

- On Telemetry Units –
 - New patients get new batteries in the tele boxes
 - Check the monitors for the bars in the battery symbol, if there is one bar replace the battery.



- If you see “ LEAD OFF” , replace the specified lead



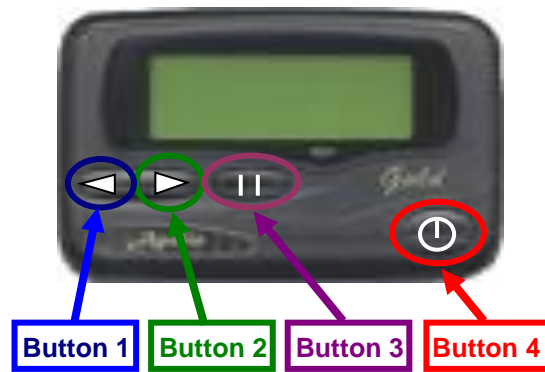
- Telemetry Certified Techs –
 - Be mindful of the monitors and acknowledge alarms as appropriate.

Care of the Telemetry Transmitters:

- TRANSMITTERS ARE NOT WATERPROOF
- Clean the Transmitters with the orange top PDI Sani-Cloth Bleach Wipes ONLY.



Apollo Gold Pager Quick Reference Guide



Reading Messages:

- 1) When the pager alerts you that there is a message, press **Button 4** to stop the vibrate/beep
- 2) Press **Button 4** to read through the message

Reading Old Messages:

- 1) Press **Button 4** to turn on or wake up your pager
- 2) A Flashing ▲ in the upper left screen indicates there is an unread message
- 3) Press **Button 4** to pull up the last message
- 4) Press **Button 1** to scroll through and read your messages

* **Please Note:** If any messages are not read, the pager will periodically vibrate/beep

Deleting One Message:

- 1) Follow steps 1 - 4 under Reading Old Messages
- 2) Press and hold **Button 4** for about 2 seconds until **DELETE ?** comes up on the screen
- 3) Release **Button 4** and then quickly press it again to confirm delete

Deleting All Messages:

- 1) Press **Button 3** until **UP OR ESCAPE** shows on the screen
- 2) Press **Button 2** to scroll to **DELETE ALL**
- 3) Press **Button 3** to confirm
- 3) Press **Button 2** to Delete all Messages

* **Please Note:** Only messages that have been read will be deleted

Turning Pager Off: (Do not take out the battery)

- 1) Press **Button 3** until **UP OR ESCAPE** shows on the screen
- 2) Press **Button 1** to scroll to **PAGER OFF**
- 3) Press **Button 3** to confirm
- 3) Press **Button 2** to turn off the pager

Turning Pager On:

- 1) Press and hold **Button 4** until it beeps to turn on the pager

Setting Time/Date:

- 1) Press **Button 3** until **UP OR ESCAPE** shows on the screen
- 2) Press **Button 1** to scroll to **SET TIME**
- 3) Press **Button 3** to enable time set
- 4) Press **Button 3** to change each set of flashing digits, while using **Button 2** to move the cursor
- 3) Press **Button 4** to activate the time and date changes

Apollo Gold Pager Quick Reference Guide



COMPETENCY: IntelliVue Patient Monitor (HCU/IMC/ICU)

Employee's Name: _____ Clock # _____ Unit: _____

Initial Education Recurring Validation

Validation Method Key: B = Bedside Observation, C = Chart Documentation, D= Demonstration, E = Education Provided, V = Verbalizes

Performance Criteria	Validation Method	Performance Criteria		Comments
		Met (initials/date)	Unmet (Initials/date)	
1. States how to admit and discharge a patient				
2. Associates the patient through CareAware (ICU)				
3. Ensures transport monitor seated correctly behind bedside monitor (ICU)				
4. Pairs the MP30 (when applicable)				
5. Identifies patient's current rate and rhythm				
6. Reviews/Adjusts settings for each patient a. Selects best lead for ECG tracing b. Turns pacing on c. Adjusts HR alarm d. Adjust thresholds or turn off arrhythmia alarms based on history of patient rhythm				
7. Discuss the 3 levels of alarms: a. Red b. Yellow c. INOPs (Blue)				
8. Understands difference between the following and states when to use each: a. Silence b. Pause c. Suspend d. Standby				
9. Check battery life and change if needed (HCU/IMC). a. A new patient needs a new battery. b. Replace battery when there is one bar noted on screen				

Performance Criteria	Validation Method	Performance Criteria		Comments
		Met (initials/date)	Unmet (Initials/date)	
10. States process for monitoring patient off unit				
11. Describe the best practice skin prep for electrode placement <ul style="list-style-type: none"> a. change electrodes daily, date and time pads b. Vigorously clean skin with soap and water c. when changing one electrode, change them all 				
12. Limit monitoring interruption time during bathing. Remove leads only long enough to prep the skin and change.				
13. Print rhythm strip once a shift (and prn with change in rhythm or condition), places in patient chart and interprets rhythm				
14. Review alarm history every 4 hours and documents				
15. Identifies medications or lab values that can alter rate or rhythm				

Employee Signature: _____ **Date:** _____

Validator's Name (Please Print)	Title	Signature	Date