Providing Patient Safety with Alarm Standardization

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Christiana Care Health System  
Newark, Delaware
“Alarm fatigue” linked to patient’s death

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Patient with history of heart problems was awaiting permanent pacemaker insertion following surgery. She ate breakfast, visited with family, walked and bathed.

9:53 am - heart rate decreased and triggered warning alarms, the crisis alarms were turned off
10:16 am - nurse found the patient unresponsive who later died

Background

- Estimated exposure to 700 physiologic monitor alarms per patient per day\(^1\)
- 2006 American College of Clinical Engineering Survey
  - N=1300 healthcare professionals
  - 81% - nuisance alarms occur frequently
  - 77% - disrupt care
  - 78% - leading to disabling of alarm

1. Cvach. Biomedical Instrumentation & Technology 2012
More Background

- Joint Commission
  - Proposed 2014 National Patient Safety Goal
- ECRI Institute
  - One of 2013 Top Technology Hazards
1999 Snapshot

- Different monitoring systems on select units
- Alarm response was inconsistent unit to unit
- Bed-flow challenges due to patient transfers/delays for the “right” bed
- Alarm parameters varied by practitioner and unit
- Alarm Anesthesia
  - 2 Events related to leads off and low battery
  - Unit PI
    - > 80 alarms / 2 hours for 20 bed unit
Objectives

1. Review equipment changes and standardization
2. Review alarm standardization
3. Review alarm response standardization
1 – Equipment Changes and Standardization

- 1999 Cardiac Monitoring Team
  - Objectives
    - Increase availability of monitored beds outside of the ICU
    - Improve monitoring and response to patient alarms
    - Improve continuity of care by reducing multiple unit transfers
  - Crucial blend of Clinicians, Information Technology, and Clinical Engineering
To possess the capability to rapidly deploy wireless multi-parameter monitoring systems **anytime** and **anywhere** within the acute facilities of Christiana Care Health Services to enhance patient care and to insure patient safety.
Goals for new monitoring system

- Safety net of networked monitoring at point-of-care
- Ability to display vital signs, waveforms, trends, and full-disclosure record of any patient, anywhere, any time on the hospital network for patients
IT Requirements - System

- Network
  - Standard 802.11x wireless network
  - Coexist with other wireless traffic
  - Main hospital network

- Printing
  - Must use Christiana Care standard printers (HP)
IT Requirements - Network

- Network
  - Redundant coverage with no dead space
  - Handle monitors with no data loss
  - On-going upgrades/validation of network hardware/firmware
Clinical Engineering Support

- **System**
  - Hands-on support of the monitoring system
  - Maintain alarm settings on current and all future new monitors
  - Work with clinicians, vendor, and IT for upgrades, problem resolution

- **Monitors**
  - Responsible for inventory and maintenance of equipment
2013 Monitor Capacity

Christiana Hospital
- 7 Central Stations
- capacity 320

Wilmington Hospital
- 2 Central Stations
- capacity 77
Other Supportive System Changes
Flexible Monitoring Department

• Centralized Monitoring Room
• Monitor Technicians
• System Education included in all orientation
## Education

### ECG Class
- 4 day ECG class already existed
- 2 day ECG class added with emphasis on:
  - Clinical considerations
  - Anticipated treatment

### Medication Class
- 8 hour Critical Care Class
- 4 hour Flexible Monitoring Class
- Case scenario driven
Pharmacy Drug Leveling

- Pharmacy Drug Leveling
  - A. Any area
  - B. Cardiac Monitored
  - C. Critical care

Christiana Care Health Services

MEDICATION LEVELING POLICY

PURPOSE:
The Medication Administration Task Force is a sub-committee of the Pharmacy and Therapeutics Functional Improvement Committee (P&T) formed to create standards for the safe administration and monitoring of critical medications.

POLICY:
All patient care units will adhere to the unit leveling criteria and level designations set forth and re-apply to the P&T Committee for any subsequent change in status. Medications are leveled to specific areas based upon the type and degree of monitoring required. Medications having designated levels will be noted in the “Restriction” section of the individual drug monograph in the online formulary. Any medication with no level designation is considered Level A. It is the responsibility of the nurse manager to assure that any patient receiving a Level B or Level C drug have appropriate unit requirements met. All current lists of restricted medications, leveling criteria and unit level designations are available for viewing on the INet Nursing Portal under Staff References and the Physician Portal under Formulary.

PROCESS:
A formal process was instituted by which all patient care areas have been designated a Level A, B or C by the P&T Committee to administer Level A, B, or C designated medications. All nurse managers completed applications for leveling status. This process allows the assurance of proper education, monitoring and credentialing of those administering these critical medications to patients. If at anytime, a nurse manager wishes to change the current status of their unit, they may reapply to the P&T Committee. This application is available on the INet Nursing Portal under Staff References.
STAT Nurse Program
(Stabilization-Telemetry-Administration-Teaching)

- 2000
  - Medical ICU RN
  - Early outreach and precursor to Rapid Response Team program

- 2005 Conversion to RRT
  - Medical ICU RN
  - Respiratory Therapist
  - Resident Physician
  - Access to Intensivist and Attending
2 - Alarm Standardization

- 1999 Cardiac Alarm Team
  - Cardiologists, intensivists, nurses, clinical engineering, IT experts

- New Cardiac Alarm Defaults
  - What are essential arrhythmia alarms?
    - Clinician driven not manufacturer
  - Same for all systems
# Example of Standardization

<table>
<thead>
<tr>
<th>Philips</th>
<th>Welch Allyn Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vent Rhythm</td>
<td>V-Rhythm</td>
</tr>
<tr>
<td>ON, 3</td>
<td>ON</td>
</tr>
<tr>
<td>Run PVC’s</td>
<td>PVC Run</td>
</tr>
<tr>
<td>OFF</td>
<td>ON, 3</td>
</tr>
<tr>
<td>Pair PVC’s</td>
<td>Couplets</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Vent Bigeminy</td>
<td>Bigeminy</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Vent Trigeminy</td>
<td>Trigeminy</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>PVC’s &gt;x/min</td>
<td>PVC’s min</td>
</tr>
<tr>
<td>ON, &gt; 10 min</td>
<td>ON, &gt;10 min</td>
</tr>
<tr>
<td>Missed Beats</td>
<td>Irregular HR</td>
</tr>
<tr>
<td>ON, may turn OFF ONLY for patients currently in AFib</td>
<td>ON, may turn OFF ONLY for patients currently in AFib</td>
</tr>
</tbody>
</table>
Alarm Standardization (cont)

- 2003 Clinical Alarms Committee Standards

Excerpt from Alarms, Clinical Equipment Policy

<table>
<thead>
<tr>
<th>Cardiac Monitors, including telemetry</th>
<th>Cardiac Monitoring or Cardiac &amp; Respiratory Monitoring, Pediatrics</th>
<th>CCHS Alarm Defaults</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Welch Allyn Micrapaq devices are designed to not have local alarms when connected to a central station and revert to local heart rate alarms if that connection is lost.</td>
<td></td>
</tr>
</tbody>
</table>
3- Alarm Response Standardization

- Alarm Notification by Monitor Technicians/Centralized Monitoring Room
  - All lethal alarm conditions via hot-key Emergency Heart Phone. This labeled phone is located in each district on each nursing unit.
  - All non-lethal alarm conditions via hot-key unit Telemetry Companion Phone carried by an RN on each nursing unit.
  - Escalation algorithm for calls not answered
3- Alarm Response Standardization
Lethal Alarm Condition

- Answer all **Emergency Heart Phones** immediately.
- Any RN in district answer with unit location.
- Respond immediately by checking the patient first and:
  1. Assess hemodynamic status
  2. Assess presence or absence of clinical symptoms
  3. Initiate call to physician as indicated (Call Physician Parameters)
  4. Notify the patient’s nurse
  5. Web page RRT if indicated
  6. Initiate BLS and Code Blue Response for unresponsive or compromised patients

- HR < 40 or >120
- Sustained Vtach
- PVC > 10/min
- PAT > 16 beats
- Pause > 3 sec
- New Afib or Aflutter
- New 2nd or 3rd degree heart block
3- Alarm Response Standardization
Non-Lethal Alarms

- The RN carrying the **Telemetry Companion Phone** will respond by notifying the nurse caring for the patient or check the patient immediately and;
  1. Assess hemodynamic status
  2. Assess presence or absence of clinical symptoms
  3. Initiate call to physician as indicated (Call Physician Parameters)
  4. Notify the patient’s nurse
  5. Web page RRT if indicated
  6. Initiate BLS and Code Blue Response for unresponsive or compromised patients
Changes 2013
Cardiac Telemetry Monitoring for the Right Indication and Right Duration

- New Cardiac Telemetry Monitoring Orders
- Indication & Duration Based

- Level B medication with required monitoring
- Level B medications with recommended monitoring

- Cardiac Telemetry Assessment Task for safe discontinuation
Level B Medications
3 new monitoring categories

No Warning for Cardiac Telemetry required
Prescriber may choose to order
Examples: Hydralazine Inj

Cardiac Telemetry Monitoring REQUIRED warning
Alert will fire to the prescriber and an order for cardiac telemetry will be placed for 24 hours then reassessed
Examples: Amiodarone inj, Diltiazem inj, Dobutamine, Verapamil Inj

Cardiac Telemetry Monitoring OPTIONAL warning
Alert will fire to the prescriber, and the prescriber can decide if monitoring is needed
Examples: Labetalol, Metopropol, Propranolol
Cardiac Telemetry Order will automatically discontinue based on the ordered duration (24/48 hours)

- One hour prior to the order expiration, the Cardiac Telemetry Assessment form task will fire
- Task to be completed by RN to assess for safe discontinuation of telemetry or need for new order based on set criteria (vital signs and/or a significant changes in clinical condition)
- RN will assess patients vital signs (current set compared to previous 8 hours) and for any clinical changes within that period
- Documented vital signs will automatically display from previous 8 hours and within current hour
- New set of vital signs will have to be obtained if none taken within prior hour
Cardiac Telemetry Assessment Form cont’d

- If vital signs are outside of the parameters or patient has had a significant change in clinical status a message will prompt RN to contact the provider to evaluate need for a new **Cardiac Telemetry Monitoring Order**
  - New task will fire every hour until resolved (new order or discontinuation by provider)

- If patient meets criteria to discontinue telemetry, once assessment form is signed, a screen message will indicate “OK” to remove telemetry and CMR will be **automatically** notified

- This avoids the extra task of RN notifying CMR via web form

- Task cannot be rescheduled

- As always clinical judgment should prevail
Bottom line, it is all about patient care and patient safety