

Alarm Complacency and Patient Safety

The Office of Health Care Quality (OHCQ) recently received a report from a Maryland hospital concerning an elderly patient who succumbed in an Intensive Care Unit because a cardiac arrhythmia alarm went unnoticed by staff for several minutes. By the time intervention was begun the patient had suffered irreversible damage and died shortly thereafter.

It is sobering that critical care units, to which a gravely ill patient is sent for intensive monitoring, may fail to provide a safe environment. The very efforts to protect the patient through the use of hemodynamic monitoring can result in an environment where the alarm noise itself defeats the goal of alerting the staff to dire changes in a patient's condition and patient safety is severely compromised.

We have seen eight such cases in the past two years; they encompass a host of variations around the theme of unit staff beset by the sounds of multiple alarms beeping, with responsibility for response sometimes unclear and with the staff often unable to hear or see monitors, depending upon where the nurses are in the unit. In addition, an abundance of false alarms and nuisance alarms (for instance, a “leads off” alarm that is so sensitive that it sounds every time the patient turns over) leads the staff to ignore the sound or discount the severity of the alarm.

One hospital reported three episodes, two reported two episodes and two hospitals had one each. We are fairly certain that these cases are under-reported because it may not be apparent to the staff that ‘find’ patients in an arrest situation that an alarm has been sounding for some time without response.

CASE I

The most recent case which prompted this Clinical Alert involves an elderly woman on hemodynamic monitoring in an intensive care unit. The nurse responsible for this patient was preparing medications in a room within the unit which had neither a visual nor auditory link to the patient or the monitoring system. The patient's alarm sounded for a potentially fatal dysrhythmia. Despite the fact that this unit had central monitoring, the facility had eliminated the position of monitor technician; there was no person at the central monitor to observe the onset of a potentially lethal dysrhythmia, nor was the alarm audible to the nurse in the medication room. Several minutes elapsed before the beeping alarm was noted and an intervention begun, but too late.

CASE II

This case involved the failure to respond to a cardiac alarm which sounded when the leads were dislodged as the patient, while attempting to get up, fell on the floor. The patient lay on the floor for almost 30 minutes, causing a “leads fail” alarm to sound. No

one responded to the alarm until the patient was discovered on the floor by housekeeping staff. Resuscitation was unsuccessful.

In this case, the staff discounted the severity of the “leads fail” alarm as it was considered by staff to be of low priority. Investigation revealed that alarms sounded almost continuously on the unit. Leads are removed by staff for a variety of reasons such as when patients are being bathed or when they are leaving the unit. The near constant noise related to alarms frequently desensitized the staff to the meaning and severity of the alarms. One hospital found an average of 21 audible alarms per minute in their ICU, with a high of over 1500 alarms for a 30 minute period. Is there a way to mitigate this without depending just on the increased vigilance by staff?

CASE III

The patient’s ventilator tubing disconnected from the trachea and no one heard the low pressure alarm. Staff did eventually respond to the patient’s pulse oximeter alarm. Subsequently it was determined that the ventilator alarm was operational. Staff either did not hear the alarm or simply ignored it.

CASE IV

A post-op patient in the surgical intensive care went into cardiac arrest while his assigned nurse was off the unit. There was a long and fatal delay before another nurse observed the tracing on the central monitor. The alarm was not heard outside the patient’s room, because the sound volume had been set too low. Even though the unit had central monitoring, there was no one staff person who was responsible to look at and listen to the monitors.

CASE V

There was a delay in responding to a crisis alarm for “leads off/asystole” in a patient who was on one unit but being monitored remotely on another unit. There was a difference of opinion as to whether the monitor technician actually notified the floor where the patient was located about the dysrhythmia. No one could remember hearing any alarms or getting any calls. The investigation found that the hospital may also have had problems with phone signaling around the hospital—“dead space.”

See VA Patient Safety Alert, published by the VA Center for Patient Safety. “Failure of Medical Alarms Systems Using Paging Technology.” Available at:

<http://www.va.gov/ncps/alerts/AlarmPagingJuly04.pdf>

CASE VI

A post-op patient who was being weaned off a ventilator was found to be apneic while on CPAP. Warning alarms were audible only; a crisis alarm would have caused the charge nurse pager to beep, but typically no crisis alarms were set for respiratory parameters (as in this case). The oxygen saturation alarm had gone off but was not heeded as many other alarms were going off at the same time in the unit.

No one was stationed in the central alarm station to see which alarm was sounding and why. There were so many alarms ringing in the nursing units at any point in time that the staff had become desensitized to the sound (and meaning) of the alarms.

CASE VII

The pulse oximeter alarms went off simultaneously on two different patients. A nurse responded promptly to the first patient, but there was a fatal delay in responding to the second patient's alarm.

Because of the excessive number of false alarms on the second patient, the patient's nurse decided to first finish preparing medications for the patient before investigating the alarm. The hospital also determined that the code alarm could not be heard by a physician in the on-call room and that no one on the code team had a key to get onto the unit.

CASE VIII

A patient was transferred from the emergency department to a monitored bed. He was supposed to go into the "A" bed in a room but was accidentally placed in the "B" bed and placed on the "B" bed monitor. When this was discovered, the beds were switched so the patient was in the "A" position and his monitor box or module was removed from the "B" bed location and put in the "A" bed location. The monitoring system was not changed, so that the central monitor still read bed "B" for patient in "A" bed. A new patient was then placed in bed B, but his monitor was on the patient in the "A" bed. Both patients had similar cardiac dysrhythmias. The patient in Bed "A" was treated with Cardizem for his rapid rate, however, the treatment regimen was based on cardiac rhythm for the patient in bed "B." The problem was discovered when the patient in bed "B" was taken off the monitor for a test, and the patient in bed "A" monitor went black. No harm came to either patient.

Could any of these situations happen in your hospital?

PROBLEMS FOUND THROUGH THE HOSPITALS' INVESTIGATIONS

1. Failure to cover a nurse's monitored patients when the nurse leaves the unit.
2. Detaching patients from the monitoring system while giving routine care leads to an increase in the general alarm noise on the unit.

3. "Leads off" alarm is not seen as a priority.
4. Alarms not heard throughout a unit; blind spots exist.
5. No one monitoring the central alarm station.
6. Staff become unresponsive to constant sound of alarms.
7. Alarms shut down by staff to decrease noise level. This sometimes has an unintended consequence of shutting off the crisis alarms.
8. Alarm parameters are set based on protocols instead of specific patient needs, possibly leading to more false alarms.
9. Frequent false alarms.
10. Monitor and patient identification.

In 2002, the Joint Commission reviewed 23 sentinel events related to mechanical ventilation. Nineteen of these cases resulted in death and 4 resulted in coma. 65% of these were related to alarms not being heard or answered. However, The Joint Commission determined in 2005 that alarm safety would no longer be included among its National Patient Safety Goals. Based on the experience at OHCQ, however, monitoring alarms continues to be problematic and hazardous to patients.

Some suggestions:

1. Review the environment and determine if there are blind and deaf spots. Have your biomedical engineering department analyze amount and type of alarms, if possible, to determine rate and type.
2. Work with manufacturers to decrease the sensitivity of the equipment which results in false alarms.
3. Train staff in full use and understanding of monitoring equipment. In one case, the nurses did not know that silencing one alarm also silenced the crisis alarms. Training should be interdisciplinary, especially between respiratory therapy and nursing.
4. Determine if alarms are being set correctly with patient-specific parameters.
5. Assure that all monitoring being done at a central control area is done effectively and continuously.

Other resources:

<http://psnet.ahrq.gov/>

http://www.guideline.gov/browse/guideline_index.aspx (search on Patient Safety)

<http://www.patientsafety.gov/>

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