



Educational Approach to Combat Alarm Fatigue among Nurses of a Neonatal Intensive Care Unit (NICU)

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Abstract

Working in an environment where equipment usage is a bit challenging, brings nurses into a technical trouble. For nurses handling monitors, incubators and dealing with their alarms at a same time becomes an additional work with care. Especially when it comes to handling neonates, the challenge increases more because of the age and size of the babies. With a time period nurses become habitual and tend to avoid alarm noises in order to continue or carry out their work. Eventually it is seemed not proper and considered wrong when alarms are ignored. As a common practice it has given sentinel issues to patients especially small babies. Also, many of the nurses were not aware of the technical aspect of the alarms and their detailed handling or reporting. These observations were listed during clinical practicum of the authors' team. It was commonly seen that refraining from looking towards alarm beep; many necessary alarms have been also missed. Also, it is their keen practice to check out for the beeping alarms, assessing the babies and look after for any necessary connections between the changing ranges of alarms and baby's condition. The critical observations noted during the practicum recommends a rigorous observational research and continuous teaching and learning activities related to equipment handling and biomedical, especially NICU alarms.

Keywords: Neonates; Neonatal Care; Alarms; Monitor; Nurses; Monitoring; Alarm Fatigue

Introduction

Surveillance is identified as one of the important nursing intervention. As, it helps in identifying and preventing adverse events. The term monitoring is interchangeably used with surveillance and the action has huge importance in nursing [1,2]. Continuous monitoring is required for critically ill patients, especially neonates. Neonate population is fragile and vulnerable and it is very much essential to keep a sharp eye on their health status. Adverse events and medical errors are common in critical care units like neonatal intensive care units (NICUs), due to various issues faced by nurses. Surveillance then plays significant support in nurses' regular activities in NICU setting [1, 2].

Alarms are basically for the indication of hazardous events and potential patient problems. The sound or alarm that is set to indicate deviations in parameters and indicate if the device is not working properly, is reported as irritant in various studies. Continuous beeps or bells are actually causing noise pollution, to which patients, their families and staffs are exposed every time [3]. Nurses working in areas where cardiac monitors are commonly used such as NICU usually become desensitized to that alarm. As they think, continual alarms disrupts their usual workflow and may lead to errors or decreased quality of care because of constant distraction [3, 4]. The continuous beeps or alarm results in alarm fatigue and make nurses habitual of ignoring them [5].

Alarm fatigue is now a day a global concern. Particularly it is an expanding problem in NICUs. Like other intensive care units, it is intended to provide immediate interventions to any deviations in patient's conditions. Common alarms in NICU are cardiac alarms pertaining to vitals and other functioning of neonate [5, 6]. Cardiac monitors are important tools for continuous assessment of patients. These monitors provide information regarding patient's status. They are essential for detection of changes in cardiac function, so that those changes can be timely intervened in order to ensure patients' recovery. The monitors normally display various patient parameters. It is usually set to indicate if those patient parameters run outside the expected ranges [7]. Another most important alarm is the temperature alarms of

incubator to monitor the warmth of incubator to keep the neonate warm and sustain its health in the incubator. Also, the alarm indicates whether there is any issue of functionality in the incubator or for any reason the neonate is unable to maintain its body temperature [8].

It has been found that nurses^(A) are not quickly responding to alarms, alarms are being neglected in NICU and other intensive care units which are again not good and safe for patient's well-being. Because the purpose for those alarms, is to alert staff that immediate care is needed. And neglecting those alarm means showing careless attitude towards neonates and their health. This is something unethical and purely against the mandate of NICU and other intensive care units [8, 9].

All NICU related health care providers^(B) are responsible for providing holistic care to the patients. In our context, NICU nurse-patient ratio is 1:1 for infected or child under special observation and 1:2 for routine neonate care. This can be referred as perfect staffing because neonates require more attention. Staff working there in NICU, are usually engaged in providing care and doing essential tasks that are vital for neonates' recovery. So while taking care of neonates and then looking after monitor beeps at the same time is an additional task for them. This is why alarms are being neglected and when they exceed the normal range, it leads to alarm fatigue [8].

Another situation that has been observed reflects that ignoring alarms is not only a matter of irritation or less priority but the staff themselves are unaware about the functioning of the equipment. Here, the role of biomedical assistance becomes very important as many of the nurses in the NICU are not aware about the proper functioning of monitors and unaware about the mechanism on which the alarms work in NICU setting [10].

There are many reasons for which we see multiple events emerging as fatal for the neonate population. These events not only occur because of certain technical issues but because of negligence from the working staff in the NICU. The paper is developed after a complete process of observations and evaluation held by authors' team during the clinical practicum in the bachelor of nursing program and also describe the educational interventions done to assess, reflect and educate on the practices of nurses while dealing with alarms in NICU setup.

Methods and Materials

On the basis of clinical observations, a checklist of ten items were prepared and was divided among team to assess the nurses. During the clinical shift each nursing staff was asked to perform certain tasks from the checklist that showcases their understanding about the equipment and alarms. All of their responses and actions were noted and listed as results to develop insights about their understanding on the equipment in NICU (more specifically incubators and cardiac monitors).

The checklist states the following items and tasks for the assessment of assigned nurses:

1. How to setup a relevant cardiac monitor scheme (paeds, adults and neonate) in the monitor?
2. How do you check history of vital signs in case you miss any current readings?
3. How to set auto setups for alarms, vital signs, timely monitoring etc. in the cardiac alarm.
4. What is your usual practice during care of baby, when you listen to cardiac alarm?
5. If you hear cardiac alarm and see the monitor with a reading of high pulse rate, what will be your first action?
6. How you will hold a child in an incubator so that the temperature is maintained and you perform necessary handling and care?
7. What will be your first action when you hear incubator alarm?
8. What if the alarm is silent and you observe the light on the alarm icon located on the incubator? What will you do?
9. What other necessary item you will check when you are taking or handing over the incubator to other nursing staff?
10. What necessary information you will provide to other staff about cardiac and incubator alarms, when you are assigning them to your neonate client during break time or while you are caring for another neonate or in any other emergent situation when you are not around?

^Arefers to both Registered Nurses and Nurse Technicians working in NICU that was our practicum setup, as both of these nursing staff were assigned on neonates. Also, nursing technician have training of biomedical and technical aspect of the care and they utilize these equipment its necessary to add them in the project implementation and assessment.

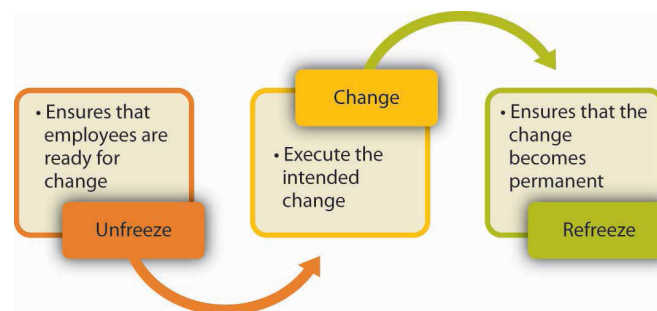
^Brefers to the concept that all working staff and health care professionals who work at NICU are responsible for neonate care and biomedical part should be also their learning as well not only of nurses. Since, nurse spent majority time with neonates are frontline care provider so they are accountable for alarms and equipment too along with care and that is why they were primary target.

The purpose to create this checklist and record the responses and observation was that in previous projects there is a huge conflict between practices and observations with regard to its reflection in the results of a quiz, pretest or questionnaires. Many of the elective course candidates or practicum candidates who have reciprocated their ideas, were not satisfied as they felt a conflict among nurses' responses in questionnaires and in actual clinical practice.

Results and Discussions

According to Lewin's model of change [11, 12], there are three phases of change, unfreeze, change and refreeze. The phase unfreeze include preparation for change. In case of alarm fatigue this includes preparation of strategies or ways to reduce alarm fatigue and improving alarms safety. The second phase is change phase which involves the implementation of new evidence based strategies in order to ensure safety and promote better environment for both neonates and health care professionals. Change phase also includes providing adequate education to staff accordingly so that they can accept, learn and follow that change process. It is very important that terms, conditions and goals must be clearly communicated with staff in order to have favorable outcomes. Third and last stage of change model is refreezing which include stabilizing that change. During this stage staff becomes fully adopted to change and this is often seen through their work.

Integrating the model of lewin (see figure 1) provides us a basis of an idea to work on change and maintain its presence in any area strongly. The idea of change is based on the results that we had through these observation of checklist. Total 41 NICU nursing staff was evaluated by the team on the items of checklist during the time period of 2.5 months. The results were very much interesting to share and developed the base of the educational approach that we were seeking to develop for the NICU nurses later on.



The summary of results is that majority of the nurses were not aware that they have set adult or paed's parameters on the cardiac monitors of neonates. This will definitely not catch or provide related changes about condition of neonate. Nurses were comparatively better in maintain cardiac alarm setups and auto setup in the cardiac monitors. However, many reported that they either snooze the alarms, ignore the alarm or not respond to it. Some of them said they ask any other person to snooze or look for alarms. Very few responded that they at least look towards cardiac monitor for what is happening that an alarm is beeping or buzzing. In terms of their responses regarding quick action when they see changes in heart rate, many said they will recheck the heart rate, some said they will confirm it with symptoms of neonate and few said they will report to head nurse or team leader of shift. Similarly majority of them reported snoozing of incubator alarms and have no significant information about incubator that can be provided to other nurse while handing over the neonate. The most common practice or response that was noticed that nurses are aware about temperature, its importance and its record keeping but not that much aware about how mechanism of incubator can support temperature maintenance and how to distinguish between actual and false alarm. It was also seen that the details a nurse should share about cardiac alarms settings and incubator alarms when they ask any other nurse for help or ask them to take care the neonate in their absence (break etc.) was not that much particular. Even majority of them have not considered it as a significant thing to share.

The major action that we took and we planning to take under the Lewin's model of change was coming up with an educational approach to bring change in nurses' practice. We incorporated the biomedical team and strengthen our own understanding upon the alarms and technical aspects of the monitors. Later we divided into groups and on regular basis conducted individual demonstration with each NICU nurse. Also we ask them to reflect upon their responses of checklist and how developing alarm fatigue would be fatal at any instance for neonates. We also took re-demonstrations from them on the dummy equipment during their clinical hours and provided them appreciation badges for their practices. We also noted their practices and change in routine action as covert evaluators during the span of our practicum. At the end we collaborated with the admin and leadership of NICU to arrange teaching sessions and educational videos for nurses during their educational hours.

As literature also provide evidences that due to busy shifts and other important priority activities nurses tend to ignore alarms [13]. With time they develop alarm fatigue that they unconsciously don't hear the beeps and buzzes of cardiac monitor and incubator alarms [14]. This can be definitely combated by continues education and evaluation of nurses and bring them into realization of how dangerous can be the situation sometime when alarm fatigue becomes more common [15].

Recommendations and Conclusion

Alarm devices are designed to active or alert the healthcare providers for the unfavorable conditions. Whenever, alarm is subjected to beep too many times, it creates disturbance in the workflow of the healthcare providers and ultimately leads to errors due to interference, omission and disturbance in their work. Nurses must apply monitor troubleshooting algorithm at the start of the shift to check either the device is error free or not. Each nurse should be trained to handle these equipment. Multi-parameter alarm filtering should be developed in the monitors to provide only valid alarms to the caregiver. Proper skin care should be performed before applying electrodes to make sure that electrodes are placed properly as in case if skin gets dry, the chances of electrode detachment increases which causes error in the monitor hence, alarm nuisance occurs. A committee should be developed to address the issues faced by alarm negligence and deliver importance of alarm monitoring in critical areas to provide hazard free environment to the patients. Head Nurse and Nurse Instructor should involve biomedical staff to arrange continuous education sessions and also to monitor responses and practices of staff while dealing with alarms.

Alarm is an effective way to respond any unusual situation that may harm neonate. With time nurses develop alarm fatigue which is not a positive response for providers working in any clinical setting. Nurses and leadership should take a wise education and collaborative approach to re visit their practices and improve patient health by combating alarm fatigue as a team.

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