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A Study on Alarm Fatigue Among Nurses Working in Critical Care Units from Dehradun City

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ABSTRACT

The critically ill patients are technically connected with number of devices who give so many alarms sound and give information about patient condition. The purpose of this study was to assess the alarm fatigue among nurses working in critical care unit setting in Dehradun city. A Quantitative research approach with purposive sampling technique was done in intensive care unit of Himalayan hospital Dehradun. This study includes a total of 120 participants. Data were collected by providing socio-demographic performa and alarm fatigue questionnaire. This data was analysed using descriptive and inferential statistics. Most of the participants (93.4%) had moderate level of alarm fatigue followed by severe (5%) and mild (1.6%). About 72.3% participants never turned off the alarm at the beginning of every shift. About50% participants did not feel nervous to alarm sound. About 40% of the participants were paid less attention to the alarm of the equipment. About 32.5% participants were acting differently to low and high volume of the ventilator. About 30% participants sometimes here a certain amount of noise in the ward. About 28.3% participants sometimes believed that much of the noise in the ward is from the alarms of the monitoring equipment. Intensive care unit nurses have an alarm fatigue which create hindrance in their regular work regarding patient care, medication, feeding, charting, providing positioning and assisting physician's rounds. Nurses should know proper technique which help to minimize the alarm fatigue among them.

INTRODUCTION

Now a days medical facility is so advanced that it provide quick response to the clients about their health. Intensive care unit is a specialized area in the hospital which provides special health care to the critically ill patients and provides close observation to them. Most medical equipment which sounds every hour of each day to inform health care professionals about changes in physiological parameters, as well as any failures thereof, is equipped with alarms[1]. The monitoring equipment is extremely useful for doctors and nurses to be able to carry out a rapid response at the intensive care unit[2]. False alarms are very common, interrupting rest, interruption of concentration, impairing sleep, interfering with communication and increasing the risk for accidents by not setting alarm values correctly or using patients monitors too often[3].

Nurse alarm fatigue occurs when a number of alarms signal overwhelms the nurse, which can lead to desensitization and it is for this reason she may deactivate variables that require monitoring, reduce volume, silence or inhibit alerts if they are not in compliance with patient needs[4]. These changes may lead to a missed significant and important change in the patient's health, so that he or she is no longer adequately responding[5].

Many studies have reported that various factors influence alarm fatigue, number of false alarms and the studies were tracked alarm monitoring devices and find more percentage of false alarm which does not need any action[1,6,7]. The number of unwanted alarms which need to be included in the study cause mostly alarm fatigue among nurses at the time of monitoring alarm as well as patients. Alarm fatigue happens when staff nurses are surrounded by number of clinical alarms in some false alarm, not properly settings alarm to their ranges and number of multiple uses of patient's monitors which might be a factor to cause alarm fatigue. The purpose of this study was to assess the alarm fatigue among nurses in critical care setting in Dehradun city.

MATERIALS AND METHODS

This study was performed in intensive unit of "Himalayan Hospital" of Dehradun. The total sample size was 120 staff nurses who were assigned in ICU. A purposive sampling technique was adopted to choose the sample for study.

Present ICU provides all medical and surgical services and treatment facilities for all type of critically ill patients. The choice of the research setting was done on the ground of sample availability and feasibility of the research project. Sample for the present study was nurses working in intensive care unit of selected hospital, Dehradun, Uttarakhand. In the context of this study, the term Alarm fatigue, Nurses and Intensive care unit include: It refers to the sensory overload of nurses when they are exposed to numbers of alarms result in desensitization to alarms and missed alarms, will be measured by Alarm Fatigue Assessment Questionnaire. Nurses: They refer to the professional nurses working in critical care setting. Intensive Care Unit: It refers to specialized unit where patients with variety of critical conditions are provided the highest level of care by trained health care personnel.

The data was collected in Intensive Care Unit in the month of July and August 2022 after getting permission from ethics committee of SRHU and administrative approval. Eligible participants were identified as per the selection criteria of the study. Rationale of the study was explained and written consent was taken. On the day of data collection socio- demographic Performa and alarm fatigue questionnaire was administered and information was collected from the participants. Collected data was entered in master sheet after encoding for analysis.

Ethical permission was obtained from Ethics Committee, SRHU. Written informed consent was obtained. Data analysis was planned according to the prepared objectives and hypothesis and descriptive and inferential statistics were used. Descriptive statistics such as frequency and percentage were used to describe characteristics of study participants. Inferential statistics were used to determine the association of alarm fatigue among nurses.

RESULTS

Majority 72 (60%) of the study participants falls in age group 26-35 year. More than half of the participants 81 (67.5%) were females. More than half of the participants 61 (50.83%) had done GNM followed by B.Sc. Nursing 49 (40.84%). Majority 120 (100%) cardiac monitoring were used in the ICU followed by 94 (78.33%). Mechanical ventilator, 76 (63.33%) Syringe pump, 76 (45.83%) Infusion pump, 33 (27.5%) Mobile-landlines, 33 (27.5%) DVT pump and 17(14. 16%) Hemodialysis machine. (Table 1)

Data presented in Table 2 reveals that obtained range 16-36 of score was 0-52 (maximum score 52), mean was 26.76±1.87 with the median 27 (Table 2).

Table 3 and Fig. 1 shows that most of the participants (93.4%) had moderate level of alarm fatigue followed by severe (5%) and mild (1.6%) (Table 3 and Fig. 1).

About 40% of the participants paid a smaller amount of attention to the alarm. About 40.8% participants were not losing any patient when alarm go off repeatedly and continuously. About 31.6% participants were act indifferently when alarm goes off

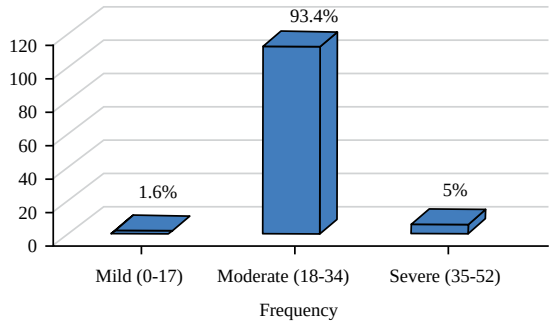

Fig. 1: Bar chart showing level of alarm fatigue among participants

Table 1: Frequency and percentage of socio-demographic profile of participants (n= 120)

Variables	Frequency (f)	Percentage (%)
Age (year)		
20-25	34	28.3
26-35	72	60
36-46	14	11.7
Gender		
Male	39	32.5
Female	81	67.5
Education		
GNM	61	50.84
BSc nursing	49	40.84
Post BSc nursing	10	8.32
MSc nursing	0	0
Working-experience (Overall, in year)		
< 1	15	12.8
1 to 5	62	51.7
6 to 10	34	28.40
11 to 15	5	4.20
16 to 20	3	2.9
Working-experience (ICU in year)		
<1	26	21.6
1-5	80	66.66
6-10	13	10.9
11-15	0	0
16-20	1	0.84
Marital status		
Married	51	42.6
Unmarried	69	57.4
SHIFTS		
Morning	40	33.3
Evening	80	66.7
Night	0	0
Nurse/patient ratio		
1:1	63	52.5
1:2	57	47.5
Properly-sleep pattern		
Yes	88	73.4
No	32	26.6
Have headache		
Yes	33	27.5
No	87	72.5
History of Illness		
Yes	11	10
No	108	90
No. of devices		
Cardiac monitor	120	100
Mechanical ventilator	94	78
Syringe-pump	76	63
Infusion-pump	55	45
Mobile and landlines	33	27
DVT pump	33	27
Hemodialysis machine	17	14

repeatedly. About 34.1% participants sometimes prevent from quick response to alarm due to heavy workload in their shifts. About 28.3% participants

Table 2: Range, mean, median and mean percentage of alarm fatigue among participants (n = 120)

Variables	Range	Mean± SD	Median	Mean (%)
Alarm Fatigue	16-36	26.76±1.87	27	51.46%

Table 3: Levels of alarm fatigue among participants (n = 120)

Level of alarm fatigue	Frequency (f)	Percentage (%)
Mild (0-17)	2	1.6
Moderate (18-34)	112	93.4
Severe (35-52)	6	5

sometimes believed too much disturbance due to sound. Mostly (30%) participants sometimes heard noise in the ward (Table 4).

Non-significant association was seen between Alarm fatigue and Socio-demographic variables of Participants at p<0.05 level of significance such as Age (3.13), Gender (2.09), Education status (2.07), Overall clinical experience (0.02), Overall ICU experience (0.87), Marital status (0.03), Shift (1.33), Nurse- Patient ratio (4), Proper sleep pattern (0.1), Have headache (1.66) and History of illness (1.66) (Table 5).

DISCUSSIONS

The state of alarm fatigue is an area of mental health with a very important bearing on healthcare professionals' quality of life. Fatigue may also affect staff health and morale in the long term, having effects on cardiovascular outcomes, depressions leading to stress and even burnout[8].

Our study found that most of the participants (93.4%) had moderate level of alarm fatigue followed by severe (5%) and mild (1.6%). These findings were supported by the similar study which observed that critical care nurses are experiencing alarm fatigue or not (66.92%) alarm fatigue[9]. Another study was carried out in Iran among intensive care nurses, with an incidence of alarm fatigue at 19.08 and 6.26[10]. This difference may be due to the different in settings, infrastructure and protocols of critical care settings.

Our study found that non-significant association exist between Alarm fatigue and Socio-demographic variables of Participants at p<0.05 level of significance. There was no association between Alarm fatigue and Socio-demographic variables such as age (3.13), gender (2.09), Education status (2.07), Overall clinical experience (0.02), Overall ICU experience (0.87), Marital status (0.03), Shift (1.33), Nurse- Patient ratio (4), Proper sleep pattern (0.1), Have headache (1.66) and History of illness (1.66).

In contrast, a study in Iran found that nurses with higher educational attainment were more likely to be affected by alarm fatigue and also an analysis in Lebanon determined that the average alert fatigue score is higher for nurses with higher levels of education[10]. However, a study on nurses working in intensive care units has shown an inverse relationship between educational attainment and the occurrence of

Table 4: Frequency and percentage of alarm fatigue among nurses (n = 120)

Statement	Never f (%)	Rarely f (%)	Sometime f (%)	Often f (%)	Always f (%)
"At visiting hours, I pay less attention to the alarm of the equipment"	48 (40%)	24 (20%)	22 (18.33%)	6 (5%)	22 (18.33%)
"Alarm sounds prevent me from focusing on my professional duties"	37 (30.8%)	21 (17.5%)	24 (20%)	11 (9.16%)	26 (21.6%)
"When alarm go off repeatedly and continuously, I lose my patience"	49 (40.8%)	22 (18.3%)	38 (31.6%)	6 (5%)	6 (5%)
When I'm upset and nervous, I'm more responsive to alarm sounds.	42 (35%)	16 (13.3%)	23 (19.1%)	12 (10%)	30 (25%)
"I react differently to low volume (yellow) and high volume (red) of the ventilator"	26 (21.6%)	16 (13.3%)	25 (20.8%)	17 (14.6%)	39 (32.5%)
"Alarm sound make me nervous"	60 (50%)	15 (12.5%)	5 (29.1%)	7 (5.83%)	5 (4.16%)
"When alarm go off repeatedly, I become indifferent to them"	36 (30%)	22 (18.33%)	38 (31.6%)	10 (8.3%)	16 (13.3%)
"In some shifts the heavy workload in the ward Prevents my quick response to alarm"	13 (10.8%)	24 (20%)	41 (34.1%)	18 (15%)	23 (19.1%)
"I pay more attention to the alarms in certain shifts"	22 (18.3%)	18 (15%)	14 (11.6%)	17 (14.16%)	49 (40.8%)
"I believe much of the noise in the ward is from the alarms of the monitoring equipment"	23 (19.1%)	15 (12.5%)	34 (28.3%)	18 (15%)	31 (25.8%)
"Generally, I hear a certain amount of noise in the ward"	21 (17.5%)	21 (17.5%)	36 (30%)	12 (10%)	28 (23.3%)
"I turn off the alarm at the beginning of every shift"	87 (72.3%)	11 (9.16%)	13 (10.8%)	2 (1.66%)	8 (6.6%)
"I regularly readjust the limits of alarms based on the clinical symptoms of the patients"	34 (28.3%)	20 (16.6%)	35 (29.1%)	11 (9.16%)	18 (15%)

Table 5: Association between alarm fatigue and socio-demographic variables of participants (n = 120)

Variables	Frequency	Below median	At and above median	Chi-square
Age				
20-35	107	52	54	3.13
36-50	13	3	10	
Gender				
Male	42	16	26	2.09
Female	78	40	37	
Education status				
Diploma	62	26	36	2.07
Degree	58	32	26	
Overall-clinical experience				
<1-10 year	107	52	55	0.02
11-20 years	13	6	7	
Over-all-ICU experience				
<1-10 Years	113	53	60	0.87
20-10 Years	7	2	5	
Marital status				
Married	51	24	28	0.03
Unmarried	69	32	36	
Shift				
Morning	40	18	22	1.33
Evening	80	45	35	
N/P ratio				
1:1	59	32	27	4
1:2	61	22	39	
Proper-sleep pattern				
Yes	92	36	56	0.1
No	28	12	16	
Have-headache				
Yes	30	14	16	1.66
No	90	41	49	
History of illness				
Yes	8	4	4	0.45
No	112	50	62	

f: frequency anddf: 2-5.99 at p<0.05

alarm fatigue[11]. The type and atmosphere of the study may be to blame for this difference. These findings were supported by the similar study conducted by Cho *et al*., had done a descriptive study[7].

A study in Lebanon revealed that the clinicians who declared that nurses are responsible for alarm limit settings showed lower scores of AF than others subgroups whereas in the current study these was no significant difference between who sets the alarm and the alarm fatigue[12]. This difference may be due to the fact that nurses and doctors jointly set alarm thresholds in most cases in this study.

A complex, uncontrollable cognitive process takes place when we experience alarm fatigue. This can be attributed to the changes in Human cognition and focus towards adapting to the environment[11]. The development of individual alarms for different situations, joint monitoring (screen), simple access to technical assistance, staff support, more humane working times and alarm management protocols may help reduce the fatigue experienced by nurses[12].

The sample size is minimal and the results in critical care settings are restricted to a single hospital. Therefore, it is not possible that all nurses working in critical care settings are represented by these findings.

CONCLUSION

The study concludes that most of the participants had moderate level of alarm fatigue which can be reduced by a proper training of handlings the alarms. To overcome alarm fatigue, improve visualization of alarms and enhancing the value of each alarm by determining which alarm is critical. Periodically check and adjust the status of all machine backups and batteries.

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