A Study to assess the strategies for managing alarm fatigue among nurses in the paediatric intensive care unit in Narayana Medical College and Hospital at Nellore

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Abstract: Background: This study assesses the strategies for managing alarm fatigue among nurses in the pediatric intensive care at Narayana Medical College and hospital, Nellore. **Objectives:** 1) To assess the strategies for managing alarm fatigue among nurses in the pediatric intensive care unit. 2) To evaluate the effectiveness of strategies for managing alarm fatigue among nurses in the pediatric intensive care unit. **Methods:** A quantitative research approach and quasi experimental design adopted for this study. The study was conducted at Narayana Medical College and Hospital, Nellore. Non Probality purposive sampling technique was adopted. A total of 60 staff were conveniently selected. 30 samples assigned to experimental group. 30 samples assigned to control group. Pre test was done both experimental and control group by using interview based on alarm fatigue check list. The intervention is on strategies for managing alarm fatigue was given for 15 minutes for each sample to experimental group where as control group received routine activities. **Results:** The results show that, out of 60 nurses with regard to control group frequency and percentage distribution of alarm fatigue among nurses. During pre test, 5(16.6%) were had moderate, and 21(70%) were had severe, 4(13.3%) were had very severe. Where as in post test 4(13.3%) were had moderate, 21(70%) were had severe, 5(16.6%) were had very severe. **Conclusion:** The findings of the study shows that strategies for managing alarm was effective to reduce the alarm fatigue among nurses in the pediatric intensive care unit by using strategies for managing alarm fatigue. **Keywords: Strategies, managing, alarm fatgue, nurses.**

Introduction: The Pediatric intensive care unit (PICU) is the section of the hospital that provides sick children with the highest level of medical care. It differs from other parts of the hospital, like the general medical floors, in that the Pediatric intensive care unit PICU allows intensive nursing care and continuous monitoring of things like heart rate, breathing, and blood pressure.

The Pediatric intensive care unit also allows medical staff to provide therapies that might not be available in other parts of the hospital. Some of these more intensive therapies include ventilators (breathing machines) and certain medicines that can be given only under close medical supervision.

Need for the study: Premature ventricular contraction limit as well as eliminating duplicative alarms and third a software update that allowed nurses to view alarm messages of one patient in any monitor location on the unit. There was also a focus on personalizing alarms based on the individual patient's need. A pre intervention assessment of nurse's knowledge regarding alarm management was completed. Pre intervention alarm amount was 16953 and post intervention was 9647, a reduction of 43%. Nurses also reported a perceived reduction in overall noise after the intervention occurred.

A recent study completed by critical care nurses at Emory University, published in July, 2016 by Brantley et al examined the difference in pulse oximetry alarm rates before and after an educational session focusing on the personalizing of alarm parameters. They concluded a statistically significant reduction in pulse oximetry alarms at a 39% decrease. This study further suggests that personalization of alarm parameters can significantly reduce unnecessary alarms that contribute to alarm fatigue.

Problem statement: A study to assess the strategies for managing alarm fatigue among nurses in the pediatric intensive care unit in Narayana Medical College and Hospital at Nellore.

Objectives:

1. To assess the strategies for managing alarm fatigue among nurses in the pediatric intensive care unit.
2. To evaluate the effectiveness of strategies for managing alarm fatigue among nurses in the pediatric intensive care unit.
3. To find out association between effectiveness of strategies for managing alarm fatigue among nurses in the pediatric intensive care unit.

Operational definitions

Strategies: A plan of action designed to managing the alarm fatigue nurses in the pediatric intensive care unit.

Alarm fatigue: it is sensory overload when clinicians are exposed to an excessive number of alarms, which can result in desensitization to alarms and missed alarms.

Nurses: A person trained to care for the sick or infirm, especially in a hospital.

Null hypothesis:

H01: There is no statistically significant difference in the effectiveness of strategies for managing the alarm fatigue nurses in the pediatric intensive care unit.

Research hypothes:

H1: There is a statistically significant difference in the effectiveness of strategies for managing the alarm fatigue nurses in the pediatric intensive care unit.

Delimitations: The study is limited to,

- ❖ Only nurses in the pediatric intensive care unit.
- ❖ 60 nurses in the pediatric intensive care unit.
- ❖ 4 weeks of data collection period.

Projected outcome: The result of the study was help to managing alarm fatigue among nurses in the pediatric intensive care unit.

Methodology:

Research approach: Quantitative research approach was utilized to assess the effectiveness of strategies for managing alarm fatigue among nurses in the pediatric intensive care unit for this study.

Research design: The research design adopted for present study was quasi experimental non equalent control group design.

Group	Pre test	Intervention	Post test
Experimental	01	X	02
Control	01	-	02

O1: Pre test

X: Intervention

O2: Post test

Setting: The study was conducted in Narayana medical college and hospital at Nellore. It is located in Chinthareddypalem, urban area. It is a 1750 bedded hospital with the all facilities like special room general wards, outpatient departments, lab, pharmacy, operation theatre, intensive care unit. The study was conducted in paediatric wards consist of 120 beds and neonatal intensive care of 24 warmers, 6 phototherapy and 24 incubators and paediatric emergency consist of 6 beds with all facilities. It is well equipped with monitors and all emergency equipments. It is located first floor general block with the facilities of physiotherapy, radiological department and rehabilitation centre.

Population: Nurses who are working in pediatric intensive care unit, Narayana medical college and Hospital at Nellore.

Target population: Nurses who are working in pediatric intensive care unit, Narayana medical college and Hospital at Nellore.

Accessible population: Nurses who are working in pediatric intensive care unit who fulfill the inclusion criteria.

Sample: The sample consist nurses who are working

in pediatric intensive care unit, who fulfilled the inclusion criteria.

Sampling technique: Non Probability convenient sampling technique was adopted to select the samples.

Sample size: The sample size of the study was 60 nurses who are working in pediatric intensive care unit among them 30 were assigned to experimental group and 30 were assigned to control group.

Criteria for sample selection

Inclusion criteria

- Nurses of 21- 35 years.
- Nurses who are present in the area at time of data collection.
- Nurses who are working in the area at time of data collection.

Exclusive criteria

- Nurses who are not willing to participate in this study.
- Nurses who are not present in the area at time of data collection.
- Nurses who are not working in the area at time of data collection.

Variables

Independent variable - Strategies for managing alarm fatigue

Dependent variable - Managing alarm fatigue.

Description of the tool: The investigator was develop interview based on questionnaire to collect socio demographic data and checklist was used to assess the alarm fatigue among nurses.

Part - 1: Demographic variable of parents such as age, gender, educational qualification, income, residence, experience of staff nurses.

Part - 2: It deals with alarm fatigue checklist was for assessing the alarm fatigue among nurses.

Scoring Key: Alarm fatigue check list was used to assess the alarm fatigue.

Score interpretation

ITEM	SCORE
Mild	01-08
Moderate	09-16
Severe	17-24
Very severe	25-32

Content validity: The validity of the tool was obtained from 3 experts who are nursing personnel and professors on concerned topic. The tool was modified based on their suggestions and opinions before conducting the study.

Reliability: The reliability of the tool was established by split half method by using the spearman brown prophecy formula, r=2r/1+ r and r value was obtained, the reliability co-efficient was found to be r =1.

Feasibility: This reliability of tool was tested for feasibility by conducting pilot study among parents of under five year children with asthma in Narayana Medical College And Hospital at Nellore.

Ethical clearance: Ethical clearance was obtained from the institutional ethical committee for conducting the pilot study and the study was conducted in pediatric intensive care unit at Narayana Medical College and Hospital, Nellore. The formal permission was obtained from medical superintendent, HOD of pediatric department and Nursing Superintendent of the same hospital.

Pilot study: The formal permission was obtained from the institutional ethical committee, Medical superintendent, HOD of pediatric department and Nursing superintendent for conducting the pilot study for 2 weeks. Informed consent was collected from the 6 nurses. 3 were assigned to experimental group and 3 were assigned to control group. The study sample was obtained after explaining the nature and benefit of the study. The study was carried out from nurses who are working in pediatric intensive care unit at Narayana Medical College Hospital, Nellore. Pre test was done by using interview based alarm fatigue check list for nurses in experimental group and control group. The intervention is on strategies for managing alarm fatigue on clean and monitoring the equipments was given for 15 minutes for each participants in experimental group. After the intervention 15 minutes post test was conducted to assess the effectiveness of strategies for managing alarm fatigue by using checklist in experimental group and control group. The practicability feasibility of the

tool was established during the pilot study.

Data collection procedure: The data collection procedure was done for a period of 4 weeks from 8th feb 2019 to 8th March 2019. After obtaining prior permission from the Institutional Ethical committee, Medical superintendent, nursing superintendent and HOD of pediatrics department of Narayana medical college and hospital at Nellore. Informed consent was taken from the nurses. A total of 60 participants was selected by non probability convenient sampling technique. 30 samples assigned to experimental group.30 samples assigned to control group. Pre test was done both experimental and control group by using interview based on alarm fatigue check list. The intervention is on strategies for managing alarm fatigue was given for 15 minutes for each sample to experimental group where as control group received routine activities. After the intervention15 minutes post test was conducted to assess the effectiveness of strategies for managing alarm fatigue by using the alarm fatigue check list for both group. The study was limited for 4 weeks.

Plan for data analysis: Data analysis is done using descriptive statistics such as inferential statistics. The following methods was used to analyze the data.

Data analysis	Method	Remarks
Descriptive statistics	Frequency percentage distribution Mean and SD	Distribution of socio demographic variables of nurses in the pediatric intensive care unit. ❖ To assess the alarm fatigue among nurses in PICU
Inferential statistics	Paired "T" test	❖ To assess the effectiveness of strategies for managing alarm fatigue among nurses in PICU
	Chi–Square test	❖ To fine out association between effectiveness of strategies for managing alarm fatigue among nurses in PICU

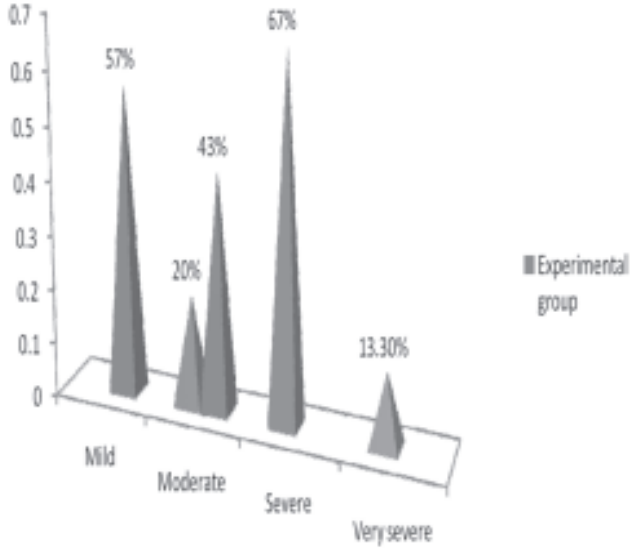
RESULTS:

Table 1: Frequency and percentage distribution on effectiveness of strategies for managing alarm fatigue among nurses in the paediatric intensive care unit in experimental group.

Level of alarm fatigue	Pre test		Post test	
(experimental group)	F	%	F	%
Mild	-	-	17	56.6
Moderate	6	20	13	43.3
Severe	20	66.6	-	-
Very severe	4	13.3	-	-
Total	30	100	30	100

Table 1: Shows that in experimental group, during pre test, 6(20%) were had moderate, and 20(66.6%) were had severe, 4(13.3%) were had very severe. Where as in post test, 17(56.6%) were had mild and 13(43.3%) were had moderate.

Figure 1: Percentage distribution on managing alarm



fatigue during pre test and post test in experimental group.

Table-2: Mean and Standard deviation of effectiveness of strategies for managing alarm

fatigue among nurses in the pediatric intensive care unit in experimental & control group. (N=60)

Group	Criteria	Mean	SD	Paired " t" test
Experimental	Pre-test	20.43	3.81	C=20.143
	Post test	9.73	3.77	df=2
				T=4.30; S*
				P<0.05
Control	Pre-test	20.33	3.63	C=.988
	Post test	20.73	3.78	df=2; T=4.30;
				NS; P<0.05

Table-2: Shows that mean and standard deviation of pre test and post test scores on managing alarm fatigue among nurses in the pediatric intensive care unit in experimental group. The pre test mean is 20.43 with SD 3.81. The post test mean is 9.73 with SD 3.77. The calculated value of paired 't' test is 20.143 and table value is 4.30 P<0.05 at the level of significance The calculated value is greater than the table value; so the null hypothesis is rejected and research hypothesis is accepted. It is evident that strategies for managing alarm fatigue is effective In control group the pre test mean is 20.33 with SD 3.63. The post test mean is 20.73 with SD 3.78. The calculated value of paired' test is 988 and table value is 4.30 at the p<0.05 level of significance. The calculated value is less than the table value; so the null hypothesis is rejected and research hypothesis is not accepted.

Table.3: Association between the post test scores on strategies for managing alarm fatigue with their selected socio demographic variables in experimental group. (N=30)

Socio demographic variables	Mild		Moderate		Chi square
	F	%	F	%	
Age					C=35.628
a. 21year - 25 years	2	6.6	4	13.4	t=3.18
b. 26 years - 30 years	7	23.4	9	30	df=3
c. 31 years - 35 years	5	16.6	1	3.4	S*
d. 36 years - 40 years	0	0	2	6.6	P<0.05
Gender					C=16
a. Male	6	20	4	13.4	t=12.71
b. Female	12	40	8	26.6	df=1;S*
Residence					C=4.84
a. Urban	4	13.4	2	6.6	t=12.71
b. Rural	14	46.6	10	33.4	df=1;NS*
					P<0.05
Monthly income					C=87.227
a. 10000Rs-12000Rs	2	6.6	0	0	t=3.18
b. 13000Rs-14000Rs	12	40	7	23.4	df=3
c. 15000Rs-16000Rs	4	13.4	5	16.6	S*
d. >17000Rs	0	0	4	13.3	P<0.05
Educational qualification					C=58.245 t=4.30
a. GNM	3	10	5	16.6	df=2
b. B.Sc	5	16.6	4	13.3	S*
c. Post B.Sc	6	20	3	10	P<0.05
Experience					C=72.725
a) Less than 1year	4	13.4	4	13.4	t=3.18
b) 1year-3years	14	46.6	8	26.6	df=3
c) 3years-5years					P<0.05
d. > 5 years					S*

S: Significance C: Calculated value NS: Non Significant T: Tabulated value Df =(c-1) (r-1)

Table.3: Shows that the association between post test scores effectiveness of strategies for managing alarm fatigue with their socio demographic variables in experimental group.

In reference with age calculated value is 35.628 and table value is 3.18. The calculated value is less than the table value, so there is statistical significance.

With regard to gender calculated value is 16 and table value Is 12.71. The calculated value is less than the table value, so there is statistical significance. With reference to residence, the calculated value is 4.84 and table value is 12.71. The calculated value is less than the table value, so there is no statistical significance.

With regard to monthly income, calculated value is 87.227 and table value Is 3.18. The calculated value is less than the table value, so there is statistical significance.

With concern to educational qualification, calculated value is 58.245 and table value is 3.18. The calculated value is less than the table value hence there is statistical significance.

In association with experience, calculated value is 72.725 and table value is 3.18. The calculated value is more than the table value, so there is statistical significance.

Discussion: Control group frequency and percentage distribution of alarm fatigue among nurses. During pre test, 5(16.6%) were had moderate, and 21(70%) were had severe, 4(13.3%) were had very severe. Where as in post test 4(13.3%) were had moderate, 21(70%) were had severe, 5(16.6%) were had very severe.

Nursing implications of the study: The findings of the study have several implications for nursing practice, nursing education, nursing research, and nursing administration.

Nursing practice

❖ The nurse as a member of health care team should be aware of the managing alarms fatigure.

❖ Nurse should explain the strategies for managing alarm fatigue among nurses in the pediatric intensive care unit.

Nursing education

❖ Education helps on nursing students to develop more insight on new concepts which will enable them to take care of managing alarm fatigue effectively.

❖ Nursing student should taught on strategies for managing alarm fatigue among nurses in the pediatric intensive care unit, so that they can provide standard care to the child.

Nursing administration

❖ Nursing administration should organize in-service education/ workshop/simulation/ CNE/ seminar on managing alarm fatigue regarding various strategies are keep monitors clean, aware of correct monitoring, proper handling, to improve the knowledge of staff nurse and students.

❖ Nursing administration should plan in service education programme on alarm errors.

Nursing research:

❖ Extensive research can carried out on effectiveness of strategies for managing alarm fatigue in the ICU.

❖ Research on knowledge regarding alarm fatigue among nurses can be conducted in community setting.

Recommendations for the further research:

Based on the findings, the following recommendations are suggested for future research.

1. A similar study can be replicated on a large sample to generalize the findings.
2. This study can be conducted with managing alarm fatigue among nurses in general wards.

Conclusion: The findings of the study shows that strategies for managing alarm was effective to reduce the alarm fatigue among nurses in the pediatric intensive care unit by using strategies for managing alarm fatigue.

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