

Effectiveness of an Interventional Program on Nurses' Knowledge and Practices About Clinical Monitoring Devices Alarms at Intensive Care Unit at Al-Imam Al-Hussein Medical City in Holy Karbala Governorate

الخلاصة:

خلفية البحث: ان عدد الأجهزة المزودة بأنظمة إنذار قد تضاعف بشكل كبير في السنوات الأخيرة في اغلب وحدات المستشفى. حيث تُصدر شاشات المراقبة وأجهزة التهوية الاصطناعية ومضخات التسريب والتقطير الوريدي والعديد من الأجهزة الأخرى صقيراً متكرراً لا نهاية له، مما يتطلب انتباه مقدم الرعاية الصحية دائماً.

الهدف: تهدف الدراسة الحالية إلى معرفة فاعلية البرنامج التداخلي على معارف الممرضين فيما يتعلق بأسباب انطلاق إنذار الأجهزة السريرية ومعرفة العلاقة بين فاعلية البرنامج والمستوى التعليمي للممرضين وسنين الخبرة في مهنة التمريض، وسنين الخبرة للممرضين في وحدات العناية المركزة.

المنهجية: تم إجراء دراسة شبه تجريبية على 80 ممرض وقسمت إلى مجموعتين (المجموعة التجريبية التي تعرضت الى البرنامج، والمجموعة الضابطة للمقارنة مع المجموعة التجريبية). للممرضين العاملين في مدينة الامام الحسين ع الطبية في مدينة كربلاء المقدسة في العراق. بدأت الدراسة في 3 / أيار / 2020 ولغاية 25 / أيار / 2021. تتكون أداة القياس من جزئين؛ يتناول الجزء الأول خصائص العينة من حيث العمر والجنس ومستوى التعليم وسنين الخبرة في التمريض وسنين الخبرة في وحدات العناية المركزة والدورات التدريبية المحددة المتعلقة بالإنذار. يتناول الجزء الثاني من الاداة معارف الممرضين فيما يتعلق بأسباب انطلاق الإنذار في أجهزة المراقبة السريرية والذي يتكون من 23 فقرة. تم الحصول على صلاحية الأداة والبرنامج من 12 خبيراً في التخصص الدقيق، وكانت الموثوقية = 0.83، وتم تحليل البيانات باستخدام برنامج SPSS الإصدار 23. الأساليب الإحصائية المستخدمة في الدراسة الحالية هي الإحصاء الوصفي والاستنتاجي.

النتائج: أوضحت نتائج هذه الدراسة أن استجابات الممرضين للمجموعتين التجريبية والضابطة حول أسباب انطلاق الإنذار لكل من جهاز شاشة المراقبة وجهاز التنفس الصناعي وجهاز مضخة الحقن والتقطير حيث كانت نسبة المعارف للممرضين 54.31% فيما يتعلق بأسباب انطلاق إنذار جهاز شاشة المراقبة للمجموعة التجريبية قبل تنفيذ البرنامج، بينما تحسنت معارفهم لتكن 100.0% في الاختبار البعدي. معارف الممرضين في المجموعة الضابطة بقيت على نفس المستوى في الاختبار القبلي والذي هو 54.32%. فيما يتعلق بأسباب انطلاق انذار جهاز التنفس الصناعي فقد كانت نسبة معارف الممرضين 53.16% في الاختبار القبلي وتغيرت إلى 93.66% في الاختبار البعدي للمجموعة التجريبية، بينما كانت معارف الممرضين في المجموعة الضابطة المتعلقة بأسباب إنذار جهاز التنفس الصناعي 22.26% في الاختبارين القبلي والبعدي واستجابات الممرضين لأسباب انطلاق إنذار مضخة الحقن والتقطير فقد كانت 63.38% في الاختبار القبلي وتحسنت معارفهم في الاختبار البعدي بنسبة 100.0% للمجموعة التجريبية، وكانت معارف الممرضين للمجموعة الضابطة حول أسباب إنذار جهاز الضخ والتقطير 26.66% للاختبارين القبلي والبعدي.

الاستنتاجات: استنتجت الدراسة بأن البرنامج الإرشادي قد اثبتت فاعليته من خلال تحسين معارف الممرضين في المجموعة التجريبية.

التوصيات: يوصي الباحث بضرورة تطبيق البرنامج الحالي على جميع الممرضين في الوحدات الحرجة لما له من أهمية قصوى في المراقبة وسلامة المرضى.

الكلمات المفتاحية: برنامج إرشادي، معارف، الممرضين، السريرية، المراقبة، أجهزة، إنذارات، وحدة العناية المركزة.

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ABSTRACT

Background: In recent years, the number of devices with alarms has multiplied exponentially in the vast majority of hospital units. Where monitors, ventilators, infusion pumps, and many other devices beep endlessly, demanding the care provider's attention always ⁽¹⁾.

Objective: The aims of the present study is to find out the effectiveness of instruction program on nurses knowledge concerning causes of releasing clinical devices alarm and to find out the relationship between the effectiveness of program and nurses level of education, year of experiences in nursing, and year of experiences in intensive care units.

Methodology: a quasi-experimental study was carried out on 80 nurses which is divided to two groups (Experimental group who exposed on program, and control group to compare with experimental group) of nurses working in Al-Imam Al-Hussein Medical City, in holy Kerbala 'a City, Iraq. The study started in 3rd of May, 2020 to 25th of May, 2021. The instrument consist of two part; part one deals the characteristics of the sample which of age, gender, level of education, year of experiences in nursing, year of experiences in intensive care units, and specific training courses. Part two deals with the nurses' knowledge concerning causes of releasing clinical devices alarm which of 23 items. The validity of instrument and program was obtained from 12 experts in specialty, the reliability was =1.81, the data analysis was done by uses SPSS program version

23, the statistical methods which used in present study is descriptive and inferential statistics.

Results: the findings of present study revealed that the nurses' responses for experimental, and control groups about the causes of releasing alarm for monitor, ventilator, and syringe pump infuser alarm, which of 54.31% of experimental group knowledge about the causes of monitor device alarm at pretest, while their knowledge was improved to 100.0% at posttest, the control group knowledge related to causes of monitor device alarm was still at same level in pre and posttest which of 54.32%, the experimental group knowledge related to causes of ventilator machine alarm was 53.16% at pretest, and changes to 93.66% at posttest, while the control group knowledge related to causes of ventilator alarm was 22.26% in pre and posttest, and the nurse responses for causes of syringe pump infuser alarm was 63.38% at pretest and their responses improved at posttest which of 100.0% for experimental group, and the control group knowledge about causes of alarm for syringe pup infuser was 26.66% at pre and posttest.

Conclusion: the study concluded that the instruction program on nurses' knowledge was effective on experimental group through improving their knowledge.

Recommendation: The researcher recommends that the current program should be applied to all nurses in critical units because of its utmost importance in monitoring and patient safety.

Keyword: Instructions Program, Nurses, Knowledge, Clinical, Monitoring, Devices, Alarms, Releasing, Intensive Care Unit.

INTRODUCTION

Alarms help to prevent patient harm by providing rapid recognition of and reaction to critical situations, but only if they are not 'false alarms'. Medical progress leads to an increasing number of monitor able parameters and thus an increasing number of possible alarms ⁽²⁾. Clinical alarms of

medical devices in intensive care units were considered a health technology hazard and one of the foremost essential methods that warn the critical care nurses for immediate or potential threats facing critically ill patients before an undesired event occur.

The effective management of clinical alarms proceeds to be a challenging area for critical care nurses in a different clinical setting with regard to how they are selected, set up, and responded to it (3). Clinical alarms sources in the intensive care unit are generated from medical devices that includes not only cardiac physiological monitors for measuring vital signs but also therapeutic devices, such as mechanical ventilators, syringe or infusion pumps, air bed mattresses alarms, pneumatic compression devices and patient call systems. These devices have a variety of auditory and visual alarm signals that alert clinicians independently to changes in the condition of a patient (4, 5).

AIMS OF THE STUDY

The aims of the present study is to find out the effectiveness of instruction program on nurses knowledge concerning causes of releasing clinical devices alarm and to find out the relationship between the effectiveness of program and nurses level of education, year of experiences in nursing, and year of experiences in intensive care units.

METHODOLOGY

- **Study Design:** A quasi-experimental design (test-retest method) is used to conduct the present study.
- **Ethical Consideration:** The researcher obtained the approval of the hospital administration, as well as the consent of the participants in the research.
- **Study setting:** Al-Imam Al-Hussein Medical City, Holy Karbala, Iraq.
- **Study sample:** A purposive, non-probability sample of (80) nurses who work at the intensive care unit, and medical. The sample was divided to two groups which of (40) nurses as experimental, 40 nurses as control group.
- **Study instrument:** the instrument consist two part; part one deals the characteristics of the study sample which of 6 items, and part two consist of 23 items constructed according to review of literature.
- **Validity of Instrument:** the validity of instrument was obtained through 12 experts.
- **Reliability of instrument:** the reliability was estimated by using Cronbach's Alpha which equal 0.83.
- **Statistical and Data Analysis:** the researchers are used Package of Social Sciences version 23, and used of Descriptive and Inferential Statistical for data analysis.

RESULTS

Table (1): Distribution of the Study Sample (Experimental, and control groups) according to their Socio demographic Characteristics (No = 40)

No.	Characteristics	Experimental group		Control group		
		Freq.	%	Freq.	%	
1	Age/Years	22 – 26	22	55.0	15	37.5
		27 – 36	16	40.0	16	40.0
		37 – 46	1	2.5	5	12.5
		47 – 56	1	2.5	3	7.5
		57 and over	0	0	1	2.5
		Total	40	100 %	40	100 %
		Mean ± SD	23.65 ± 3.25		27.07 ± 8.52	
2	Gender:	Male	17	42.5	20	50.0
		Female	23	57.5	20	50.0
3	Level of education	College	20	50.0	20	50.0
		Institute	9	22.5	9	22.5

		Preparatory	11	27.5	11	27.5
4	Years of experience In nursing	1 – 5	28	70.0	28	70.0
		6 – 10	5	12.5	5	12.5
		11 – 15	3	7.5	3	7.5
		16 ≤	4	10.0	4	10.0
5	Years of experience in ICU	1-3 years	26	65.0	25	62.5
		4-6 years	14	35.0	15	37.5
6	Specific Training course	No	36	90.0	30	75.0
		Yes	4	10.0	10	25.0

Similarity for two variables for Experimental and control group No: Number, F: Frequency, %: Percentage.

Table 1 shows the socio-demographic characteristics of present study revealed that the age of experimental group was 55 % at 22-26 years old (M.S., 23.65, S.D. 3.25) and the control group was 40% at 27-36 years old (M.S., 27.07, S.D., 8.52). A high percent of nurses who participated in present study was females which of 57% for experimental, and 50% for control group, high percent of both group was graduated from nursing college which of 50%, 70% of experimental and control group have 1-5 year of experiences in nursing which of 70%, high percent of experimental and control group have 1-3 year of experiences in critical care unit which of 65%, and 62.5% respectively, and majority of the nurses not have training course related to clinical alarm which of 90%, and 75% for experimental, and control group respectively.

Table (2): Nurses' Responses about clinical alarm releasing causes for Experimental and Control Group

No.	Items	Experimental group (N=40)				Control group (N=40)			
		Pre-test		Post-test		Pre-test		Post-test	
		F.	%	F.	%	F.	%	F.	%
1.	The monitor (telemetry) device								
Total	Agree		54.31%		100.0%		54.32%		54.32%
Total	Not sure and disagree		45.69%		0		45.68%		45.68%
Total	Disagree		0		0		0		0
2.	The ventilator machine device								
Total	Agree		53.16%		93.66%		22.26%		22.26%
Total	Not sure and disagree		46.84%		6.34%		77.74%		77.74%
Total	Disagree		0		0		0		0
3.	The syringe pump infuser device								
Total	Agree		63.38%		100.0%		26.66%		26.66%
Total	Disagree and not sure		36.62%		0		73.34%		73.34%
Total	Disagree		0		0		0		0

No: Number, Freq.: frequency, %: percentage

Table 2 showed that the nurses' responses for experimental, and control groups about the causes of releasing alarm for monitor, ventilator, and syringe pump infuser alarm, which of 54.31% of experimental group knowledge about the causes of monitor device alarm at pretest, while their knowledge was improved to 100.0% at posttest, the control group knowledge related to causes of monitor device alarm was still at same level in pre and posttest which of 54.32%, the experimental group knowledge related to causes of ventilator machine alarm was

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Table (3): Statistical Differences between the Experimental, and control groups regarding to nurse’s knowledge about the causes of alarm

Items	Paired Differences					t. test	df.	Sig. P≤ 0.05
	Total Mean	S.D	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Nurses’ knowledge about monitor alarms causes	63.00000	9.13713	1.44471	60.07780	65.92220	43.607	39	.000 H.S
Nurses’ knowledge about ventilator alarms causes	67.82500	24.02978	3.79944	60.13990	75.51010	17.851	39	.000 H.S
Nurses’ knowledge about syringe pump infuser alarms causes	45.35000	5.03093	.79546	43.74103	46.95897	57.011	39	.000 H.S

Table (3) shows that there were highly significant between the experimental and control group regarding nurses' knowledge about the alarm causes at P≤ 0.05 level.

Table (4): Statistical Differences between the Experimental and control groups regarding their Practical Knowledge for management of alarm.

Items	Paired Differences					t	df	Sig. P≤0.05
	M.S	S.D	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Practical Knowledge for management of alarm	-31.175	32.796	5.185	-41.663	-20.686	-6.012	39	.000 H.S.

M.S: mean of score, S.D: standard deviation, t: t-test, df: degree of freedom, Sig.: significant.

Table 4 shows that there were highly significant between the experimental and control group regarding to nurses Practical Knowledge for management of alarm at P ≤ 0.05 level.

Table (5): Relationship between the effectiveness of Interventional Program on experimental group and Nurses level of education, year of experiences in nursing, and year of experiences in Critical units.

Items		Level of education	Experiences in nursing	Experiences in Critical Units	Total Knowledge
Education Level	Pearson Correlation	1	-.083	-.176	-.222
	Sig. (2-tailed)		.610	.279	.169
	N	40	40	40	40
	Pearson Correlation	-.083	1	.260	-.293

Experiences	Sig. (2-tailed)	.610		.105	.056 (S.)
	N	40	40	40	40
Years of Experiences In ICU	Pearson Correlation	-.176	.260	1	.159
	Sig. (2-tailed)	.279	.105		.327
	N	40	40	40	40
	Pearson Correlation	-.222	-.293	.159	1
	Sig. (2-tailed)	.169	.056	.327	

Table 5 revealed that there was a relationship between the effectiveness of instruction program and nurses year of experiences in nursing at $p \leq 0.05$ levels..

DISCUSSION

Regarding socio-demographic characteristics which are presented in table (1) showed the eligible sample for this study consisted of (80 (adult nurse for both two groups (experimental versus control). Thirty seven (37) nurses were males and forty three (43) were female nurses. The current outcome can be similar to a research was conducted by researchers who stated that the results of the study in both groups were based on demographic characteristics such as age, gender, level of education, years of experience, years of experience in intensive care unit and participation in clinical alarm course . There was no significant difference at ($p > 0.05$) between the two groups related to the variables mentioned ⁽⁶⁾. Our age findings are similar to the results of a survey design study that was conducted by Rachel, et al. to evaluate nurses' perceptions of infusion pump alarms in Bethlehem, Pennsylvania, USA. The majority of participants were of 30-40 years of age ⁽⁷⁾.

According to current findings of study which showed a descriptive assessment of clinical alarms questionnaire for both experimental and control groups before applying the instruction program to assess studied samples' knowledge concerning clinical monitoring devices alarms releasing causes (table 2). Results of the study found that nurses' knowledge before applying program were at moderate levels for both experimental and control group. Respectively as regard to before implementation of the program. Safaa, and

colleagues carried out a quasi-experimental design study in Egypt to deliver a same program for (20) adult men patient in intensive care unit. Before executing the instructions, they assessed the targeted sample's knowledge level concerning clinical alarm. The results revealed that most study participants were confirmed to have poor to moderate level of knowledge related to clinical alarms. And after the implementation of the program, nurses' knowledge improved. So, these results come in total agreement with the current results of the study ⁽⁸⁾.

Effectiveness of the instruction program is clearly observed through the results of table (3). This table illustrates that there are significant mean differences concerning specific knowledge areas between the experimental and control groups after applying the program in the post-test period at p value ≤ 0.01 . These findings were agreed with outcomes obtained from educational study conducted by Thompson and Stapley, in University of York, in UK to identify whether the educational interventions improve nurses' clinical decision making and judgment. They emphasized that the educational program helps to improve and develop the skills and knowledge of nurses and found wide differences between pre-post-tests ⁽⁹⁾.

Table (4) shows that there were highly significant between the experimental and control group regarding to nurses Practical Knowledge for management of alarm at $P \leq 0.05$ level. Safaa and

colleague, (2019) reported in their study that their intervention program was effective and it achieved a statistically significant improvement of nurse's practice at post-intervention program process regarding clinical alarms management ⁽¹⁰⁾. Table (5) revealed that there was a relationship between the effectiveness of instruction program and nurses year of experiences in nursing at $p \leq 0.05$ levels. Speich M., (2017) mentioned in her study that the pre-intervention alarm rates a high count. And at post-intervention stage through the educational sessions, the alarms counted down and that mean there was a statistically significant decreased at $P \leq 0.05$ ⁽¹¹⁾.

CONCLUSION

In conclusion, the results of the current study show that the experimental group participants have significant improvement in post-test mean of scores about clinical monitoring devices alarms releasing causes, control and solutions. The study

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recommended to encourage nurses staff at Al-Imam Al-Hussein Medical City in Holy Kerbala 'a Governorate to perform clinical alarms management courses periodically.

RECOMMENDATIONS

The researcher recommends that the current program should be applied to all nurses in critical units because of its utmost importance in monitoring and patient safety.

ACKNOWLEDGEMENTS:

This research was funded by Authors. Moreover, we would like to thank the study participants and data collectors for their fully participation and responsible data collection.

Conflict of interest: None declared.

Ethical approval: The study was approved by the Institutional Ethics Committee.

Practice and Patient outcomes at Intensive Care Unit. A published thesis. *Journal of Nursing and Health Science (IOSR-JNHS)*, E-ISSN: 2320–1959. p- ISSN: 2320–1940 Volume 8, Issue 4 Ser. I. (2019), pp.: 01-14, 1, 2, 6.

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