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# Instruction Program on Nurses Knowledge concerning causes of releasing clinical Devices Alarm in Critical Care Units

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**Abstract:** In recent years, the number of devices with alarms has multiplied exponentially in the vast majority of hospital units. Monitors, ventilators, infusion pumps, and many other devices beep endlessly, demanding our attention [(1)].

**Objectives:** 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 is divided to two groups (Experimental group who exposed on program, and control group to compare with experimental group) two group of nurse is 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 course. 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 pre test, 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 post test 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 post test, while the control group knowledge related to causes of ventilator alarm was 22.26% in pre and post test, and the nurse responses for causes of syringe pump infuser alarm was 63.38% at pretest and their responses improved at post test 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 post test.

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

**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.

**Keywords**: Instructions Program, Nurses, Knowledge, Clinical, Monitoring, Devices, Alarms, Releasing, Intensive Care Unit

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**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 monitorable 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).

## Methodology:

**Design of the Study:** 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.

**Setting of the Study:** Al-Imam Al-Hussein Medical City, Holy Karbala, Iraq.

**The Sample of the Study:** 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.

**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:

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**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 | 18 – 24 | 22 | **55.0** | 15 | 37.5 |
| | | 25 – 34 | 16 | 40.0 | 16 | **40.0** |
| | | 35 – 44 | 1 | 2.5 | 5 | 12.5 |
| | | 45 – 54 | 1 | 2.5 | 3 | 7.5 |
| | | 55 and over | 0 | 0 | 1 | 2.5 |
| | | Mean ± SD | | | | |
| 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

The socio-demographic characteristics of present study in table (1) revealed that the age of experimental group was 55% at 18-24 years old, and the control group was 40% at 25-34 years old, 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 experience 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**

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| 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%** |
| 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%** |
| 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%** |

**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 pre test, 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 post test 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 post test, while the control group knowledge related to causes of ventilator alarm was 22.26% in pre and post test, and the nurse responses for causes of syringe pump infuser alarm was 63.38% at pretest and their responses improved at post test 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 post test.

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

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| 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: Relationship between the effectiveness of instruction Program on experimental group and Nurses level of education, year of experiences in nursing, and year of experiences in Critical units**

| Items | | Level of ation | 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 |
| Years of Experiences | Pearson Correlation | -.083 | 1 | .260 | -.293 |
| | 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 |
| ***Total*** | Pearson Correlation | -.222 | -.293 | .159 | 1 |
| | Sig. (2-tailed) | .169 | .056 | .327 | |
| | N | 40 | 40 | 40 | 40 |

Table 4 :revealed that there was a relationship between the effectiveness of instruction program and nurses year of experiences in nursing .

## 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

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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 $\leq$ 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 judgement[(9).]

## Conclusions:

In conclusion, the results of the current study show that the experimental group participants have significant improvement in post-test knowledge scores about clinical monitoring devices alarms releasing causes, control and solutions.The study recommended to encourage nurses staff at Al-Imam Al-Hussein Medical City in Holy Kerbala'a Governorate to perform clinical alarms management courses periodically.

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Conflict of interest: None declared.

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

## References:

**1.** Emergency Care Research Institute (ECRI): Top 10 health technology hazards. *Health Devices journal*. 2012. 40 (11):1-16.

**2.** Chambrin MC, Raveaux P, Calvelo Aros D, Jaborska A, Chopin C, Boniface B. Multi-centric study of monitoring alarms in the adult intensive care unit (ICU): A descriptive analysis. *Intensive Care Med J*., 2016; 25:1360–1366. doi: 10.1007/s001340051082.

**3.** Vanderveen T. Alarm management: Using reliable data to eliminate unnecessary alarms. *Patient Safety & Quality Health J.*, (2014); 11: (6) 38-45.

**4.** The Joint Commission (TJC), National Patient Safety Goal on Alarm Management– Joint Commission Perspectives, 2013; 33 (7).

**5.** Sowan A, Reed C & Staggers N. Role of large clinical datasets from physiologic monitors in improving the safety of clinical alarm systems: A case from Philips Monitors. JMIR Human Factors, 2016.3(2):1-15.

**6.** Min C., Hwasoon K., Young W. and Insook C., Clinical Alarms in Intensive Care Units: Perceived Obstacles of Alarm Management and Alarm Fatigue in Nurses. Department of Nursing, Inha University, Incheon, Korea.2021. p.1, 50.

**7.** Maria C., Deborah D., Jan F., and Janice I., Enhancing patient safety through improved surveillance. Clinical Alarms and the Impact on Patient Safety: Initiatives in safe patient care. Medical University of South Carolina. 2009.p.p: 1, 3, 5, 6

**8.** Tsunami Alarm System. Accessed Oct. 2012. p.13. http://www.tsunami-alarm system.com

**9.** Cvach, M., Monitor alarm fatigue: an integrative review. *Biomedical Instrumentation & Technology J.* 2012. Vol. 46(4): 268-277.