EPH - International Journal of Medical and Health Science

NURSES' KNOWLEDGE IN THE MANAGEMENT OF CLINICAL ALARMS IN THE CRITICAL CARE UNIT OF A TERTIARY HOSPITAL, A CROSS-SECTIONAL STUDY

Lucy .W. Meng'anyi[1*], Lilian .A. Omondi[2], Margaret .N. Muiva[3] Sino. Z. Alaly[4]
[1]Kenyatta National Hospital, P.O. Box 20723/00202 Nairobi, Kenya,
[2]Nursing Sciences, University of Nairobi, P.O. Box 19676/00200, Nairobi, Kenya,
[3]Mount Kenya University, Thika, Kenya Email: robiwankuru@gmail.com ,Telephone Number: +254721419297.
[4]Implementation Research Solutions Kenya Email: alaly2k@gmail.com

[*]Correspondence author:-
Email: robiwankuru@gmail.com ,Telephone Number: +254721419297.

Abstract:-

Background*: In low and middle income countries like Kenya, nurses are overworked as the nurse to patient ratio is not as stipulated by the World Health Organization (WHO). In this sense clinical alarms are important as they are able to alert the nurses in the critical care units or other areas of the hospital on the change in the patient's condition. Nurses therefore need to be knowledgeable about alarms so as to manage patients effectively.*

Methods: *A descriptive cross-sectional study was carried out in the month of June 2014 where 87 nurses were recruited as study participants. A structured self-administered questionnaire was used to collect data. Chi square and Cramer's V were used to calculate relationship between the variables.*

Results: *Out of 87 respondents, 71.7% (62) were females and 27.6% (25) were males. The respondents responded to seven questions borrowed from an online Continuous Professional Development (CPD) program by the American Association for Respiratory Care (AACR) program on continuing education and scored 69% on average. There was a statistically significant association (p=0.049) between the question on knowledge, "Wiping electrodes with a rough washcloth or gauze and or using sandpaper on the electrode prevents spurious signals and helps to remove part of the stratum corneum allowing electrical signals to travel" and years worked in the critical care unit. The nurses who had worked in CCU for more than five years scored the highest (48.5%) whilst the ones who had worked in CCU for more than ten years scored the least (23.1%).*

Discussion: *There is a deficit in knowledge on the management of clinical alarms, effective assessment and training on management of clinical alarms is necessary. Protocols and policies on alarm management need to be developed.*

Key words: *Nursing, Knowledge, Management, Clinical Alarms, Intensive Care Unit, Critical Care Unit*

BACKGROUND:-

Technological advances in the health sector have increased over the past 25 years bringing about advances in more sophisticated and complicated monitoring equipment with built-in audible alarms. Alarms are intended to alert the members of the medical team regarding a deviation from a predetermined "normal status" and are considered to be a key tool in improving the safety of patients by communicating information that requires a response or awareness by the operator[1]. The various goals of device alarms are: to detect life threatening situations, diagnose, and detect life threatening device malfunction [2]. Because of the uniqueness of patients in terms of their physiological status, default alarm limits are not applicable for all patients hence alarm limits need to be set in view of each patient's condition.

In Kenya there is scarcity of research on management of alarms and the ratio of nurses to patients is not according to the WHO recommendation. From the researcher's observation at the time of rotation in the CCU, KNH, the nurse to patient ratio is a bracket of two nurses to three patients or a bracket of two nurses to four patients. The nurses also multitask, especially the nurses in the night shift who sometimes end up taking the patients for CT scans and they are the same nurses who are required to take care of other patients. Determining the knowledge of nurses on alarms in the CCU is therefore very important as it can affect the outcome of the patients. The aim of this study was determine the knowledge of nurses on the different clinical alarms in the Critical Care Unit of a Tertiary hospital. Data for literature review was obtained from: Hinari, Pubmed, Google scholar and Biomed central**.**

Methods

This was a descriptive cross sectional study which was conducted among nurses at the critical care unit from 1st June 2014 and 30th June 2014. The inclusion criteria included; all nurses who consented to participate in the study, were new nurses in the unit but had worked for six months and above during the time of the study, all nurses who had been permanently deployed to the unit at the time of data collection, and all nurses who were doing locum in the unit but were not permanently deployed to the unit and consented to participate in the study. The exclusion criteria included; all staff in the CCU who were not nurses that is, the doctors, biomedical staff and the support staff, student nurses who were on clinical rotation in the unit, nurses who declined and were absent at time of data collection. All the nurses who participated in the study were provided with informed consent sheets.

Approval for conducting the study had been sought from Kenyatta National Hospital/University of Nairobi Ethics Committee (KNH/Uon ERC). The study was funded by the KNH research and programs department. The respondents were provided with a self-administered questionnaire of which the researcher was able to collect information on: socio demographics, general questions about alarms, and nurses' knowledge of clinical alarms.

The questionnaire was pretested at the KNH Acute room, Accident and Emergency unit. The nurses in the unit have rotated in the CCU and the clinical alarms in the unit are the same as those in the CCU making the unit conducive for pretesting.

The sample size of 87 respondents was determined using the Cochran's formula[3] and since the target population was less than 10,000, the Fisher et al. formula [4] was used to give a further sample size estimate. The nurses have different work shifts hence convenience sampling method was used to recruit study respondents. Independent variables in the study were the age of the respondents, gender, professional qualifications of the respondents, and experience of the respondents which was measured by the number of years the respondents have worked in the unit. The dependent variable was knowledge on alarm management. The intervening variables were; workload, work environment and structural or organizational policies.

Statistical Package of Social Sciences (SPSS) version 20 [5] was used to analyze quantitative data. Chi square (X^2) and Cramer's V were used to establish the relationship between study variables.

Results: - Of the 87 nurses who participated in the study, the mean age (±SD) was 39.1 ±5.8 ranging from 27 to 54 years. Majority of the respondents were females 62(71.3%) whereas males were only 25(27.6%). A total of 7 questions borrowed from an online CPD by the AACR program on continuing education were posed to the respondents and on average the respondents scored 69% as illustrated in Table 1.it was noted that there was a statistical significance (p=0.049) between the question: "Wiping electrodes with a rough washcloth or gauze and or using sandpaper on the electrode prevents spurious signals and helps to remove part of the stratum corneum allowing electrical signals to travel" with the socio demographic variable years worked in the critical care unit (Table 2).

Discussion

The average score of 69% scored by nurses indicate that the nurses in the unit do require training on management of clinical alarms. The institution should also ensure that refresher courses on alarm management need to be an ongoing process. The nurses also reported lack of protocols and policies on alarm management hence the hospital should come up with a team that will ensure development of protocols and policies.

During collection of data, the respondents in this study expressed that the training on clinical alarms they had received during their training in Critical Care Nursing (CCN) was sufficient but the results of the study were on the contrary. The findings in this study therefore show that as much as the nurses thought they were knowledgeable about clinical alarms they were actually not. Most health care workers are very confident of what they do as a result of experience and most forget to look up the best way of doing things in terms of evidence based care.

The association between years worked in the critical care unit and the question on wiping electrodes with a rough cloth, could perhaps be explained by the fact that this action is a recent practice which has been researched by researchers like Cvach et al[9] and proved to work. Nurses who have not worked in the unit for long may probably not take time to research and be acquitted with current ways of handling alarms as they are happy with the status quo or think they know everything they need to know.

Conclusion

The results from this study indicate that nurses need to be sensitized on alarm management so as to improve on care of patients and alarm policies need to be established in the institution. The results from this study cannot be generalized to all the nurses in the other units in the hospital or the other professions like the doctors and biomedical staff. Further research needs to be undertaken to determine the knowledge level of this other professionals and the knowledge level of the other nurses in the other units like theatre and the emergency department.

Abbreviations

AACN: American Association of Critical Care Nurses
AARC: American Association for Respiratory Care
BScN: Bachelor of Science in Nursing
CCN: Critical Care Nursing
CCU: Central Care Unit
CPD: Continuous Professional Development
ERC: Ethics and Research Committee;
KNH: Kenyatta National Hospital
KRCHN: Kenya Registered Community Health Nurse
KRN: Kenya Registered Nurse
MScN: Masters of Science in Nursing
UoN: University of Nairobi
WHO: World Health Organization

Authors' contribution

L.W. submitted this research as part of a thesis for the partial fulfillment of the award of degree of Master of Science in Nursing (Critical Care Nursing) at the University of Nairobi. The substantial contributions to the conception or design and analysis of the work were done by L.W. L.O. and M.M. were the supervisors and helped in critically revising the work so as it could be fit for research. S.A. scrutinized and edited the work. The final version for publishing was prepared by L.W. L.O. M.M. and S.A. were informed and gave the go ahead to publish the work. L.W. agrees to be held accountable for all aspects of the work hence any questions related to the accuracy or integrity of the work should be directed to L.W. The results of this study were presented in the 3 International UoN/ KNH conference held on 12th of June 2015.

Competing interests

The authors declare no conflict of interest.

Refrences:-

[1].Initiatives inSafePatient Care.Saxe Healthcare Communications .www.initiativespatientsafety.org.(accessed 31/1/2014).

[2].Schmid F, Goepfert MS, Reuter DA. Patient monitoring, alarms in the ICU and in the operating room. *Critical care (London, England). 2013; 17(2):216.*

[3].Cochran W G, (1977). Sampling Techniques. 3rd Edition. John Wiley & Sonjs,Inc. ISBN 0– 471-16240-X.USA.

[4].Mugenda O, Mugenda A. Research methods: quantitative and qualitative approaches. In: Nairobi; African Centre for technology studies. ACTS: Press; 2003.

[5].IBM Corp. Released 2011. IBM SPSS statistics for windows, version 20.0. Armonk, NY: IBM Corp.

[6].Biomed Central Critical care article.www.Ccforum.com(accessed on 22/9/2014)

[7].American Association of Critical Care Nurses Website. Www. aacn.org. (Accessed 24/1/2014).

[8]."Alarm Management", American Association of Critical Care Nurses (AACN) Bold Voices, 2013: http://www.nxtbook.com/nxtbooks/aacn/boldvoices_201308/?startid=0#/10 (accessed 26/1/2014).

[9].Cvach M. The John Hopkins Hospital Quality Improvement Data. Presented at the Medical Device Alarm Summit. *Oct 5, 2011.Herndon, VA.*

Table 1: Frequency and percentage of the Nurses Knowledge on clinical alarms

Nurses knowledge				
Variable	True n (%)	False n (%)	Not sure n (%)	Correct Response
Alarm sound can be relied on to determine alarm urgency in terms of patients change in condition [1]	77 (88.5)	8 (9.2)	2 (2.3)	True
When an alarm is reliable each time it signals, this is known as alarm specificity [1].	65 (74.7)	12(13.8)	10(11.5)	True
High priority alarm indicates an urgent situation[6]	82 (94.3)	4 (4.6)	1 (1.1)	True
Medium priority alarm indicates a dangerous situation and a quick response from the medical staff is needed [4]	47 (54)	36(41.4)	4 (4.6)	True
A low priority alarm indicates an alert situation and the attention of the medical staff is needed[6]	68 (78.2)	14(16.1)	5 (5.7)	True
Skin preparation is not important in reducing false alarms [1]	21(24.1)	52(59.8)	14 (16.1)	False
Wiping the electrode with a rough washcloth or gauze and or using sandpaper on the electrode to roughen a small area of the skin[7] prevents spurious signals and it also helps to remove part of the stratum corneum to allow the electrical signals to travel[8]	29 (33.3)	34(39.1)	24 (27.6)	True
Total Score	**420×2=840/1218×100= 69%**			

Table 2: Association of Socio demographic characteristics and the question:"Wiping electrodes with a rough washcloth or gauze and or using sandpaper[7]on the electrode prevents spurious signals and helps to remove part of the stratum corneum[8] allowing electrical signals to travel"

Socio demographic variables	True n (%)	False n (%)	Not Sure n (%)	Chi	Df	p value	Cramer's V
Age in years				1.449[a]	4	0.836	0.836
25-35	8(29.6)	10(37)	9 (33.3)				
36-44	15(34.1)	19(43.2)	10(22.7)				
45-55	6(37.5)	5 (31.2)	5 (31.2)				
Gender				3.838[a]	2	0.147	0.147
Male	5(20)	10 (40)	10 (40)				
Female	24(38.7)	24(38.7)	14(22.6)				
Professional qualification				7.064[a]	6	0.315	0.315
KRCHN	26(33.3)	29(37.2)	23(29.5)				
BScN	3(42.9)	4 (57.1)	0 (0)				
MScN	0(0.0)	0 (0.0)	1 (100)				
KRN							
Years worked as a Nurse				5.160[a]	6	0.523	0.523
Below 2 years	2(66.7)	1(33.3)	0(0)				
Above2 years	0(0)	2(100)	0 (0)				
Above 5 years	6(31.6)	7(36.8)	6(31.6)				
Above 10 years	21(33.3)	24(38.1)	18(28.6)				
Years worked in CCU				12.654[a]	6	0.049	0.049
Below 2 years	6 (40)	8 (53.3)	1 (6.7)				
Above2 years	1 (7.7)	6 (46.2)	6 (46.2)				
Above 5 years	16(48.5)	9 (27.3)	8 (24.2)				
Above 10 years	6 (23.1)	11(42.3)					
CCU Trained				1.416[a]	2	0.493	0.493
Yes	24(31.2)	31(40.3)	22(28.6)				
No	5(50)	3(30)	2(20)				
Alarm management trained				2.407[a]	2	0.300	0.300
Yes	7(43.8)	7(43.8)	2 (12.5)				
No	22(31.4)	26(37.1)	22(31.4)				