Impact of Applying Guidelines on Nurses` Perception about Positive aspect regarding the use of Technological Devices in Critical Care Units

[1] **Lara Adel** [2]**Magda Mohamed** [3]**Mammoth Mohammed** [4] **Dina sobh**

[1]Clinical instructor at health technical institute in port said, [2]professor of medical-surgical nursing, in Faculty of Nursing at Ain Shams University [3]professor of general and vascular surgery, in Faculty of Medicine at Suez Canal University, [4]Lecture of medical-surgical nursing, in Faculty of Nursing at Port Said University.

ABSTRACT

Back Ground: Technology creates challenges for nurses and nursing care and may dehumanize the caring of the patients. A Quasi-experimental design was used to evaluate the impact of applying guidelines on nurses' perception regarding positive aspect of using technological devices in critical care units. It was conducted in critical care units of Port-Said General Hospital, El- Zohoor Hospital, Port-Foad Hospital, El-Mabarrah Hospital (Health insurance) and El-Tadamon Hospital. The study samples consisted of 112 nurses working in the previous settings. The data were collected through a structured questionnaire to assess nurses` perception about positive aspects of using technological devices in critical care units. The results revealed that the nurses' perception regarding the positive aspects in related to nursing care increased from 42.9% in pre-intervention to 95.5% in post-intervention and 83.9% through the follow up with high statistically significant relation as p=0.000. In multivariate analysis, the model explains 17% of the change in nurse's perception in related to positive aspects after intervention. It could conclude that, educational guidelines would be benefits. The study recommended different strategies for nursing practice to enhance nurses` perception regarding use of technological devices in critical care such as handout with Arabic language including comprehensive information about all aspects of technologies.

Key Words: Critical care unit - Guidelines- perception - positive aspect–Technology

INTRODUCTION

Technology is the practical application of knowledge, especially in a particular area (medical technology) or a manner of accomplishing a task, especially using technical processes, methods, or knowledge (new technologies for information storage) ***(Webster, 2016)***.

Critical care units are a specialized section of a hospital that provides comprehensive and continuous care for persons who are critically ill. The intensive care units (ICU) environment is a stressful one for patients. The presence of strange machinery, flashing lights, loud and unfamiliar noises, noxious smells, and lights on 24 hours a day, coupled with invasive procedures, lack of privacy, separation from family, and immobility contribute to make this a stressful environment ***(Pang, & Suen, 2008; Sole, Klein, & Moseley, 2013)***.

The Institute of Medicine (IOM) suggests that quality health care must be safe, patient-centered, timely, efficient, effective, and equitable. These goals for excellence in health care help guide the use and development of technology in the acute and critical care setting ***(Elizabeth, 2010)***.

Simply nurses must know more than ever before in order to deliver safe and effective care that meets each patient's unique needs with the rapid increase in complexity knowledge and technology in the ICUs. Nurses play a vital role in critical care units and as a result of the advancement of science we can say that technology is involved in most of the nursing care received for critically ill patients ***(kiekkas et al., 2006; Adel, 2014)***.

Significant of the study: The importance of the present study was to improved nurses' perception in the Critical Care Units regarding the use of technological devices through applying guidelines to help them enforce on positive aspects effects in order to keep the patient with optimal health status. For this aim, the current study was done.

Aim of study: ***This study aims to:*** Evaluate the impact of applying guidelines on nurses' perception on positive aspects regarding the use of technological devices in critical care units. Through:

a) Develop the guidelines on nurses` perception regarding positive aspects of using technological devices in critical care units based on the needs.

b) Implement the guidelines on nurses` perception regarding positive aspects of using technological devices in critical care units.

c) Evaluate the impact of implementing guidelines on nurse's perception immediately and follow-up after three months of implementation.

Research questions: To achieve the aim of this study، the following research questions were formulated:

1. What is the nurses` perception regarding positive aspects of using technological devices in critical care units?

2. What is the impact of implementing guidelines on nurse's perception after implementation?

Subjects and methods: Research Design: Quasi experimental research design was used in the current study to fulfill the aim of the study and answer the research questions.. This study was conducted at general Intensive care units (ICU) and cardiac care unit (CCU) of Port-Said General Hospital, El- Zohoor Hospital, Port-foad hospital, El-Mabarrah Hospital and El-Tadamon Hospital. A convenience sample was used in this study. The sample recruited in this study consisted of 112 nurses both sexes (males and females) who were working in Intensive Care Unit and Cardiac care units at selected hospital.

Tools of data collection: Tool was used in the study divided into two parts. The tool was developed by researcher based on several lectures review adopted from *(Noh et al., 2002; Kiekkas et al., 2006; Wikstrom et al., 2007; Samaher , 2008; Adel , 2014).*

Part I: *Socio-demographic Data Sheet:* It was developed by the researcher, and included data related to age, gender, level of education, years of experiences and training courses on technological equipment... etc.

Part II: *Structured questionnaire sheet to assess positive aspects of using technology which divided into:* *Positive aspect of using technology on patient* such as (higher care effectiveness, technological equipment directs and controls medical treatment….etc), *Positive aspect of using technology on nursing practice knowledge and skill* such as (ease of completion of nursing duties, improves nurse's knowledge and skill….etc), and *Positive aspect of use technology on nurse such as* (increase prestige of nurses, technological equipment is the eyes and hands of nurse…etc).

The Interventional Nursing Perception Guidelines: The guidelines were designed based on several literature reviews and the findings of the baseline assessment of nurse`s perception regarding positive aspects of using technology in critical care units. It included the teaching guidelines schedule and illustrated booklet, PowerPoint, posters, and videos to achieve the general objectives of the program the guidelines included five educational sessions would be conducted for each nurse in addition to the pre assessment session.

(II) <u>Operational Design:</u> The Operational design includes preparatory phase and a pilot study

Preparatory Phase: It was included revision of related literature, and theoretical knowledge of various aspects of the study using books, articles, internet periodicals and magazines to develop the tools for data collection. The tool was tested for content validity by 7 expert nurse educators from the Faculty of Nursing in Ain shams University, Alexandria University and a second phase, to check for clarity.

Pilot Study: A pilot study was carried out after development of data collection tool. And it was applied on a sample of "9" nurses working in previously selected settings ,and was conducted one month before embarking on the field of the working of the study. After obtaining the result of the pilot study, the necessary modifications were done and the final form was developed. The nurses in the pilot study were not included in the main sample.

Field of the Work: Data were collected from March 2015 to May 2016. Data were collected five days a week from Saturday to Thursday at morning shift from 8:00 Am to 2:00 pm and afternoon shifts from 2:00 pm to 8:00 pm and nurses were recruited conveniently**.** Data were collected through the following four phases:

- **Phase I: Prior Guidelines Development:** The researcher would started the preparation of the tools, which would be used from the different scientific references and then identify the nurses. This would be followed by collecting baseline data, which would help in the design of the guidelines, in addition to literature review.

- **Phase II : Pre-Test Phase (Prior Guidelines Implementation):** The researcher assessed the nurses' socio-demographic characteristics and perceptions of positive aspects regarding the use of technological devices in critical care units by using part I,II of tool

- **Phase III: Implementation Phase:** The guidelines would be implemented in a clear and concise manner in 5 sessions within 6 months.

- **Phase IV: Evaluation Phase (Post-Test and Follow-Up):** It would be assessed immediately after implementing and follow-up after 3 months of the guidelines implementation.

(III) <u>**Administrative Design:**</u> An official verbal and written permission to conduct the study was obtained from the head of Critical care units of the selected hospitals.

Ethical Consideration: The aim of the study has been explained to directors, physicians and staff nurses at critical care units of the concerned hospitals before asking them to participate in the study, stressing on confidentiality of the collected information.

Statistical Design:

- Data were extracted from the interview questionnaire and computerized in Microsoft Excel 2010. Analysis was undertaken using IBM SPSS (statistical package for social science) version 22.0.

- A significant level value was considered when p-value ≤ 0.05 and a highly significant level value was considered when p-value ≤ 0.001, while p-value > 0.05 indicates non-significant results.

RESULTS:

Table (1): shows that more than half of nurses in the study sample (58.0%) were at age group less than 25 years old. Regarding years of experience, more than two fifths of nurses (42.0%) had 1-5 years of experience, while (28.6%) of them had more than five year of experience. For nursing qualification, most nurses in the study sample (83.9%) had a nursing school diploma

Table (2): reveal that the most of the nurses (86.6%) had high total agree score of perception regarding the positive aspects of using technology in related to nurse during pre-intervention phase, while the majority of nurses (92.0%) had high total score of perception regarding the positive aspects of using technology in related to nurse during post- intervention phase, in contrast percentage of nurse reduced to (87.5%) during follow up. Also, the same table indicates that, the nurses' total agree score of perception regarding the positive aspects in related to nursing care, increased throughout the phases from (42.9%) in pre-intervention to (95.5%) in post-intervention and (83.9%) through the follow up with high statistically significant relation as (p=0.000).

Table (3): reveals that there were statistically significant relations between nurses' pre-intervention positive perception about technology use and their age whereas (p=0.04); younger nurses were the highest percentage agreed about the positive aspects (43.8%). At the same time, there were statistically significant relation between nurses' pre-intervention positive perception regarding technology use and qualification as (p=0.03). On the other hand, it was observed that, gender had no effect.

Table (4): reveals that there were statistically significant relations between nurses' post-intervention positive perception about technology use and their gender whereas (p=0.05), while no statistically significant relation between nurses' post-intervention positive perception about technology use and age and qualification (p= 0.69 & 0.23) respectively.

In multivariate analysis **(Table 5),** the intervention program was identified as the main positive predictor of the change in nurses` positive perception score, whereas nurse's qualification and job position was a negative predictor. The model explains 17% of the change in nurse's perception score.

Table (1): Frequency distribution of the study sample according to their socio-demographic characteristics (n=112)

Socio-demographic Characteristics	NO	%
Age		
Less than 25	65	58.0%
25 – 35	38	33.9%
More than 35	9	8.0%
Gender		
Male	13	11.6%
Female	99	88.4%
Qualification		
Bachelor	18	16.1%
Nursing school diploma	94	83.9%
Health technical institute	0	0%
Position		
Head Nurse	12	10.7%
Staff Nurse	100	89.3%
Years of Experience (Year)		
Less than 1	33	29.5%
1 – 5	47	42.0%
More than 5	32	28.6%

Table (2): Frequency distribution of nurses' total score upon the positive aspects of using technology throughout study phases (n = 112)

Positive Aspects Related to:	Pre No	Pre %	Post No	Post %	FU No	FU %	X^2	P-value
Patients								
Agree	91	81.3	102	91.1	97	86.6	X^2= 7.725	P= 0.10
Uncertainly	15	13.4	9	8.0	8	7.1		
Disagree	6	5.4	1	0.9	7	6.3		
Nurse								
Agree	97	86.6	103	92.0	98	87.5	X^2= 7.294	P= 0.12
Uncertainly	12	10.7	9	8.0	14	12.5		
Disagree	3	2.7	0	0.0	0	0.0		
Nursing Care								
Agree	48	42.9	107	95.5	94	83.9	X^2= 90.41	P=0.000**
Uncertainly	53	47.3	4	3.6	13	11.6		
Disagree	11	9.8	1	0.9	5	4.5		
Total Score								
Agree	92	82.1	104	92.9	96	85.7	X^2= 6.196	P= 0.19
Uncertainly	19	17.0	8	7.1	15	13.4		
Disagree	1	0.9	0	0.0	1	0.9		

(**) high statistically significant at p<0.01

Table (3): Relation between nurses' pre-intervention perception related to positive aspect of technology use and their socio-demographic characteristics (n=112

Socio-Demographic Characteristics	Agree No	Agree %	Uncertain No	Uncertain %	Disagree No	Disagree %	X^2	p-value
Age								
Less than 25	49	43.8	16	14.3	0	0.0	10.05	0.04*
25 – 35	36	32.1	1	0.9	1	0.9		
More than 35	7	6.3	2	1.8	0	0.0		
Gender								
Male	10	8.9	3	2.7	0	0.0	0.504	0.78
Female	82	73.2	16	14.3	1	0.9		
Qualification								
Bachelor	16	14.3	1	0.9	1	0.9	14.02	0.03*
Nursing school diploma	76	26.2	18	14.45	0	0.0		
Health technical institute	0	0	0	0	0	0		

(*) statistically significant at p<0.05

Table (4): Relation between nurses' post-intervention perception related to positive aspect of technology use and their socio-demographic characteristics (n=112)

Socio-demographic Characteristics	Total Score				X^2	p-value
	Agree		Uncertain			
	No	%	No	%		
Age Less than 25	60	53.6	5	4.5	0.754	0.69
25 – 35	35	31.3	3	2.7		
More than 35	9	8.0	0	0.0		
Gender Male	10	8.2	3	2.7	5.630	0.05*
Female	94	83.9	5	4.5		
Qualification Bachelor	17	15.2	1	0.9	4.280	0.23
Nursing school diploma	87	77.6	7	6.3		
Health technical institute	0	0	0	0		

(*) statistically significant at p<0.05

Table (5): Best fitting multiple linear regression model for the positive perception score (n=112)

	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	95% Confidence /Interval for B	
	B	**Std. Error**				**Lower**	**Upper**
Constant	92.85	4.85		18.764	0.001	85.33	101.39
Intervention	2.92	0.84	0.22	3.484	0.001	1.25	4.54

R-square=0.174　　　　　　　　　　　　　　　　Model ANOVA: F=7.475, p=0.001

DISCUSSION:

Critical care nurses of the 21st century are routinely caring for the complex, critically ill patients who just a few decades ago would not have survived a critical illness. As a result, nurses are increasingly being challenged to integrate sophisticated technologies and interventions, implement care based on contemporary evidence while simultaneously caring for the whole person by addressing the psychosocial challenges and ethical conflicts associated with critical illness and delivering care not only to the patient but also to the patient's family, as defined by the patient—not in professional

isolation but in collaboration with the interdisciplinary team *(Morton, & Fontaine, 2013)*.

The majority of nurses included in the present study carried diploma degrees in nursing. This is a common finding in studies in Egypt, where the majority of the nursing workforce consists of diploma graduates *(Ahmed, 2003; Booker, 2015)*. The nurse having a higher qualification is expected to have more perception regarding the use of technology in critical areas since the curricula of bachelor degree programs of nursing offer more time and depth to the theory and practice of this important subject. Hence, the nursing schools' curricula should incorporate concepts and principles that guide students in developing caring, safe, competent, and professional behavior *(Khouri, 2011)*.

The pre-intervention perception among the nurses in the current study was higher in related to positive aspect of using technological devices in critical care units. This relatively high percentage of satisfactory perception could be related to nurses` daily experiences with technology that provide them with accurate information about patients and help in controlling medical treatment. This will provide them a sense of safety for patients. This result is supported by the findings of many previous studies, which include, *(Marie, 2013)* who found that, nurses who work in critical care or urgent areas generally are required to have experience.

On the other hand, the pre-intervention perception of positive aspect among the nurses in the current study was slightly low in the areas of nursing care. This is an extremely alarming finding since the nurse who has a lack of perception in these areas cannot understand and/or apply the positive aspect properly, and can expose the patients, as well as her/himself to the risk. This lack of high perception could be attributed that the majority of nurses were graduated from nursing school diploma and lack of training on technological devices had the potential to increase the amount of time nurses spend with patient.

The implementation of the present study training intervention led to significant improvements in almost all areas of nurses' perception regarding to the positive aspects, especially in related to nursing care. This might be due to desired of nurses to achieve all tasks fasting to complete their duties in the field more than strength on the

effects of its technology on patient or on themselves this might be the result of shortage in nursing and overload. On the same line, *Shostek (2007)* reported that, critical care units must manage the intersecting challenges of maintaining a high-tech environment and ensuring staff competency in operating the equipment, providing high-quality care to the facility's sickest patients, and tending to the needs of staff members working in a very stressful

The height scored positive aspect of using technological devices in critical care units slightly reduced during follow up when compared with post-intervention. In fact, the present study results revealed significant associations between nurses` perception and continuing education because the nurses depended only on the training session during the implementation of guidelines and neglect refreshment of knowledge through continuing education or evidence based practice. This is in agreement with some researches indicated the same result *(IOM, 2010; Gralton et al., 2013)*.

The present study result provided an objective evidence of the success of the training intervention in achieving its ultimate goal, which indicated training intervention related to positive aspects of using technological devices in critical care units changes nurses` perception by (17.0%). This is good average of change when take in consideration face of factors affected training in real situations; it was preferred previously.

CONCLUSION:

From this study, it can be concluded that:

- The majority of nurses had higher perception regarding to positive aspects of using technological devices in critical care units.
- The impact of guidelines on nurses` perception regarding the use of technological devices in critical care units would be benefited.

RECOMMENDATIONS:

Based on the result of this study the following recommendations are suggested:

Recommendations for Nursing Practice:

(1) Improve and update the Nurses' knowledge about positive and negative aspects of using technology in critical care units through, Encourage nurses to attend regular, formal in-service education.

(2) Specific books, handouts and slides include comprehensive information about technological devices in Arabic language should be available

(3) Developing training materials to increase the motivation of nurses to accept their training.

Recommendations for Nursing Educational *(undergraduate and continued):*

- Nursing curriculums must include concept of technological devices in critical care units which include knowledge and skills about technology, with great emphasis on application through adequate training.

Recommendations for Future Studies:

- An ongoing, well-structured education program for nurses about positive and negative aspects of using technology should be initiated in critical care units.

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تقيم ادراك الممرضات تجاه استخدام الاجهزة التكنولوجيه بوحدات الرعايه الحرجه

لارا عادل ، أ.د. ماجده عبد العزيز محمد ، أ.د. ممدوح محمد المزين، د. دينا التابعى صبح صبيح

أخصائي تدريس علوم تمريض بالمعهد الفنى الصحى بيورسعيد، استاذ التمريض الباطنى والجراحى ـكلية التمريض-جامعة عين شمس، استاذ الجراحه العامه وجراحة الاوعية الدمويه ـكلية الطب- جامعة قناة السويس، مدرس التمريض الباطنى والجراحى ـكلية التمريض- جامعة بورسعيد

الخلاصة

أجريت هذه الدراسة ذات التصميم شبه التجريبي لتقييم تأثير تطبيق الإرشادات على إدراك الممرضين تجاه استخدام الأجهزة التكنولوجية فى وحدات العناية الحرجة بمستشفى بوسعيد العام، الزهور العام، بورفؤاد العام، ومستشفى التأمين الصحي (المبره- التضامن) على عينة قوامها 112 ممرض و ممرضة من العاملين بوحدات العناية الحرجة. وقد تم جمع البيانات باستخدام استمارة استبيان لتقييم إدراك الممرضين للوجوه الإيجابية حول استخدام الأجهزة التكنولوجية في وحدة العناية الحرجة وتشمل :**الجزء الأول ويتكون مـن:** البيانات الشخصية والأجتماعية مثل (السن ، المؤهل.....) **الجزء الثاني:** إستمارة استبيان لتقييم إدراك الممرضة للنواحى الإيجابية حول إستخدام الاجهزة التكنولوجية في وحدة العناية الحرجة والتى تشمل: النواحى الإيجابية لاستخدام التكنولوجية على المريض مثل (تقدم رعاية أكثر فعالية ، أكثر امان على المريض ....). والنواحى الإيجابية لإستخدام التكنولوجية على معلومـات ومهارات التمـريض مثل (سـهولة إتمـام الواجبـات التمـريضـية ، تحسين مهارات ومعلومات الممرضة ،...........). والنواحى الإيجابية لإستخدام التكنولوجية على الممرضة مثل (تحسين صورة وأراء الناس تجاه دور الممرضة ،.........). وتشير الإحصائيات إلى زيادة إدراك الممرضين تجاه الأوجه الإيجابية فيما يتعلق بالرعاية التمريضيه من (42.9%) قبل البرنامج إلى (95.5%) بعد البرنامج ثم (83.9%) عند المتابعه ، كما توجد علاقة ذات دلالة إحصائية P<0.00. كذلك توضح النتائج أن 17٪ من التغير في درجة الإدراك للممرضة تجاه الجوانب الإيجابية وهذا يوضح أن التحسن كان ملحوظ تجاه الأوجه السلبية مقارنتاً بالأوجه الايجابية لكنه لم يترجم إلى تغير فى السلوك تجاه استخدام الأجهزة التكنولوجية والتي تؤثر سلبا على المريض والممرضة والرعاية التمريضية. وأوصيت الدراسة باتباع استراتجيات وإرشادات مختلفة كى تؤكد على الأوجه الإيجابية و تقلل من المضـاعفات الناتجـة عن عدم إدراك الممرضين من استخدام الأجهزة التكنولوجيـة بوحدات العناية الحرجة حفاظا على سلامة المرضى والممرضين بتلك الوحدات.

الكلمات المرشده: وحدات الرعاية الحرجه- ارشادات ـ إدراك – الوجوه الايجابيه والسلبية ـ التكنولوجيا