Original Article *Egyptian Journal of Health Care, 2016 EJHC Vol.7 No.3*

Barriers to evidence-based pressure ulcer prevention in Intensive Care Units

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Abstract

Aim of the study: The aim of the present study was to determine the barriers to evidence-based pressure ulcer prevention in Intensive Care Units. ***Research design and setting***: A descriptive cross-sectional design was selected to conduct the current study in the ICU units of Zagazig University Hospitals. ***Subjects***: 200 nurses from the above mentioned setting who met the inclusion criteria. ***Tools of data collection:*** A Self-administered questionnaire was used. ***Results*:** Most of the nurses in the study sample (80%) were having unsatisfactory total knowledge about pressure ulcers. Majority of the nurses in the study sample (90.5%) were having positive attitudes towards the prevention of pressure ulcers. slightly more than two-thirds of them (69.0%) were having high perception of barriers hindering the application of EBP in pressure ulcers prevention. It is noticed that the highest perceived barriers were related to the work environment (62%), whereas the lowest were related to nursing (11.5%). ***Conclusion:*** The main barriers to implementation of evidence-based preventive practices for pressure ulcers revealed in the study are the nurses' deficient knowledge, in addition to the work environment-related barriers. ***Recommendations*:** Training programs for nurses about evidence-based pressure ulcer prevention, improvement of work environment and further study for their effectiveness are recommended.

Key words: Barriers, Evidence-based, pressure ulcer, prevention, Intensive care units

Introduction

Pressure ulcers (PUs) constitute a major health problem in clinical practice, and can have negative impacts on patient's quality of life and health care costs ***(Dugaret et al, 2012)***. Patients who develop PUs have generally longer hospital length of stay, are more likely to die to be readmitted within 30 days after discharge, and are at higher risk of death during hospital stay ***(Lyder et al, 2012)***. Moreover, PUs pose a substantial financial burden on hospitals ***(Leaf Healthcare, 2014)***. Given their importance and preventability, PUs are addressed as one specific area of patient safety ***(The Joint Commission, 2014)***.

Patients admitted to intensive care units (ICUs) are at a higher risk of developing PUs compared with the patients admitted to general care. A review of ICU-related literature from 2000 to 2005 indicated a high incidence of PUs, reaching 3.8 to 12.4%, with an even higher prevalence rate that may reach 49% ***(Shahin et al, 2008)***.

Implementing evidenced based practice (EBP) leads to the highest quality of care and best patient outcomes ***(Reigle et al, 2008; Talsma et al, 2008)***. In nursing, the application of EBP enhances the use of critically appraised and scientifically proven evidence for delivering quality care to a specific population ***(Majid et al, 2011)***. Thus, the development of pressure ulcers can be prevented through implementing evidence-based nursing practice ***(Karen, 2013)***. This is an essential aspect of nursing practice ***(Gallagher et al, 2008)***.

Pressure ulcers are internationally recognized as an important and mostly avoidable indicator of health care quality ***(National Pressure***

Ulcer Advisory Panel, 2011). However, preventing PUs in hospitalized patients presents a challenge, even when facilities have prevention programs in place ***(Jankowski and Nadzam, 2011)***. Moreover, the implementation of evidence-based care for prevention of PUs is often lacking ***(Sving et al, 2014)***. Nursing intervention and regular skin care have a great influence on the reduction of pressure ulcer prevalence in intensive care patients ***(Shahin et al, 2008)***. As nurses play a unique role in the delivery of health care, they need to embrace new and innovative techniques to provide effective and best possible care to their patients ***(Majid et al, 2011)***.

Significance of study:

Despite implementation of evidence-based pressure ulcer (PU) prevention protocols, patients continue to suffer from these injuries. The total number of hospitalizations with a secondary diagnosis of PU in the United States increased by 80% between 1993 and 2006, and in 2009, the incidence of facility acquired PUs was determined to be 5% on the basis of assessments of more than 92,000 patients **(Russo, Steiner& Spector, 2008; VanGilder et al, 2009).** Prevention measures are not used for a large proportion of patients at risk for developing PUs **(Baath et al. 2014).** In Egypt, **Mohammed** and **Wehedia (2015)** recommended that obstacles with regard to the implementation of pressure ulcer preventive measures should be recognized and addressed to achieve a change in practice. Therefore, it is important to find out more about barriers to evidence-based pressure ulcer prevention.

Aim of the study

The aim of the present study was to determine the barriers to evidence-based pressure ulcer prevention in Intensive Care Units.

Research question:

What are the barriers to evidence-based pressure ulcer prevention in Intensive Care Units**?**

Subjects and methods:

Research design and setting:

A descriptive cross-sectional design was selected to conduct the current study in the ICU units of Zagazig University Hospitals.

Subjects:

A purposive sample was used with the inclusion criteria of providing direct patient care, having at least one-year experience in the ICUs and accepting to participate in the study. The sample size was calculated to identify any barriers to EBP of 20% or more among them, with a 95% confidence level, and a 2% standard error, using the sample size equation for estimation of single proportion, with finite population correction ***(Kish and Leslie, 1965)***. Accordingly, the required sample is 169 nurses. This was increased to 200 to account for an expected non-response rate of approximately 20%. These were 56 from medical ICUs, 61 from surgical ICUs, and 83 from specialties ICUs.

Data collection tools

Data collection was carried out by one tool as following:

Self-administered questionnaire: It was designed by the first researcher in Arabic after reviewing related literatures to determine barriers to evidence-based pressure ulcer prevention in Intensive Care Units. It included the following:

- **Part (A): Personal and job characteristics of the nurses:** It covered respondents' socio-Personal and job characteristics as age, gender, marital status, years of experience, qualifications, training courses and source of nurses' knowledge.

- **Part (B): Nurses' knowledge regarding pressure ulcer prevention:** It was in the form of multiple choice questions (20 questions) to assess their knowledge on pressure ulcer prevention, and they were categorized into skin examination, risk factors, and prevention. The knowledge questionnaire consisted of 20 multiple-choice questions (MCQs) to assess nurse's knowledge of skin examination for pressure ulcer development (3 questions), assessment for risk factors (5 questions) and related preventive measures such as changing patient position, nursing care for pressure

sites, etc. (12 questions). A correct answer for each question was scored "1" and the incorrect "0". For each area of knowledge and for the total questionnaire, the scores of the items were summed-up and the total divided by the number of the items, and converted into percent scores. Knowledge was considered satisfactory if the percent score was 60% or more and unsatisfactory if less than 60%.

- **Part (C): Nurses' Attitude Scale:** The attitude scale was adopted from a scale used by **Moore and Price (2004)**. It has 9 statements on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree." It had positive statements such as "most pressure ulcers can be prevented" as well as negative statements such as "prevention of pressure ulcers has a lower priority in comparison with other patient care tasks." The responses from "strongly agree" to "strongly disagree" were scored 5 to 1 respectively. The negative statements were inversely scored so that a higher score indicates more positive attitude. The scores of the items were summed-up and the total divided by the number of the items, and converted into a percent score. The attitude of the nurse was considered positive if the percent score was 60% or more and negative if less than 60%.

- **Part (D): Nurses' Perceived barriers:** The perceived barriers scale was constructed by the researcher based on pertinent literature. It covers three categories of barriers. The first includes barriers related to nurses (6 items) such as lack of time, lack of training in pressure ulcers prevention, etc. The second involves barriers related to work environment (14 items) such as staff shortage, lack of quality programs, lack of protocols, etc. The third is for patient-related barriers (3 items) such as lack of cooperation, heavy weight, etc. Each barrier checked was scored one point. For each category of barriers and for the total questionnaire, the scores of the items were summed-up and the total divided by the number of the items, and converted into percent scores. The nurse perception of the presence of the barriers categories was considered high if the percent score was 60% or more and low if less than 60%.

The prepared data collection tool was reviewed for face and content validity by three nursing and medical experts. It was assessed for relevance, completeness, and comprehensiveness. The tool was modified according to their recommendations and suggestions. The reliability of the attitude scale was done through measuring its internal consistency. It showed good reliability with Cronbach alpha coefficient 0.60.

Pilot study:

A pilot study was carried out on 20 staff nurses representing 10% of the sample to test the feasibility and applicability of the study and to assess the clarity and of the tool. It also served to estimate the time needed for data collection. Since some modifications were made in the tool in terms of re-wording and re-phrasing, those nurses who participated in the pilot study were not included in the main study sample.

Fieldwork:

After obtaining official permissions, the researchers started recruiting the nurses who met the inclusion criteria. They were informed about the aim of the study and were invited to participate. Those who gave their consent were handed the data collection form to complete it. The work was done during the morning and afternoon shifts, five days per week starting from August 2015 to the end of October 2015. The time needed to fill the forms ranged between 35 and 45 minutes for each participant.

Administrative and ethical considerations:

An official permission for data collection was obtained from the administration of Zagazig University Hospitals. The aim of the study and its procedures were explained to every nurse before participation to obtain her/his verbal consent. They were informed about their rights to refuse or withdraw with no reason to be given. They were also reassured that the information obtained during the study will be confidential and used for the research purpose only.

Statistical analysis:

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Cronbach alpha coefficient was calculated to assess the reliability of the developed tool through their internal consistency. Qualitative categorical variables were compared using chi-square test. Whenever the expected values in one or more of the cells in a 2x2 tables was less than 5, Fisher exact test was used instead. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. In order to identify the independent predictors of nurses' scores of knowledge, attitude, and barriers perception, multiple linear regression analysis was used, and analysis of variance for the full regression models was done. Statistical significance was considered at p-value <0.05.

Results:

Nurses' age ranged between 18 and 50 years, with median 25 years **(Table 1)**. Most of them were females (82%) with a diploma degree (86.7%), with no training in pressure ulcers care (95.5%). Their experience years ranged between 1 and 23 years, with median 3.5 years.

Table (2): Demonstrates that most of the nurses in the study sample (80%) were having unsatisfactory total knowledge about pressure ulcers. While their knowledge about skin examination and risk factors was mostly satisfactory, only 6.5% of them had satisfactory knowledge of the prevention of pressure ulcers.

Table (3): Indicates, a majority of the nurses in the study sample (90.5%) were having positive attitudes towards the prevention of pressure ulcers. The table also demonstrates that slightly more than two-thirds of them (69.0%) were having high perception of barriers hindering the application of EBP in pressure ulcers prevention. It is noticed that the highest perceived barriers were related to the work environment (62%), whereas the lowest were related to nursing (11.5%).

As illustrated in **table (4)**, nurses' attitude scores have statistically significant weak positive correlations with their age (r=0.276), and years of experience (r=0.185). Meanwhile, nurses' scores of perceived barriers had statistically significant weak negative correlation with their level of qualification (r=-0.241), while the correlation was weak and positive with their years of experience (r=0.179).

In multivariate analysis **(Table 5)**, nurses' qualification was the only statistically significant independent positive predictor of the knowledge score. It explains 6% of the variation in this score as indicated by r-square value. Concerning the attitude score, the nurse age and knowledge score were the statistically significant independent positive predictors, while training courses and the barriers perception score were negative predictors. The model explains 12% of the variation in the attitude score as indicated by its r-square value. Similarly, for the barriers perception score, the table shows that nurses' qualification was the main statistically significant independent negative predictor, whereas the work in a specialty ICU and being married were positive predictors. The model explains 37% of the variation in the barriers perception score.

Discussion:

Staff nurses need to develop their knowledge and skills to reduce the healthcare costs of pressure ulcers and to promote patient quality of life ***(Ousey et al, 2016)***. The present study findings indicate deficient knowledge among nurses regarding the prevention of pressure ulcers. Although the majority have positive related attitude, their perception of the barriers hindering the practice of evidence-based preventive measures is high, particularly those related to the work environment.

According to the present study results, only approximately one-fifth of the nurses had satisfactory knowledge of pressure ulcers. Although their knowledge was mostly satisfactory concerning skin examination and assessment for risk factors, they had a major deficiency in the knowledge of preventive measures. This could be considered as a major barrier to implementation of evidence-based prevention of pressure ulcers. The possible explanation could be the lack of in-service training program and refresher courses. This is confirmed by the finding that only 4.5% of them reported having attended training in pressure ulcers. The finding is very close to that reported by ***Mohamed*** and ***Weheida (2015)*** in Egypt, who found that 77.5% of the nurses in their study had unsatisfactory knowledge regarding pressure ulcers. Similarly, a study in Nigeria reported low levels of knowledge among nurses about pressure

ulcers ***(Akese et al, 2014)***. However, in disagreement with the current study, their knowledge of the preventive measures was higher than that of the risk factors of pressure ulcers.

On the same line, studies in and Bangladesh ***(Islam, 2010)***, Jordan ***(Qaddumi & Khawaldeh, 2014)***, Uganda ***(Mwebaza et al, 2014)***, and Ethiopia ***(Nuru et al, 2015)*** reported that the nurses had limited knowledge about pressure ulcers care. On the contrary, another study in Ethiopia showed that about two thirds of the respondents had adequate knowledge of pressure ulcer prevention practices ***(Dilie & Mengistu, 2015)***. This higher rate of satisfactory knowledge, in comparison with the current study could be explained by the differences in the settings as well as the nursing curricula and the level of qualification of the nurses. In fact, the present study revealed a higher nursing qualification as the only significant independent predictor of the nurse's knowledge score. Thus, the nursing diploma curricula may be insufficient regarding the care for pressure ulcers in comparison to the bachelor degree programs. In fact, a study in Australia showed that nurses' knowledge about pressure ulcers was positively related to their level of qualification ***(Lawrence et al, 2015)***.

As regards nurses' attitude towards implementation of evidence-based prevention of pressure ulcers, the present study demonstrated that almost all nurses showed a positive attitude. This might reflect their good intentions to serve their patients, which would obviate any "negative attitude" barriers, since nurses' attitudes towards pressure ulcers constitute an important factor in the development of pressure ulcer as shown by ***Waugh (2014)*** in a systematic review. Similarly high percentages of nurses having positive attitudes towards pressure ulcer prevention practices were reported in a survey in Sweden where all nursing staff demonstrated positive attitude ***(Källman & Suserud, 2009)***. On the same line, ***Ibrahim (2006)*** in Iraq and ***Beeckman et al (2011)*** in Belgium found that the majority of the nurses had positive attitude toward pressure ulcer prevention practices. Nonetheless, the very high percentages of positive attitudes in various studies could reflect the bias of self-reporting, where respondents tend to give a positive image of themselves through over-reporting positive attitudes, and under-reporting negative attitudes.

As for the factors influencing nurses' attitude, the present study bivariate analysis revealed that the age and years of experience were positively correlated with this score. However, in multivariate analysis, the nurse age and knowledge score were independent positive predictors of the attitude score. Thus, with advancing age the nurse may have more tendency to serve the patient. In agreement with this, a study in Jordan demonstrated a significant positive relation between nurses' attitude and years of experience ***(Tubaishat et al, 2013)***. Moreover, better knowledge would certainly foster the positive attitude. Therefore, continuing education based on applied clinical practice is needed to improve nurses' knowledge of pressure ulcer prevention, which would consequently enhance their attitudes ***(Lee et al, 2016)***.

Conversely, the attendance of training courses and the higher perception of barriers had a negative influence on nurses' attitude as shown in the current study results. This indicates that the training courses provided to a minority of the nurses in the study sample were useless or even deleterious. This could be due to the content and process of the courses, or to the carelessness in attendance of such training, which would obviate any beneficial effect of training. Meanwhile, the higher perception of barriers would lead to frustration from the feeling of inability of the nurse to serve her/his patients. This could have a negative influence on the attitude. In agreement with this, studies demonstrated that the training courses using lectures with one-way communication are ineffective and the associated knowledge retention is very short ***(Abbasi et al, 2013; Sadeghi et al, 2014)***.

The present study revealed that more than two-thirds of the nurses had high perception of the barriers hindering the application of evidence-based preventive practices of pressure ulcers. The findings indicate that the highest category of barriers was that related to the work environment. This included factors such as lack of facilities and hospital policy, quality assurance, educational courses and shortage of nursing staff. These factors are of major importance since they constitute the essential elements needed for service provision. The findings are in congruence with those of ***Qaddumi*** and ***Khawaldeh (2014)*** in Jordan and ***Nuru et al (2015)*** in Ethiopia where the organizational factors represented the most

important barriers for them in prevention of pressure ulcer. Also in agreement with this, ***Hartmann et al (2016)*** in a study in the United States found that the barriers related to hospital administration support and leadership were the main factors influencing success of prevention and management of pressure ulcers.

On the other hand, the nurses of the present study had a low perception of the barriers related to nursing. These included factors such as workload, lack of time, language problems, and lack of training in pressure ulcers prevention. Although these could be real barriers, the nurses did not give them as much importance as the barriers related to work environment or patient. This might be a kind of self-defensiveness, whereby the nurses try to negate any barriers related to themselves. Similar findings were reported in a study in the United States exploring the factors hindering the application of pressure ulcer preventive programs, where most of the factors were related to work system with the only exception of lack of trained nurses ***(Padula et al, 2015)***. On the same line, a study in the United Kingdom identified the lack of nurses' knowledge as an important factor for nurses' inadequate practice related to pressure ulcers ***(Newham & Hudgell, 2015)***.

Concerning the factors affecting nurses' perception of the barriers hindering the application of evidence-based preventive practices of pressure ulcers, the current study identified the work in a specialty ICU as the main positive predictor. The work in specialty ICU could increase nurses' perception of the barriers because of the type of patients they admit and their severity categories, which may need special facilities, equipment, and skills that could be not available. Conversely, a higher nursing qualification turned to be a significant negative predictor of the score of perception of barriers. This could be attributed to that nurses with higher qualification may have more access to resources, which would lead to decreases in their perception of the barriers. Moreover, they may have a higher opportunity of exposure to different courses directly or indirectly related to prevention of pressure ulcer, which might decrease their perception of barriers. In congruence with this, ***Mwebaza et al (2014)*** in a study in Uganda found that the lack of access to information and current literature was perceived as a main factor underlying barriers to nurses' care of pressure ulcers.

Conclusion and recommendations:

To conclude, the main barriers to implementation of evidence-based preventive practices for pressure ulcers revealed in the study are the nurses' deficient knowledge, in addition to the work environment-related barriers. Meanwhile, nurses' attitudes do not constitute any barriers. Therefore, the study recommends well-designed training programs in evidence-based preventive practices of pressure ulcers, particularly for less qualified nurses. Moreover, the hospital administration should improve the work environment, with implementation of evidence-based protocols for pressure ulcers. Further intervention studies to assess the effectiveness of such recommendations.

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Table (1): Personal and job characteristics of the nurses in the study sample (n=200)

Item	***Frequency***	***Percent***
Age:		
▪ *<30*	*82*	*41.0*
▪ *30-*	*63*	*31.5*
▪ *40+*	*55*	*27.55*
Range	*18.0-50.0*	
Mean±SD	*27.0±6.4*	
Median	*25.00*	
Gender:		
Male	*36*	*18.0*
Female	*164*	*82.0*
Marital status:		
Unmarried	*95*	*47.5*
Married	*105*	*52.5*
Nursing qualification:		
Diploma	*173*	*86.5*
Technical nursing institute	*27*	*13.5*
Experience years:		
▪ *<5*	*126*	*63.0*
▪ *5-*	*39*	*19.5*
▪ *10+*	*35*	*17.5*
Range	*1.0-23.0*	
Mean±SD	*5.0±4.3*	
Median	*3.50*	
Had training in pressure ulcers	*9*	*4.5*
Sources of information:		
▪ *Study*	*43*	*21.5*
▪ *Training*	*21*	*10.5*
▪ *Conferences*	*3*	*1.5*
▪ *Readings*	*2*	*1.0*
▪ *Others*	*159*	*79.0*

Table (2): Knowledge about pressure ulcers among nurses in the study sample (n=200)

Satisfactory knowledge (60%+) about pressure ulcers:	Frequency	Percent
Skin examination	191	95.5
Risk factors assessment	171	85.5
Prevention	13	6.5
Total knowledge:		
Satisfactory	40	20.0
Unsatisfactory	160	80.0

Table (3): Total attitude and barriers against application of EBP in pressure ulcers management among nurses in the study sample (n=200)

Item	Frequency	Percent
Attitude towards pressure ulcers:		
Positive (60%+)	181	90.5
Negative (<60%)	19	9.5
High presence (60%+) of barriers related to:		
▪ Nursing	23	11.5
▪ Work environment	124	62.0
▪ Patient	63	31.5
Total barriers:		
High (60%+)	138	69.0
Low (<60%)	62	31.0

Table (4): Correlation of knowledge, attitude, barriers scores and nurses' characteristics

Item	Spearman's rank correlation coefficient		
	Knowledge	Attitude	Barriers
Knowledge			
Attitude	0.13		
Barriers	0.11	-0.04	
Age	0.13	.276**	0.11
Qualification	0.10	0.09	-.241**
Years of experience	0.11	.185**	.179*

(*) Statistically significant at p<0.05 *(**) Statistically significant at p<0.01*

Table (5): Best fitting multiple linear regression model for the knowledge, barriers, and attitude scores

Item	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	95% Confidence Interval for B	
	B	Std. Error				Lower	Upper
Knowledge score							
Constant	47.96	1.587		30.223	<0.001	44.827	51.086
Qualification	4.82	1.339	.248	3.599	<0.001	2.178	7.458
r-square=0.06 Model ANOVA: F=12.95, p<0.001 Variables entered and excluded: age, gender, qualification, experience, marital status, training courses, hospital							
Attitude score							
Constant	70.86	4.263		16.620	<0.001	62.447	79.262
Age	.23	.069	.229	3.381	.001	.097	.370
Training courses	-6.01	2.122	-.190	2.834	.005	-10.197	-1.829
Knowledge score	.14	.066	.137	2.041	.043	.005	.266
Barriers score	-.09	.029	-.207	3.078	.002	-.147	-.032
r-square=0.12 Model ANOVA: F=7.45, p<0.001 Variables entered and excluded: gender, qualification, experience, hospital							
Barriers perception score							
Constant	90.17	3.804		23.702	<0.001	82.666	97.671
Work in specialty ICU	1.16	.179	.375	6.498	<0.001	.809	1.515
Married	4.85	1.715	.160	2.830	.005	1.471	8.234
Qualification	-17.46	2.569	-.394	6.796	<0.001	-22.529	-12.395
r-square=0.37 Model ANOVA: F=40.18, p<0.001 Variables entered and excluded: age, gender, experience, training courses, hospital, knowledge and attitude scores							