Nurses' knowledge and Practice Regarding Management and Prevention of Pressure Ulcer among Critically Ill Patients

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Abstract

A pressure ulcer is a localized injury to the skin or underlying tissue, as a result of pressure, and an external surface for a prolonged period of time. Pressure ulcer prevention and management is the responsibility of all health care professionals who involve in patient care to prevent slow progression of complications. **The aim:** The study was aimed to assess nurses' knowledge and practice regarding management and prevention of pressure ulcer among critically ill patients. **Methodology: Setting**: This study was conducted in the Intensive Care Unit at Suez Canal University Hospitals and Ismailia General Hospital; A descriptive correlational research design was used to conduct this study. **Subject:** All available nurses during conducting the current were recruited (35 females & 15 males). **Tools**: **1)** An interview questionnaire sheet to assess nurses' knowledge regarding prevention and management of pressure ulcer. **2)** Observational check lists to assess nurses' practice regarding prevention and management of pressure ulcer. **Result:** The findings showed that studied nurses had unsatisfactory knowledge and practice. There was positive significant correlation between nurses' knowledge and practice regarding prevention and management of pressure ulcer (r=0.302, p=0.033). **Conclusion:** All the studied nurses had unsatisfied level of knowledge and practice about pressure ulcer prevention and management. **Recommendation:** Periodical updating for knowledge and practice concerning with pressure ulcer prevention and management through sharing educational programs. Use risk assessment tool as Braden scale to assess patient risk for pressure ulcer development.

Keywords: Critically ill patients, nurses' knowledge and practice, pressure ulcer, prevention, and management.

Introduction

A pressure ulcer is a localized injury or any lesion to the skin or underlying tissue, because of pressure and external surface for a prolonged period. Is considered both inevitable and preventable (**Pokorny, et al. 2003, Reilly, et al. 2007, EPUAP & NPUAP. 2009 and Guy, 2012).**

Previous studies have identified the following factors as increasing the likelihood of developing a pressure ulcer: immobility, admission to the ICU, malnutrition, incontinence, spinal cord injury (SCI), stroke, hemodynamic instability, reduced level of consciousness, fractures and/or major orthopedic procedure, advanced age, trauma, dehydration, peripheral vascular disease, ischemia, infection, inadequate nursing care, not turning the patient, history of a previous pressure ulcer, medications such as sedatives and analgesics and chronic illness "including being bed-bound" **(Reilly, et al. 2007, Melter, 2011 and Salcido, 2012).**

Pressure ulcer occurs as a result of a combination of both intrinsic and extrinsic factors and one important extrinsic factor is related to inadequate knowledge and practice of healthcare provider, therefor is considered a significant problem in elderly and critically ill patients, causing pain, decreasing quality of life, and leading to prolonged hospital stays, loss of function & independence, increased incidence of infection, additional surgical interventions, significant economic costs **(Reilly, et al. 2007 and Berlowitz, 2011).**

Pressure ulcers increases hospital costs significantly. In the USA, pressure ulcer care is estimated to approach $11billion annually, with

a cost of between$ 500 and $ 70,000 per individual pressure ulcer **(NPUAP, EPUAP and Pan Pacific Pressure Injury Alliance, 2014).**

In critical care patients, pressure ulcers are an additional comorbid threat in patients who are already physiologically compromised. Among all hospitalized patients, prevalence rates of acquired pressure ulcers are the highest in patients in the intensive care unit (ICU), from 14% to 42% **(Russo, et al. 2008 and Cox, 2011).** Multiple studies have highlighted the fact that knowledge about pressure ulcers, good assessment skills, the use of prevention strategies, and provision of appropriate treatments and comprehensive wound documentation is necessary and a duty of each provider as well as essential for health care facilities **(Thomas, 2012).**

Preventing pressure ulcers has been a nursing concern for many years "If has a bedsore, it's generally not the fault of the disease, but of the nursing or "a visible mark of caregiver sin" associated with poor or nonexistent nursing care **(Maylor, 2001, Panagotopoulou & Kerr, 2002 and Lyder & Ayello, 2008).**

The principles of treatment of pressure ulcers include assessing severity, reducing pressure, friction and shearing forces, optimizing local wound care, removing necrotic debris, managing bacterial contamination, and correcting nutritional deficits. Pressure injuries may be avoidable when consistent attention is given to assessment, nutrition, and appropriate positioning within appropriate time frames **(David & Thomas, 2006 and Irene, 2010).**

When a pressure ulcer develops, nursing's goal for patient's safety is to assist the health care team in closing the ulcer as quickly as possible. Nursing is also concerned with preventing further ulcer deterioration, keeping the ulcer clean and in moisture balance, preventing infections from developing, and keeping the patient free from pain, many aspects of managing pressure ulcers are like prevention (mechanical loading, support surfaces, and nutrition) **(Lyder & Ayello, 2008).**

Significance of the study

Pressure ulcers have been described as one of the costliest and physically debilitating complications in the 20th century. Pressure ulcers are the third most expensive disorder after cancer and cardiovascular diseases due to prolonged hospitalization, and the need for intensive nursing care for pressure ulcer (**Ayello, et al. 2006 and Taylor & Kass, 2012**). Pressure ulcer was a significant financial burden to any health care system and had adverse effects on achieving goals of care. Pressure ulcers come at a high cost to everyone. They result in pain, suffering, diminished quality of life and even death for some residents. For a nursing, they represent extra staff hours and medical supplies spent caring for a preventable condition, as well as more residents hospitalized (**Taylor & Kass, 2012**).

Worldwide; (**Moore, 2005)**, estimated that the annual treatment cost of pressure ulcers in the United King (UK) was $270 to $481.5 million and prevention cost was $270 to$1132.5 million. **Pieper (2007),** who stated that treatment cost of pressure ulcer ranged from $2.2 to $3.6 billion per year in (USA). Recently in the USA, pressure ulcer care is estimated to approach $11billion annually, with a cost of between$ 500 and $ 70,000 per individual pressure ulcer **(NPUAP, EPUAP and Pan Pacific Pressure Injury Alliance, 2014).**

Subject and Methods

Aim of the study: This study was aimed to assess nurses' knowledge and practice regarding management and prevention of pressure ulcer among critically ill patients. To fulfill the aim of the study, three research questions are formulated.

1. Do the nurses' have a satisfactory level of knowledge regarding management and prevention of pressure ulcer?
2. Do the nurses have satisfactory level of practice regarding management and prevention of pressure ulcer?
3. Is there a relationship between nurses' knowledge and practice regarding management and prevention of pressure ulcer?

The study was portrayed under the four main designs as follows:

A- Technical design.

B- Operational design.

C- Administrative design.

D- Statistical design.

Technical design

Research design: A descriptive correlational research design was utilized to investigate the research questions.

Setting: This study was conducted at Intensive Care Unit in two governmental hospitals were Suez Canal University hospital and Ismailia General Hospital.

Subjects: Nonprobability (convenience samples) of 50 nurses (35 females and 15 males) were available at the previous mentioned settings were recruited and accepted to participate in the study.

Tools for data collection:

Tool I: Self-administrated questionnaire: This sheet was developed by the researcher based on a relative literature to assess the nurses' knowledge about pressure ulcer prevention and management guided by **(Smith& Waugh, 2009, Islam, 2010, Taylor, et al. 2011, Ignatavicius & Workman, 2013 and white, et al. 2013).** It consists of 6 parts:

Part I: Include information related to nurses' demographic data: Include nurses' age, gender, level of education, years of general experience, working place, attending training program related to care of pressure ulcer & benefits of attending).

Part II: it was used to assess nurses' knowledge about skin anatomy and physiology. Every question includes items with one point for every correct answer. The nurses' score ranged from 0 to 6.

Part III: it was used to assess nurses' knowledge about pressure ulcer (definition, risk factors, causes, signs & symptoms and most common sites). Every question includes items with one point for every correct answer. The nurses' score ranged from 0 to 19.

Part IV: it was used to assess nurses' knowledge about nursing assessment for pressure ulcer. Every question includes items with one point for every correct answer. The nurses' score ranged from 0 to 10.

Part V: it was used to assess nurses' knowledge about nursing care to prevent pressure ulcer. Every question includes items with one point for every correct answer. The nurses' score ranged from 0 to 30.

Part VI: it was used to assess nurses' knowledge about nursing care to manage pressure ulcer. Every question includes items with one point for every correct answer. The nurses' score ranged from 0 to 9.

Scoring system: One grade for correct answer and zero for wrong or did not know the answer. Total knowledge score was ranged from 0-74 by adding all the five domains. It was considered that ≥ 80% as satisfactory level of knowledge.

Tool II: Observational checklist: Six observational checklists were adopted to assess nurse's level of practice, related to turning & positioning, dressing, bed making, range of motion and nurses' performance regarding pressure ulcer prevention were added to achieve aim of study thoroughly, there was adapted but necessary modifications were done to simplify the steps of procedure. It was adapted from **(Ellis & Bentz, 2007 and Lynn, 2011)**, but necessary modifications were done to simplify the steps of procedure.

A. Making an "occupied" bed Observational checklist. This tool (40 items) This checklist aimed to assess nurse's level of practice during making an occupied bed.

B- Patient positioning (20 items) observational checklist. This checklist aimed to assess nurse's level of practice during patient positioning.

C- Assisting patient with turning in bed observational checklist. This checklist (22 items) aimed to assess nurse's level of practice during turning in bed patient.

D- Performance range of motion exercise observational checklist. This checklist (30 items) aimed to assess nurse's level of practice during performance range of motion exercise.

E- Pressure Ulcer Dressing Observational checklist. This checklist (18 items) aimed to assess nurse's level of practice during applying pressure ulcer dressing.

F- Nurses' performance regarding pressure Ulcer (20 items) assess nurse's level of practice during performance regarding pressure ulcer prevention.

Scoring system: One grade was given when the step was done correctly, while zero point was given if the step was not done. Total practice score was ranged from 0-150 by adding all the six domains .It was considered ≥ 80% as satisfactory level of practice.

Operational design:

The operational design includes preparatory phase, content validity, pilot study and field work.

Preparatory phase

It includes reviewing of literature, different studies, and theoretical knowledge of various aspects of the problems using books, articles, internet, periodicals, and magazines to develop tools for data collection.

Tools validity:

It was done by a panel of seven expertise from nursing and medical staff who revised the tools for clarity, relevance, applicability, comprehensiveness, understanding and ease for implementation and according to their opinion modifications were applied.

Content reliability:

Coefficient of reliability of the evaluating tools was measured by Cronbach's α alpha. Cronbach's alphas were calculated for the overall nursing knowledge and the overall nursing practice. The reliability of each of knowledge scales exceeded the acceptable level (0.73 standards), while the reliability of each of practice scales exceeded the good level (0.75 standards).

Pilot study

A pilot study was conducted on 10% of subjects to test whether tools of data collection are clear, understandable, feasible and valid. After piloting it, the necessary modification was done.

Field work:

Data collection of this study was carried out in the period from December 2013 to February 2014. The period of data collection was divided into two stages as following: First stage: The study aim, and component of the tools were explained for the selected subject prior to the data collection. Second stage: Data were collected by the researcher by rotation 3 days weekly at the previous mentioned settings during morning shift from 8.00 am to 2.00 pm on Thursday, in afternoon shift from 2.00 pm to 8.00 pm on Friday, and in night shift from 8.00 pm to12.00 am on Saturday. Observational checklists were completed and filled in by the researcher within 20 minutes. The researcher visited the units at the different work shift to assess nurses' practice (making an occupied bed, patient positioning, turning patient in bed, range of motion exercise, pressure ulcer dressing and nurses' performance regarding pressure ulcer prevention). Each nurse was observed while caring for patient with pressure ulcer. An interview questionnaire sheet to assess nurses' knowledge was given to nurses to read it. The time needed for completing the questionnaire sheet of nurses' knowledge was 30: 45 minutes in the present of the researcher and without referral to textbooks or colleagues during the interview.

Administrative design:

An official permission for data collection in Suez Canal university hospitals and Ismailia General hospital was obtained from the hospital administrative personnel by submission of a formal letter from the vice dean of the faculty of nursing. Meeting and discussion were held between the researcher and the nursing administrative personnel to make them aware about aims and objectives of the research, as well as, to get better cooperation during the implementation phase of the research, also nurse's verbal consent were obtained before starting data collection.

The studied nurses were assured of maintaining anonymity and confidentiality of collected data.

Statistical design:

SPSS system files were used to handle, code, and recruit raw data (Version 18), the normality test was done by the Kolmogorov-Smirnov test and was none significant at ≥0.05, presenting parametric data. Data were analyzed using statistical measures as frequency and distribution to describe different characteristics. The independent-sample t-test for related groups and repeated ANOVA Measures test were used to evaluate a correlation between variables and considered significant $p \leq 0.05$.

Results

Section I: Demographic characteristics:

Table (1): revealed that (70%) of studied nurse were female. while (40%) of studied nurses aged between twenty to less than thirty years. While (48%) of studied nurses had diplomat of nursing and (18%) of studied nurses had Bachelor of nursing. Regarding duration of nursing experience (40%) of studied nurses had experience from five years to less than ten years.

Regarding to working place (70%) of studied nurses were working at Suez Canal University Hospitals and (30%) of studied nurses were working at Ismailia General Hospital. Regarding to attending to training courses (80%) of studied nurses were not attended training courses about prevention and management of pressure ulcer, and benefits from attending training courses (50%) of studied who attended training courses were had moderate benefits of attending training courses. About availability of policies and procedure indices at unit about prevention and management of pressure ulcer all studied nurses had not polices and procedure indices at units.

Table (1): Number and Percentage distribution of studied nurses according to their demographic data. (N=50).

Demographic data	Studied nurses (n=50)	
	No.	%
Gender		
Male	15	30.0
Female	35	70.0
Age (years)		
Less than20	10	20.0
20-	20	40.0
30-	18	36.0
40≤	2	4.0
Level of education		
Diplomat of Nursing	24	48.0
Nursing Technical institute	17	34.0
Bachelor of Nursing	9	18.0
Duration of nursing experience (Years)		
Less than 1	8	16.0
1-	17	34.0
5-	20	40.0
≥10	5	10.0

Section II: Knowledge of the study subjects:

Knowledge about skin anatomy and physiology:

Showed that approximately two third (76%) of studied nurses had unsatisfactory knowledge related to skin anatomy and physiology.

Knowledge about pressure ulcer (definition, causes, most common sites,..ect).

Showed that all studied nurses had unsatisfactory knowledge about pressure ulcer.

Knowledge about nursing assessment for pressure ulcer.

Showed that more than two third of studied nurses had unsatisfactory, while (2%) of studied nurses had satisfactory knowledge related nursing assessment for pressure ulcer.

Knowledge about nursing care to prevent pressure ulcer.

Showed that all studied nurses had unsatisfactory knowledge related nursing care to prevent pressure ulcer.

Knowledge about nursing care for pressure ulcer.

Showed that more than two third of studied nurses had unsatisfactory, while (4%) of studied nurses had satisfactory knowledge related nursing care for pressure ulcer.

Total satisfactory level of overall knowledge among the studied nurses about pressure ulcer prevention and management.

Figure (1) Percentage distribution of knowledge of the study subjects regarding pressure ulcer prevention and management (n=50):

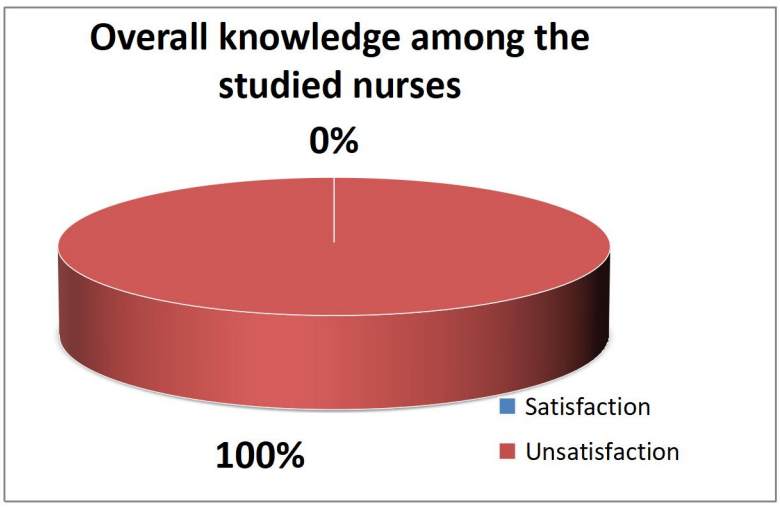

Figure (1) showed that all of the study subjects had unsatisfactory scores (<80%).

Section III: Practice of the study subjects:

Distribution of nurses' satisfactory level of practice about making an "occupied" bed.

Showed that totally all nurses (100%) had unsatisfactory practice regarding making an occupied bed.

Nurses level of practice regarding patient positioning.

Showed that (90%) of the studied nurses had unsatisfactory practice regarding preparations of patient's position, while all (100%) of studied nurses had unsatisfactory practice regarding supine, fowler, Sims, and Prone position, while more than one third (38%) of studied nurse had satisfactory practice regarding side lying position.

Regarding post procedure, all studied nurses had unsatisfactory level of practice. Totally, all studied nurses had unsatisfactory level of practice regarding patient positioning.

Distribution of nurses' satisfactory level of practice about assisting a patient with turning in bed.

Scoring System: howed that more than two third (98) had unsatisfactory practice regarding assisting patient with turning in bed.

Distribution of nurses' practice about performing Range of Motion Exercises.

Showed that all nurses (100%) had unsatisfactory level of practice regarding performing range of motion exercises.

Distribution of satisfactory level of nurses' practice regarding applying transparent adhesive film dressing.

Showed that (100%) of studied nurses had unsatisfactory level of practice regarding applying transparent adhesive film dressing.

Distribution of satisfactory level of nurses' performance regarding pressure ulcer prevention.

Showed that totally all nurses (100%) had unsatisfactory level of practice regarding pressure ulcer prevention.

Total score of overall practice among the studied nurses about pressure ulcer prevention and management.

Figure (2) Percentage distribution of practice of the study subjects regarding pressure ulcer prevention and management (n=50):

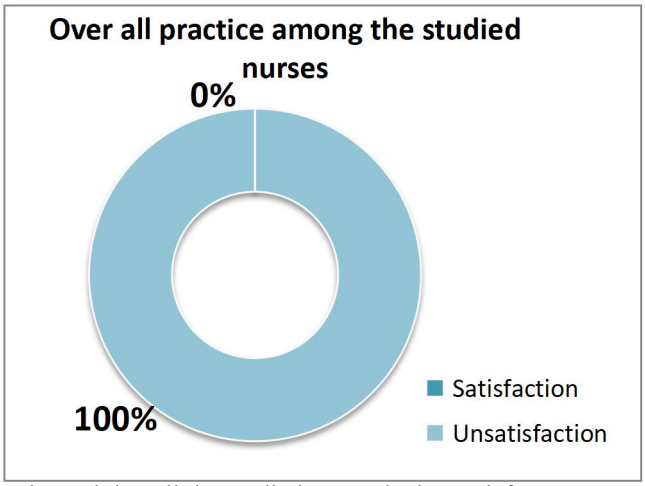

Figure (2) showed that all the studied nurses had unsatisfactory scores (<80%).

Section (IV): Total score of knowledge and practice about prevention and management of pressure ulcer.

Table (2): Mean scores of studied nurses' knowledge and practice about prevention and management of pressure ulcer (n=50).

Knowledge and practice	Scores of studied nurses (N=50)	
	Min-Max Range	Mean ±SD
Total knowledge	36.5-60.8	49.3±6.3
Total practice	47.3-65.9	57.5±3.1

Section (V): Relation between knowledge level and practice regarding management and prevention of pressure ulcer.

The study subjects had unsatisfied level of knowledge about pressure ulcer management and prevention.

The study subjects had unsatisfied level of practice about pressure ulcer management and prevention.

There was a significant correlation between nurses' knowledge and practice about pressure ulcer management and prevention.

There was also positive significant correlation between knowledge score and assisting a patient with turning in bed score.

There was significant correlation between practice score, care of patient to prevent pressure ulcer and attending training courses.

PART (V): Relation between knowledge level and practice regarding management and prevention of pressure ulcer.

Table (3): This table revealed that there was not a significant relation between nurses' total score of knowledge about management and prevention of pressure ulcer and their gender with the P value= 0.13, their age with P value= 0.49, their educational degree with the P value= 0.411, their duration of nursing

experience with P value= 0.79. Regarding to their working place the P value= 0.558 also regarding to their attendance training courses with the P value= 0.266 and regarding to their having polices & procedure indexes about pressure ulcer prevention and management at unit with the P value= 0.548.

Table (3): Relation between total score of nurses' knowledge and their demographic data. (N=50)

Demographic data	Studied nurses (n=50)		
	No.	Knowledge score (%)	Significance
Gender			
Male	15	51.3±5.0	t=1.531
Female	35	48.4±6.7	P=0.132
Age (years)			
Less than20	10	51.4±6.3	
20-	20	48.4±6.8	F=0.725
30≤	20	49.1±5.9	P=0.49
Level of education			
Diplomat	24	48.4±5.5	
Nursing Technical Institute	17	50.9±8.1	F=0.907
Bachelor	9	48.4±4.3	P=0.411
Duration of nursing experience (Years)			
Less than 1	8	48.6±5.6	
1-	17	50.2±5.6	
5-	20	49.3±7.5	F=0.349
10≤	5	47.0±5.0	P=0.79
Working Place			
Suez Canal University hospitals	35	49.6±5.9	t=0.59
Ismailia General Hospital	15	48.5±7.2	P=0.558
Attended training Courses			
No	40	49.8±6.6	t=1.126
Yes	10	47.3±4.9	P=0.266
Having polices and procedure indexes about pressure ulcer prevention and management at unit			
Yes	10	50.1±4.3	t=0.611
No	40	49.1±6.8	P=0.548

t: t-test **F: ANOVA test** ***significant at P≤ 0.05**

Discussion

Nursing team members are responsible for direct and continuous care related to PU prevention and treatment **(Miyazaki, et al. 2010).** In this respect, the main concern of the present study was to evaluate nurses' knowledge and practice regarding management and prevention of pressure ulcer among critically ill patients. The results will be discussed as follow:

A. Demographic characteristics.

Findings of the present study indicated that more than third of studied nurses their age between 20 to less than 30 years old. Supporting to these findings **(El-Sayed, et al. 2003, Al Kharabsheh, et al. 2014, Mohamed & Weheida, 2014, Mwebaza, et al. 2014, and Taha, 2014)**, who found this might be due to almost of nurses were newly graduates from technical school of nursing and Diplomat together at intensive care unit. Contradiction to these findings **(Islam, 2010)**, who found that most of studied nurses more than half their age were ranged between 30 to 40 years old.

The result of the present study revealed that, diploma nurses constituted the highest percentage in the study followed by nursing technical institute followed by bachelor degree. This result in agreement with **(Islam, 2010,**

Abou El Enein & Zaghloul, 2011, Mohamed & Weheida, 2014 and Mwebaza, et al. 2014), who found that about more than two third of the sample in their study had diploma degree. Contradiction to these findings **(Taha, 2014)**, who found that most of studied nurses more than half had technical school education and **(Banjor, et al. 2012 and Alkherabsheh, et al. 2014),** found that the majority of studied nurses had a baccalaureate degree.

The result of the present study revealed that the majority of studied nurses were female. This result agreement with **(Islam, 2010, Banjor, et al. 2012, Mohamed & Weheida, 2014 and Mwebaza, et al. 2014),** those found that most of studied nurses were female. Contradiction to these findings **(Alkherabsheh, et al. 2014)**, who found that more than half of studied nurses were male.

This study revealed that, more than third of study nurses had five to less than 10 years of experience. This result agreement with **(Islam, 2010 and Mohamed & Weheida, 2014)**. This result Contradicted with **(Mwebaza, et al. 2014 and Taha, 2014)**, those found that more than half of studied nurses had less than five years of experience and **(Banjor, et al. 2012)**, who found more than half of studied nurses had experience years ranged from one to three years.

This study indicated that the majority of nurses didn't attend training courses related to prevention and management of pressure ulcer; thus pressure ulcer may occur. This agreement with **(Islam, 2010 and Taha, 2014)**, those found more than two third of studied nurses did not receiving any previous training courses.

This may be due to lack of in-service education program in hospital and lack of opportunity to be trained about updated on pressure ulcer prevention and management programs might preclude the nurses from remembering, understanding, and applying suitable knowledge regarding pressure ulcer prevention and management. This result agrees with **(Sheta, 2006, Hamed, 2009, Islam, 2010, Abou El Enein & Zaghloul, 2011 and Taha, 2014),** those recommended that in-service training and refresher courses about pressure ulcer prevention should be designed for nurses .This should provide them with up-dated knowledge to understand pressure ulcer prevention which can be translated into practice.

Also, the result revealed absence of policies and procedures indexes in intensive care units under the study. This may be due to negligence from hospitals services administration, and this may lead to occurrence of pressure ulcer. This agreement with (**Islam, 2010 and Tubaishat, et al. 2010**), those found that PU clinical guidelines were not applicable in hospital.

B- Regarding to knowledge related to management and prevention of pressure ulcer:

The finding showed that the nurses who participated in this study had a very low level of overall knowledge regarding prevention and management of pressure ulcer. This agreement with **(El sayed, et al. 2003, Miyazaki, et al. 2010, Mwebaza, et al. 2014 and Taha, 2014),** those found poor level of knowledge about pressure ulcer prevention and management among the studied nurses.

On another hand, this result was contradicted with **(Pancorbo-hidalgo, et al. 2007, Meesterberends, et al. 2011 and Mohamed & Weheida, 2014)**, those found that level of knowledge among studied nurses had a satisfied level also other studied **(Tweed & Tweed 2008 and Lyder & Ayello, 2008)**, reported high level of knowledge among studied nurses about pressure ulcer prevention and management among the studied nurses.

There are three possible causes to explain the very low level of overall knowledge of this group of subjects. First, their formal education background and training experience may be a factor related to this unsatisfactory knowledge in which less than half of nurses graduated from diploma degree followed by nursing technical Institute. Second, the lack of opportunity to be trained about updated on pressure ulcer prevention programs might preclude the nurses from remembering, understanding, and applying suitable knowledge regarding pressure ulcer prevention so the highest percentages of nurses were not trained related to the prevention of pressure ulcers' program. Third reason, the lack of

learning resources for nurses to up-date their knowledge would be another reason for the very low level of knowledge. Supporting to these study findings **(Sheta, 2006**, **Hamed, 2009, Miyazaki, et al. 2010 and Taha, 2014)**, those stated that most nurses in both units had secondary diploma degree.

In agreement of this finding **(Jankowski & Nadzam, 2011)**, stated that lack of nurse's knowledge, is still seen as one of the primary causes for pressure ulcer development so the pressure ulcers are increasingly used as an indicator of the quality of care. This agrees with **(Gunningberg, 2004 and Islam, 2010)**, who concluded that nurses need further continuing education and training program regarding pressure ulcer prevention that could influence positive attitude, ultimately, leading to effective nursing role toward pressure ulcer prevention.

This agreed with **(Pancorbo-Hidalgo, et al, 2007)**, found that lack of updating in nurses' education decreased the level of knowledge among nurses and added that nurses who were not being trained in pressure ulcer prevention possessed lower level of knowledge as compared to those being trained in pressure ulcer prevention program. In addition **(El-Sayed, et al. 2003)** reported that results of the analysis before program implementation showed very low levels of knowledge as regards the identification, prevention, and management of bed sores.

This might be related to the lack of scientific preparation of nurses. So, it is to be concluded that studied nurses were mostly not properly prepared prior to their working and dealing with such critically ill patients.

C-Regarding to practice related to management and prevention of pressure ulcer:

Findings of the present study showed that all studied nurses who participated in this study had unsatisfactory practice level regarding the pressure ulcers prevention and management. This result agrees with **(El-Sayed, et al. 2003, Islam, 2010 and Taha, 2014**). This disagreement with **(Hdley & Roques, 2007 and Mohamed & Weheida, 2014),** found that the nurses' practice regarding pressure ulcer was at moderate level of practice regarding the pressure ulcers prevention and management.

A possible reason for explaining this low level of practice may be due to certain factors: First, the shortage of nursing staff and limited working time available for direct patient care in preventing and management of pressure ulcer may be an organizational factor related to the low level of practice. Second, education and training, administrative support, and supplies of equipment are particularly essential for nurses to prevent and management the pressure ulcer. In this study hospitals, no in service education or training or adequate supplies of equipment are available for preventing and management of pressure ulcer. For example, there is no pressure ulcer relieving support surfaces and dressing.

The studied nurses in both hospitals were not trained and equipped for providing a good slandered of nursing care to prevent and manage pressure ulcer. This agrees with (**Rahman, et al. 2002).** Third, the provision of guidelines for practice to prevent pressure ulcer is an important factor for nurses in providing nursing care. This agrees with (**Islam, 2010).**

D- Relation between nurses' knowledge scores and practice scores regarding to their characteristics.

The present study finding revealed that there were positive significant correlation between nurses' knowledge scores and practice scores. This finding agrees with **(Taha, 2014)**. While it's contradicted with **(Maylor, 2001, Pancorbo-Hidalgo, et al. 2007 and Islam, 2010)**, found that there was no relationship between nurses' knowledge and practice about pressure ulcer prevention and management.

Current literature suggests that age, education, and years of experience may influence registered nurse's knowledge on pressure ulcer care **(Hulsenboom, et al. 2007 and choa, et al. 2011).**

The study showed that nurses' knowledge was inadequate and was no relation with their basic age. This agreement with **(Hamed, 2009, Saleh, et al .2012, Alkherabsheh, et al. 2014 and Mohamed & Weheida, 2014)**, mentioned

that there was not relationship was seen between level of nurses' knowledge and nurses' age, while it contradicted with **(Taha, 2014)**, found highly statistical positive correlation between age and nurses' knowledge.

The study showed that nurses' knowledge was inadequate and was no relation with their gender, while it contradicted with **(Saleh, et al .2012)** found that gender influences in relation of nurses' knowledge toward pressure ulcer care, male participant had higher pressure ulcer knowledge score.

The study showed that nurses' knowledge was inadequate and was no relation with their educational level. This agreed with **(Taha, 2006, Saleh, et al. 2012, Mohamed & Alkherabsheh, et al. 2014 and Weheida, 2014)**. It was contradicted with **(Hamed, 2009 and Taha, 2014)**, found there were highly statistically significant relation between level of education with knowledge. The study showed that nurses' knowledge was inadequate and was no relation with years of experience. This agreed with **(Pancorbo-Hidalgo, et al. 2007, Hamed, 2009, Alkherabsheh, et al. 2014 and Mohamed & Weheida, 2014)**. While it contradicted with **(Taha, 2014)**, found that there was highly statistical positive correlation between years of experience and nurses' knowledge.

The study showed that nurses' practice was inadequate and was no relation with their basic age. This agreed with **(Sheta, 2006 and Mohamed & Weheida, 2014)**, found no relationship between level of nurses' practice and nurses' age. It was contradicted with **(Taha, 2014)**, who found a highly statistical positive correlation between age and nurses' practice. The study showed that nurses' practice was inadequate and was no relation with their gender, while it contradicted with **(Saleh, et al .2012)**, who found that gender influences in relation of nurses' practice toward pressure ulcer care, male participant had higher pressure ulcer practice score.

The study showed that nurses' practice was inadequate and was no relation with their educational level. This agreement with **(Mohamed & Weheida, 2014)**. The study showed that nurses' practice was inadequate and was no relation with years of experience. This agreement with **(Sheta, 2006 and Mohamed & Weheida, 2014)**. It was contradicted with **(Seloma, 2003 and Taha, 2014)**, who found that the years of working in ICU and years of experience the higher efficacy of nurses' clinical practice. The study showed that there was positive significant correlation between level of practice and attending training courses regarding pressure ulcer prevention and management. The opportunity to be trained about updated on pressure ulcer prevention and management programs may help the nurses for remembering, understanding, and applying suitable practice regarding pressure ulcer prevention and management.

Conclusion

In this research findings, concluded that all the studied nurses had unsatisfied level of knowledge and practice about pressure ulcer prevention and management. There was a significant correlation between total level of knowledge and total level of practice. There was positive significant correlation between knowledge score and assisting a patient with turning in bed score. There was significant correlation between practice score, care of patient to prevent pressure ulcer and attending training courses. There was no significant correlation between nurses' knowledge and their demographic characteristics.

Recommendations

The results' study recommended that; Establish system which includes policies and procedure manual to guide knowledge and practice regarding prevention and management of pressure ulcer to be available in Intensive care units. Revise, design and apply repositioning schedule for nursing care staff in intensive care unit. Assure adequate supply of facilities and equipment necessary for caring of pressure ulcer. Use risk assessment tool as braden scale to assess patient risk for pressure ulcer development. Periodical updating for knowledge and practice concerning with pressure ulcer prevention and management through sharing educational programs.

Limitations of the study: The small number of subjects led to inability to generalize the results of the study, so not

representing the whole population. Using of hydrocolloid dressing was not applied at both hospitals at the time of conducting the study.

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Conflict of interest: There was no conflict of interest.

Ethics approval: Approved from Faculty of Nursing, Institutional Review Board.

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