

Nurses' Performance Regarding Implementation of Pressure Ulcers Care Bundle at Intensive Care Units

Elsayed Mohamed Elsayed Ibrahim¹, Zeinab Hussein Ali ², Sabah Nagah Hassan ³, Tamer Sayed Abdelmola⁴

¹ Intensive care unit supervisor at Fayoum University hospital, Egypt.

² Professor of Medical Surgical Nursing, Faculty of Nursing - Helwan University, Egypt.

³ Lecturer of Medical Surgical Nursing, Faculty of Nursing- Helwan University, Egypt.

⁴ Lecture of Critical Medicine, Faculty of Medicine- Fayoum University, Egypt.

ABSTRACT

Background: Pressure ulcers prevention strategies remain at the forefront of health care prevention measures. Care bundles that combine evidence-based interventions are more effective in preventing pressure ulcers development. **Aim:** this study aimed to assess nurses' performance regarding implementation of pressure ulcers care bundle at the intensive care unit. **Design:** A descriptive exploratory research design was utilized to achieve the aim of this study. **Setting:** This study was conducted at the intensive care units at Fayoum University hospital. **Subjects:** A convenient sample of 80 nurses working at the previous mentioned intensive care units was included in the study. **Tools:** Data were collected using the following three tools: Tool (I): Self-administered questionnaire, Tool (II): Nurses' practices observational checklist, Tool (III): Nurses' attitude regarding pressure ulcer prevention. **Results:** This study showed that 90% of the studied nurses aged from 20 to less than 30 and 82.5% of the nurses had technical nursing institute qualification. Only 11.3% & 6.3% of the studied nurses had satisfactory level of knowledge and competent practices respectively, while, 66.3% of them had total positive attitude regarding pressure ulcers and pressure ulcers care. **Conclusion:** The minority of the studied nurses had satisfactory level of knowledge and total competent practices scores regarding pressure ulcers and pressure ulcers care bundle, whereas, two thirds of them had total positive attitude regarding pressure ulcers prevention. Recommendations: Dissemination of the skin care bundle to improve nurses' performance toward skin care to prevent skin breakdown and decrease its complications.

Introduction

Pressure ulcer (PUs) can be defined as localized injury to the skin or subcutaneous tissue caused by suppression of soft tissue between protruding bone and the outer surface for a long period of time. PUs result from continuous and unrelieved pressure, friction or shear causing damage to the skin and underlying tissue. PUs occurring in the care setting are known as a hospital-acquired pressure ulcer (HAPU). HAPUs remain a leading patient's safety problem at the intensive care setting despite new technologies and continued quality improvement efforts (Hsieh et al., 2020).

According to the National Pressure Ulcer Advisory Panel (NPUAP), pressure ulcer causes painful conditions, takes a long time to heal and is often a precursor to life-threatening complications such as skin and bone infections. Circulation is stopped when blood flow slows or ceases between the bone and the bed or wheelchair surface in the enclosed region. The skin may die as little as half a day when the tissue is deprived of oxygen and nutrients, although the evidence may not be apparent for days or even weeks (Mervis & Phillips, 2019).

Pressure ulcers are largely preventable adverse events which can result in increased hospital length of stay of up to 20 days. PUs has unfavorable impacts on patients' physical and psychosocial wellbeing. These include prolonged pain, infection, corrective surgery, social isolation and exacerbation of mental health conditions. In addition to a significant economic burden to health services worldwide (Padula & Delarmente, 2019).

Pressure ulcers can result in severe harm or even death and research suggests that between 80% to 95% of these ulcers are avoidable. So, prevention has been a primary goal of pressure ulcer research. It's a vital part of nursing practice as all nurses are at the forefront of predicting the patients at risk and providing measures to the patient for healing of pressure injury (Mervis, & Phillips, 2019).

Keywords:Care bundle, Performance, Pressure ulcers

DOI:
10.5455/jcmr.2023.14.05.34

Pressure ulcers prevention strategies remain at the forefront of health care prevention measures, with clinical practice guidelines (CPG) providing clinicians with globally accepted best practice standards in care. Implementing Pressure ulcers prevention include initiating evidence-based intervention strategies, early mobilization, specialized support surfaces, regular skin assessments, repositioning, adequate nutrition and skin care. Furthermore, quality and safety initiatives that aim at reducing the burden of adverse events are emerging in health care (Deakin et al., 2020).

A "care bundle" is also sometimes referred as bundle of care, patient care bundle, prevention bundle, or nursing cluster bundle. These terms interchangeably refer to the practice of a series of evidence-based treatment and nursing measures. Care bundles with a risk assessment are more effective in preventing HAPU development. Care bundles combine evidence-based interventions, usually three to five components; to produce a significantly better outcome than when individually implemented. Most HAPU care bundles include a risk assessment, support surfaces, patient repositioning, mobilization, friction reduction, nutritional support and moisture management (Floyd et al., 2021).

Significance of the study:

Pressure ulcer is a serious adverse event that can result in physical and psychological consequences, increased morbidity and mortality. Pressure ulcers are clinically skin and soft tissue disease that occurs in all health care settings worldwide. Despite active practical interventions, global HAPU rates have remained relatively high since the last 15 years, the prevalence of PUs around the world is estimated to range from 6% to 19% and a pooled prevalence of 13% was reported in hospitalized adults (Li et al., 2020) in (Lechner et al., 2022). Every year, approximately 186,617 patients develop new acute ulcers. Also, 60,000 people have died as a result of global pressure ulcer complications (Berihu et al., 2020).

In American hospitals, the prevalence is estimated to be 0.4% to 38%. Each year, nearly 3 million people develop HAPUs in the United States, costing \$10 billion with a \$48,000 average charge per ulcer. More than 60,000 acute care patients die from complications related to HAPUs, yet as many as 95% are preventable (Floyd et al., 2021).

Prevalence of hospital-acquired pressure ulcer is reported to be 4% to 40% at the intensive care unit (ICU), with higher prevalence reported in the medical ICU. HAPUs in the ICU contribute to increased nurse workload, as high as 50%, with at least a 5% impact on the overall budget due to more staffing, medical supply consumption, specialty bed usage, and nutritional support. HAPUs have a deleterious impact on the quality of life for people recovering from illnesses with limited mobility, increase incidence of sepsis, additional surgeries and extended hospital stay. For these reasons, HAPUs are a recognized quality of care indicator, risk management problem, and patient safety priority for the ICU (Floyd et al., 2021).

Although studies have demonstrated an association between care bundle and positive outcomes for ICU patients, the complexity of the ICU environment and the severity of the patient's illness present challenges to care bundle implementation. In addition, nurses' implementation is also an important factor that needs to be evaluated when using a care bundle. Measuring the effectiveness of the PU bundle implementation through compliance with the bundle is essential for a comprehensive understanding of the quality of the bundle and its implementation (Zhang et al., 2021). So, the aim of this study was to assess nurses' performance regarding implementation of pressure ulcer care bundle.

Aim of the study

This study aimed to assess nurses' performance regarding implementation of pressure ulcers care bundle at the intensive care unit. This aim was achieved through the following objectives:

1. Assess the level of nurses' knowledge regarding implementation of pressure ulcer care bundle at the intensive care unit.
2. Assess the level of nurses' practices regarding implementation of pressure ulcer care bundle at the intensive care unit.
3. Assess nurses' attitude regarding implementation of pressure ulcer care bundle at the intensive care unit.

Research questions:

The objectives of the study were achieved through answering the following questions:

1. What is the level of nurses' knowledge regarding implementation of pressure ulcer care bundle at the intensive care unit?
2. What is the level of nurses' practices regarding implementation of pressure ulcer care bundle at the intensive care unit?
3. What is nurses' attitude regarding implementation of pressure ulcer care bundle at the intensive care unit?

Operational definition

Performance: refer to nurses' knowledge, practices and attitude regarding implementation of pressure ulcer care bundle.

The subjects and methods of this study were portrayed under the four main items as follows:

- Technical item.
- Operational item.
- Administrative item.
- Statistical item.

Technical design:

The technical design included research design, setting, subjects and tools of data collection.

Research design:

A descriptive exploratory research design was utilized to achieve the aim of this study.

Setting:

This study was conducted at the intensive care units at Fayoum University Hospital

Subjects:

A convenient sample of 80 nurses working at the previous mentioned intensive care units was included in the study.

Tools for data collection:

Data were collected using the following three tools:

Tool I: Self-administered questionnaire:

This tool included 2 parts:

Part I: Nurse's demographic characteristics and work related data:

This tool was developed by the investigator based on an extensive literature review (Habiballah, 2018); (Kose et al., 2016). It contained items regarding nurse's demographic data such as (age, gender, educational level, years of experience in nursing profession, attendance of training programs related to PU care bundle, duration after training and years of experience at ICU).

Part II: Nurse's level of knowledge assessment questionnaire.

This questionnaire was developed by the investigator based on an extensive literature review (beeckman et al., 2010; Al Shidi, 2016) to assess nurses' knowledge regarding pressure ulcers and pressure ulcer care bundle. It included 26 questions under 5 main domains:

- Nurses' knowledge regarding pressure ulcer (3 items).
- Nurses' knowledge regarding pressure ulcer care bundle (5 items).
- Nurses' knowledge regarding risk factor of pressure ulcer (3 items).
- Nurses' knowledge regarding sites and degrees of pressure ulcer (5 items).
- Nurses' knowledge regarding nursing care of pressure ulcer (10 items)

Scoring system of knowledge assessment questionnaire

Each correct answer had score 1 and the incorrect answer had score zero. Total scores of knowledge ranged from 0 to 26 degrees and were categorized as:

Satisfactory if the total score is 85% or more (22 degrees or more)

Unsatisfactory if the total score less than 85% (less than 22 degrees) (Amr et al. 2022).

Tool II: Nurses' practices observational checklist

This tool was developed by the investigator based on an extensive literature review (Zuo & Meng, 2015; Hashad, & Hassan, 2018), to assess nurses' practices during caring for patient with pressure ulcer.

It included 25 practices items under 5 main domains: Risk assessment (5 items), skin assessment (5 items), support surfaces use (5 items), repositioning patient (5 items) and nutritional support (5 items).

Scoring system of nurses' practices observational checklist:

Each step that had been done had 1 score and not done step had score zero. Total practice scores ranged from 0 to 25 degrees and were categorized as:

- Competent if the total score is 95% or more. (24 degree or more).
- Incompetent if the total score is less than 95% (less than 24 degree) (Amr et al. 2022).

Tool III: Nurses' attitude regarding pressure ulcer prevention

This tool was adapted from (Beeckman et al., 2010) to assess nurses' attitude regarding pressure

ulcer prevention at intensive care unit.

It included 16 statements under 4 main domains: nursing competence (4 items), priority of pressure ulcer prevention (5 items), impact of pressure ulcer prevention (4 items) and nurses' responsibility (3 items).

Scoring system of Nurses' attitude regarding pressure ulcer prevention:

The tool consists of positively and negatively worded statements, items were scored on 3 points Likert scale from (0= disagree), (1= agree to some extent) and (2= strongly agree). Total scores ranged from 0 to 32 degrees and were categorized as:

- Positive attitude if the total score is 75% or more. (24 degree or more)
- Negative attitude if the total scores less than 75% (less than 24 degree) (Florin et al. 2016).

Negatively worded statements were reversely scored. They were 5 items (Pressure ulcer prevention is too difficult related to own competence, pressure ulcers prevention is time consuming to carry out, pressure ulcer almost never causes discomfort for a patient, the impact of pressure ulcers on a patient should not be exaggerated, being irresponsible if a pressure ulcer develops in patient).

II- Operational Item:

Preparatory phase:

It included reviewing of past, current, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Pilot study:

The pilot study was done on 10% of the sample (9 nurses) to examine the clarity of questions and time needed to complete the study tools. Subjects included in the pilot study weren't excluded from the study sample as necessary modifications were done.

Field Work:

- Data were collected within 6 months in the period from the beginning of December 2022 to the end of May 2023.
- The investigator visited the neurosurgical intensive care unit and neurology care department two days per week during the morning shifts (8:00 am to 2:00 pm). Each day the investigator interviewed 1 or 2 nurses.
- The aim of the study was explained to nurses before any data collection
- The investigator obtained the nurses' consent for participating in the study.
- The study tools were completed and filled in by the nurses within an average time of 35-50 minutes as following: self-administrated questionnaire for collecting data regarding demographic and work related characteristics of nurses; it took about 5-10 minutes as well nurses' knowledge questionnaire took about 15-20 minutes, and nurses' attitude questionnaire took about 15-20 minutes.
- Each nurse was observed individually 3 times by the investigator during the shift to assess his/her practices during implementation of pressure ulcer care bundle.

Ethical considerations:

An official permission to conduct the proposed

study was obtained from the scientific research ethics committee faculty of nursing-Helwan University. Participation in the study was voluntary and subjects were given complete full information about the study and their role before signing the informed consent. The ethical considerations included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where they weren't accessed by any other party. Ethics, values, culture and beliefs were respected.

III-Administrative item:

After explanation of the study aim and objectives, an official permission was obtained from the dean of faculty of nursing and the director of Fayoum University hospital asking for cooperation and permission for data collection.

IV-Statistical Item:

Table (1): Frequency and percentage distribution of the studied nurses according to their demographic and work related characteristics (N=80).

Nurses' characteristics		No	%
Age (in years)	20 < 30	72	90.0
	30 < 40	7	8.7
	40 < 50	1	1.3
Mean + SD	25.71 + 2.939		
Gender	Male	44	55.0
	Female	36	45.0
Educational level	Nursing diploma	2	2.5
	Technical nursing institute	66	82.5
	Bachelor's degree	12	15.0
	Post graduate	0	0.0
Years of experience in nursing profession	< 5 years	61	76.2
	5- < 10 years	18	22.5
	>10 years	1	1.3
Attendance of training program regarding pressure ulcers bundle	Yes	26	32.5
	No	54	67.5
Duration after training (n= 26)	Less than 3 years	17	65.3
	3- 5 years	9	34.7

Upon completion of data collection, collected data were organized, tabulated and analyzed using Statistical Package for Social Science (SPSS), version 24 for analysis. For quantitative data, numbers, percentage, mean, and standard deviation (SD) were used to describe results. For qualitative data which describe a categorical set of data, frequency and percentage of each category were calculated.

Appropriate significance was adopted at P < 0.05 for interpretation of results (Siregar, 2021). The observed associated differences were considered as not significant if p>0.05 and significant if p<0.05. Appropriate inferential statistics such as chi square, Pearson correlation "r" test were used as well.

Results

Table 1: shows that 90 % of the studied nurses aged from 20 to less than 30 years with a mean age 25.71 + 2.939, 55 % of them were males and 82.5% of the nurses had technical nursing institute qualification. Regarding nurses' years of experience; 76.2% had experience of less than 5

years in nursing profession. As well, 67.5% of the studied nurses didn't attend any training programs regarding pressure ulcers care bundle, while, only 32.5% of them attended training programs with 65.3% of them attended since less than one year.

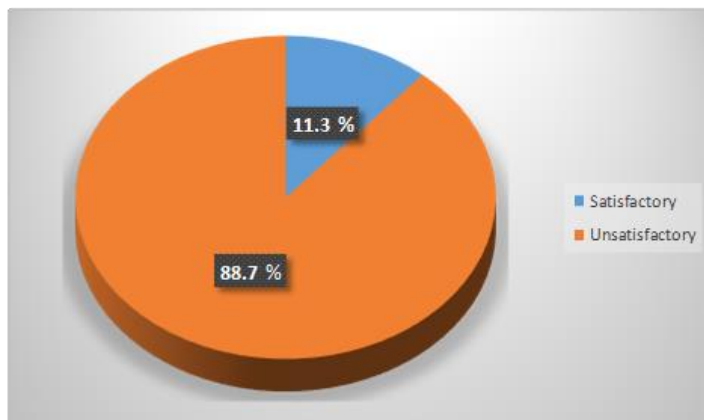


Figure (1): Percentage distribution of the studied nurses according to total knowledge scores (N=70).

Figure (1) illustrates that only 11.3% of the studied nurses had satisfactory level of knowledge regarding pressure ulcers and pressure ulcers care

bundle, while, 88.7% of them had unsatisfactory level of knowledge.

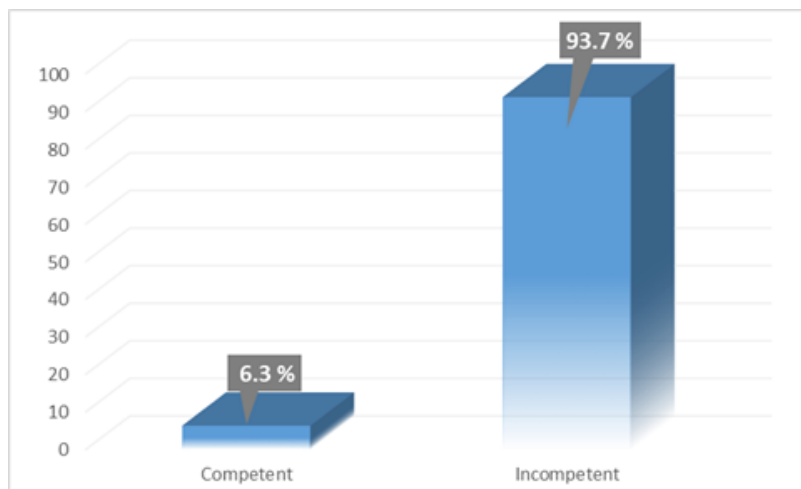


Figure (2): Percentage distribution of the studied nurses according to total competent practices scores (N=70).

Figure (2): illustrates that only 6.3% of the studied nurses had total competent practices scores regarding pressure ulcers and pressure ulcers care

bundle, while, 93.7% of them had total incompetent practices scores.

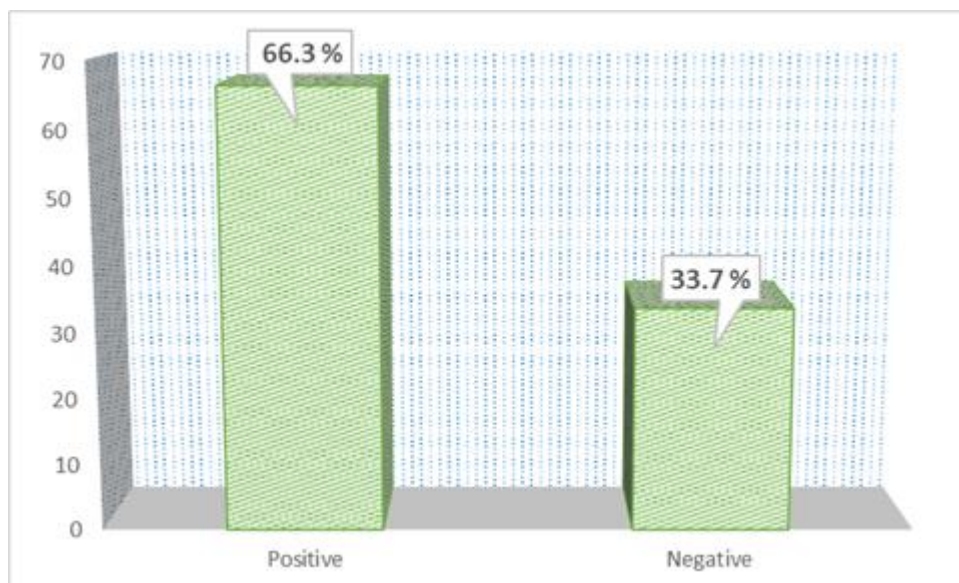


Figure (3): Percentage distribution of the studied nurses according to total attitude scores (N=70).

Figure (3): illustrates that 66.3% of the studied nurses had total positive attitude regarding pressure ulcers and pressure ulcers care bundle,

while, 33.7% of them had total negative attitude scores.

Table (2): Correlations between total knowledge scores of the studied nurses, their practices and attitude scores.

Items	Correlation coefficient (r)	P value
Total knowledge and practices scores	0.092	0.041*
Total knowledge and attitude scores	0.248	0.027*
Total practices and attitude scores	0.075	0.508

Table (2): shows that there were statistically significant positive correlations between total knowledge scores of the studied nurses and their practices with (P value = 0.041) and between their knowledge and attitude scores with (P value = 0.027). While, there was no statistically significant correlations between total practices and attitude scores of the studied nurses.

Discussion

Concerning the demographic characteristics of the studied nurses, this study findings revealed that the most of the studied nurses aged from 20 to less than 30 years, more than half of them were males and the majority of the nurses had technical nursing institute qualification. This finding may be interpreted by the studied nurses were recently graduated from technical nursing institute and the number of male gender in the nursing profession has increased in the last years.

This study result is similar to El-berdan et al., (2022), whose study aimed to assess impact of a pressure ulcer instructional program on nurses' performance and patient outcomes and mentioned that the majority of the studied nurses had age ranged between 26 to more than 30 years, while, the same study disagrees with the study results as the minority of the nurses were graduated from technical nursing institute. Additionally, Zainel, (2023), whose study titled "Assessment of nurses' knowledge towards prevention of pressure ulcer in Telfer general hospital" and showed that male nurses make up less than two thirds of the nursing workforce.

In the same context, more than two thirds of the studied nurses didn't attend any training programs regarding pressure ulcers care bundle, while, only less than one third of them attended training programs with two thirds of them attended since less than one year. This finding is in accordance with Al khazali, (2023), whose study aim was to investigate nurses' knowledge and barriers to perform pressure ulcers prevention practices and mentioned that about two thirds of the studied nurses didn't attend any training courses regarding pressure ulcers prevention.

According to years of experience of the studied nurses, this study finding illustrated that the majority of them had less than 5 years of experience in nursing profession and at intensive care unit. This result is in disagreement with Sayar et al., (2022), who examined the nurses' knowledge level regarding pressure injury and its staging and documented that two fifths of the nurses had less than 2 years of employment. As well, these findings mismatch with Ibrahim et al. (2022) whose study titled "Assessment of nurses performance in caring for children at risk and having decubitus ulcer" and found that more than half of them had years of experience ranged between 5- <10 years.

Regarding total satisfactory scores of nurses' knowledge, the present study clarified that only the minority of the studied nurses had satisfactory level of knowledge regarding pressure ulcers and pressure ulcers care bundle, while, the majority of them had unsatisfactory level of knowledge. Many reasons may contribute to the lack of knowledge among the studied nurses as their educational level and the majority of them didn't attend training courses regarding pressure ulcers care.

This result is in the same line with Hu et al. (2021), whose findings showed that the minority of nurses had sufficient knowledge about pressure ulcer prevention. As well, Sen, (2020), whose study titled "Nurses knowledge and practices toward pressure ulcer prevention in medical hospital" and stated that the level of knowledge was poor in the majority of participants.

Concerning total competent practices scores, only the minority of the studied nurses had total competent practices scores regarding pressure ulcers and pressure ulcers care bundle, while, the most of them had total incompetent practices scores. This finding may be related to the poor knowledge level among nurses, as well as, shortage of nursing staff and a heavy workload resulted in the low level of nurses' performance. This study is congruent with Amr et al., (2022) who studied the effect of skin care bundle protocol on

nurses' performance regarding prevention of skin breakdown and documented that less than one quarter of nurses had total competent practices regarding skin care bundle at pre implementation of skin care bundle protocol.

Additionally, this study finding is compatible with study carried out by Awad, & Hewi, (2020), which titled "Effect of pressure ulcer preventive nursing interventions on knowledge, attitudes and practices of nurses among hospitalized geriatric patients in Alexandria, Egypt" and found that two thirds of the study nurses had poor levels of PUs preventative practices previous to the implementation of the study's interventions.

The current study findings concluded that two thirds of the studied nurses had total positive attitude regarding pressure ulcers and pressure ulcers care bundle, while, one third of them had total negative attitude scores. Similarly, Rostamvand et al., (2022) carried out a systematic review and meta-analysis study about nurses' attitude on pressure injury prevention and their findings revealed that nurses and nursing students have a moderately positive attitude toward the prevention of PU. In contradicting with this study, the findings of GreššHalász et al., (2021), who conducted a study about "Nurses' knowledge and attitudes towards prevention of pressure ulcers" and revealed that insufficient attitudes of nurses towards PU prevention was reported among two thirds of them.

Regarding correlations between the studied variables, the study findings showed that there were statistically significant positive correlations between total knowledge scores of the studied nurses and their practices and between their knowledge and attitude scores. While, there was no statistically significant correlation between total practices and attitude scores of the studied nurses. This can be explained by practice is influenced by knowledge and attitude, because knowledge is a necessary precondition for putting skills and abilities into practice.

These results are supported by Hu et al., (2021), who revealed that there was a significant and positive relationship between pressure ulcers prevention practices and knowledge. Similarly, Awad and Hewi, (2020) who highlighted the same relation between knowledge and practices of the studied nurses. In addition, Khojastehfarb et al., (2020), who evaluated factors related to knowledge, attitude, and practice of nurses in intensive care unit in the area of pressure ulcer prevention and found out a significant and positive correlation between knowledge and attitudes.

Conclusion:

On the light on the finding of the current study, it can be concluded that only the minority of the studied nurses had satisfactory level of knowledge and total competent practices scores regarding pressure ulcers and pressure ulcers care bundle, whereas, two thirds of the studied nurses had total positive attitude regarding pressure ulcers and pressure ulcers care bundle.

There were statistically significant positive correlations between total knowledge scores of the studied nurses and their practices and between their knowledge and attitude scores. While, there was no statistically significant correlations between total practices and attitude scores of the

studied nurses.

Recommendations:

Dissemination of the skin care bundle to improve nurses' performance toward skin care to prevent skin breakdown and decrease its complications.

The obstacles in the implementation of pressure ulcer preventive measures must be identified.

Continuous education and training are needed to health care providers to work collaboratively and implement skin care bundle as a system.

References:

Al Shidi, A., (2016). Pressure ulcer management in Oman: nurses' knowledge and views. Doctoral thesis. Nursing and Health Care School. College of Medical, Veterinary & Life Sciences. University of Glasgow

Al khazali, (2023). Nurses' knowledge and barriers to perform pressure ulcers prevention practices. *HIV nursing*, 23 (1), 285-293.

Amr, E., Tantaewy, N., Abo Hadida, R., Bayumi, H., Abed Elazeem, Y., & Shrief, S. (2022). Effect of Skin care Bundle Protocol on nurses' Performance Regarding Prevention of Skin Breakdown. *Egyptian Journal of Health Care*, 13 (4), 1323-1333.

Awad, W., & Hewi, S. (2020). Effect of pressure ulcer preventive nursing interventions on knowledge, attitudes and practices of nurses among hospitalized geriatric patients in Alexandria, Egypt. *J Nurs Health Sci*, 9(2), 1-2.

Berihu, H., Wubayehu, T., Teklu, T., Zeru, T., & Gerensea, H. (2020). Practice on pressure ulcer prevention among nurses in selected public hospitals, Tigray, Ethiopia. *BMC Research Notes*, 13(1), 1-7.

Deakin J., Gillespie, B., Chaboyer, W., Nieuwenhoven, P., & Latimer, S. (2020). An education intervention care bundle to improve hospitalized patients' pressure injury prevention knowledge: a before and after study. *Wound Practice and Research*, 28(4), 154-162.

Beeckman, D., Defloor, T., Demarré, L., van Hecke, A., & Vanderwee, K., (2010). Pressure ulcers: development and psychometric evaluation of the attitude towards pressure ulcer prevention instrument (APuP). *Int J Nurs Stud* 2010;47:1432-41

El-berdan, A., Elesawy, F., & Jahan M. (2022). Impact of a pressure ulcers instructional program on nurses' performance and patient outcomes. *The Malaysian Journal of Nursing*, 13 (4), 25-33.

Florin, J., Bååth, C., Gunningberg, L., & Mårtensson, G. (2016). Attitudes towards pressure ulcer prevention: a psychometric evaluation of the Swedish version of the APuP instrument. *International Wound Journal*, 13, 655-662

Floyd, N., Dominguez-Cancino, K., Butler, L., Rivera-Lozada, O., Leyva-Moral, J., & Palmieri, P. (2021). The effectiveness of care bundles including the Braden scale for preventing hospital acquired pressure ulcers in older adults hospitalized in ICUs: a systematic review. *The Open Nursing Journal*, 15, 74-84. DOI: 10.2174/1874434602115010074.

Grešš Halász, B., Bérešová, A., Tkáčová, L., Magurová, D. and Lizáková, L. (2021). Nurses' Knowledge and Attitudes towards Prevention of Pressure Ulcers. *International Journal of Environmental Research and Public Health*, 18, Article No. 1705.

Habiballah, L. (2018). Attitudes of intensive care nurses towards pressure ulcer prevention. *Clinical Nursing Studies*, 6 (3), 1-7.

Hashad, R., & Hassan, R. (2018). The effect of implementing a designed SKIN care bundle protocol on modifying Nurses' practices toward Pediatric intensive care unit patients. *International Journal of Nursing Didactics*, 8 (2), 33-40.

Hsieh, H., Lee, C., Wu, H., Zhuo, M., & Hwang, C. (2020). Pressure Ulcers and Skin Infections after Cochlear Implantation: A Delayed yet Serious Issue. *International Journal of Pediatric Otorhinolaryngology*, 110241

Hu, L., Sae-Sia, W., & Kitrungrrote, L. (2021). Intensive care nurses' knowledge, attitude, and practice of pressure injury prevention in China: A Cross-Sectional Study. *Risk Management and Healthcare Policy*, (14), 4257.

Ibrahim, N., Mohamed, E., & Hassan, S. (2022). Assessment of nurses' performance in caring for children at risk and having decubitus ulcer. Published at: <https://www.researchgate.net/publication/358505782>.

Khojastehfar, S., Ghezalje, T. N., & Haghani, S. (2020). Factors related to knowledge, attitude, and practice of nurses in intensive care unit in the area of pressure ulcer prevention: A multicenter study. *Journal of Tissue Viability*, 29(2), 76-81.

Kose, I., Yeşil, P., Öztunç, G., & Eskimez, Z. (2016). Knowledge of nurses working in intensive care units in relation to preventive interventions for pressure ulcer. *International Journal of Caring Sciences*, 9 (2): 677.

Lechner, A., Coleman, S., Balzer, K., Kirkham, J., Muir, D., Nixon, J., Kottner, J. (2022). Core outcomes for pressure ulcer prevention trials: results of an international consensus study. *British Journal of Dermatology*, 187, 743-752.

Li, Z., Lin, F., Thalib, L., & Chaboyer, W. (2020). Global prevalence and incidence of pressure injuries in hospitalised adult patients: a systematic review and meta-analysis. *Int J Nurs Stud*, 105, 103546.

Mervis, J., & Phillips, T. (2019). Pressure ulcers: Pathophysiology, epidemiology, risk factors, and presentation. *Journal of the American Academy of Dermatology*, 81(4), 881-890.

Padula W, & Delarmente B. (2019). The national cost of hospital-acquired pressure injuries in the United States. *Int Wound J*, 16, 634- 640.

Rostamvand M, Abdi K, Gheshlagh RG, Khaki S, Dehvan F, Barz-garan R. (2022). Nurses' attitude on pressure injury prevention: A systematic review and meta-analysis based on the pressure ulcer prevention instrument (APuP). *J Tissue Viability*, 31(2):346-352.

Sayar, S., Ceran, M., Demir, A. (2022). Determining the pressure injury and staging knowledge of nurses at a hospital in Turkey. *Journal of Tissue Viability*, 31, 735-740.

Sen, S. (2020). Nurses knowledge and practices toward pressure ulcer prevention in medical hospital, Kolkata. *Journal Homepage: http://ijmr.net.in*, 8(04).

Siregar, P. (2021): Data SPSS (statistical package for the social sciences) and Types of variables, descriptive statistics, and sample size. *Indian Dermatology Online Journal*, 10 (1), 82.

Zainel, I. (2023). Assessment of nurses' knowledge towards prevention of pressure ulcer in Telfer general hospital. *Journal of Pharmaceutical Negative Results*, 14 (2), 4-9.

Zhang, X., Wu, Z., Zhao, B., Zhang, Q., Li, Z. (2021). Implementing a Pressure Injury Care

Bundle in Chinese Intensive Care Units. *Risk Management and Health care Policy*, 14, 2435-2442.

Zuo, X., & Meng, F. (2015). A care bundle for pressure ulcer treatment in intensive care units, *International Journal of Nursing Sciences*, 1-5