



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

SciVerse ScienceDirect

Procedia - Social and Behavioral Sciences 47 (2012) 2196 – 2206

---

---

**Procedia**  
Social and Behavioral Sciences

---

---

CY-ICER 2012

## An interventional study on the effects of pressure ulcer education on Jordanian registered nurses' knowledge and practice

Mohammad YN Saleh<sup>a,†</sup>, Jamal A.M. Saleh Qaddumi<sup>b</sup>, Denis Anthony<sup>c</sup><sup>a</sup> RN, PhD, TVNS, Assistant Professor, Faculty of Nursing, University of Jordan, Amman, Jordan<sup>b</sup> Assistant Professor, Faculty of Nursing, Al Najah University, Nablus, Palestine<sup>c</sup> Professor School of Nursing & Midwifery, De Montfort University, 266 London Rd, LE2 1RQ Leicester, UK

---

### Abstract

**BACKGROUND:** Pressure ulcers (PUs) are health problems that resulted in human suffering, pain, disfigurement, loss of productive time, and financial burden. Despite the fact that PU is largely preventable (Elliott, McKinley & Fox, 2008) and recent advances in health care, PU rates are significantly increased in health care facilities (EPUAP, 2009). **PURPOSE:** The current study examined the effects of pressure ulcer education program on nurses' knowledge, practices, attitudes and intentions towards PU prevention and treatment. **METHODS:** Interventional approach using before-after test design was used. Two hundred and twenty nurses were randomly selected from eight hospitals in Jordan. Nurses' knowledge and practice about PU was measured by PU knowledge and practice test based on EPUAP guidelines and Beeckman et al. (2011), while attitudes and intentions were measured using scales. **RESULTS:** The study revealed that nurses' knowledge, practices, attitudes and intentions were improved towards PU prevention and treatment. Demographic variables such as gender and years of experience were influential in relation to nurses' knowledge, practices, attitudes and intentions towards PU prevention and treatment. Results also showed lack of accurate information about PU management among nurses and positive nurses' attitudes toward PU prevention and treatment. **CONCLUSION:** A PU education program is a powerful tool for nurses. It provides an opportunity to improve understanding of PU, keep abreast of current knowledge on PU, and eliminate patient's suffering. Additionally, PU education programs can help nurses to acquire professional attitudes that will enable them to improve quality of nursing care.

*Keywords: Pressure Ulcer, knowledge, practice, prevention and treatment*

---

<sup>†</sup>Mohammad Y N Saleh. Tel.: +00962 6 5355000 ext.231550

E-mail address: [m.saleh@ju.edu.jo](mailto:m.saleh@ju.edu.jo)

### 1. Introduction

Pressure ulcers (PUs) are health problems that resulted in human suffering, pain, disfigurement, loss of productive time, and financial burden. Despite the fact that PU is largely preventable (Elliott, McKinley, & Fox, 2008) and recent advances in health care, PU rates are significantly increased in health care facilities (EPUAP, 2009a).

Numerous clinical guidelines have been developed to improve pressure ulcer prevention and treatment such as the Agency for Health Care Policy and Research (AHCPR) (1992) guidelines, the European Pressure Ulcer Advisory Panel (EPUAP) (1998) and the National Institute for Clinical Excellence (NICE) (2003). No published work has confirmed the use of any of these guidelines in the Arab World. Pressure ulcer guidelines may encourage nurses to

implement the knowledge on PU prevention and treatment in clinical practice. Non adherence to these guidelines is often (Meesterberends et al., 2010) and influenced by nurses' attitudes and lack of knowledge (Van Gaal et al., 2010).

PU prevention programs consist of different components including risk assessment, training and education, repositioning, use of preventive measures and support surfaces, and skin assessment. PU prevention programs including education have demonstrated significant reductions of pressure ulcer incidence and time taken for treatment (Chamanga, 2010) and (Reddy, 2006). Improved nurses' knowledge on PU prevention and treatment enhances patient's outcomes in terms of reduced hospital stay, reduced pain, and reduced human suffering (Smith & Waugh, 2009). Several studies have been conducted to evaluate nurses' knowledge and practices on pressure ulcer prevention and treatment. Pancorbo-Hidalgo et al. (2007) found high levels of knowledge in a Spanish location and about two thirds implemented prevention interventions and a similar figure for treatment interventions. Although they found nurses with a university degree, specific education in pressure ulcers or had been involved in pressure ulcer research had better knowledge and higher implementation rates, Hulsenboom, Bours, and Halfens (2007) emphasized that age, gender, and experience had no influence on PU care. In a Belgium setting, Beeckman et al (2011) found inadequate knowledge on prevention of pressure ulcer, though knowledge was not correlated with application of preventive measures – attitude was. Similarly, O'Brien and Cowman (2011) found significant gap between nursing records of skin condition with actual skin examination in relation to PU. In the Arab world, Abou El Enein & Zaghoul (2011) reported that 70% of nurses scored useful measures in PU care and 66% of them scored non-useful measures were in use in PU care.

Poor nurses' knowledge and practices emphasized the need for education programs on PU prevention and treatment. Bales & Padwojski (2009) studied effects of education including skin assessment, PU risk assessment, strategies of PU prevention and treatment and found significant reduction in PU prevalence rates. Similar results were found in earlier works of Finlay, Smith, & Abrams (2004) and Young, Evans, & Davis (2003). Additionally, Paquay et al. (2010) found that nurses' adherence to PU guidelines was significantly improved after implementation of an education program. Although PU education improves nurses' knowledge, nurses' attitudes towards PU prevention and treatment are also significant to improve PU care (Gunningberg, 2001; Moore & Price, 2004). Demarre et al. (2011) found that nurses' attitudes towards PU prevention and treatment were significant in predicting implementation of PU care.

Few studies have been conducted to explore nurses' attitudes towards PU prevention and treatment. Whilst Moore and Price (2004) found that nurses had a positive attitudes towards PU care, Bostrom and Kenneth (1992) highlighted lack of interest and low priority of PU prevention and treatment in nursing care and Maylor and Torrance (1999) addressed lack of individual motivation as a barrier to effective PU care. However, knowledge alone is not enough to change nurses' attitudes towards PU care (Moore & Price, 2004).

In Jordan as well as the Arab World, pressure ulcers are significant health problems among hospitalized patients (Tubaishat et al. 2010 and Saleh et al., 2009). Nursing care in relation to pressure ulcers is lacking adequate pressure ulcer documentation, risk assessment, training, and prevention and treatment guidelines (Tubaishat et al. 2010). The implementation of tissue viability programs including pressure ulcer care in Jordan is new and emerging part in clinical practice which requires the need for evidence based using interventional research methods. The current study is the first of its kind in Jordan and in the Arab world. It provides an opportunity to evaluate the effects of PU education on Jordanian nurses' knowledge an practice, attitudes and intentions towards PU care. The findings of this study can be baseline for nurses and health care professionals. It contributes to develop an educational platform on pressure ulcer prevention and treatment at national and global levels as there are no documented interventional studies have been conducted to assess effectiveness of using PU education program on nurses' knowledge and practice and their attitudes and intentions towards PU care.

## 2. Methods

### 2.1. Research Hypotheses

*Hypothesis 1.* Nurses who complete education program on PU prevention and treatment will show increased knowledge, practice, positive attitudes, and higher intentions towards PU prevention and treatment compared with the control group.

*Hypothesis 2.* Gender, age, years of experience in nursing, and sources of knowledge on PU will affect nurses' knowledge and practice, attitudes, and intentions towards PU prevention and treatment.

### 2.2. Design

A true experimental design was used to examine the effects of PU education on nurses' knowledge and practice, attitudes, and intentions towards PU prevention and treatment. This study involved random assignment of subjects to either the experimental or control group. The pre- and posttest were administered to all subjects in both groups separately. The experimental group attended PU education program. The control group received no education.

### 2.3. Sample/participants

Pressure ulcer care is performed at hospital settings in Jordan. Inclusion criteria were those hospitals having 200 and more beds and having medical, surgical, and critical care units because pressure ulcer prevention and treatment should form a routine part of nurses' daily activities at the selected hospitals. From a population of governmental (n=30), private (n=65), military (n=11) and university (n=2) hospitals, eleven hospitals (6 governmental, 2 university, 1 military, and 2 private) met the inclusion criteria.

A list of all units in which there were likely to be patients with pressure ulcer including medical, surgical, and critical care units at each selected hospital was obtained from directors of nursing. Only three units (a medical unit, a surgical unit, and a critical care unit) were chosen by means of a random number table from each site and then all registered nurses (RNs) at the selected units were invited to participate in the study. Though, 220 male and female registered nurses with Baccalaureate and/ or 3 years diploma programme or master's degree who were involved in patient care where direct patient assessment, pressure ulcer prevention and treatment are routine part of their work agreed to participate in the study. Head nurses, supervisors, nursing directors, and nurses working in maternity, operation, hemodialysis units, and emergency departments were excluded.

Participating RNs were randomly assigned to either the experimental group or the control group based on a list of RNs provided by each hospital using simple random sampling. This method was used because it is the most basic type of probability sampling, wherein a sampling frame was created by enumerating all members of a population and then selecting a sample from the sampling frame through random procedures (Polit & Beck, 2008). To eliminate the possibility of self-selection bias, participating RNs were assigned odd numbers for the control group and even numbers for the experimental group.

### 2.4. Power calculation

A power analysis using g power V.3.1 (Faul, Erdfelder, Buchner, & Lang, 2009) showed that the required sample size is 192 participants (96 in each group). The power is about 80% that of Student's t test (Anthony 2011, p 247). This figure used  $\beta=0.80$ ,  $\alpha=0.01$  (2-tailed) and medium effect size=0.5. We achieved a sample of 220 RNs.

## 2.5. Instrument

To assess the effectiveness of PU education program on nurses' knowledge and practice, attitudes, and intentions towards PU prevention and treatment, researchers used an instrument divided into 4 sections:

- Demographic and contextual characteristics of participants which included gender, age, years of clinical experience, higher education, previous participation in PU research, sources of knowledge on PU and previous pressure ulcer education.
- PU Knowledge and Practice Test based on EPUAP (2009), Beeckman et al. (2009), Vanderwee et al. (2007) and Dealey & Defloor (2009) to assess nurses' knowledge and practices on PU prevention and treatment. It includes 26 multiple choice questions reflecting the most relevant aspects of PU care (Etiology and development, Classification and observation, Nutrition, Risk assessment, Reduction the magnitude of pressure and shearing, and Reduction the duration of pressure and shearing). Of four alternatives multiple choice questions, participants asked to circle the best alternative that answers the question.
- Pressure ulcer attitudes scale: includes 11 items authored by Moore & Price (2004). For each item, participants asked to indicate whether they (strongly agree=5, agree=4, neither agree nor disagree=3, disagree=2, or strongly disagree=1) with the scale items. Three items were reverse coded as defined by authors.
- Pressure ulcer intentions scale: includes 3 items authored by Moore & Price (2004). Participants asked to indicate whether they (strongly agree=7, moderately agree=6, agree=5, neither agree nor disagree=4, disagree=3, moderately disagree=2, or strongly disagree=1) with the scale items.

## 2.6. Educational Program

PU education program has been developed at The University of Jordan and guided by EUPAP and NPUAP (2009a, 2009b) guidelines for PU prevention and treatment was used in this study. The researchers integrated the concepts of PU etiology and development, classification and observation, nutrition, skin assessment, risk assessment, and strategies to reduce pressure and shearing into the PU education program. The PU education program was conducted by tissue viability nurse specialist and took place in lecture rooms. PU education program was approximately 6 hours long and conducted into two sessions over one day. The program applied several times to groups consists of 20-22 participants from the experimental group over one week. The PU program had three parts. The first part focused on providing an introduction to the PU education program and the pretest. During this part of the program, both the researchers and the participants agreed on the mutual goal of the PU education program, which was to introduce nurses to consistent PU prevention and treatment guidelines essential to care patients having and/ or at risk of PU development in their clinical settings. The second part of the program focused on nurses' training, where the concepts and principles of PU care have been introduced. The second part of the program contained seven modules:

Module 1: Orientation.

Module 2: Skin anatomy and physiology.

Module 3: PU etiology and development.

Module 4: PU classification and skin assessment.

Module 5: PU risk assessment.

Module 6: Nutrition and pressure and shear reduction.

Module 7: PU treatment modalities

The researchers used a variety of educational methods, including PowerPoint lectures, group discussions, videos, case presentation, simulation, and printed materials. The third part of the program, which was approximately 2 hours long, focused on introducing the posttest and obtaining feedback from participants.

### 2.7. Ethical considerations

Approval was obtained from the scientific and ethical research committees at the faculty of nursing and the University of Jordan. After approval was obtained, permission was obtained from the targeted hospitals before data collection began. Each participant was asked to sign a written consent form to participate in the study. The form explained the purpose of the study and described participants' rights. Respondents' confidentiality was ensured throughout the study. Data were secured and saved in a password-protected computer, with hard copies stored in a cabinet in a locked office. Moreover, the demographic data sheets were coded with numbers, with no names, to maintain confidentiality. In addition, no one except the principal investigator had access to the data. Respondents were advised that participation in the study was voluntary and that they could withdraw without consequences.

### 2.8. Validity and reliability & rigor

A pilot study was conducted using study instrument including PU knowledge and practice test, attitudes scale, and intentions scale towards PU prevention and treatment among a sample of twenty RNs after an access was sought from the director of nursing in a university hospital. Eighteen RNs completed the study. RNs asked clarification about some misleading and repeated items in knowledge and practice test and attitudes scale were all then revised by expert panel consists of nurse educator, nurse researcher, and tissue viability nurse specialist. Content validity index showed 0.83 for PU knowledge and practice test, 0.90 for attitudes scale, and 0.90 for intentions scale. The internal consistency (Cronbach's  $\alpha$ ) resulted in 0.78 for PU knowledge and practice test, 0.82 and 0.84 for attitudes and intentions scales respectively. RNs who have been involved in the pilot study were not included as part of the main study.

### 2.9. Data Collection

A detailed explanation of the aims and procedures for the study was given to the participants. For the experimental group, participants were given a self-administered instrument at the beginning of the PU education and after the completion of the program. Data were collected over a period of 1 week at the educational center where the program was conducted. For the control group, data were collected from participants with the same instrument used for the experimental group. Data collection occurred at the participants' hospitals at the same time data collected from experimental group either at beginning or after the completion of PU education program. Demographic and contextual characteristics of the participants were collected only at the beginning of the PU education program while PU knowledge and practice test, attitudes and intentions scales towards PU prevention and treatment were completed at the beginning and after completion of PU education from both experimental and control groups.

### 2.10. Data analysis

Based on 26-multiple choice PU knowledge and practice test, 11-items attitudes scale, and 3-items intentions scale, nurses' responses were summed up in total scores were then calculated in mean scores and standard deviations. Descriptive statistics was used to describe demographic and contextual characteristics of the participants using frequencies, means and standard deviations. t test for independent groups was used to compare mean difference between experimental and control groups, while paired t test used to compare mean differences within experimental or control group in relation to nurses' PU knowledge and practice, attitudes, and intentions towards PU prevention and treatment. Analysis of variance was used to examine the differences of demographic and contextual variables (e.g., age, experience, last attended PU education, and sources of PU knowledge) within both groups (Polit & Beck, 2008). All statistical procedures were performed at  $\alpha=0.01$  (2-tailed) using the Statistical Package for the Social Sciences (SPSS) version 16.0.

**3. Results**

Demographic characteristics of participants shows 58.6% (n=129) were male, had Bachelor degree (88.1 % , n = 194), aged 22 to 40 years (M=27.2, SD=3.4), and almost half of them had 5 to 10 years of experience in nursing (47.9 %, n=105). Sources of knowledge about pressure ulcer were largely from formal education or in service training. The majority of participants (84%, n=185) were not involved in research activities on pressure ulcer.

To test Hypothesis 1, an independent samples t test was used. Results in Tables 1, 2, and 3 indicate that the difference in PU knowledge and practice test, attitudes, and intentions scores between experimental and control groups after implementation of PU education program were statistically significant (P = 0.002, P = 0.03, P = 0.001 respectively). These results suggested the usefulness of implementing PU education program to improve RNs’ knowledge and practices on PU and their attitudes and intentions towards PU prevention and treatment.

Table 1 The effectiveness of PU education program on RNs' knowledge and practice on PU prevention and treatment (N=220)

	Groups					
	Experimental (n=112)		Comparison (n=108)			
	Mean	SD	Mean	SD	t	P value
Pretest	10.8/26	1.05	10.4/26	2.05	1.05	0.12
Posttest	15.2/26	1.50	13.6/26	1.80	2.05	0.002*

\*Significant at  $\alpha=0.01$  (2-tailed)

Table 2 The effectiveness of PU education program on RNs' attitudes towards PU prevention and treatment (N=220)

	Groups					
	Experimental (n=112)		Comparison (n=108)			
	Mean	SD	Mean	SD	t	P value
Pretest	29.2/55	2.28	30.3/55	2.35	1.71	0.32
Posttest	38.8/55	3.84	37.8/55	2.04	2.31	0.03*

\*Significant at  $\alpha=0.01$  (2-tailed)

Table 3 The effectiveness of PU education program on RNs' intentions towards PU prevention and treatment (N=220)

	Group					
	Experimental (n=112)		Comparison (n=108)			
	Mean	SD	Mean	SD	t	P value
Pretest	14.5/21	3.1	13.9/21	1.1	1.14	0.68
Posttest	17.1/21	2.2	15.6/21	2.4	2.35	0.001*

\*Significant at  $\alpha=0.01$  (2-tailed)

To ascertain previous results, paired t test was used to compare RNs' knowledge and practice, attitudes, and intentions scores in the experimental group at pretest and posttest stages. RNs in the experimental group had significant knowledge and practice scores ( $t = -5.47$ ,  $P < 0.001$ ), attitude scores ( $t = -6.8$ ,  $P = 0.01$ ), and intention scores ( $t = -6.7$ ,  $P < 0.001$ ) at the posttest compared to their pretest scores.

The participants assigned randomly to experimental and control groups. This method made the two groups comparable as there were no statistical difference between the two groups in regard to knowledge and practice, attitudes, and intentions scores at the pretest stage ( $P = 0.12$ ,  $P = 0.32$ ,  $P = 0.68$  respectively) (Tables 1, 2, 3).

To test hypothesis 2, whether gender, age, years of experience in nursing, and sources of knowledge on PU affect nurses' knowledge and practice, attitudes, and intentions towards PU prevention and treatment, either independent t test or analysis of variance was used. Table 4 shows that although male participants had higher PU knowledge and practices scores ( $P = 0.02$ ), females had higher intentions scores ( $P = 0.001$ ) towards PU prevention and treatment. Having longer years of experience in nursing improves RNs' attitudes ( $P = 0.006$ ) and intentions ( $P = 0.007$ ) towards PU prevention and treatment. Although sources of knowledge on PU were variable, university degree and inservice training improved RNs' attitudes ( $P = 0.009$ ) and their intentions ( $P = 0.002$ ) towards PU prevention and treatment.

Table 4 Significant characteristics influence RNs' knowledge and practice, attitudes, and intentions towards PU prevention and treatment (N=220)

RNs' knowledge and practice on PU prevention and treatment		n	M	SD	t-test	ANOVA	P-value
Gender	Male	129	11.4	2.2	2.33		<b>0.021*</b>
	Female	91	10.5	2.1			
RNs' attitudes towards PU prevention and treatment		n	M	SD	t-test	ANOVA	P-value
Years of Experience in Nursing	< 2	11	34.7	1.7		4.3	<b>0.006*</b>
	2-4	101	35.4	4.2			
	5-10	105	33.4	3.3			
	11-15	1	39.0	0.0			
	16-20	2	38.0	0.0			
Sources of knowledge on PU	University degree	138	34.2	3.7		2.9	<b>0.009*</b>
	In-service training	56	34.2	2.1			
	Conference	8	34.8	2.6			
	Product promotion	13	35.3	3.2			
	Other sources	5	34.0	3.5			
RNs' intentions towards PU prevention and treatment		n	M	SD	t-test	ANOVA	P-value
Gender	Male	129	11.2	3.0	-3.77		<b>0.001*</b>
	Female	91	14.2	3.0			
Years of Experience in Nursing	< 2year	11	10.4	2.6		4.22	<b>0.007*</b>
	2-4 years	101	12.7	2.9			
	5-10	105	12.6	3.4			
	11-15	1	18.0	0.0			
	16-20	2	12.0	0.0			
Sources of	University degree	138	12.4	2.9		3.72	<b>0.002*</b>

knowledge on PU	In-service training	56	12.7	3.0
	Conference	8	17.2	2.7
	Product promotion	13	10.3	3.2
	Other sources	5	11.0	1.4

\*Significant at  $\alpha=0.01$  (2-tailed)

**4. Discussion**

The current study examined the effectiveness of using PU education on RNs’ PU knowledge and practices, attitudes and intentions towards PU prevention and treatment.

Although RNs had low scores in PU knowledge and practices test, observed PU knowledge and practice, attitudes and intentions scores of the experimental group were higher than the pretest scores and higher than the scores of the control group on completion of the PU education program. A clear benefit of such a program was suggested by these findings and supported by the increased level of knowledge and implementation on PU prevention and treatment. The findings that PU education improves nurses’ knowledge and practice on PU prevention and treatment is similar to the findings of Paquay et al. (2010), who found that nurses' adherence to PU guidelines was significantly improved after implementation of an education program. Further, Jordanian nurses’ knowledge and practice scores were comparable to the findings of Abou El Enein and Zaghoul (2011) and Beeckman et al. (2011), who evaluated nurses’ knowledge on PU prevention and treatment using different methods and suggested that nurses' knowledge on PU care can be improved and PU guidelines should be implemented in clinical practice. Several variables may contribute to inadequate nurses’ knowledge on PU care in Jordan include clinical barriers such as lack of time, staff turnover (Hayajneh et al., 2009) and lacking adequate PU documentation and risk assessment (Tubaishat et al. 2010).

The study results imply the attainment of the goal of improving RNs’ knowledge through positive effects of the pressure ulcer education program. Whilst PU clinical guidelines were not applicable in Jordan (Tubaishat et al., 2010), PU education program has been developed and guided by EUPAP and NPUAP (2009a, 2009b) guidelines for PU prevention and treatment. However, the findings of this study suggested that implementing PU education based on PU prevention and treatment guidelines improves nurses’ knowledge and practice on PU care. These findings were consistent with Clark et al. (1999), who evaluated the implementation of pressure ulcer programs based on AHCPR guidelines in clinical practice and found that nurses’ knowledge increased in relation to pressure ulcer prevention and treatment. Similarly, Hulsenboom et al. (2007) found that nurses' knowledge about pressure ulcer was slightly increased in 2003 compared to 1991 using PU clinical guidelines.

The data presented in this study contribute to the literature on PU care, with particular focus on the characteristics of Jordanian nurses in relation to PU care. Current literature suggests that age, education, and years of experience may influence RNs’ knowledge on PU care (Choa et al., 2011) and (Hulsenboom et al., 2007). In contrast, data from the current study indicated differently; no significant relationship was seen between nurses’ age, educational level, and involvement in research on PU. The findings of current study emphasized gender influence in relation to nurses’ knowledge and practice and intentions towards PU care. Additionally, years of experience and source of knowledge on PU were influential in relation to both nurses’ attitudes and their intentions towards PU prevention and treatment.

The current study revealed significant correlation between knowledge gained by PU education and attitudes and intentions towards PU prevention and treatment. Attitudes are important and influential factor that determines individual's likelihood of carrying out certain behavior (Cacioppo, 1996) and (Ajzen and Fishbein, 2005). Positive attitudes and intentions are not enough to elucidate actual changes in practice (Moore and Price, 2004), particularly in this study where attitudes and intentions are assessed and showed short term effects. This necessitates the need for



long-term moral, ethical and communication training because the behaviors and intentions of nurses are affected by factors other than education (Ke, Chiu, Hu, & Lo, 2008).

Important implications of this study include improving nurses' clinical learning through increasing RNs' knowledge on PU care and subsequently improving the quality of patient care. Education programs should enable RNs to achieve an open approach that includes communication and collaborative work. Such programs may aid in enhancing the attitudes of RNs towards PU prevention and treatment through the application of updated knowledge on PU care and demonstrating better adherence to PU clinical guideline.

Limitations must be weighed against the strengths of this study. The use of randomization minimized the chance of bias, and the use of a control group provided a baseline for evaluation of the effect of the educational intervention. Additionally, the response rate was acceptable for the data collection method, taking into consideration the varying work schedules for RNs. The use of randomization and a control group improved the external validity of the study and the ability to generate the research findings to the general population of RNs.

Although this study did not examine the long-term effects of the PU education program, it examined whether there were differences in RNs' knowledge and practice, attitudes, and intentions related to RNs' gender, age, years of experience, previous education, sources of knowledge on PU, and involvement in PU research. However, conducting this study in a developing country such as Jordan may help to determine how PU education differs globally.

## 5. Conclusion

This study helped to increase the level of knowledge on PU prevention and treatment among Jordanian RNs. Using the findings of the current study, nursing managers, policy makers, educators, and researchers can facilitate the development and implementation of PU education within educational programs. A PU education program is a powerful tool for RNs that provides an opportunity to improve understanding of PU, keep abreast of current knowledge on PU, and eliminate patient's suffering. Finally, PU education programs can help RNs to acquire a professional attitude that will enable them to improve quality of nursing care.

## Acknowledgements

The authors are grateful to the University of Jordan for funding this study.

## References

- Abou El Enein, N.Y. & Zaghoul, A. A. (2011). Nurses' knowledge of prevention and management of pressure ulcer at a Health Insurance Hospital in Alexandria. *International Journal of Nursing Practice*, 17(3), 262–268.
- Agency for Health Care Policy and Research (1992). Pressure Ulcers in Adults: Prediction and Prevention. Clinical Practice Guideline, Number 3. AHCPR Publication No. 92-0047. Rockville, MD. Public Health Service, U.S. Department of Health and Human Services.
- Ajzen, I. & Fishbein, M. (2005). The influence of attitudes on behavior. In Albarracín, D.; Johnson, B.T.; Zanna M.P. (Eds.). *The handbook of attitudes*, Lawrence Erlbaum Associates.
- Bales, I. & Padwojski, A. (2009) Reaching for the mtxn: achieving zero pressure ulcer prevalence. *Journal of Wound Care*. 18 (4), 137-144.
- Beeckman, D., Defloor, T., Schoonhoven, L. & Vanderwee, K. (2011) Knowledge and Attitudes of Nurses on Pressure Ulcer Prevention: A Cross-Sectional Multicenter Study in Belgian Hospitals. *Worldviews on Evidence-Based Nursing*, doi: 10.1111/j.1741-6787.2011.00217.x.
- Beeckman, D., Vanderwee K., Demarre' L., Paquay L., Van Hecke A., & Defloor T. (2009). Pressure ulcer prevention: Development and psychometric validation of knowledge assessment instrument. *International Journal of Nursing Studies*.1- 12.
- Bostrom, J. & Kenneth, H. (1992) Staff nurse knowledge and perceptions about prevention of pressure sores. *Dermatology nursing/Dermatology Nurses' Association*, 4(5), 365.

- Cacioppo, J. T., Crites, S. L., Jr., & Gardner, W. L. (1996). Attitudes to the right: Evaluative processing is associated with lateralized late positive event-related brain potentials. *Personality and Social Psychology Bulletin*, 22, 1205-1219
- Chamanga, E. (2011). Improving pressure ulcer care. *Journal of Community Nursing*. 25 ( 4),16-21.
- Choa, I., Parkb, H.A., & Chung, E. (2011). Exploring practice variation in preventive pressure-ulcer care using data from a clinical data repository. *International Journal of Medical Informatics*. 8 0, 47–55.
- Clark, M. (1999) Developing guidelines for pressure ulcer prevention and management. *Journal of Wound Care*. 8(7), 357.
- Dealey, C., & Defloor, T., (2009). Prevention Pressure Ulcer Guidelines. Presentation at the 11th National Pressure Ulcer Advisory Panel National Biennial Conference, Arlington, Virginia (D.C. Area), February 27.
- Demarré, L., Vanderwee, K., Defloor, T., Verhaeghe, S., Schoonhoven, L. & Beeckman, D. (2011), Pressure ulcers: knowledge and attitude of nurses and nursing assistants in Belgian nursing homes. *Journal of Clinical Nursing*. doi: 10.1111/j.1365-2702.2011.03878.x
- Elliott, R., McKinley, S., and Fox, V. (2008). Quality improvement program to reduce the prevalence of pressure ulcers in intensive care units. *American Journal of Critical Care*. 4 (17), 328-34.
- European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel (2009a) Prevention and treatment of pressure ulcers: quick reference guide, National Pressure Ulcer Advisory Panel, Washington DC.
- European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel (2009b) Treatment of pressure ulcers: Quick Reference Guide, National Pressure Ulcer Advisory Panel, Washington DC.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). Statistical power analysis using G\*Power 3.1: Test for correlation and regression analysis. *Behavior Research Methods*, 41(4), 1149-1160.
- Finlay, K., Smith, J., & Abrams, S. (2004). The impact of nursing education on pressure ulcer prevention. *Journal of Wound, Ostomy and Continence Nursing*. 31(3S), S3-S4.
- Gunningberg, L., Lindholm, C., Carlsson, M., & Sjöden P-O. (2001). Risk, prevention and treatment of pressure ulcer – Nursing staff knowledge and documentation. *Scandinavian Journal of Caring Science*. 15, 257-263.
- Hayajneh, Y.A., AbuAlRub, R.F., Athamneh, A.Z., & Almkhzoomy, I.K.( 2009). Turnover rate among registered nurses in Jordanian hospitals: An exploratory study. *International Journal of Nursing Practice*. 15, 303–310.
- Hulsenboom, M.A., Bours, G.J. & Halfens, R.J. (2007) Knowledge of pressure ulcer prevention: a cross-sectional and comparative study among nurses. *BMC Nurs*, 6, 2.
- Ke, L.S., Chiu, T.Y., Hu, W.Y., & Lo, S.S. (2008). Effects of educational intervention on nurses' knowledge, attitudes, and behavioral intentions toward supplying artificial nutrition and hydration to terminal cancer patients. *Support Care Cancer*.16, 1265–72.
- Maylor, M., & Torrance C. (1999).Pressure sore survey part 2: nurses' knowledge. *Journal Wound Care*.8, 49-52.
- Meesterberends, E., Halfens, R., Lohrmann, C., & de Wit, R. (2010). Pressure ulcer guideline development and dissemination in Europe. *Journal of Clinical Nursing*. 19(11–12), 1495–1503.
- Moore, Z., & Price, P. (2004). Nurses' attitudes, behaviors and perceived barriers towards pressure ulcer prevention. *Journal of Clinical Nursing*, 13, 942-952.
- O'Brien J., & Cowman S. (2011). An exploration of nursing documentation of pressure ulcer care in acute setting in Ireland. *Journal of Wound Care*. 20, 5, 13 May 2011, pp 197 – 205

- Paquay, L., Verstraete, S., Wouters, R., Buntinx, F., Vanderwee, K., Defloor, T., & Van Gansbeke, H. (2010). Implementation of a guideline for pressure ulcer prevention in home care: pretest–post-test study. *Journal of Clinical Nursing*, (19) 13-14, 1803–1811
- Pancorbo-Hidalgo, P.L., Garcia-Fernandez, F.P., Lopez-Medina, I.M. & Lopez-Ortega, J. (2007) Pressure ulcer care in Spain: nurses' knowledge and clinical practice. *Journal of Advanced Nursing*. 58(4), 327-38.
- Polit, D. F., & Beck, C. T. (2008). *Nursing research: Generating and assessing evidence for nursing practice*. (8th ed.). New York: J. B. Lippincott.
- Reddy, M., Gill, S.S., & Rochon, P.A. (2006). Preventing pressure ulcers: A systematic review. *Journal of American Medical Association*. 296, 974-84.
- Saleh, M., Anthony, D.M. & Parboteeah, S. (2009) The impact of pressure ulcer risk assessment on patient outcomes among hospitalised patients. *Journal of Clinical Nursing*. 18, 1923–1929.
- Smith, D., & Waugh, S. (2009). Research study: an assessment of registered nurses' knowledge of pressure ulcers prevention and treatment. *Kansas Nurse*, 84(1), 3-5.
- Tubaishat, A., Anthony, D.M. & Saleh, M. (2010) Pressure ulcers in Jordan: A point prevalence study. *Journal of Tissue Viability*. 20(1), 14-19.
- Young, Z. F., Evans, A., & Davis, J. (2003). Nosocomial pressure ulcer prevention: A successful project. *Journal of Nursing Administration*. 33(7/8), 380-83.
- Van Gaal B., Schoonhoven L., Vloet L., Mintjes J., Borm G., Koopmans R., & van Achterberg T. (2010). The effect of the SAFE or SORRY? Programme on patient safety knowledge of nurses in hospitals and nursing homes: A cluster randomized trial. *International Journal of Nursing Studie.* , 47(9), 1117–1125.
- Vanderwee K., Clark M., Dealy C., Gunningberg L. & Defloor T. (2007) Pressure ulcer prevalence in Europe: a pilot study. *Journal of Evaluation in Clinical Practice*. 13 (2), 227-235.