

Nurses' Knowledge, Attitudes and Practices regarding Pressure Ulcer Prevention in the Umgungundlovu District, South Africa

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Abstract

The prevention of pressure ulcers remains a serious problem for nurses. The effects of pressure ulcers include high treatment costs, litigation matters, and increased workloads on nursing staff. Pressure ulcers affect patients' emotional, physical and social well-being. The pain caused by pressure ulcers prolongs rehabilitation and hospital stays and could eventually lead to disability and death. The purpose of the study, conducted in the Umgungundlovu District in South Africa, was to assess the knowledge, attitudes, and practices of nurses regarding the prevention of pressure ulcers. A descriptive cross-sectional study with an analytical component was implemented. The data were collected using a self-administered questionnaire. Frequency distribution tables, the *t*-test and ANOVA were used in the analysis of the data. A *p*-value of less than 0.05 was deemed statistically significant. The mean knowledge of nurses ($N = 223$) was 69.1 per cent, which was low. There was a statistically significant difference in knowledge by rank ($p = 0.001$), years of experience ($p = 0.002$), previous knowledge of pressure ulcers ($p = 0.001$), and hospital ward ($p > 0.001$). There was a significant difference in knowledge between the nursing assistants and the registered nurses ($p = 0.004$). A large proportion of nurses (58%) had a positive attitude towards pressure ulcer prevention. The average practice score was 56.2 per cent. The nurses' knowledge and practices of the prevention of pressure ulcers are unsatisfactory, although their attitudes are positive. Knowledge improvement is necessary to influence attitudes and practices. A multi-faceted approach is required to empower the nurses.

Keywords: attitude, knowledge, nurse, practice, pressure ulcer prevention



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Background

Pressure ulcers (PUs) are a common problem in the healthcare system (Malar 2016, 13). PUs affect the patient's quality of life and result in physically debilitating complications. The pain and discomfort of PU delay rehabilitation, prolong illness and the timing of discharge, and also contribute to disability and death (Abou El Enein and Zaghloul 2011, 265). PUs affect all age groups but are mostly common among immobile or geriatric patients, and patients with severe acute or neurological conditions (Kruger, Pires, and Rubayi 2013, 572). The prevalence of PUs ranges between 3.4–32.4 per cent globally and the prevalence in Europe is 18 per cent (Anthony, Alosoumi, and Safari 2019, 706; Vanderwee et al. 2007, 229). In Africa, the magnitude of PUs varies from country to country. In South Africa, the incidence and prevalence of PUs are difficult to source; however, despite the lack of published data, it appears that the liability from patients developing PUs is on the increase (Jonsson and Engman 2010, 8).

The cost of treating PUs places an additional pressure on health institutions and has a negative impact on the patient's emotional, physical and social well-being (Spear 2013, 147). The cost of treating grade four PUs in the United States of America (USA) is estimated at \$150 000 (Lyder and Ayello 2008, 12) and up to £579 million in Europe (Bennet, Dealey, and Posnett 2004, 233). In addition, litigation matters further increase costs, with an average malpractice lawsuit settlement amounting to \$250 000 in the USA (Leaf Healthcare 2014, 2). PUs increase hospital stay by seven days, adding to the financial costs (Anthony, Reynolds, and Russel 2004, 5). The time spent on the treatment of PUs has an impact on the workload of nursing staff, especially in settings which are short-staffed (Anthony, Reynolds and Russel 2004, 5). Apart from the financial implications, PUs affect the quality of life of patients as they experience pain, limited mobility, and increased dependency on family for assistance with activities of daily living (McInnes et al. 2011, 346).

The risk factors associated with PU development include immobility, nutritional status, age, skin status (perfusion, moisture, and temperature), and the general health status (Coleman et al. 2013, 974). The development of PUs is complex; hence the prevention is not based on a single practice but rather on a combination of strategies. The National Pressure Injury Advisory Panel (NPIAP) and the European Pressure Ulcer Advisory Panel (EPUAP) developed PU-prevention guidelines which include baseline assessments to determine risk, reduction of mechanical load through the use of pressure-redistributing surfaces, correction of nutritional deficiencies, maintenance of optimal skin status, and patient education (NPIAP 2014).

Prevention methods include positioning, the use of pressure-relieving surfaces such as mattresses or pillows, rectifying nutritional deficiencies, and maintaining good skin quality (Reddy, Gill, and Rochon 2006, 2648). The prevention of PUs include the use of a combination of strategies such as foam-based mattresses, sheepskin and other high technology pressure support surfaces which have been found to be more effective than standard hospital beds (McInnes et al. 2011, 346). Furthermore, a combination of

repositioning and the use of pressure alleviating surfaces has been found to be more effective than using a single strategy (Reddy et al. 2008, 2648).

PU development is considered an indicator of the quality of nursing care. However, PUs are largely preventable. A number of studies have revealed that nurses' knowledge of PU prevention is insufficient and not in line with current guidelines (Al Kharabsheh et al. 2014, 113; Gunningberg et al. 2001, 258; Tubaishat and Aljezawi 2014, 115). PUs have been recognised universally as a preventable patient safety problem (Khojastehfar et al. 2019, 5–6). A management plan should be in place to prevent the development of PUs, to optimise healing, and to prevent complications with an existing PU for patients who are identified as being at risk. According to the quality improvement audit reports from the uMgungundlovu District, the number of patients with PUs in the two hospitals increased from 21.2 per cent to 78.8 per cent over three years. Most of the patients who presented with PUs were from orthopaedic, medical, and surgical wards. According to literature from other studies, it has been identified that nurses' knowledge of the prevention of PUs is poor, which is reflected in their practices as they do not comply with best practice guidelines (Islam 2010, 60–61; Muhammad et al. 2017, 51–52).

Nurses are the backbone of any health institution and although PU prevention requires a multi-disciplinary approach, nurses are the most appropriate practitioners to lead prevention teams since they are primarily concerned with coordinating the nursing aspect of care (Yap and Kennerly 2013, 106–107). In order to execute this role effectively, nurses require good knowledge, positive attitudes, and evidence-based practices. The purpose of this research was to assess the knowledge, attitudes and practices (KAPs) of nurses at two hospitals in the uMgungundlovu District, concerning PU prevention.

Research Methods and Design

An observational, cross-sectional, descriptive study design with an analytic component was implemented. A self-administered questionnaire was used to collect the data. The questionnaire was adapted from the study by Islam (2010, 87), which investigated nurses' KAPs of PU prevention at a university hospital in Bangladesh. The questionnaire was tested through a pilot study of 15 nurses working in an outpatient section to ensure that it was user-friendly. The appropriateness of the instrument was measured through a pretesting exercise, and the constraining factors were rectified. Regarding the reliability, the study used Cronbach's coefficient alpha to measure consistency, complementarity and the correlation coefficient. To generate the Cronbach's alpha results, validation of the instrument was conducted through a pilot study and the results obtained had an overall Cronbach's alpha of (r) = 0.78.

Before applying the survey instrument, the researchers engaged different expert reviewers such as academics from the nursing field and physiotherapists who work in the area of pressure care to evaluate and finalise the instrument. Good knowledge refers

to those nurses who scored above the mean score (70%) of the knowledge questions and those who scored below the mean value were regarded as having poor knowledge regarding the prevention of PUs. The participants were asked to choose the correct answer from three choices given for each question. Knowledge elements included factors related to PU development, risk assessment, skin care, and nutrition to maintain healthy skin, management of mechanical loads, and educational programmes for patients, family and staff. A score of “1” was given for a correct answer and “0” for an incorrect answer and it was then converted to a percentage. A score of less than 70 per cent was considered low.

Good attitude was measured as those who scored above the mean score (70%) of the attitude questions whereas those who scored below the mean score were deemed as having poor attitudes towards the prevention of PUs. Attitude components included factors related to PU development, risk assessment, skin care, and nutrition to maintain healthy skin. The participants were asked to rate the 5 levels of attitude ranging from 1 to 5; 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, and 1 = strongly disagree. A score of less than 70 per cent was regarded as a poor attitude.

Good practice was regarded as those who scored above the mean score (70%) of the practice questions whereas those who scored below the mean score were regarded as having poor practices towards the prevention of PUs. Practice elements included factors related to PU development, risk assessment, skin care and nutrition to maintain healthy skin. A 3-point numerical rating scale, ranging from 1 to 3; 3 = always, 2 = sometimes, and 1 = never. A score of less than 70 per cent was regarded as poor practice.

Study Setting

The study was conducted at two hospitals in the uMgungundlovu District in the KwaZulu-Natal province of South Africa with the one being a tertiary hospital and the other being a district or regional hospital. The services provided include medical, surgical, orthopaedic, intensive care, neurosurgery, and obstetrics and gynaecology, among other things. There were 450 nurses placed in the units of interest at the time of data collection.

Study Population

The study population consisted of all categories of permanently employed nurse working in the medical, orthopaedic, and surgical wards, and intensive care units (ICUs) on either day or night shift in the two hospitals. Convenience sampling was used. All permanently employed registered nurses, staff nurses, and nursing assistants working in the medical, surgical, and orthopaedic wards, and ICUs either on day or night shifts at the respective hospitals were invited to participate in the study. Convenience sampling was used and all nurses in the units of interest who were willing to participate were surveyed on the days of data collection. All student nurses, those nurses not permanently employed at the respective hospitals, and all nurse categories currently working in other

units were excluded. A total of 317 questionnaires were distributed to nurses who agreed to participate. A total number of 223 nurses completed the questionnaires, which yielded a response rate of 70 per cent.

Data Collection

A meeting was held with the nursing managers of the relevant institutions to inform them about the study. The list of nurses permanently employed was obtained from the Human Resource Departments at the two hospitals. The nurses who agreed to participate were screened by research assistants to ensure that they met the inclusion criteria. The data were collected between May 2016 and August 2016. The respondents were asked knowledge-based, attitude-related and practice-based questions to assess their level of KAP towards the prevention of PUs.

Data Analysis

The responses from the questionnaires were captured on a Microsoft Excel spreadsheet and exported to Stata. The descriptive data were summarised using frequencies and displayed using frequency distribution tables. The independent *t*-test and ANOVA were used to assess differences between categorised demographic characteristics and KAPs. The level of significance used was 95 per cent ($p < 0.05$).

Ethical Considerations

The nurses who participated in the study were requested to sign a consent form. Those who signed were given a questionnaire along with a participation information sheet. The consent forms and questionnaires were filed separately for anonymity purposes. Non-maleficence of respondents was maintained through the provision of a participant information sheet explaining the study and risks involved in terms of participation. The ethical guidelines used were informed by the ethics policy of the University of KwaZulu-Natal. Ethical approval was obtained in writing from the Biomedical Research Ethics Committee (reference number BE375/15) and the KwaZulu-Natal Department of Health (reference number HRKM104/16). Permission was further obtained in writing from the two research sites.

Results

The total number of respondents who completed the questionnaires was 223 (see Table 1), which included 49.5 per cent of the nurses employed at the Metropolitan Hospital Complex at the time of the study. The majority of the respondents (114, 51.1%) were aged between 30 and 44 years, and 190 (85.2%) were females. Most of the respondents were registered nurses (111, 49.8%) and had clinical nursing experience of 1 to 10 years (131, 60.1%). About 97 (43.5%) of the respondents were working in the medical wards, and 128 (60.4%) reported to have obtained PU prevention knowledge through hospital in-service training.

Table 1: Demographic characteristics of respondents ($N = 223$)

Demographic characteristics	N	%
Age		
18–29	37	16.6
30–44	114	51.1
45–49	66	29.6
60–69	6	2.7
Gender		
Male	31	13.9
Female	190	85.2
Rank		
Nursing assistant	40	17.9
Enrolled nurse	72	32.3
Registered nurse	111	49.8
Years of experience		
0–10	131	60.1
10–20	59	27.1
20–30	21	9.6
30–40	7	3.2
Type of ward		
Orthopaedic	31	13.9
Surgical	70	31.4
ICU	25	11.2
Medical	97	43.5
Previous PU knowledge		
Peer review	30	14.2
Internet	3	1.4
External course	23	10.8
In-service training	128	60.4
Tertiary	28	13.2

Nurses' Knowledge of Pressure Ulcer Prevention

A Likert scale was used to assess the nurses' knowledge on PU prevention. With regard to nurses' knowledge, the respondents were asked to identify the correct answer to each question. The majority of the respondents ($n = 198$, 89%) knew that pressure was a contributing factor to the development of PUs, and $n = 186$ (83%) were able to identify immobility as the most important factor contributing to PU development in older patients. The majority of the respondents ($n = 176$, 79%) could adequately identify the first sign of a PU. Less than half of the respondents (92, 41%) did not know the scale used to determine the risk of developing a PU (Table 2).

Table 2: Nurses' knowledge of PU prevention ($N = 223$)

Statement	Correct		Incorrect	
	N	%	N	%
What factor contributes to the development of a PU?	198	89	25	11
Which is the most important factor contributing to PU development in an 80-year-old man who has a fractured hip and is bedridden?	186	83	37	17
What is the first sign of a PU?	176	79	47	21
Which scale is used to identify an individual who is at risk of developing PUs?	92	41	131	59
Which environment will best favour the growth of bacteria on the skin of a patient with a head injury?	156	70	67	30
Which nutritional factor contributes to the development of PUs?	152	68	71	32
What is the method for maintaining integrity of the skin?	93	42	130	58
What would be an appropriate strategy to manage the mechanical load?	98	44	125	56
What nutritional support would be required for an 80-year-old bedridden patient with a BMI < 18.5?	186	83	37	17
What is an appropriate method for skin care?	62	28	161	72
What is the correct description of a grade 2 PU?	144	65	79	35

The mean knowledge score for all the nurses was ($M = 15.2$ $SD = 3.4$). More than half (69.1%) of the respondents were found to have good knowledge, whereas a substantial proportion (39.9%) of the respondents were not. The ANOVA test showed a statistically significant difference in the mean knowledge score for the four represented variables, namely, nursing rank ($F(2,220) = 7.020$, $p = 0.001$), years of experience ($F(3,214) = 3.216$, $p = 0.024$), previous PU knowledge ($F(4,978) = 4.975$, $p = 0.001$), and type of ward ($F(3,219) = 10.680$, $p = 0.000$) (see Table 3).

Table 3: Differences in knowledge between categories of respondent ($N = 223$)

Variable	Mean knowledge score	Standard deviation	P-value
Rank			
Nursing assistant	14.1	2.7	0.001
Enrolled nurse	14.7	4.2	
Registered nurse	16.1	3.5	
Years of experience			
0–10	15.2	3.8	0.002
10–20	14.8	3.2	
20–30	17.4	2.5	
30–40	16.3	2.4	
Previous PU knowledge			
Peer review	15.5	3.2	0.001
Internet	14.3	5.5	
External course	12.5	4.5	
In-service training	15.5	3.3	
University/tertiary	16.6	3.5	
Ward			
Orthopaedic	16.9	2.5	< 0.001
Surgical	15.9	3.3	
ICU	17.0	3.1	
Medical	13.9	3.6	

Nurses' Attitude to Pressure Ulcer Prevention

The mean score of the attitudes for all the respondents was ($M = 88.8$, $SD = 13.9$). More than half of the respondents ($n = 111$, 58.1%) had positive attitudes towards PU prevention. The respondents were asked to indicate the extent to which they agreed or disagreed with the statements on attitudes towards PU prevention. A slight majority of respondents ($n = 111$, 50.7%) agreed that most risk factors contributing to PU development could be managed. About a third of the respondents ($n = 71$, 32.4%) disagreed with the statement that nurses were less interested in PU prevention than other aspects of nursing care. In addition, $n = 102$ (46.8%) of the respondents disagreed with the statement that nutritional status is not an important risk factor in the development of PU characteristics (Table 4).

Table 4: Nurses' attitudes towards PU prevention ($N = 223$)

Statement	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
Most risk factors contributing to PUs can be managed.	0	0	10	4.6	4	1.88	111	50.7	94	42.9
I am less interested in PU prevention than other aspects of nursing care.	71	32.4	101	46.1	18	8.2	20	9.1	9	4.1
I do not think nutritional status is an important risk factor in the development of PUs.	47	21.6	102	46.8	17	7.8	30	13.8	22	10.1
Prevention of PUs is time-consuming to carry out.	32	14.5	69	31.4	24	10.9	49	22.3	46	21
My clinical judgement is better than using a PU risk-assessment tool.	13	6	58	26.7	23	10.6	74	34.1	49	22.6
All patients are at risk of developing PUs.	29	13.6	83	39	17	8	33	15.5	51	24
The development of PUs is an important indicator of quality nursing care.	20	9.2	40	18.3	15	6.9	63	28.9	80	36.7

Nurses' Practices of Pressure Ulcer Prevention

By using practice-based questions, the mean practice score of the respondents was found to be ($M = 56.2$, $SD = 8.3$). More than half (56.2%) of the respondents had good practice, whereas the remaining 43.8 per cent of respondents had poor practice of PU prevention. Nearly two-thirds of the respondents ($n = 134$, 61.75%) indicated that they always observe the way in which other nurses assess a patient's risk of developing a PU. A large majority of the respondents ($n = 181$, 83.4%) indicated that they always identify common factors contributing to PU development, whereas $n = 32$ (14.7%) indicated that they sometimes did, and only $n = 4$ (1.8%) indicated that they never did. Nearly two-thirds of the respondents ($n = 144$, 66.1%) indicated that they monitor patients who require high protein and high carbohydrate diets, whereas only $n = 8$ (3.6%) said they never did (Table 5).

Table 5: Nurses' practices of PU prevention ($N = 223$)

Statement	Always		Sometimes		Never	
	N	%	N	%	N	%
I observe how other nurses assess a patient's risk of developing PUs.	134	61.7	80	36.9	3	1.4
I identify common factors that contribute to the development of PUs in my patients.	181	83.4	32	14.7	4	1.8
I monitor patients who need high protein and carbohydrate diets.	144	66.1	61	28	13	6.0
I avoid bony areas.	66	30.4	39	18	112	51.6
I attend seminars or courses on PU prevention.	59	26.9	89	40.6	71	32.4
I use risk-assessment scales to determine my patients' risk of developing PUs.	177	80.8	31	14.2	11	5.0

The results from the post hoc Tukey test revealed that firstly, the mean knowledge score for registered nurses was statistically significantly higher (16.14 ± 3.5) than that of the nursing assistants (14.1 ± 2.7 , $p = 0.004$) and enrolled nurses (14.7 ± 4.2 , $p = 0.014$). Secondly, the respondents with 20–30 years of experience had a statistically significantly higher average knowledge (17.4 ± 2.5) than that of the respondents with 0–10 years (15.2 ± 3.8 , $p = 0.026$) and 10–20 years (14.8 ± 3.2 , $p = 0.055$) of experience. Furthermore, the respondents who obtained PU information through external courses had a significantly higher mean knowledge (12.5 ± 4.5) than those who underwent peer reviews (15.5 ± 3.2 , $p = 0.015$), in-service training (15.5 ± 3.3 , $p = 0.002$) and by attending a tertiary institution (16.6 ± 3.5 , $p = 0.000$). Lastly, the respondents from medical wards had a significantly lower mean knowledge score (13.9 ± 3.6) than those from orthopaedic (16.9 ± 2.5 , $p < 0.001$), and surgical (15.9 ± 3.3 , $p = 0.001$) wards and ICUs (17.0 ± 3.1 , $p < 0.001$) (Table 6).

Table 6: Differences in knowledge, attitudes, practices and respondent characteristics ($N = 223$)

Respondent characteristics	N	Differences in knowledge				Differences in attitudes				Differences in practices			
		M	SD	t-test	P-value	M	SD	t-test	P-value	M	SD	t-test	P-value
Age					0.874				0.874				0.419
18–29	37	89.7	8.0			89.7	8.0			57.8	4.4		
30–44	114	88.3	16.5			88.3	16.5			55.2	10.5		
45–49	66	88.7	11.9			88.7	11.9			57.0	5.2		
60–69	6	92.5	7.1			92.5	7.1			59.5	6.3		
Gender					0.061				0.061			1.900	0.228
Male	31	93.2	10.9	0.239		93.2	10.9	0.239		57.9	4.7	1.900	
Female	190	88.1	88.1			88.1	14.3			55.9	8.8		

Rank					0.001				0.304				0.860
Nursing assistant	40	89.2	12.5			89.2	12.5			55.9	5.3		
Enrolled nurse	72	90.7	12.9			90.7	12.9			56.0	8.5		
Registered nurse	111	87.4	14.9			87.4	14.9			56.6	9.1		
Years of experience					0.030				0.765				0.442
0–10	131	88.6	1.3			88.6	1.3			55.6	9.9		
10–20	59	89.6	1.6			89.6	1.6			57.8	5.5		
20–30	21	86.0	2.2			86.0	2.2			56.4	4.9		
30–40	7	90.4	3.0			90.4	3.0			56.3	5.6		
Ward					0.000				0.818				0.110
Orthopaedic	31	90.2	8.5			90.2	8.5			56.2	3.5		
Surgical	70	88.2	10.2			88.2	10.2			57.6	5.8		
ICU	25	87.0	9.8			87.0	9.8			58.1	6.0		
Medical	97	89.3	18.0			89.3	18.0			54.8	10.9		
Previous PU knowledge					0.001								0.537
Peer review	30									55.4	6.9		
Internet	3									59.3	5.7		
External course	23									54.3	5.3		
In-service training	128									56.4	9.9		
Tertiary	28									58.0	4.2		

Discussion

The purpose of this study was to assess nurses' KAPs of PU prevention. This study showed that nurses' knowledge of PU prevention was low, their attitudes were positive, and their level of practice was low. Although PU prevention is a multi-disciplinary team responsibility, nurses play a major role (Lyder and Ayello 2008), and therefore need to possess good knowledge, positive attitudes, and also good practices. The lack of knowledge demonstrates that nurses are not equipped with enough education to predict and prevent PUs appropriately (Qaddumi and Khawaldeh 2014, 1).

Knowledge of PU Prevention

The low level of knowledge of PU prevention in this study was in line with that indicated in previous studies (Nuru et al. 2015, 34; Shrestha and Shrestha 2016, 48). Reasons that could explain the lack of knowledge include inadequate training, the lack of evidence supported by research, and staff shortages (Landau 2014, 43; Mwebaza et al. 2014, 2). In the current study, the majority of the respondents received previous PU prevention knowledge through in-service training, whereas Qaddumi and Khawaldeh (2014, 1) found that the majority of respondents received previous PU prevention knowledge at university. However, in both studies the level of knowledge of PU prevention was inadequate. This could be linked to the way in which nurses remember and understand

PU prevention and may suggest that they require more frequent up-to-date PU prevention training and improved dissemination of PU prevention guidelines.

The results showed that there were significant differences between knowledge and rank ($p = 0.001$), years of experience ($p = 0.002$), previous PU knowledge ($p = 0.001$), and the ward in which the nurses were employed ($p < 0.001$). This is comparable to the findings of Taha (2014, 248) among the nurses in an ICU setting. In contrast, a study conducted among Jordanian nurses found no significant difference in knowledge with years of experience and previous PU training (Qaddumi and Khawaldeh 2014, 5), although the study found a significant difference in knowledge between the genders. However, a study by Pancarbo-Hildago et al. (2007, 328) revealed a significant difference in knowledge with years of experience, which supported the findings of this study.

The current study did not find a significant difference in knowledge between the genders. This study revealed a significant difference between nursing assistants and registered nurses ($p = 0.004$) and between enrolled nurses and registered nurses ($p = 0.014$) which are in contrast with the findings of Demarre et al. (2011, 1365) who found no significant difference in knowledge between nursing assistants and nurses. However, the findings by Pancarbo-Hildago et al. (2007, 329) found significant differences between registered nurses and licensed practice nurses. There was a statistically significant difference in knowledge between nurses who had 10–20 years of experience and those who had 20–30 years of experience ($p = 0.0017$), those who had 0–10 years of experience and those with 20–30 years of experience ($p = 0.0037$). These findings were similar to those of Pancarbo-Hildago et al. (2007, 328) who found that there was a significant difference in knowledge between the groups of nurses with more years of experience than those with less years of experience.

In this study, the lowest scores were found in the questions relating to risk assessment and skin integrity, and the higher scores were found in the questions relating to factors contributing to PU prevention, nutrition, and PU classification. In contrast, a study conducted in Belgium (Demarre et al. 2011, 1367) found that the lowest scores were among nutrition, aetiology, and classification of PUs, and the higher scores were found in questions relating to risk assessment. The difference in findings in this respect may be attributed to the difference in setting of the two studies and also to the way in which nurses remember, understand and apply knowledge.

Attitudes towards PU Prevention

The nurses' attitudes towards PU prevention were positive and this concurs with the findings from other studies (Dilie and Mengistu 2015, 9; Muhammad et al. 2017, 50; Uba et al. 2015, 57). The majority of the respondents agreed that most risk factors contributing to PUs could be avoided and that the development of PUs is an important indicator of quality nursing care. In this regard, the results correspond with the findings of previous studies (Dilie and Mengistu 2015, 2; Landau 2014, 41). The respondents

displayed low levels of knowledge, but positive attitudes; this may suggest that training is needed on the prevention and management of PUs. The current study revealed no statistical differences in attitudes with demographic characteristics, which supported the findings of a study conducted in Turkey that investigated nurses' attitudes with regard to PU prevention (Aslan and Van Giersbergen 2016, 68). The respondents mostly disagreed with the statement that all patients were at risk of developing PUs and that PU prevention is time-consuming; although a study conducted in Addis Ababa found that nurses strongly agreed with the statement that all patients were at risk of developing PUs and that PU prevention is time-consuming (Etafa, Gemechu, and Melese 2018, 2).

Practices of PU Prevention

The practices of PU prevention among the respondents in this study were unsatisfactory, even though they had positive attitudes. This suggests that the unsatisfactory practices could be attributed to inadequate knowledge (Moore and Price 2004, 943). A study by Nuru et al. (2015, 5) also found poor practices among the nurses in the prevention of PUs, and the barriers identified were formal training on PU prevention, dissatisfaction with the nursing leadership, and staff shortages. The nurses' practice scores were the highest in practices relating to skin assessments, risk assessment, and positioning whereas the lowest scores were related to nutritional assessments and attending seminars on PU prevention. This finding was consistent with that of Islam (2010, 60) who also found the highest scores in positioning and skin assessments but the lowest scores in risk assessment, in addition to nutritional assessment and attending seminars on PU prevention. The reason for the low scores on nutritional aspects could be owing to the overall low levels of knowledge on PU prevention. The low scores pertaining to attending seminars on PU prevention may be owing to the lack of training opportunities and also the poor access to updated PU prevention programmes as confirmed by Uba et al. (2015, 55). The low practice score may also be attributed to the way in which nurses imitate and manipulate PU prevention practices.

Limitations

The data were self-reported and therefore subject to information bias. The study used a self-administered questionnaire and did not include observations. The study was conducted in one health district and the results may be generalisable to nurses working in similar settings.

Recommendations

The nurses' knowledge and practices in this study were unsatisfactory but their attitudes were positive. An intervention that will provide ongoing education and support for nurses especially the lower-ranking nurses is necessary. Regular in-service training that includes theory and also practical sessions should be implemented. Nurse-led PU prevention programmes are essential to improve patient outcomes. Adequate

dissemination of PU prevention guidelines is a prerequisite for improving the quality of PU prevention. Furthermore, more research is required in this field to ascertain the reasons for the low knowledge and poor practices among nurses regarding PU prevention and to deal with those issues adequately through the appropriate strategies.

Conclusion

Knowledge and practices of PU prevention among nurses were low although attitudes were positive. PU prevention is a patient safety concern; nurses are at the forefront of care and need to be equipped with good knowledge and practices. Further research should seek to identify barriers to PU prevention and strategies to manage those barriers to improve clinical care.

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References

- Abou El Enein, N., and A. Zaghoul. 2011. "Nurses' Knowledge of Prevention and Management of Pressure Ulcers at a Health Insurance Hospital in Alexandria." *International Journal of Nursing Practice* 17 (3): 262–8. <https://doi.org/10.1111/j.1440-172X.2011.01933.x>.
- Al Kharabsheh, M., R. Alrimawi, R. Al Asaaf, and M. Saleh. 2014. "Exploring Nurses' Knowledge and Perceived Barriers to Carry Out Pressure Ulcer Prevention and Treatment, Documentation and Risk Assessment." *American International Journal of Contemporary Research* 4: 112–9.
- Anthony, D., D. Alosoumi, and R. Safari. 2019. "Prevalence of Pressure Ulcers in Long-Term Care: A Global Review." *Journal of Wound Care* 28 (11): 702–709. <https://doi.org/10.12968/jowc.2019.28.11.702>.
- Anthony, D., T. Reynolds, and L. Russel. 2004. "The Role of Hospital Acquired Pressure Ulcers in Length of Stay." *Clinical Effectiveness in Nursing* 8 (1): 4–10. <https://doi.org/10.1016/j.cein.2004.02.002>.
- Aslan, A., and M. Yavuz van Giersbergen. 2016. "Nurses' Attitudes towards Pressure Ulcer Prevention in Turkey." *Journal of Tissue Viability* 25 (1): 66–73. <https://doi.org/10.1016/j.jtv.2015.10.001>.

- Bennet, G., C. Dealey, and J. Posnett. 2004. "The Cost of Pressure Ulcers in the UK." *Age and Ageing* 33 (3): 230–5. <https://doi.org/10.1093/ageing/afh086>.
- Coleman, S., C. Gorecki, A. Nelson, and J. Closs. 2013. "Patient Risk Factors for Pressure Ulcer Development: Systematic Review." *International Journal of Nursing Studies* 50 (7): 974–1003. <https://doi.org/10.1016/j.ijnurstu.2012.11.019>.
- Demarre, L., K. Vanderwee, T. Defloor, S. Verhaeghe, L. Scoonhoven, and D. Beeckman. 2011. "Pressure Ulcers: Knowledge and Attitudes of Nurses and Nursing Assistants in Belgian Nursing Homes." *Journal of Clinical Nursing* 21 (9–10): 1425–34. <https://doi.org/10.1111/j.1365-2702.2011.03878>.
- Dilie, A., and D. Mengistu. 2015. "Assessment of Nurses' Knowledge, Attitudes and Barriers to Expressed Pressure Ulcer Prevention Practice in Addis Ababa Government Hospitals, Addis Ababa, Ethiopia, 2015." *Advances in Nursing*. <https://doi.org/10.1155/2015/796927>.
- Etafa, W., Z. Argaw, E. Gemechu, and B. Melese. 2018. "Nurses' Attitude and Perceived Barriers to Pressure Ulcer Prevention." *BMC Nursing* 17: 4. <https://doi.org/10.1186/s12912-018-0282-2>.
- Gunningberg, L., C. Lindholm, M. Carlsson, and P. Sjoden. 2001. "Risk, Prevention and Treatment of Pressure Ulcers – Nursing Staff Knowledge and Documentation." *Scandinavian Journal of Caring Sciences* 15 (3): 257–63. <https://doi.org/10.1046/j.1471-6712.2001.00034.x>.
- Islam, S. 2010. "Nurses' Knowledge, Attitudes and Practices regarding Pressure Ulcer Prevention for Hospitalised Patients at Rajshashi Medical College in Bangladesh." Master's dissertation, Prince of Songkla University.
- Jonsson, A., and E. Engman. 2010. "Pressure Ulcers Prevention in Ghana: What is the Nurses' Knowledge?" Accessed 10 December 2019. <https://www.diva-portal.org/smash/get/diva2:414949/fulltext01>.
- Khojastehfar, S., T. Najafi Ghezalje, and S. Haghani. 2019. "Knowledge and Attitude of Intensive Care Nurses regarding the Prevention of Pressure Ulcers." *Iran Journal of Nursing* 31 (116): 5–17. <https://doi.org/10.29252/ijn.31.116.5>.
- Kruger, E., M. Pires, and S. Rubayi. 2013. "Comprehensive Management of Pressure Ulcers in Spinal Cord Injury: Current Concepts and Future Trends." *Journal of Spinal Cord Medication* 36 (6): 572–85. <https://doi.org/10.1179/2045772313Y.0000000093>. ??
- Landau, G. 2014. "Nutrition and Pressure Ulcers." *Wound Healing Southern Africa* 7: 40–44.
- Leaf Health Care. 2014. *The Financial Impact of Pressure Ulcers Healthcare*. Accessed 12 November 2019. http://leafhealthcare.com/pdfs/lh_wp_financialoverview_1563ab_101316.pdf.

- Lyder, C., and E. Ayello. 2008. *Pressure Ulcers: A Patient Safety Issue*. Rockville: Agency for Healthcare Research and Quality.
- Malar, K. 2016. "Knowledge of Nurses regarding Prevention of Pressure Ulcers." *Journal of Medicine: Research and Review* 3: 12–16.
- McInnes, E. J-B. A., S. Bell-Syer, J. Dumville, and N. Cullum. 2011. "Prevention Pressure Ulcers – Are Pressure Redistributing Support Surfaces Effective? A Cochrane and Meta-Analysis." *International Journal of Nursing Studies* 49 (3): 345–59. <https://doi.org/10.1016/j.ijnurstu.2011.10.014>.
- Moore, Z., and P. Price. 2004. "Nurses' Attitudes, Behaviours and Perceived Barriers towards Pressure Ulcer Prevention." *Journal of Clinical Nursing* 13 (8): 942–51. <https://doi.org/10.1111/j.1365-2702.2004.00972.x>.
- Muhammad, D., I. Ahmad, M. Khan, F. Ali, and G. Muhammad. 2017. "Knowledge, Attitudes and Practices of Nurses regarding Pressure Ulcers Prevention at a Tertiary Care Hospital of Peshawar, Khyber Pakhtunkhwa." *Journal of Khyber College of Dentistry* 7: 50–55.
- Mwebaza, I., G. Katende, S. Groves, and J. Nankumbi. 2014. "Nurses' Knowledge, Practices and Barriers in Care of Patients with Pressure Ulcers in a Ugandan Teaching Hospital." *Nursing Research and Practice* 1–6. <https://doi.org/10.1155/2014/973602>.
- NPIAP (National Pressure Injury Advisory Panel). 2014. "Pressure Ulcer Prevention Points." Accessed 17 May 2020. <http://www.npuap.org/resources/educational-and-clinical/pressure-ulcer-prevention-points>.
- Nuru, N., F. Zewdu, S. Amsalu, and Y. Mehretie. 2015. "Knowledge and Practices of Nurses towards Prevention of Pressure Ulcer and Associated Factors in Gondar University Hospital, Northwest Ethiopia." *BMC Nursing* 14: 34. <https://doi.org/10.1186/s12912-015-0076-8>.
- Pancarbo-Hildago, P., F. Garcia-Fernandes, I. Lopez-Medina, and J. Lopez-Ortego. 2007. "Pressure Ulcer Care in Spain: Nurses' Knowledge and Clinical Practice." *Journal of Advance Nursing* 58 (4): 327–38. <https://doi.org/10.1111/j.1365-2648.2007.04236.x>.
- Qaddumi, J., and A. Khawaldeh. 2014. "Pressure Ulcer Prevention Knowledge among Jordanian Nurses: A Cross-Sectional Study." *BioMed Central Nursing* 13 (6): 1–8. <https://doi.org/10.1186/1472-6955-13-6>.
- Reddy, M., S. Gill, S. Kalkar, P. Anderson, and P. Rochon. 2008. "Treatment of Pressure Ulcers: A Systematic Review." *Journal of the American Medical Association* 300 (22): 2647–62. <https://doi.org/10.1001/jama.2008.778>.
- Reddy, M., S. Gill, and P. Rochon. 2006. "Preventing Pressure Ulcers: A Systematic Review." *Journal of the American Medical Association* 296 (8): 974–84. <https://doi.org/10.1001/jama.296.8.974>.

- Shrestha, N., and P. Shrestha. 2016. "Knowledge of Pressure Ulcer Management among Nurses." *Journal of Gandaki Medical College – Nepal* 9 (2): 47–51. <https://doi.org/10.3126/jgmcn.v9i2.17869>.
- Spear, M. 2013. "Pressure Ulcers: What are the Implications?" *Plastic Surgical Nursing* 33 (3): 147–149. <https://doi.org/10.1097/PSN.0b013e3182a57622>.
- Taha, A. 2014. "Nurses' Knowledge and Practices related to Pressure Ulcer at Intensive Care Unit." *Journal of International Academic Research for Multidisciplinary* 2: 247–262.
- Tubaishat, A., and M. Aljezawi. 2014. "Exploring Pressure Ulcer Care in Jordan." *Journal of the Dermatology Nurses' Association* 6 (3): 115–123. <https://doi.org/10.1097/JDN.0000000000000046>.
- Uba, M., F. Alih, R. Kever, and N. Lola. 2015. "Knowledge, Attitudes and Practices of Nurses towards Pressure Ulcer Prevention in University of Maiduguri Teaching Hospital, Borne State, North Eastern Nigeria." *International Journal of Nursing and Midwifery* 7 (4): 54–60. <https://doi.org/10.5897/IJNM2014.0155>.
- Vanderwee, K., M. Clark, C. Dealey, L. Gunningberg, and T. Defloor. 2007. "Pressure Ulcer Prevalence in Europe: A Pilot Study." *Journal of Evaluation in Clinical Practice* 13 (2): 227–235. <https://doi:10.1111/j.1365-2753.2006.00684.x>.
- Yap, T., and S. Kennerly. 2013. "A Nurse-Led Approach to Preventing Pressure Ulcers." *Rehabilitation Nursing* 36 (3): 106–10. <https://doi.org/10.1002/j.2048-7940.2011.tb00074.x>.