





BMJ Open Pressure injury prevention practice and associated factors among nurses at Wolaita Sodo University Teaching and Referral Hospital, South Ethiopia: a cross-sectional study

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ABSTRACT

Objective The prevention of pressure injury is of great importance in providing quality care to patients, as it has been reported that approximately 95% of all pressure injury are preventable. Nurses working in clinical settings play a key role in identifying patients at risk and administering preventative care. Therefore, this study examines pressure injury prevention practices among nurses.

Design Cross-sectional study design.

Setting Wolaita Sodo University Teaching and Referral Hospital, Ethiopia.

Participants 240 nurses.

Main outcome measures Pressure injury prevention practices among nurses.

Result Among nurses, 37.9% had good pressure injury prevention practices. The factors associated with pressure injury prevention practices included having a bachelor's degree or higher (adjusted odds ratio (AOR)=2.18; 95% CI 1.12 to 4.25), having more than 10 years of nursing experience (AOR=3.44; 95% CI 1.41 to 8.37), lacking subject knowledge (AOR=0.49; 95% CI 0.27 to 0.91) and being over the age of 40 (AOR=0.55; 95% CI 0.09 to 0.35).

Conclusion The majority of nurses reported having a limited level of pressure injury prevention practice. Since pressure ulcer prevention practice is majorly the role of nurses. Upgrading the educational level of the nurses through continuous professional development opportunities can improve the preventive practice of pressure ulcer injury by increasing the knowledge and skill gained during the vocational training.

INTRODUCTION

A pressure injury (PI) is localised damage to the skin and underlying soft tissue commonly occurring over a bony prominence area due to pressure or shearing/friction forces with pressure causing localised injury to the skin and/or underlying tissue.^{1 2} The injury can appear as intact skin or open injury and can be painful. In 2016, the National Pressure ulcer Advisory Panel (NPUAP) updated the

Strengths and limitations of this study

- Strength of this study was that the study tried to assess the magnitude and factors associated with pressure injury prevention practices among nurses and it can be an input for prevention of pressure injury together with other pocket studies from different corners of the country (Ethiopia).
- The study might have faced some limitations; such as, nature of the study design, which cannot establish a temporal relationship between the predictors and the outcome variable.
- The study does not assessed nurse's knowledge with respect to pressure injury treatment interventions, it only assessed the preventive aspect.
- Socially desirability bias since the study assessed self-reported practice there might be over reported behaviour.

term pressure ulcer to PI to include stage 1 in the definition since the skin is intact with non-blanchable erythema.²

Contributing factors are multifactorial, occurring mainly due to a combination of physiological events and external conditions.³ Tissue ischaemia at pressure points as a result of compression of tissue in the bone prominence area due to prolonged external pressure, shearing force, and prolonged contact with hard surfaces were the main cause of the PI. In addition, PI develops as a result of impaired lymphatic drainage due to compression of tissue, which causes increased interstitial fluid and buildup of waste.^{3 4} The risk of developing a PI was higher in patients with spinal cord injury, elderly patient and patients who were sedated for trauma or surgery, since this group of patients have less chance to

change position and they spend prolonged time in bed.⁵

The formation of PI is strongly influenced by risk factors such as peripheral vascular diseases, diabetes mellitus, smoking, long-term immobility, poor nutritional status, incontinence, altered feelings and ageing. Other contributing factors include a shortage of pressure-relieving devices, a lack of universal guidelines and the failure to prioritise PI.⁶ Healthcare organisations may also play a role in the development of PI as a result of lack of subject matter expertise, heavy workload and inadequate staff⁶⁻⁸ being a barrier for administering proper care.

The global prevalence of PI among adults was estimated to be 12.8%.⁹ It is most prevalent among hospitalised patient especially those in the ICU, and account for 14%–42% of global mortality despite advances in medical technology. In addition, among older adults, the mortality rate increased by 60% within a year of hospital discharge due to PI.¹⁰

Between 2017 and 2018, over 1300 new injury were reported each month, affecting up to 200 000 people annually. Pressure injuries are also responsible for 2% of preventable mortality¹¹ in addition to causing intense pain and discomfort in patients, prolonging hospital stay and delaying recovery.¹² In Ethiopia, the prevalence of pressure ulcer among hospitalised patients was estimated to be 16.8% which is higher compared with the prevalence in Nigeria affecting 13.84% of the patient. According to studies conducted in Ethiopia 48.4%–67.3% of nurses had good practices to PI prevention.⁵

PIs have numerous impacts on patient and the healthcare system. In the healthcare system, it can increase the risk of hospital-acquired infection, prolonging hospital stay, increase healthcare cost, and increase both morbidity and mortality.^{9 13 14} The economic burden associated with a PI is high. In the USA, annually about US\$11 billion is spent for the prevention and treatment of pressure ulcers. In the USA and UK, from total treatment cost, 2% and 4% are allocated for pressure ulcer treatment respectively.^{14 15} According to data from the National Health Survey, the impact of PI is multifactorial and costs 1.4 million pounds per day for treatment.¹¹ In comparison to treatment, the cost of materials and interventions needed to prevent PI is lower.¹⁶

PI has a significant impact on the psychological well-being of the patient which is related to pain, increased risk of infection, patient's reduced autonomy and sepsis.¹⁴ Depression is being prevalent among patients with pressure ulcer injury. In a study conducted in Brazil among older adults with PI, 80.9% of the patients were identified as having depression.¹⁷

PI prevention is becoming a key indicator in the assessment of quality care and patient experience.^{7 11 18 19} Although the prevention of PI is the responsibility of all healthcare professionals, those involved in direct patient care, especially nurses, have higher burdens in administering preventative care.²⁰ The role of nurses

during PI preventive practice include assessing patient at the risk for developing a PI,²¹ changing the position of the patient, keeping the head of the bed at the lowest safe elevation to prevent shear, using pressure-reducing surfaces and devices, and assessing and providing adequate nutrition for patients.²² However, different factors affect the implementation of PI prevention and treatment among nurses, such as gender, age, experience, educational status, knowledge, training and lack of guidelines.^{7 23}

Prevention of PI has a great significance as it has been stated that around 95% of all PI are preventable; nurses that are working in clinical settings have key roles in identifying patients at risk due to their daily and direct contact with patients.²⁴ However, in most cases, due to different barriers such as lack of subject matter expertise, heavy workload, and inadequate staff, nurses were not administering proper care for patients with PI.⁶⁻⁸

Now a day, the government in different countries was launching the programme and developing guidelines for the prevention of pressure ulcers. In 2009, University of Miami Hospital (UMH) initiate a multi-disciplinary process improvement programme. The programme implemented different interventions methods to reduce PI and resulted in a decrease in the prevalence of HAPU at UMH from 11.7% of stage II to IV ulcers in the second quarter, 2009 to 2.1% in the third quarter.¹⁵ Different guidelines were developed such as NPUAP in the USA, Agency for Health Care Policy and Research guidelines, The European Pressure Ulcer Advisory Panel.¹³ Therefore, the prevention of pressure ulcer injury needs a collaborative approach of the government, the patient and interdisciplinary healthcare professionals, especially nurses.

Limited studies are showing the level of practice of nurses on PI, therefore, this study aimed to assess PI prevention practice of nurses and associated factors at the Wolaita Sodo University Teaching and Referral Hospital (WSUTRH) in the Southern Nations, Nationalities and Peoples' Region of Ethiopia.

METHOD AND MATERIALS

Study setting and design

A Hospital-based cross-sectional study design was conducted at WSUTRH, which has 268 beds and 246 staff nurses. The hospital provides services to 3.5–5 million people annually for the neighbouring areas of Wolaita and Dawuro, Gamo Gofa and Kambata Tambaro. The study was carried out from 1 July 2019 to 30 July 2019.

Patient and public involvement

No patients were involved in the design, or conduct, or reporting, or dissemination plans of our research

Study population

Nurses who were working in the inpatient department and directly involved in patient care at WSUTRH.

Inclusion and exclusion criteria

Inclusion criteria

All nurses who are permanent recruit with a minimum diploma in Nursing and working in inpatient department (Medical, Surgical, Intensive care unit) and directly involved in patient care were involved in the study.

Exclusion criteria

Those who were not available during the time of the study (annual, maternal, sick leave).

Sample size determination

The sample size was determined by using a single population proportion formula with using a proportion of (33.42%),⁶ a 95% confidence level and a margin of error 5%. Since the source population was less than 10 000, a correction formula was used and 10% non-response was added, giving the final sample size of 158. We used a convenience sampling method. Since the total number of nurses working in the hospital was 246, the study involved all of them to increase the power of the study.

Data collection tool and procedure

A structured self-administrated questionnaire was used for data collection. The standardised questionnaire which was adapted and selected from the PI knowledge and attitude test developed by Piper and Mott, 1995, was used for data collection.²⁵

The questionnaire was validated questionnaire with the internal consistency reliability (Cronbach's α) of 0.77. The 1-week test-retest interclass correlation coefficient (stability) was 0.88. The content validity index was 0.79–1.00.

The content validity is computed using the Item-content validity index (I-CVI) in this study. I-CVI is computed as the number of experts giving a rating of 'very relevant' for each item divided by the total number of experts. The value range from 0 to 1 and is interpreted as If I-CVI > 0.79, the item is relevant, If it is between 0.70 and 0.79, the item needs revisions, and If the value is below 0.70 the item is eliminated.²⁶

Practice tests and other related questions were developed and modified from different literature.^{25 27 28} We have used 22-item practice-based questions which are pretested and validated instruments with Cronbach's alpha of (r)=0.76 from the study conducted in Gonder Ethiopia.²⁸ The questionnaire has three responses (always, sometimes and never with a score of 2, 1 and 0, respectively). Before administering the questionnaire the data collectors explained the aims and procedure of the study. Also, each questionnaire has a participant Information Sheet that describes the study title, Purpose of the study, Procedure and duration Risk and benefits, and confidentiality. Then, they administered the questionnaire for the respondent before 1 hour of the end of the regular working hours. The data collectors collected the filled questionnaire before the respondent left the hospital by completing their shift work.

Operational definition

Knowledge

Adequate knowledge: Nurses who scored greater or equal to the mean of knowledge-based questions.

Inadequate knowledge: Nurse who scored less than the mean of knowledge-based questions.

Practice

Good practice: Nurse who scored greater or equal to the mean of practice-related questions.

Poor practice: Nurse who scored less than the mean of practice-related questions.

Data quality control

To maintain the quality of data; 2 days of training were given for data collectors and supervisors about the objectives of the study, the contents of the questionnaire, issues related to the confidentiality of the responses, and the rights of respondents. Pretest was done in the 5% of the study subject in Durame General Hospital. Follow-up and supervision were conducted during the data collection period. The collected data were checked by data collectors every day at the end of each data collection day.

Data processing and analysis

The data collected were checked for completeness and entered into Epi data V.4.6.0.2. Analyses were done by SPSS V.25. Bivariate and multivariate logistic regression models were used to identify factors associated with PI prevention practice. In bivariate analysis, the association was tested with each independent variable and dependent variable separately. The variables with a $p \leq 0.25$ in bivariate analysis were taken into the multivariable model to control for all possible confounders. ORs with 95% CI were estimated to identify the factors associated with PI prevention practice using multivariable logistic regression analysis. The level of statistical significance was declared at a $p < 0.05$.

RESULTS

Sociodemographic characteristics

A total of 240 nurses from the Wolaita Sodo Teaching and Referral Hospital participated in this study with a response rate of 97.5%. The majority of nurses were between the ages of 20 and 30 (65.4%) and females accounted for 55.4% of participants. Among the participants, 36.7% had a monthly income ranging from 3654 to 5244 Ethiopian birrs. The majority (72.5%) of participants were educated (bachelor's degree or higher) and 73.3% had served for less than 10 years (table 1).

Nurses' knowledge of PI prevention

More than half of the respondents (53.3%) were found to have poor knowledge regarding PI prevention practices, while a 46.7% had good knowledge (figure 1).

Organisational factors

The majority of nurses (85.4%) and (70.0%) reported that there was a shortage of pressure-relieving devices and

Table 1 Frequency distribution of nurses' socio-demographic variables in the WSUTRH, 2019, (n=240)

Variables	Category	Frequency (%)
Sex	Male	107 (44.6)
	Female	133 (55.4)
Age	20–30 years	157 (65.4)
	31–40 years	70 (29.2)
	>40 years	13 (5.4)
Educational status	Diploma	70 (29.2)
	Degree and above	170 (70.8)
Monthly income (ETB)	<3654	76 (31.7)
	3654–5244	88 (36.7)
	5244–7100	60 (25.0)
	>7100	16 (6.7)
Work experience	<10 years	176 (73.3)
	≥10 years	64 (26.7)

ETB, Ethiopian Birr; WSUTRH, Wolaita Sodo University Teaching and Referral Hospital.

a lack of guidelines for the risk assessment and preventative practices of PI, respectively. More than three-quarters of nurses (82.1%) did not receive formal training and 77.5% reported staff shortages. Moreover, 71.3% of nurses reported that the hospital emphasises patient safety; however, 76.7% reported that the work environment was not conducive to patient safety (table 2).

Workplace factors

More than three-quarters of nurses (76.7%) were not satisfied with their job, and 84.6% reported heavy workloads. More than half (52.9%) cited that PI were not a priority (table 3).

Nurses' PI prevention practices

In this study, 37.9% of respondents had good PI prevention practices, while the remainder had poor PI prevention practices (figure 2).

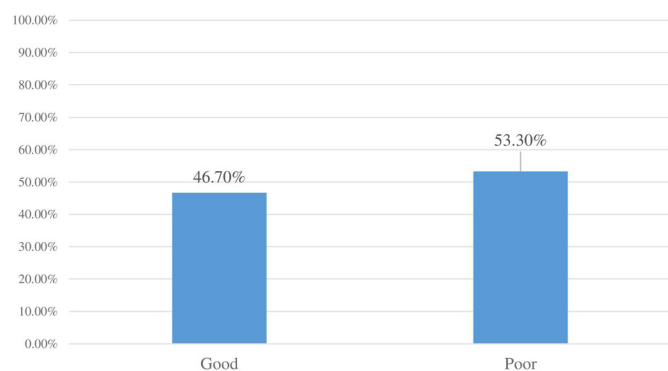


Figure 1 Nurses' knowledge of pressure injury prevention at the WSUTRH, 2019. WSUTRH, Wolaita Sodo University Teaching and Referral Hospital.

Table 2 Frequency distribution of organisational related factor on prevention of pressure injury in the WSUTRH, 2019, (n=240)

Variables	Category	Frequency (%)
Shortage of pressure relieving devices	Yes	205 (85.4)
	No	35 (14.6)
Lack of universal guidelines	Yes	168 (70.0)
	No	72 (30.0)
Lack of training	Yes	43 (17.9)
	No	197 (82.1)
Emphasised patient safety	Yes	171 (71.3)
	No	69 (28.8)
Un-conducive working environment	Yes	56 (23.3)
	No	184 (76.7)
Shortage of staff	Yes	186 (77.5)
	No	54 (22.5)

WSUTRH, Wolaita Sodo University Teaching and Referral Hospital.

Factors associated with nurses' PI prevention practices

In binary logistic regression, nine variables had p values of 0.25 and were candidates for multiple logistic regression. In multiple logistic regression only four variables were significantly associated with PI prevention practices ($p < 0.05$).

Educated nurses (with a bachelor's degree or higher) were twice more likely to have good PI prevention practices than those with diplomas (adjusted odds ratio (AOR)=2.18; 95% CI 1.12 to 4.25). Nurses who had served for more than 10 years were three times more likely to have good PI prevention practices than those who had served for less than 10 years (AOR=3.44; 95% CI 1.41 to 8.37). Nurses with poor knowledge on PI prevention were 51% less likely to have a good practice of PI prevention than those nurses having good knowledge (AOR=0.49; 95% CI 0.27 to 0.91). Nurses aged greater than forty years were 45% less likely to have a good practice of PI prevention than those nurses ages between 20–30 years old (AOR=0.55; 95% CI 0.09 to 0.35) (table 4).

Table 3 Frequency distribution of health professional related factor on pressure injury prevention in WSUTRH, 2019, (n=240)

Variables	Category	Frequency (%)
Lack of job satisfaction	Yes	190 (79.2)
	No	50 (20.8)
Work load	Yes	203 (84.6)
	No	37 (15.4)
Presence of other priorities cases than pressure injury	Yes	127 (52.9)
	No	113 (47.1)

WSUTRH, Wolaita Sodo University Teaching and Referral Hospital.

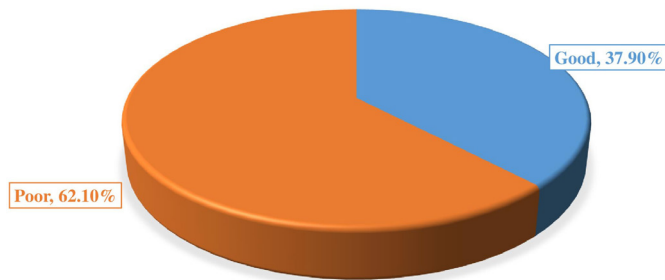


Figure 2 Nurses' pressure injury prevention practices at the WSUTRH, 2019. WSUTRH, Wolaita Sodo University Teaching and Referral Hospital.

DISCUSSION

The study found that 37.9% of nurses had good PI prevention practices. Educational status, year of experience, knowledge and age were factors associated with nurse's PI prevention practice.

PI prevention practice in this study is lower than the study conducted in Gonder,²⁸ Diredawa,⁵ Addis Ababa,²⁰ Nigeria,⁸ Uganda²⁹ and Turkey.³⁰ This might be due to variations in level of education of participants, the hospital setting and patient load of the setting. But it was significantly higher than study conducted in Egypt.³¹ This might be due to variation in sample size and the area of work of the participants.

Level of education has an impact on PI prevention practice; this study showed that Nurses who were educated degree and above were two times more likely to

have good practice of PI prevention than educated up to diploma (AOR=2.18; 95% CI 1.12 to 4.25). This finding is consistent with studies conducted in Egypt.³¹ Educational programmes can reduce incidence and prevalence of PI by improving informed decision-making.³² Also it has a significant impact on the knowledge and competency of the nurse clinician in decreases the occurrence of PI and improving patient outcome.^{33 34} Education also offers a greater opportunity to learn a variety of courses that are directly or indirectly related to the prevention and management of PI.²⁸

Nurses who were served for more than 10 years were three times more likely to have good practice of PI prevention compare to those who served less than 10 years (AOR=3.44; 95% CI 1.41 to 8.37), this finding is consistent with study done on Gonder,²⁸ Lahore³⁵ and Nigeria.³⁶ This could be explained by the fact that, through their work experience, nurses can be exposed to various patients with PI, thereby improving their level of practice.

Knowledge has relationship with pressure injury prevention practice, in this study Nurses who have poor knowledge were 51% less likely to have good practice of PI prevention than those nurses having good knowledge (AOR=0.49; 95% CI 0.27 to 0.91). To reduce mortality related to PI nurses need to have knowledge of prevention and treatment of PI which is precondition to undertake effective prevention and therapeutic interventions of PI and its complications.²³ Although knowledge is basis

Table 4 Bivariate and multivariate analysis of sociodemographic, knowledge, organisational factor and health professional related factor of nurse in WSUTRH 2019 (n=240)

Variable	Category	Pressure injury preventive practice		P value (<0.25)	C or 95% CI	P Value (<0.25)	AOR, 95% CI
		Good	Poor				
Educational status	Diploma	31 (44.3%)	39 (55.7%)	0.193	1.45 (0.82 to 2.56)	0.021	2.18 (1.12 to 4.25)
	Degree and above	60 (35.3 %)	110 (64.7%)				
Service year	<10 years	60 (34.1%)	116 (65.9%)	0.044	1.81 (1.01 to 3.24)	0.006	3.44 (1.41 to 8.37)
	≥10 years	31 (74.8.4%)	33 (51.6%)				
Age	20–30 years	59 (37.6%)	98 (62.4%)	0.128	0.30 (0.65 to 1.41)	0.002	0.55 (0.09 to 0.35)
	31–40 years	30 (42.9%)	40 (57.1%)				
	>40 years	2 (15.4%)	11 (84.6%)				
Lack of universal guidelines	Yes	58 (34.5%)	110 (65.5%)	0.099	0.62 (0.35 to 1.09)	0.111	0.59 (0.31 to 1.12)
	No	33 (45.8%)	39 (54.2%)				
Lack of training	Yes	12 (27.9%)	31 (72.1 %)	0.138	0.57 (0.28 to 1.19)	0.217	1.70 (0.73 to 3.98)
	No	79 (40.1%)	118 (59.9%)				
Work load	Yes	82 (40.4%)	121 (59.6%)	0.068	2.10 (0.94 to 4.70)	0.082	0.45 (0.18 to 1.10)
	No	9 (24.3%)	28 (75.7%)				
Lack of job satisfaction	Yes	79 (41.6%)	111 (58.4%)	0.025	2.25 (1.10 to 4.58)	0.225	1.64 (0.73 to 3.65)
	No	12 (24.0%)	38 (76.0%)				
Unconducive working environment	Yes	75 (40.8%)	109 (59.2%)	0.102	1.72 (0.89 to 3.29)	0.210	1.59 (0.76 to 3.32)
	No	16 (28.6%)	40 (71.4%)				
Knowledge	Good knowledge	48 (42.9%)	64 (57.1%)	0.141	1.48 (0.87 to 2.50)	0.024	0.49 (0.27 to 0.91)
	Poor knowledge	43 (33.6%)	85 (66.4%)				

Bold values indicates P value <0.25.

AOR, Adjusted Odds Ratio; WSUTRH, Wolaita Sodo University Teaching and Referral Hospital.



for developing and maintaining competency of delivering high quality of nursing care.³⁷

Those nurses whose age were greater than 40 years were 45% less likely to have good practice of PI prevention than those nurses age between 20 and 30 years old (AOR=0.55; 95% CI 0.09 to 0.35) evidence suggested that there is diminished job performance and age with respect to certain job tasks, especially, if job tasks require sensory perception, selective attention, working memory, information processing, rapid reaction or physical strength.³⁸ Also researches indicate that when people reach a certain age, their work ability significantly decreases which is due to decline in their physical and mental abilities, this might have effect on the management of PI.³⁹

Generally, the study tried to assess the pressure ulcer prevention practice and associated factors among nurses and it can be an input for the prevention of PI programmes together with other pocket studies from different corners of the country (Ethiopia). But the study might have faced the following limitations. First, since we have used a self-administered questionnaire this study may have faced social desirability bias. Second, the study does not assessed nurse's knowledge with respect to PI treatment interventions it only assessed the preventive aspect. Also, the study may not show a temporal relationship because of the cross-sectional study design. Therefore, the study should be interpreted cautiously. The use of non-probability sampling method might affect the generalisability of this study to general population.

CONCLUSION

The majority of nurses reported having a limited level of PI prevention practice. Since pressure ulcer prevention practice is majorly the role of nurses. Upgrading the educational level of the nurses through continuous professional development opportunities can improve the preventive practice of pressure ulcer injury by increasing the knowledge and skill gained during the vocational training. In addition, implementing educational programmes, and providing up-to-date training on pressure ulcer prevention practice were recommended to increase the practice of the nurses.

Contributors NA conceived the original idea and was involved in proposal development, design and data collection and analysis and in all stages of the research project. NA, TT, AA and TLL participated in data analysis and in all stages of the research project. Finally, all authors revised the manuscript and approved the final version. NA is responsible for the overall content as the guarantor.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Consent obtained directly from patient(s).

Ethics approval Ethical approval was obtained from the Ethical Clearance Committee of Wolaita Sodo University College of Health Science and Medicine with reference number CARD/20/201. Then a letter of cooperation was written to Wolaita Sodo University Teaching and Referral Hospital (WSUTRH) administration. Informed

voluntary written and signed consent were obtained from all respondents before the study. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. The datasets used during the current study are available from the corresponding author on reasonable request.

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