

# Knowledge and practice of pressure injury prevention and treatment among nurses in the university of Benin Teaching Hospital, Benin City, Nigeria, 2019

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## Abstract

**Context:** Pressure injuries are localized damage to the skin or underlying tissue that usually occurs over a bony prominence areas as a result of usually long-term pressure that occurs by staying in one position for too long. This preventable threat makes patient stay in the hospital longer than it should be; raised the cost of patient care, cause pain and discomfort, which is totally not acceptable in the health care system.

**Aims:** Consequently, this study aims to examine the knowledge and practice of nurses towards pressure injury prevention in very ill patients and also to evaluate the method used in the prevention and treatment of a patient that is at high risks, such as diabetic patients.

**Setting and Design:** This is a descriptive research design conducted on Nurses at the University of Benin Teaching Hospital, Benin City, Nigeria, 2019.

**Materials and Methods:** This study was conducted among 200 nurses from different wards and units through a stratified probability sampling method, and a self-structured questionnaire were designed, administered, and retrieved.

**Statistical Analysis Used:** Data collected were analyzed using descriptive statistics, mean, and standard deviation at 0.05 levels of significance through the Statistical Package for the Social Science software.

**Results:** The knowledge of Nurses on pressure injury treatment and prevention had a mean score of 34 ( $\pm 0.29$ ). The result also revealed a low level of practice of pressure injury prevention with composite percentage scores of 39.5%.

**Conclusion:** There is good knowledge toward pressure injury prevention, but the practice level is low and this is found to be associated with a shortage of workforce and availability of materials for the prevention of pressure injury. Therefore, the hospital managers should employ more nurses to facilitate and improve the quality of care given to the nonambulant patient in the hospital to prevent pressure injury.

**Keywords:** Knowledge, Practice, Pressure injury, Prevention, Sore, Therapy, Ulcer

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## INTRODUCTION

Pressure injury is localized damage to the skin and or underlying soft tissue usually over a bony prominence or related to a medical or other device.<sup>[1]</sup> Pressure injury also known as pressure ulcer or decubitus injury are a type of injury that breaks down the skin and underlying tissue when an area of the skin is placed under constant pressure for a certain period, causing tissue ischemic, cessation of nutrients, and oxygen supply to the tissue.<sup>[2]</sup> A constant pressure resulting in distortion or deformation damage is probably the most accurate description of a pressure injury.<sup>[3]</sup> Pressure injury makes patients stay in the hospital longer than it should be; they raise the cost of patient care, cause pain and discomfort.<sup>[4]</sup> Most pressure injury result from lack of mobility and nerve damage and these factors predispose individuals to its development.<sup>[5]</sup> The statistics of world injury day show that nearly 700,000 were affected by pressure injury each year; around 186,617 patients develop a new pressure injury in the acute care setting each year.<sup>[6]</sup> This has shown that between January 2012–December 2014, about 4-6% of patients in the acute care setting had pressure injury.<sup>[1,7]</sup> A study states that nurses' practice towards pressure injury prevention is not reliable because they prioritize it at a very low level due to their inadequate knowledge about the serious consequences of evidence-based practice.<sup>[8,9]</sup> Nowadays, if a patient develops pressure injury during hospitalization, it indicates poor quality of nursing care.<sup>[8,10]</sup> Although preventing a patient from pressure injury is the responsibility of all health-care professionals but primarily nurses are involved in direct patient care and take forefront of providing pressure injury prevention care.<sup>[11]</sup> Recently, there is a report of increasing incidents of pressure injury in Africa's Hospital, including Nigeria.<sup>[12,13]</sup> Could this be because the nurses who are the key player in preventing pressure injury are not well informed? if not, what is there practice level like in Nigeria? From this point of view, we aimed to examine the knowledge and practice of pressure injury prevention and treatment among nurses in the University of Benin Teaching Hospital (UBTH), Benin City, Nigeria, 2019.

## MATERIALS AND METHODS

### Research design and setting

A descriptive survey of nonexperimental research design was applied to this study. This is applicable because the independent variable occurs naturally, and there will be no manipulation of the variable, and a descriptive design is appropriate because it evaluate the nurses' knowledge and practice toward the treatment of pressure areas. This

study was carried out in university of Benin Teaching Hospital (UBTH). This hospital was founded in 1973; it is geographically located in the Ugbowo community between the boundaries of Egor and Ovia North East Local Government Area of Edo State. It is a tertiary health institution that serves as a referral center. The target population is 200 registered nurses who give nursing care to patients at the hospital.

The inclusion criteria were as follows: being willing to participate in the study, being formally staff of the hospital, and having the age of 20 years and above. while the nurses working in intensive care unit of the hospital, in which the nature of responsibility or duties could limit his or her ability in participating in the study were excluded.

### Sample size and sampling procedure

Taro Yamane's method was used to calculate the sample size: 100. Sample size  $N = \frac{n}{1 + N(e)^2}$  where  $n$  = sample

size:  $N$  = the population size:  $e$  = level of precision/error margin (0.05):  $e = 0.005$  (error of margin). The sample is made up of 100 registered nurses: Nursing Officer Two (NO II), NO I, Senior Nursing Officer (Sno), Assistance Chief Nursing Officer (Acno) And Chief Nursing Officer (CNO) working in medical and surgical wards were selected through a stratified random sampling technique.

### Data collection tools and procedure

Data collection instruments were structured questionnaire consisting of 36 questions made up of 5 parts; Section A: Sociodemographic data of respondents with 6 items, Section B: Percentage distribution on knowledge of nurses on pressure injury treatment and prevention with 8 items. The mean score of 3.5 and above rated excellent knowledge, 3.0–3.4 mean score rated very good knowledge, 2.5–2.9 rated good knowledge, below 2.5 mean score rated poor knowledge. Section C: Factors contributing to development of pressure injury with 5 items. section D: Measures of preventing pressure injury with 9 items. Section E: Practice of pressure injury prevention with 8 items.

The validity of the instrument was ensured by been scrutinized by an expert to ensure validity (face validity and content validity), and the reliability of this research was carried out by administering 10% of the sample size questionnaire which is 10 questionnaires to nurses in State Hospital UBTH Edo State. The method used was split-half method, which is done by coding and

splitting the research questions into even (X) and odd (Y) data and was then analyzed through Cronbach Alpha which result in 0.9, shows that the test item is highly reliable. The research assistant was trained to assist in the administration of the questionnaire. A proper introduction was made, and permission obtained from the heads of wards and clinics of the hospital. The questionnaire were distributed with the help of a research assistant to the nurses in all in medical and surgical wards in UBTH for a period of 1 week. The guideline for the filling of the questionnaires was provided and respondents were assured of anonymity and confidentiality. The completed questionnaires were collected on the spot after completion. The data obtained were coded and analyzed using the Statistical Package for the Social Science statistical software version 21.00 (IBM corp. released 2012 Armonk, NY, USA: IBM Corp). Variables and research questions were analyzed using descriptive, mean, and standard deviation.

### Ethical considerations

Ethical approval for this study was obtained from the ethics and Research Committee of UBTH on November 30, 2019, with protocol number: ADM/E/22/A/VOL/148190. The Deputy Director clinical, nursing science, and the head of department of different ward and units in the hospital were informed. In line with the Belmont Report, the researcher strived to do no harm to the participants. The consent form was given to the participants to seek written consent, and verbal consent was also taken before data collection. In order not to exploit the participants financially and physically, their time of carrying out their duties in their respective units was not encroached into, and data collection took place after each shift and nurses who declined inclusion were not penalized.

### RESULTS

Demographic characteristics of the nurses from different wards and units are shown in Table 1. It shows that majority of respondents (40%) were aged between 20 and 29 years. Five percent of respondents were male, ninety five percent of respondents were females, the majority of respondents (50%) were married, 2% of respondents were CNO, 6% ACNO, 16% SNO, 26% NO I, and 50% were NO II.

Knowledge of pressure injury treatment and prevention among nurses reported in Table 2. It shows that the respondents agreed that physical examination is a tool to detect those at risk of developing pressure injury with

**Table 1: Socio-demographic characteristics of nurses in university of Benin Teaching Hospital, Benin-city, Nigeria, 2019**

Variables	Classification	Frequency (n=200), n (%)
Age	20-29	80 (40)
	30-39	62 (31)
	40-49	54 (27)
	50 and above	4 (2)
	Total	200 (100)
Sex	Male	10 (5)
	Female	190 (95)
	Total	200 (100)
Marital status	Married	100 (50)
	Single	70 (35)
	Divorced	26 (13)
	Widow	4 (2)
	Total	200 (100)
Religion	Christian	190 (95)
	Muslim	10 (5)
	Traditional	-
	Others	-
	Total	200 (100)
Rank	CNO	4 (2)
	ACNO	12 (6)
	SNO	32 (16)
	NO I	52 (26)
	NO II	100 (50)
	Total	200 (100)

NO: Nursing officer, SNO: Senior nursing officer, ACNO: Assistance chief nursing officer, CNO: Chief nursing officer

a mean of 3.75 ( $\pm 1.58$ ). The respondents agreed the proper positioning is the best action preventing pressure injury with a mean of 4.85 ( $\pm 2.05$ ). The respondents agreed that pressure injury is preventable in the very ill and nonambulant patients with a mean rating of 4.35 ( $\pm 1.83$ ). The respondents agreed that bed-ridden patients should be turned 2 hourly with a mean rating of 3.95 ( $\pm 1.67$ ). The respondents agreed that the treatment of the pressure area is time-consuming with a mean rating of 3.40 ( $\pm 1.43$ ).

The respondents agreed that a limited workforce hinders the treatment of pressure injury with a mean rating of 4.95 ( $\pm 2.08$ ). The respondents agreed that regular skin inspection is an essential factor in preventing pressure injury with a mean rating of 4.35 ( $\pm 1.83$ ). The respondents agreed that adequate nutrition is an essential factor in the prevention of pressure injury with a mean rating of 4.50 ( $\pm 1.90$ ). In summary, the ground means for the knowledge of pressure injury treatment and prevention among nurses is 4.26 ( $\pm 1.80$ ).

Contributory factors to pressure injury development has viewed by the nurses is reported in Table 3. It shows that the respondents agreed that immobility and illness predisposes a patient to pressure injury with a mean of 5.00 ( $\pm 2.11$ ). It also shows that a lack of passive exercises can cause pressure injury with a mean score of 4.75 ( $\pm 2.00$ ).

The respondents agreed that malnutrition dehydration predisposes a patient to pressure injury with a mean of 4.90 ( $\pm 2.07$ ). The respondents agreed that excessive perspiration contributes to the development of pressure injury with a mean rating of 4.75 ( $\pm 2.00$ ). Moreover, the respondents also agreed that underweight patients are more at risk of developing pressure injury with a mean rating of 4.05 ( $\pm 1.71$ ).

The measure of preventing pressure injury has viewed among nurses is reported in Table 4. It shows that the respondents agreed that adequate nutrition is necessary for pressure injury healing with a mean of 4.65 ( $\pm 1.96$ ). Also said that routine pressure area treatment is a measure to prevent pressure injury with a mean score of 4.40 ( $\pm 1.86$ ). The respondents agreed that protein nutrition is necessary for a diet for patients with pressure injury with a mean of 3.70 ( $\pm 1.56$ ). It also shows that health educating the patient on the importance of the

range of motion exercises prevents injury is important with a mean of 4.00 ( $\pm 1.69$ ). In addition, the study shows that keeping the patient clean at all times prevent pressure injury with a mean rating of 3.80 ( $\pm 1.60$ ). Moreover, the study disagreed with the use of barrier lotion to prevent pressure injury with a mean rating of 2.55 ( $\pm 1.08$ ). But agreed that 2 hourly turning of the nonambulant patients prevent pressure injury with a mean 4.55 ( $\pm 1.92$ ).

Finally, the practice of pressure injury prevention among nurses is reported in Table 5. It shows an overall low level of practice with a composite percentage score of 39.5%.

### DISCUSSION

The findings from this study revealed that majority of the nurses demonstrate a high level of knowledge in the prevention and treatment of pressure injury which is

**Table 2: Percentage distribution on knowledge of nurses on pressure injury treatment and prevention in University of Benin Teaching Hospital, Benin City, Nigeria, 2019**

Items	SA, n (%)	A, n (%)	U, n (%)	D, n (%)	Sd, n (%)	Mean (SD)
Physical examination of the patient is a tool to detect those at risk of pressure injury	55 (55.0)	20 (20.0)	5 (5.0)	15 (15.0)	5 (5.0)	3.75 (1.58)
Proper positioning is the best for preventing pressure injury	77 (77.0)	20 (20.0)	0 (0.0)	3 (3.0)	0 (0.0)	4.85 (2.05)
Pressure injury is a preventable condition in very ill and nonambulant patient	63 (63.0)	24 (24.0)	3 (3.0)	6 (6.0)	4 (4.0)	4.35 (1.83)
Bed ridden patient should be turned 2 hourly	53 (53.0)	26 (26.0)	5 (5.0)	11 (11.0)	5 (5.0)	3.95 (1.67)
Treatment of pressure area is time consuming	45 (45.0)	23 (23.0)	4 (4.0)	19 (19.0)	10 (10.0)	3.40 (1.43)
Limited man power hinders the treatment of pressure injury	83 (83.0)	16 (26.0)	1 (1.0)	0 (0.0)	0 (0.0)	4.95 (2.08)
Regular skin inspection is a key factor in preventing pressure injury	70 (70.0)	17 (17.0)	4 (4.0)	5 (5.0)	4 (4.0)	4.35 (1.83)
Adequate nutrition is an essential factor in prevention of pressure injury	72 (72.0)	18 (18.0)	2 (2.0)	5 (5.0)	3 (3.0)	4.50 (1.90)
Ground mean						4.26 (1.80)

SA: Strongly agree, A: Agree, U: Undecided, D: Disagree, Sd: Strongly disagree, SD: Standard deviation

**Table 3: The percentage distribution of respondents on contributory factors to pressure injury development**

Items	SA, n (%)	A, n (%)	U, n (%)	D, n (%)	Sd, n (%)	Mean (SD)
Immobility and ill health predisposed a patient to pressure injury	77 (77.0)	23 (23.0)	0	0	0	5.00 (2.11)
Lack of passive exercises can cause pressure injury	74 (74.0)	21 (21.0)	5 (5.0)	0	0	4.75 (2.00)
Malnutrition dehydration disposes a patient to pressure	81 (81.0)	17 (17.0)	2 (2.0)	0	0	4.90 (2.07)
Excessive perspiration contribute to the development of pressure injury	83 (83.3)	12 (12.0)	1 (1.0)	3 (3.0)	1 (1.0)	4.75 (2.00)
Underweight patients are more at risk of developing pressure injuries	63 (63.3)	18 (18.0)	4 (4.0)	10 (10.0)	5 (5.0)	4.05 (1.71)

SA: Strongly agree, A: Agree, U: Undecided, D: Disagree, Sd: Strongly disagree, SD: Standard deviation

**Table 4: Percentage distribution on the measure of preventing pressure injury among nurses in the University of Benin Teaching Hospital, Benin City, Nigeria, 2019**

Item	SA, n (%)	A, n (%)	U, n (%)	D, n (%)	Sd, n (%)	Mean (SD)
Adequate nutrition is necessary for pressure injury healing	78 (78.0)	15 (17.0)	2 (2.0)	2 (2.0)	3 (3.0)	4.65 (1.96)
Routine pressure area treatment is a measure to prevent injury	71 (81.0)	17 (17.0)	5 (5.0)	5 (5.0)	2 (2.0)	4.40 (1.86)
Protein is necessary in a diet for patient with pressure injury	61 (81.0)	13 (17.0)	2 (2.0)	14 (14.0)	10 (10.0)	3.70 (1.56)
Health educating the patient on the importance of range of motion exercises prevent pressure injury	60 (81.0)	20 (20.0)	3 (2.0)	9 (9.0)	8 (0.0)	4.00 (1.69)
Keeping the patient clean at all times prevent pressure injury	61 (61.0)	15 (1.0)	4 (4.0)	11 (11.0)	9 (9.0)	3.80 (1.60)
The use of barrier lotion prevent pressure injury	41 (81.0)	10 (10.0)	2 (2.0)	27 (27.0)	20 (20.0)	2.55 (1.08)
Two hourly turning of nonambulant patients prevent pressure injury	81 (81.0)	10 (10.0)	2 (2.0)	5 (5.0)	2 (2.0)	4.55 (1.92)
Teaching the patient on how to carry out range motion exercise	63 (81.0)	21 (17.0)	5 (2.0)	9 (9.0)	2 (2.0)	4.20 (1.77)
The use of bed accessories like air rings prevent the development of pressure injury	53 (53.0)	17 (17.0)	0 (0.0)	22 (22.0)	8 (8.0)	3.50 (1.48)

SA: Strongly agree, A: Agree, U: Undecided, D: Disagree, Sd: Strongly disagree, SD: Standard deviation



**Table 5: The practice of pressure injury prevention among nurses in University of Benin Teaching Hospital, Benin city, Nigeria, 2019**

Item	Yes, n (%)	No, n (%)	Mean (SD)
Planning			
Developing an individualized care plan for individuals with or at risk of a pressure injury	55 (55.0)	45 (45)	1.10 (0.46)
Revising an individualized care plan by considering the individual condition	35 (35)	65 (65)	0.70 (0.30)
Prevention of pressure injury			
Turning patient 2 hourly	50 (50)	50 (50)	1.00 (0.42)
Taking counsel with a physician for individuals at risk of pressure injury	20 (20)	80 (80)	0.40 (0.17)
Taking counsel with other nurses for individuals at risk of pressure injury	40 (40)	60 (60)	0.80 (0.33)
Prevention of pressure injury deterioration			
Daily treatment of pressure injury	56 (56)	44 (44)	1.12 (0.47)
Taking counsel with a physician for individuals at risk of pressure injury deterioration	15 (15)	85 (85)	0.30 (0.13)
Taking counsel with other nurses for individuals at risk of pressure injury deterioration	45 (45)	55 (55)	0.90 (0.38)
Composite percentage score	39.5		0.79 (0.33)
Level of practice	Low		

SD: Standard deviation

in agreement with a study that assesses the knowledge, practice, and factors associated with pressure injury prevention among 248 nurses in Gondar University Hospital, North-west Ethiopia, and found that nearly half (54.4%) of the nurses had good knowledge on pressure injury prevention.<sup>[14]</sup> Similarly, a study carried out in Addis Ababa Government Hospitals, through a cross-sectional study design, and found that 61.2% of Nurses had adequate knowledge on pressure injury prevention.<sup>[15]</sup> However, on the contrary, a study carried out in Belgian hospitals in 2011; discovered that the knowledge of nurses in Belgian hospitals about the prevention of pressure injury is inadequate.<sup>[16]</sup>

Moreover, this study identified different contributory factors to the development of pressure injury, which includes immobility, lack of exercise, malnutrition, moisture. This is in line with a study carried out in South and Southeast of Brazil, among 24 nurses who were specialists in skincare from six different hospitals. Seven risk factors were validated as “very important” physical immobilization, pressure, surface friction, shearing forces, skin moisture, alteration in sensation, and malnutrition. Among the other risk factors are dehydration, obesity, anemia, decrease in serum albumin level, prematurity, aging, smoking, edema, impaired circulation, and a decrease in oxygenation and in tissue perfusion.<sup>[17]</sup> In addition to that, this present study also identified the common preventive measures of pressure injury as follow: adequate nutrition to promote injury healing, routine pressure area treatment, intake of protein diet, health education on the importance of range of motion exercises, keeping the patient clean at all times, 2 hourly turning of nonambulant patients, and the use of bed accessories like air rings. This is in agreement with a study in 2012, which opined that comprehensive assessment must include evaluation of systemic diseases, anatomical and physiological factors,

together with environmental and psychosocial factors, which can all contribute to pressure injury development. Extrinsic factors need to be considered in conjunction with intrinsic tissue health factors.<sup>[18]</sup> Similarly, a study opined that offering the combination of pressure relief therapy and an increase in blood flow creates an optimum pressure injury healing environment.<sup>[19]</sup> In addition to that other studies also believed that foam is the most commonly used material for pressure reduction and pressure injury prevention and treatment for the mobile individual and for those immobilized individuals who can achieve a passive standing position, a powered wheelchair that allows the individual to achieve a passive standing position is a good way of preventing pressure injury.<sup>[20-22]</sup>

Finally, this study discovered that there is a low level of practice of pressure injury prevention among nurses. This is in agreement with a study<sup>[14]</sup> opined that the practice of the nurses regarding the prevention of pressure injury was found to be inadequate. This result might be influenced by the enormous number of patients assigned to a nurse in a single shift because of the problem of shortage of workforce in the health sector.

Nevertheless, this study faced some challenges such as accessibility to some sensitive documents of the hospital to actually elucidate the cost implication of pressure injury of the patient in the hospital. Thus, additional research is needed to investigate the comprehensive preventive program and the cost-effectiveness of each of the programs.

## CONCLUSION

The overall knowledge of nurses on pressure injury treatment and prevention was good, but the practice of pressure injury prevention was found to be inadequate. Hospital managers should address the following problems

among nurses, such as shortage of facilities and equipment, dissatisfaction in terms of remuneration, and inadequate staff number. In-service training and promoting courses are some of the important steps to improve nurses' practice of pressure injury prevention.

Moreover, nurses will need to develop an individualized care plan for patients with or at risk of a pressure injury and be ready to turn patient two hourly on a daily basis for effective prevention of pressure injury. Therefore, there is a need for hospital management to obtain modern technology equipment to make this responsibility easy for the nurses.

Finally, this study on knowledge and practice of pressure injury prevention and treatment among nurses will enable various government and hospital managers to know areas of emphasis during policy-making on how to eradicate the threat of pressure injury in the hospitals. It will also enhance the nursing education curriculum by creating more eye-openers for students on the importance of patient changing position skills.

#### Conflicts of interest

There are no conflicts of interest.

#### Authors' contribution

Joy Onohiomeru Akhigbe contributed with concept development, collection of data, and data analysis. Ngozi Rosemary Osunde contributed with the design, literature search, data acquisition and manuscript editing. Olaolorunpo Olorunfemi contributed with the definition of the intellectual content, data analysis, statistical analysis, manuscript preparation, manuscript review and supervised the work.

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#### REFERENCES

- Coyer F, Miles S, Gosley S, Fulbrook P, Sketcher-Baker K, Cook JL, *et al.* Pressure injury prevalence in intensive care versus non-intensive care patients: A state-wide comparison. *Aust Crit Care* 2017;30:244-50.
- Bhattacharya S, Mishra RK. Pressure injuries: Current understanding and newer modalities of treatment. *Indian J Plast Surg* 2015;48:4-16.
- Gould LJ, Bohn G, Bryant R, Paine T, Couch K, Cowan L, *et al.* Pressure injury summit 2018: An interdisciplinary approach to improve our understanding of the risk of pressure-induced tissue damage. *Wound Repair Regen* 2019;27:497-508.
- Jackson D, Durrant L, Bishop E, Walthall H, Betteridge R, Gardner S, *et al.* Pain associated with pressure injury: A qualitative study of community-based, home-dwelling individuals. *J Adv Nurs* 2017;73:3061-9.
- Fulbrook P, Anderson A. Pressure injury risk assessment in intensive care: Comparison of inter-rater reliability of the COMHON (conscious level, mobility, haemodynamics, oxygenation, nutrition) Index with three scales. *J Adv Nurs* 2016;72:680-92.
- Nasreen S, Afzal M, Sarwar H. Nurses knowledge and practices toward pressure injury prevention in General Hospital Lahore. *Saudi J Med Pharm Sci* 2017;87:34-4.
- Campbell JL, Gosley S, Coleman K, Coyer FM. Combining pressure injury and incontinence-associated dermatitis prevalence surveys: An effective protocol. *Wound Pract Res* 2016;24:170-7.
- Kaddourah B, Abu-Shaheen AK, Al-Tannir M. Knowledge and attitudes of health professionals towards pressure injuries at a rehabilitation hospital: A cross-sectional study. *BMC Nurs* 2016;15:17.
- Etafa W, Argaw Z, Gemechu E, Melese B. Nurses' attitude and perceived barriers to pressure injury prevention. *BMC Nurs* 2018;17:14.
- Simonetti V, Comparcini D, Flacco ME, Di Giovanni P, Cicolini G. Nursing students' knowledge and attitude on pressure injury prevention evidence-based guidelines: A multicenter cross-sectional study. *Nurse Educ Today* 2015;35:573-9.
- Worsley PR, Clarkson P, Bader DL, Schoonhoven L. Identifying barriers and facilitators to participation in pressure injury prevention in allied healthcare professionals: A mixed methods evaluation. *J Physiother* 2017;103:304-10.
- Assefa T, Mamo F, Shiferaw D. Prevalence of bed injury and its associated factors among patients admitted at Jimma University Medical Center, Jimma Zone, Southwestern Ethiopia, 2017 cross-sectional study. *Ortho Rheum Open Access* 2017;8:1-8.
- Obilor HN, Adejumo PO, Ilesanmi RE. Assessment of patients' wound-related pain experiences in University College Hospital, Ibadan, Nigeria. *Int Wound J* 2016;5:697-704.
- Nuru N, Zewdu F, Amsalu S, Mehretie Y. Knowledge and practice of nurses towards prevention of pressure injury and associated factors in Gondar University Hospital, Northwest Ethiopia. *BMC Nurs* 2015;14:34.
- Dilie A, Mengistu D. Assessment of nurses' knowledge, attitude, and perceived barriers to expressed pressure injury prevention practice in Addis Ababa Government Hospitals, Addis Ababa, Ethiopia, 2015. *Adv Nurs* 2015;2015:1-12.
- Beekman D, Defloor T, Schoonhoven L, Vanderwee K. Knowledge and attitudes of nurses on pressure injury prevention: A cross-sectional multicenter study in Belgian hospitals. *Worldviews Evid Based Nurs* 2011;8:166-76.
- Santos CT, Almeida MD, Lucena AD. The nursing diagnosis of risk for pressure injury: Content validation. *Rev Lat Am Enfermagem* 2016;24:e2693.
- Bogie K, Powell HL, Ho CH. New concepts in the prevention of pressure injuries. *Handb Clin Neurol* 2012;109:235-46.
- Matiasek J, Djedovic G, Kiehlmann M, Verstappen R, Rieger UM. Negative pressure wound therapy with instillation: Effects on healing of category 4 pressure injuries. *Plast Aesthet Res* 2018;5:36.
- Cheng C, Li S, Thomas A, Kotov NA, Haag R. Functional graphene nanomaterials based architectures: Biointeractions, fabrications, and emerging biological applications. *Chem Rev* 2017;117:1826-914.
- Ward RS. Splinting, orthoses, and prostheses in the management of burns. *Orthotics and prosthetics in rehabilitation*. E-Book 2012;3:412.
- Riley MA, Lohman H. Orthotic intervention for older adults. *Introduction to orthotics-E-Book: A clinical reasoning and problem-solving approach*. E-Book 2014;2:346.