



Original Article

Nurses' Management of Patients with Pressure Ulcers in Selected Health Facilities in Murang'a County, Kenya.

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Article DOI: <https://doi.org/10.37284/eajhs.3.1.361>

Date Published: **ABSTRACT**

19 July 2021 Pressure ulcers are a common health problem in hospitalized patients, especially among patients with chronic illnesses and those with reduced mobility. The

Keywords: prevalence of pressure ulcers varies with health care settings and is highest in critically ill patients ranging between 15-20%. They affect the quality of life of

Pressure Ulcers,
Management,
Debridement,
Eschar. patients and caregivers and have been associated with heavy financial burdens, extended hospital stays, higher morbidity and mortality. Inadequate prevention measures and lack of active management of pressure ulcers in early stages especially in high-risk patients result in recurrence and complicated pressure ulcers. In view of this, a descriptive cross-sectional study was conducted in Murang'a County, Kenya in selected health facilities with the objective of determining the management of patients with pressure ulcers. The study population was composed of one hundred and twenty-four (124) nurses working in medical and surgical wards in selected health facilities. Semi-structured questionnaires, observational checklists and focused group discussions were used to collect data. The qualitative data from the focus group discussions and observational checklist were transcribed and a summary written. The relationship between nurse's knowledge, nurse-oriented factors and institutional factors affecting management of pressure ulcers among nurses were examined using Pearson correlation analysis and multiple regression analysis. The median age of the respondents was 37 years with at least 112 (90.3%) having diploma level of education, and 63 (50.9%) were from the medical department. The majority of the nurses (93.6%) agreed pressure ulcers can be avoided, while 58.1% preferred pressure ulcer risk assessment tools compared to 27.5% who preferred clinical judgment in the management of pressure ulcers. The majority of nurses (87.5%) who had adequate knowledge on the management of pressure ulcers mentioned immobility and bedridden patients, stroke, spinal injury, dry skin, stool and urine incontinence as

major contributors to pressure ulcers. Regarding pressure ulcer risk assessment, 62.9% of nurses assessed patients for pressure ulcers though they relied on clinical judgement as 93.9% indicated there was no risk assessment scale in the wards and 5.1% were not sure. On institutional factors 61.3% of the nurses indicated that health facilities were lacking pressure ulcer reducing devices and those that had pillows and a few ripple mattresses. Regarding guidelines in the management of pressure ulcers, 75.8% of nurses indicated they were not available in the hospital. The study found an association between age and knowledge increasing the odds of effective management age ($AOR = 6.83, p = 0.001$); experience ($AOR = 4.08, p = 0.01$), and education ($AOR = 22.9, p = 0.000$). The nurse-oriented factors increasing the odds of effective management of pressure ulcers include nurse's positive attitude on prevention of pressure ulcers ($AOR = 2.3, p = 0.040$) and nurse use of pressure ulcer risk assessment tool ($AOR = 4.3, p = 0.010$). On institutional factors, nurses trained on management of pressure ulcers were 4.47 times likely to effectively manage patients with pressure ulcers. Nurses who lack in-service training about pressure ulcers were less likely to effectively manage patients with pressure ulcers ($AOR = 0.11, p = 0.000$). The study concludes that the nurses had adequate knowledge in management of pressure ulcers, the nurses-oriented factors and institutional factors also influence the management of pressure ulcers

APA CITATION

Njoroge, J. M., Kabue, P. N., & Ochieng J. (2021). Nurses' Management of Patients with Pressure Ulcers in Selected Health Facilities in Murang'a County, Kenya. *East African Journal of Health and Science*, 3(1), 78-96. <https://doi.org/10.37284/eajhs.3.1.361>.

CHICAGO CITATION

Njoroge, Jane Muthoni., Priscillah Njeri Kabue and James Ochieng. 2021. "Nurses' Management of Patients with Pressure Ulcers in Selected Health Facilities in Murang'a County, Kenya." *East African Journal of Health and Science* 3 (1), 78-96. <https://doi.org/10.37284/eajhs.3.1.361>.

HARVARD CITATION

Njoroge, J. M., Kabue, P. N., & Ochieng J. (2021) "Nurses' Management of Patients with Pressure Ulcers in Selected Health Facilities in Murang'a County, Kenya." *East African Journal of Health and Science*, 3(1), pp. 78-96. doi: 10.37284/eajhs.3.1.361.

IEEE CITATION

J. M. Njoroge, P. N. Kabue and J. Ochieng, "Nurses' Management of Patients with Pressure Ulcers in Selected Health Facilities in Murang'a County, Kenya.", *EAJHS*, vol. 3, no. 1, pp. 78-96, Jul. 2021.

MLA CITATION

Njoroge, Jane Muthoni., Priscillah Njeri Kabue & James Ochieng. "Nurses' Management of Patients with Pressure Ulcers in Selected Health Facilities in Murang'a County, Kenya." *East African Journal of Health and Science*, Vol. 3, no. 1, Jul 2021, pp. 78-96, doi:10.37284/eajhs.3.1.361.

INTRODUCTION

Pressure ulcers are a prevalent health issue in nearly all health care settings. Their development is multifactorial, making it a complex health issue (Waugh, 2014). The ulcers develop especially in patients with other ailments, therefore complicating the management of disease and increasing hospital stay and health care costs. The UK National Health Service reports that 186,617 patients are managed for pressure ulcers every year leading to an

estimated financial burden of over £4,000 by each pressure ulcer per year (Hope, 2014).

Prevention of pressure ulcers is the best approach and forms an integral part of nursing inpatient care. Pressure ulcers result in reduced quality of life of patients and caregivers, increase morbidity, mortality, and length of hospital stay (NICE, 2014). 85 – 90% of pressure ulcers are largely avoidable with the cost of treatment been higher compared to prevention (Cooper, 2015, Hope, 2014).

Pressure ulcers are commonly found in bony prominences. The injuries are as a result of bodyweight been hard-pressed between a bony prominence and a hard surface (Repić & Ivanović, 2014). Hippocrates (460-370 B.C.) associated pressure ulcers with paraplegia, bladder and bowel dysfunction (Agrawal & Chauhan, 2012). Immobility, neurologic conditions, ageing and nutritional deficiency have been associated with increased risk of developing pressure ulcers (Waugh, 2014).

The prevalence and incidence of pressure ulcers vary depending on the care setting. The highest rates are found in intensive care units ranging between 15 to 20% due to limited mobility and systemic illnesses. Facility acquired rates for critical care units range from 8.8 % in cardiac care to 10.3 % in surgical intensive care units (Cuddigan, 2012). According to the International Pressure Ulcer Prevalence surveys, the incidence rate in a neurological intensive care unit for stage 2 or greater pressure ulcers is 12.4% (Thomas & Compton, 2013). In Mexico, the point prevalence rate in second-level hospitals was found to be 17% with stage II pressure ulcers been the most common (Galván-Martínez et al., 2014).

Though pressure ulcers are widespread, it's rarely researched in developing countries. In a study conducted in Felegehiwot Referral Hospital in Bahir Dar, Ethiopia, the prevalence rate was found to be 12.8% among hospitalized patients, the length of stay in hospital and the age of the patient was reported as contributing factors (Gedamu, Hailu & Amano, 2014).

In Kenya, pressure ulcers prevalence rate of 4.2% in Kenyatta National Hospital and 68% at Nairobi spinal injury were reported with paraplegic patients being at highest risk of pressure ulcers development (Nangole, Khainga & Kiboi, 2009). In a study conducted in St. Mary's Hospital Mumias, Butere/Mumias district a prevalence rate of 13.5% was reported among patients in medical and surgical wards (Geerligs, Bouten & Laperre, 2004). The study was carried out in Murang'a County, Central, Kenya which has 271 health facilities. There is no published research management of patients with pressure ulcers in Murang'a County.

METHODS

A descriptive cross-sectional study design was used to gather information on the management of pressure ulcers among nurses in selected health facilities in Murang'a County, Kenya. The study population included nurses taking care of pressure ulcer patients in Murang'a District Hospital, Maragua District Hospital, Kiriaini Mission Hospital, Githumu Hospital, Kangema, Kenol Hospital, Makuyu and Muriranjias sub-district hospitals in Murang'a County.

Inclusion and Exclusion Criteria

Nurses working in any of the selected hospitals' medical and surgical wards and nurses who had worked in the ward for at least 4 months were eligible for inclusion in the study. Nurses working in any of the selected hospitals' medical and surgical wards that did not consent to participate in the study and those on leave were excluded from the study.

Sampling Technique and Size Determination

Murang'a County was purposively selected as it had both County and sub- County hospitals with medical and surgical wards well distributed within the region. Total population sampling was used to purposively select nurses in medical and surgical wards since pressure ulcers patients are majorly found in these wards and the sample is small.

Using the Fishers formulae (1998) below, the sample size will be calculated as follows

$$n = \frac{Z^2 pq}{d^2} \text{ where:}$$

n is the desired sample size; Z is the normal standard deviation at the required confidence level which is 95% (standard value of 1.96); p is the percentage of the population with the desired characteristics; q is $1-p$ which represents the target population not having the particular characteristics; d is the level of statistical significance (degree of freedom = 0.05)

$$n = \frac{1.962^2 * 0.5 * 0.5}{0.05^2} = 384 \text{ respondents}$$

With the estimated total population (N) been less than 10,000, the formula: $nf = \frac{n}{(1+\frac{n}{N})}$ will be used to adjust the sample size, where;

N is the total population of nurses working in medical and surgical wards in the selected hospitals (estimated at 180); *nf* is the adjusted sample size (when the population is less than 10,000); *n* is the desired sample size (when the population is more than 10,000).

Therefore, the minimum sample size required;

$$nf = \frac{384}{(1 + \frac{384}{175})} = 120 \text{ respondents}$$

Research Instruments

The main instrument used for the study was semi-structured questionnaires with both open-ended and close-ended questions. Focused group discussions were also used don the nurses who did not complete questionnaires.

The minimum sample size for this study was 120 study participants. 132 semi-structured questionnaires were issued, but only 124 were usable for the purpose of this study (*n* = 124). The findings describe the sociodemographic characteristics of the study participants, the nurses-oriented factors, the knowledge level of nurses in the management of pressure ulcers and the institutional factors that influence the management of pressure ulcer patients.

RESULTS AND DISCUSSIONS

Sociodemographic Characteristics of the Respondents

The median age of the respondents was 37 years. The results indicated 85 (68.5%) were married, 73 (58.9%) has experience of over five years, 91 (73.4%) were permanent employees, at least 112 (90.3%) had a diploma level of education. The summary is presented in *Table 1* below.

Table 1: Sociodemographic characteristics of the respondents

Demographic Attribute		Frequency	Percentage
Age	18-25	20	16.1
	25-30	20	16.1
	30-35	15	12.1
	35-40	2	1.6
	40-45	41	33.1
	45-49	12	9.7
	>50	14	11.3
Marital status	Single	37	29.8
	Married	85	68.5
	Divorced	2	1.6
Experience	<1 Years	12	9.7
	1-3 Years	20	16.1
	3-5 Years	15	12.1
	>5 Years	73	58.9
Employment status	Permanent	91	73.4
	Contract	27	21.8
	Casual	6	4.8
Highest education level	Certificate	8	6.5
	Diploma	112	90.3
	Degree	4	3.2

Respondent's Oriented Factors that Influence Management of Pressure Ulcers***Experience, Training and the Ward of Practice***

The majority of the respondents 122 (98.4%) had served a patient with pressure ulcers, 63 (50.9%) worked in the medical department and 89 (71.8%) had taken a course on wound care. The summary is presented below in *Table 2*.

Table 2: Respondents' experience, training and the ward of practice

		Frequency	Percentage
Served patient with pressure ulcers	Yes	122	98.3
	No	2	1.6
Took course in wound care	No	89	71.8
	Yes	35	28.2
Ward of practice	Medical	63	50.9
	Orthopaedic	2	1.6
	Surgical	45	36.3
	General ward	14	11.3

Attitude and Management of Pressure Ulcers

The study wanted to understand respondents' attitudes that determine the management of pressure ulcers. On whether pressure ulcers can be avoided, (116) 93.6% of the respondents agreed that pressure ulcers were avoidable. Out of the 124 respondents, 102 (82.2%) agreed that prevention of risk factors associated with pressure ulcers was not time-

consuming, 112 (90.4%) indicated that it is important to document details of pressure ulcer care given to patients. This indicates a positive attitude that supports the prevention and management of pressure ulcers. However, 72 (58.1%) preferred the use of a pressure ulcer risk assessment tool compared to 41.9% of respondents who preferred use clinical judgment in the management of pressure ulcers (see *Table 3*).

Table 3: Respondent's attitude that influence management of pressure ulcers

	Agree n (%)	Disagree n (%)
Pressure ulcers can be avoided	116 (93.6)	8 (6.4)
It is necessary to document pressure ulcer care activities done by the nurse	112 (90.4)	12 (9.7)
Prevention of risk factors for pressure ulcers is time-consuming for me	22 (13)	102 (87)
Clinical judgment is better than using a pressure ulcer risk assessment tool	52 (41.9)	72 (58.7)

Level of Knowledge and Management of Pressure Ulcers

The study provided 16 questions to assess the level of knowledge on the management of pressure ulcers. The mean score was 78.38% with a standard deviation of 10.61. The nutritional needs of high-risk patients were best scored with all the

respondents identifying a high protein diet as essential in the management of Pressure ulcers. On the use of hot water and soap and the effect on drying the skin and increasing the risk for pressure ulcers were poorly scored with only 20.5% answering correctly. The summary of the respondents' scores is as presented in *Table 4* below.

Table 4: Respondent's level of knowledge on the management of pressure ulcers

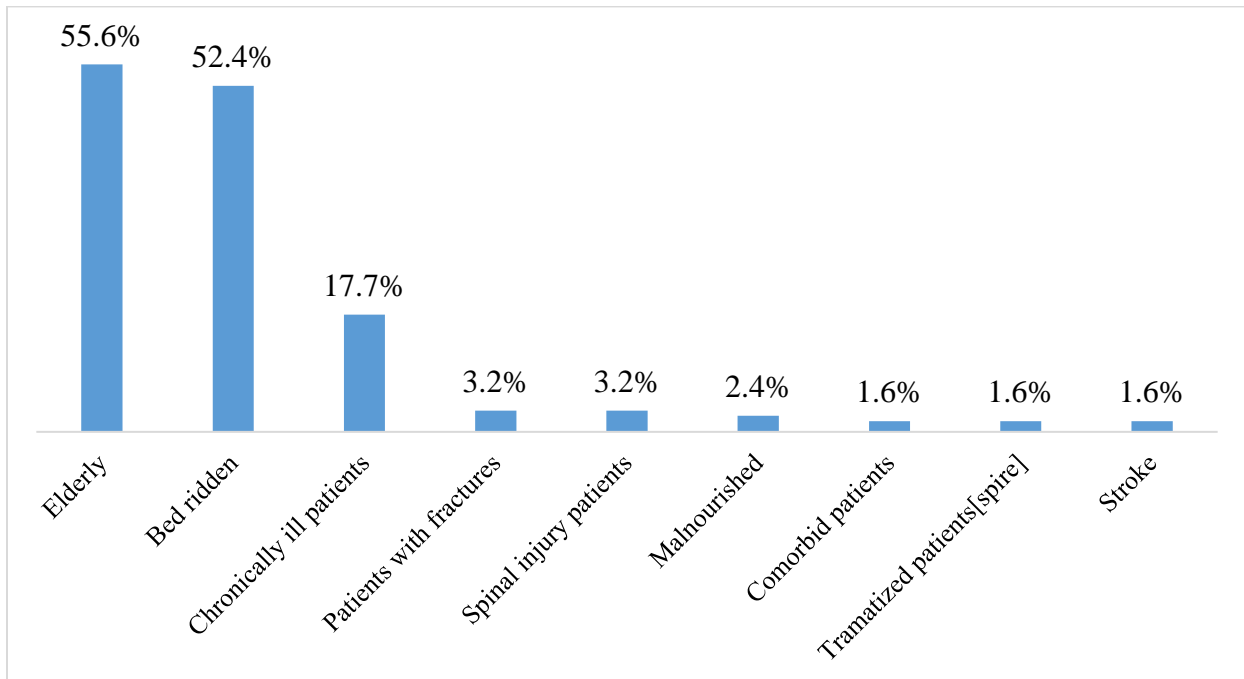
Questions	Correctly answered		Wrongly answered	
	n	%	n	%
When possible, high-protein oral nutritional supplements should be used in addition to usual diet for high-risk patients.	100	100		
A pressure ulcer is any lesion caused by unrelieved pressure that results in damage to underlying tissue. Most pressure ulcers occur over a bone (e.g., hips, tailbone...)	122	98.4		
A pressure ulcer has a negative effect on a patient's quality of life and efforts should be made by caregivers to ensure that pressure ulcers are prevented.	122	98.4	2	1.6
Management of pressure ulcers requires a multidisciplinary approach (Nurse, UCP, Dietitian, OT, PT, Pharmacist, Social Work, Physicians, Surgeons) and patient/resident/family participation.	120	96.8	2	1.6
The most common pressure ulcer site is the abdomen	118	95.2	4	3.2
Persons at risk for pressure ulcers should be nutritionally assessed (i.e., weight, nutrition intake, blood work).	116	93.5	8	6.5
Persons with decreased mobility, incontinence, poor nutrition, altered level of consciousness and underlying diseases such as diabetes are at risk for developing pressure ulcers.	116	93.5	8	6.5
A pressure redistribution surface should be used for all high-risk patients.	114	91.9	8	6.5
Dragging the patient up in bed increases friction.	106	85.5	10	8.1
It is a good idea to massage over bony prominences that are reddened.	104	83.9	18	14.5
Chair bound persons should be fitted for a chair cushion	102	82.3	20	16.1
Bedridden patients/residents should be repositioned twice on an eight-hour shift.	100	80.6	22	17.7
The best position for patients/residents while in bed is keeping the head of the bed at the highest level (90 degrees).	89	71.8	24	19.4
A footstool/footrest should not be used for an immobile patient whose feet do not reach the floor	73	58.9	35	28.2
Hot water and soap may dry the skin and increase the risk for pressure ulcers.	25	20.2		
Mean Score		78.38%		21.62%

Patients at a High-Risk of Developing Pressure Ulcers

The study aimed at understanding whether the respondents were aware of patients at a high risk of developing pressure ulcers. Through open-ended questions, the respondents identified bedridden patients, chronically ill, the elderly, and patients suffering from stroke, spinal injury been at a higher

risk. Others identified to be at a higher risk of developing Pressure ulcers included those with dry skin, immobile, malnourished, patients with tractions, paralyzed, obese with other comorbid, stool and urine incontinence. However, some mentioned lack of sleep, ignorance of caregivers, and weight loss as factors causing pressure ulcers which were not correct.

Figure 1: Individuals at a higher risk of developing pressure ulcers

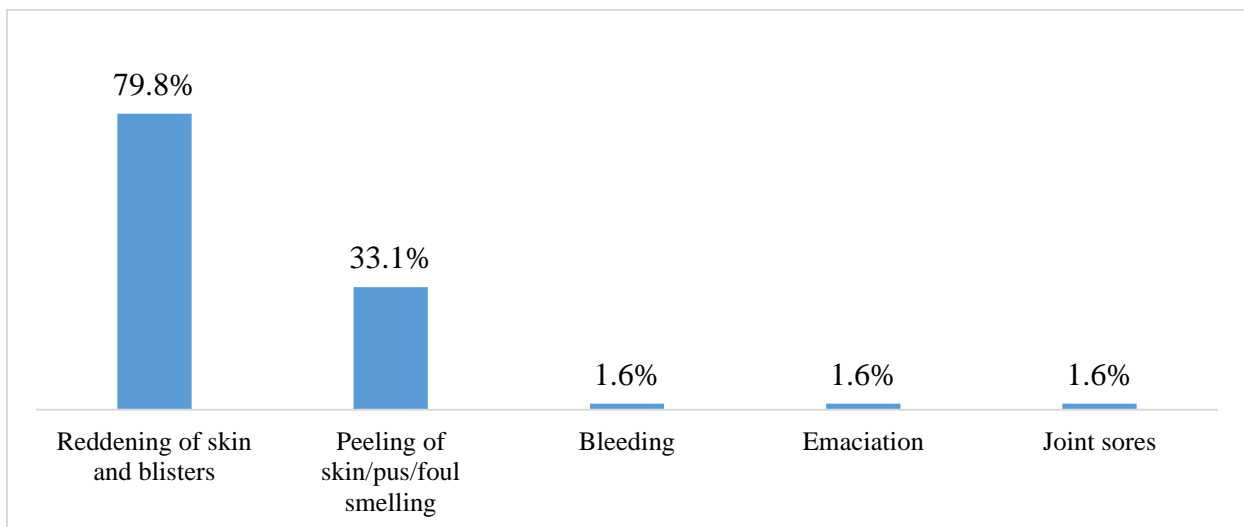


Earliest Signs of Developing Pressure Ulcers

On the earliest signs of developing pressure ulcers, most nurses were able to identify reddening of skin and blisters. However, other responses included

bleeding, being emaciated, and joint sores showing less knowledge. Nurses were able to identify signs of an infected wound with responses including foul smell, fever, greenish colouration, and presence of pressure ulcers.

Figure 2: Earliest signs of developing pressure ulcers



Respondent's Current Practice in Management of Pressure Ulcers

The study found that there were no risk assessment scales in the wards with as 116 (93.9%) of the respondents indicated. Despite there being no risk assessment scales, 78 (62.9%) of respondents performed pressure ulcer risk assessment on patients using clinical judgement, of these 68 (54.9%) performed pressure ulcer risk assessment on patients daily and on admission (*Table 5*).

The study found that 90 (72.6%) of the respondents used massaging to prevent pressure ulcers, and 120 (96.8%) repositioned patients to prevent pressure sores. Out of these, 79 (63.7%) of the respondents repositioned the patients every 2 hours. In addition, 65 (52.4%) had served 6-10 patients with pressure ulcers in the past one month and 20 (16.1%) of the respondents had used special mattresses in preventing pressure sores among their patients (*Table 5*).

Table 5: Respondents' current practice in the management of pressure ulcers

Questions	Categories	f	%
Number of patients with pressure ulcers nursed by respondents in the past 1 month	None	8	8.1
	<=5	45	36.3
	6-10	66	52.4
	>10	5	3.2
Total		124	100
Number of times respondents repositioned patients to prevent pressure sores	Not remembered	12	9.7
	2	79	63.7
	3	4	3.2
	4	27	21.8
	6	2	1.6
Total		124	100
Number of times respondents performed pressure ulcer risk assessment on patients	Daily/on admission	68	54.9
	2-4 hours	56	45.1
	Total	124	100
Uses special mattresses to prevent pressure sores	Yes	20	16.1
	No	104	83.9
Total		124	100
Respondents performing pressure ulcer risk assessment on patients	Yes	78	62.9
	No	46	37.1
	Total	124	100
Availability of risk assessment scale in the wards	Yes	8	6.5
	No	116	93.5
Total		124	100
Measure used to prevent pressure sores: massaging	Yes	90	72.9
	No	34	27.1
Total		124	100
Measure used to prevent pressure sores: Turning	Yes	120	96.8
	No	4	3.2
Total		124	100

Respondents New Approaches in Care of Pressure Ulcers

Respondents in different facilities employed different approaches during pressure ulcer care; a majority cleaned the pressure ulcers with normal saline and betadine solution. FGDs revealed new approaches that were in use while dressing the pressure ulcers. “A mixture of metronidazole tablets and hydrogen peroxide, a mixture referred to as a concoction” (Murang’a Level 5, FGD respondent). Another mixture used as stated by one nurse, “we mix metronidazole tablets, doxycycline tablets, diclofenac tablets and epanutin” (Muriranja level 4 FGD respondent).

Institutional factors affecting management of pressure ulcers among respondents

The institutional factors affecting the management of pressure ulcers among respondents included: heavy workload/staff shortage 118 (95.2%), lack of universal guidelines for prevention 96 (77.4%), lack of in-service training about pressure ulcers 96 (77.4%), uncooperative patients 67 (54%), presence of other priorities other than pressure ulcers 97 (78.2%), shortage of pressure-relieving devices 104 (83.9%), and inadequate knowledge about pressure ulcers 70 (56.5%) (Table 6).

Table 6: Institutional factors affecting management of pressure ulcers among respondents

	Yes n (%)	No n (%)
Heavy workload/staff shortage	118 (95.2)	6 (4.8)
Lack of universal guidelines for prevention	98 (79)	26 (20.9)
Lack of in-service training about pressure ulcers	96 (77.4)	28 (22.6)
Uncooperative patients	67 (54)	57 (45.9)
Presence of other priorities other than pressure ulcers	97 (78.2)	27 (21.8)
Shortage of pressure-relieving devices	104 (83.9)	20 (16.1)
Inadequate knowledge about pressure ulcers	70 (56.5)	54 (43.5)

Pressure Ulcers Devices Available in Health Facilities

The majority of nurses (61.3%) in the study indicated that health facilities lacked pressure ulcers reduction devices. However, 21% just had pillows that were being improvised and 17% had ripple mattresses.

Pressure Ulcers Guidelines, Special Diet and Training Available in Health Facilities

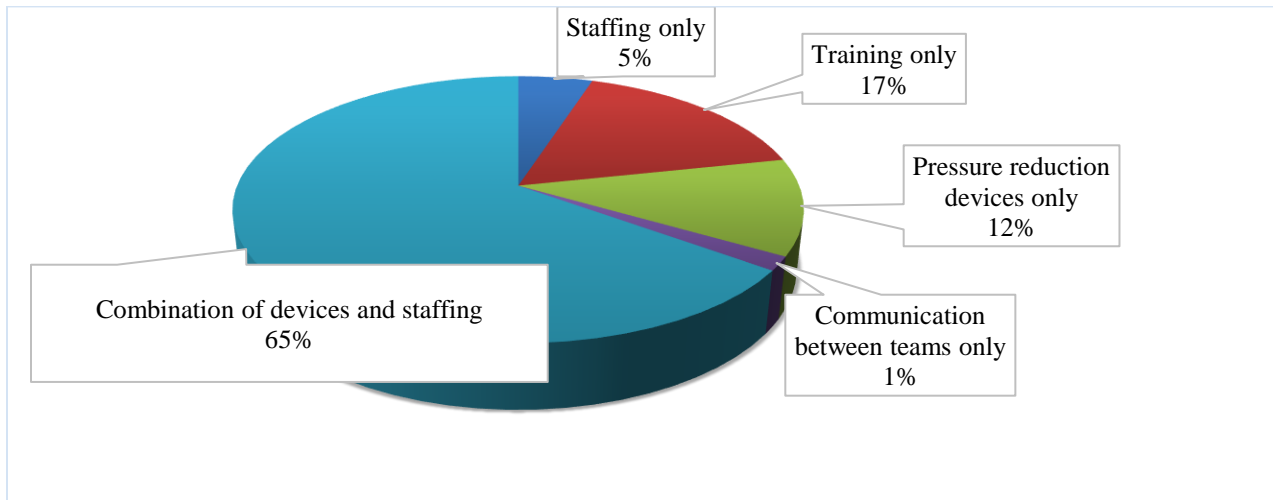
Despite sufficient knowledge on the management of pressure ulcers among nurses, the results also revealed 75.8% of the respondents indicated there is the absence of guidelines in the management of pressure ulcers, 60.5% indicated patients are not given a special diet and 77.4% indicated nurses are

not trained on the management of pressure ulcers in the facilities.

Improvement of Management of Pressure Ulcers

On the number of nurses in a given shift, the study found that the average nurse to patient ratio was 1:15 with some nurses even serving a whole ward in a shift. The study wanted to understand institutional factors that influenced nursing management of pressure ulcers patients. The results revealed that a majority of nurses (65%) understand the combination of staffing, CMEs, coordination between teams and use of devices increases improved care. However, only 23% reported having received training on pressure ulcers. This is illustrated in Figure 3 below:

Figure 3: Factors that can improve management of pressure ulcers among nurses in health facilities



Bivariate Analyses: Factors Influencing the Management of Pressure Ulcers among Nurses

Respondents’ Oriented Factors

The results indicate that age was statistically associated with the management of pressure ulcers in Murang’a County ($X^2_{(6,124)} = 52.67, p = 0.000$). Marital status was statistically associated with the management of pressure ulcers with single nurses scoring higher than married ones ($X^2_{(2-124)} = 14.20, p = 0.001$). The lower scores among single nurses correspond with the young age, whose scores were lower. Experience was statistically associated with

the knowledge on the management of pressure ulcers ($X^2_{(3,124)} = 35.10, p = 0.000$). Nurses whose experience exceed five years had higher scores on the management of pressure ulcers. The results revealed there was a statistically significant association between employment status ($X^2_{(2,124)} = 12.30; p = 0.01$, and the level of education ($X^2_{(2,124)} = 7.568; p = 0.023$) on the management of pressure ulcers. There were more permanent employees (73.6%) whose scores was above median compared to contractual nurses (37%), while degree score higher than diploma and diploma scored higher than certificate nurses. The summary is presented in *Table 7* below.

Table 7: Association between respondent’s sociodemographic factors and management of pressure ulcers in Murang’a County, 2020

	Frequency	Percentage	Bivariate Results
Age			
18-25	20	16.1	
25-30	20	16.1	
30-35	15	12.1	
35-40	2	1.6	
40-45	41	33.1	
45-49	12	9.7	
>50	14	11.3	$X^2=52.67; df=6; p = 0.000$
Marital status			
Single	37	29.8	
Married	85	68.5	$X^2=14.20; df=2; p = 0.001$
Divorced	2	1.6	
Experience			
<1 Years	12	9.7	

1-3 Years	20	16.1	$X^2=35.10$; $df=3$; $p = 0.000$
3-5 Years	15	12.1	
>5 Years	73	58.9	
Served patient with pressure ulcers			
Yes	122	98.3	$X^2=3.57$; $df=1$; $p = 0.130$
No	2	1.6	
Took course in wound care			
No	89	71.8	$X^2=0.015$; $df=1$; $p = 0.530$
Yes	35	28.2	
Employment status			
Permanent	91	73.4	$X^2=12.30$; $df=2$; $p = 0.01$
Contract	27	21.8	
Casual	6	4.8	
Highest education level			
Certificate	8	6.5	$X^2=7.568$; $df=2$; $p = 0.023$
Diploma	112	90.3	
Degree	4	3.2	
Ward of practice			
Medical	63	50.9	$X^2=6.527$; $df=3$; $p = 0.089$
Orthopaedic	2	1.6	
Surgical	45	36.3	
General ward	14	11.3	

On prevention of pressure ulcers, 93.5% agreed that the ulcers were avoidable ($X^2 = 3.3, df(1), p = 0.069$) displaying a positive attitude in management of Pressure ulcers. Respondents who agreed that documentation of pressure ulcers is essential scored

better in the knowledge assessment compared to ($X^2 = 2.626, df (1), p = 0.105$). Respondents who believed clinical judgment is better than pressure $X^2 = 14.68, df (2), p = 0.01$. Respondents who believed clinical judgment is better than pressure ulcer risk assessment tool scored below the median.

Table 8: Respondents' attitude associated with management of pressure ulcers

	Categories	f	%	Bivariate analyses
Pressure ulcers can be avoided	Yes	116	93.5	$X^2=3.3$, $df (1), p = 0.069$
	No	8	6.5	
Prevention of risk factors for pressure ulcers is time-consuming for me	Yes	102	82.2	$X^2=1.104$, $df (1), p = 0.293$
	No	22	17.7	
Clinical judgment is better than using a pressure ulcer risk assessment tool	Yes	72	58.1	$X^2=14.68$, $df (2), p = 0.01$
	No	52	42.1	
It is necessary to document pressure ulcer care activities done by the nurse	Yes	112	90.3	$X^2=2.626$, $df (1), p = 0.105$
	No	12	9.7	

Respondents' Level of Knowledge

There was no evidence of documentation of patients identified as having an increased risk of developing pressure ulcers observed. The results indicated that an experience in performing pressure ulcer risk

assessment on patients and the frequency of assessment statistically influenced nurse's level of knowledge on the management of pressure ulcers. The summary of the results is presented in *Table 9* below.

Table 9: Respondents' current practices in the management of pressure ulcers

	Categories	n	%	Bivariate analyses
Do you perform pressure ulcer risk assessments on patients?	Yes	78	62.9	$X^2=10.324$; df (1), p = 0.001
	No	46	37.1	
Is there a risk assessment scale used in the wards?	Yes	8	6.5	$X^2=0.519$, df (1), p = 0.378
	No	116	93.5	
Measure used to prevent pressure sores	Massaging	90	72.6	$X^2=0.177$, df (1), p = 0.494
	Turning	34	27.4	
How many patients with pressure ulcers have you ever nursed in the past 1 month?	None	19	15.3	$X^2=6.348$, df (3), p = 0.096
	<=5	4	3.2	
	6-10	12	9.7	
	>10	89	71.8	
How often do you do turning to prevent pressure sores	After 2 hrs	4	3.2	$X^2=4.246$, df (4), p = 0.374
	After 3 hrs	27	21.8	
	After 4 hrs	2	1.6	
	After 6 hrs	68	54.8	
	None	23	18.5	
How often do you perform pressure ulcer risk assessment on patients	Daily/on admission	20	16.1	$X^2=17.342$, df (2), p = 0.000
	2-4 hours	104	83.9	
Uses special mattresses to prevent pressure sores	Yes	120	96.8	$X^2=6.428$, df (1), p = 0.019
	No	4	3.2	

Association between Institutional Factors and Management of Pressure Ulcers

The study found that there were statistically significant higher odds of improper management of pressure ulcers when nurses have a heavy workload,

lack of universal guidelines for prevention; lack of in-service training about pressure ulcers; when they have uncooperative patients; presence of other priorities other than pressure ulcers; and when their inadequate knowledge about pressure ulcers. The summary is presented in *Table 10* below:

Table 10: Institutional factors associated with the management of pressure ulcers

		Improper management of pressure ulcers	Proper management of pressure ulcers	OR (CI), <i>p</i>-value
Heavy workload/staff shortage	Yes	41 (34.7%)	77 (65.3%)	16.8(7.852-28.025), <i>p</i> = 0.000
	No	4 (100%)	0	
Lack of universal guidelines for prevention	Yes	31 (31.6%)	67 (68.4%)	5.043 (1.770-14.366), <i>p</i> = 0.002
	No	14 (70%)	6 (30%)	
Lack of in-service training about pressure ulcers	Yes	25 (26%)	71 (74%)	9.467 (3.414-26.249), <i>p</i> = 0.000
	No	20 (76.9%)	6 (23.1%)	
Uncooperative patients	Yes	14 (20.9%)	53 (79.1%)	5.334 (2.389-11.912), <i>p</i> = 0.000
	No	31 (58.5%)	22 (41.5%)	
Presence of other priorities other than pressure ulcers	Yes	28 (28.9%)	69 (71.1%)	5.237 (2.029-13.516), <i>p</i> = 0.001
	No	17 (68.0%)	8 (32%)	
Shortage of pressure-relieving devices	Yes	35 (33.7%)	69 (66.3%)	2.464 (1.451-6.798), <i>p</i> = 0.082
	No	10 (55.6%)	8 (44.4%)	
Inadequate knowledge about pressure ulcers	Yes	15 (21.4%)	55 (78.6%)	4.667 (2.100-10.371), <i>p</i> = 0.000
	No	28 (56%)	22 (44%)	

FGDs revealed that most of the nurses had not received continuous education on management of pressure ulcers post-qualification, as one nurse put it:

I use the knowledge learned from my basic training in the management of pressure ulcers, things such as turning a patient two hourly, changing soiled linen and keeping the patient skin dry and moisturized (Kiriaini Mission Hospital, FGD respondent).

During the FGDs, the nurses also revealed the lack of any standardized guidelines and risk assessment tools for use in management and assessment of pressure ulcers as one nurse put it “*Do the risk assessment tools exist? I have never heard of such guidelines, but if they would help in management of the pressure ulcers its good we adopt*” (Maragua Level 4, FGD respondent). The majority of the nurses’ contributions in the FGDs were confirmed by our observations; that the facilities did not have a pressure reducing devices. Most facilities used pillows to elevate the patients, the pillows were found to be few and some had hard surfaces. One of the nurses stated, “*we barely have any pressure reducing device, the pillows are few, this ward has*

three and I have only seen one ripple mattress here that is often in the stores” (Murang’a Level 5, FGD respondent).

Multivariate Analyses: Factors Influencing the Management of Pressure Ulcers among Nurses

Binary regression analysis was carried out to determine the effect of predictor variables on the dependant variable while controlling for confounding and to determine whether the independent variable predicts the dependant variable. The researcher conducted a chi-square test of association to understand significant factors influencing effective management. The researcher conducted binary logistic regression to extract the adjusted odds ratio. The results revealed socio-demographic factors were positively statistically significant in increasing the odds of effective management of pressure ulcers include: Age (*AOR* = 6.83, *CI*: 2.11-13.245, *p* = 0.001); experience (*AOR* = 4.08, *CI*: 1.421-11.687, *p* = 0.01), and education (*AOR* = 22.9, *CI*: 3.63-44.79, *p* = 0.000). Older nurses were 6.8 times more likely to manage pressure ulcers effectively compared to younger nurses; respondents with experience of more than 3 years were 4 times more likely to manage pressure

ulcers effectively compared to those with less than 3 years of experience.

The study also found that nurses with a diploma level of education were 22 times more likely to manage pressure ulcers effectively compared to nurses with a lower level of education. The nurses oriented factors increasing the odds of effective management of pressure ulcers included: nurse's positive attitude on prevention of pressure ulcers which increased the odds of managing pressure ulcers effectively by 2.3 times compared to those with negative attitudes ($AOR = 2.3, 1.014-5.182, p$

$= 0.040$), and nurses use of pressure ulcer risk assessment tool were 4.3 times of managing pressure ulcers effectively compared to nurses not using the tool ($AOR = 4.3, CI 4.698-10.814, p = 0.010$). On institutional factors, nurses trained on management of pressure ulcers were 4.47 times likely to effectively manage patients with pressure ulcers. Nurses who lack in-service training about pressure ulcers were less likely to effectively manage patients with pressure ulcers by 0.11 times compared to nurses with in-service training ($AOR = 0.11, CI: 0.038-0.293, p = 0.000$).

Table 11: Multivariate analyses on factors influencing the management of pressure ulcers among nurses

		<i>AOR =</i>	<i>CI</i>	<i>P</i>
Age	<35 Years	Reference category		
	>35 years	6.83	2.211-13.245	0.001
Experience	<3 Years	Reference category		
	>3 years	4.08	1.421-11.687	0.010
Education	Certificate	Reference category		
	Diploma	22.9	3.630-44.794	0.000
Nurses attitude on prevention of pressure ulcers	Negative	Reference category		
	Positive	2.3	1.014-5.182	0.040
Nurse uses pressure ulcer risk assessment tool	No	Reference category		
	Yes	4.3	1.698-10.814	0.010
Trained on the management of pressure ulcers	Not-trained	Reference category		
	Trained	4.47	1.829-10.908	0.001
Lack of in-service training about pressure ulcers	No	Reference category		
	Yes	0.11	0.038-0.293	0.000

DISCUSSION

Respondents' Oriented Factors that Determine Management of Pressure Ulcers

The first objective was to establish respondents-oriented factors that determine the effective management of pressure ulcers. The age ($p = 0.001$); experience ($p = 0.01$), and education level ($p = 0.000$) of a nurse was found to be significant in increasing the odds of effective management. The empirical findings revealed nurses are optimistic that pressure ulcers can be avoided even though the prevention is time-consuming. The respondents also preferred pressure ulcer risk assessment tools to clinical judgment despite there being no assessment tool available for use in the wards. This disagrees

with a study by Kaddourah, Abu-Shaheen and Al-Tannir (2016), where 10.7 % of participants which included nurses and other health professionals, reported Pressure ulcers prevention as a time-consuming procedure. The respondents also reported their clinical judgment been better than the use of available Pressure ulcers risk assessment tools.

Working experience of more than 5 years was found to be significant, this agrees with a study conducted in Mzuzu Central Hospital in Mzuzu, Malawi where nurses with more than four years' experience were found to have good attitudes and upheld professionalism. Nurses with fewer years of experience may still be adapting to the new environment (Nyirenda & Mukwato, 2016).

The study revealed that none of the respondents had used a pressure assessment tool in admission or during assessments as a majority were not aware of the existence of such a tool and the health facilities had not adapted the risk assessment tool in patients' management. This is comparable to a study conducted in Ethiopia on the prevention of pressure ulcers which revealed that more than three fourth of nurses did not use a risk assessment scale (Nuru *et al.*, 2015).

A greater percentage of respondents 71.5% repositioned immobile patients every two hours to relieve pressure and promote blood circulation. Results from multivariate analyses revealed that respondents-oriented factors are significant in the effective management of pressure ulcers. Sharp *et al.* (2019) noted that Pressure ulcers continue to develop in elderly patients despite the 2-hourly repositioning. The study results agree with a study conducted by Bergstrom *et al.* (2014), whose results found repositioning of patients significant in reducing pressure ulcers. This is also in line with the NPUAP-EPUAP which recommends repositioning of patients every 2 hours (NPUAP-EPUAP-PPPIA, 2014).

The study revealed that documentation is important in the communication of care while managing Pressure ulcers. This agrees with a study by Waugh, 2014 which found that documentation and adherence to set guidelines depends on the personal attributes of the nurse. An individuals' attitude determines their expectations; persons with a positive attitude often demonstrate positive behaviour (Kaddourah *et al.*, 2016; Ajzen *et al.*, 2005).

Level of Knowledge on Management of Pressure Ulcers among Nurses

The study provided respondents with 16 questions to assess the level of knowledge on the management of pressure ulcers. The mean score was 78.38 per cent meaning the majority of nurses had sufficient knowledge on the management of pressure ulcers. The study is comparable to other studies; in a study conducted to assess the knowledge and attitudes of health professionals towards pressure ulcers at a rehabilitation hospital at King Fahad Medical City (KFMC), Riyadh, Saudi Arabia, 75 % of nurses

were found to have adequate knowledge (Kaddourah *et al.*, 2016). Likewise, the score was higher than that of a study by Islam (2010) where nurses in Bangladesh had 57.79 % on knowledge on Pressure ulcers prevention and that of a study conducted on nurses' knowledge to pressure ulcer prevention in public hospitals in Ethiopia which was found to be 73.3 % (Ebi, Hirko, & Mijena, 2019). The study participants scored higher compared to a study conducted in Sweden, where the knowledge score of staff nurses was 61% and 59.3% for the registered nurses (Gunningberg *et al.*, 2015).

The majority of respondents had knowledge on patients at a higher risk of developing pressure ulcers elderly, immobility and bedridden patients, patients with tractions, chronically ill, paralyzed, obese with other comorbid, stroke, spinal injury, dry skin, stool and urine incontinence as major factors causing pressure ulcers. However, some nurses mentioned lack of sleep, ignorance of caregivers, and weight loss as factors causing pressure ulcers. This compares with a study conducted by Murphy *et al.* (2014) which described an increase in non-communicable diseases such as diabetes, obesity and cardiovascular diseases that results in reduced mobility among the population of persons over 65 years thereby predisposing patients to Pressure ulcers. Monfre (2016) described elderly patients aged 70 years and above as the most common age group with pressure ulcers incidence. The study results also agree with a multisite study conducted in the USA and Canada health facilities which reported patients with cardiovascular disease and dementia as having the highest risk of developing Pressure ulcers (Bergstrom *et al.*, 2014).

On the earliest signs of developing pressure ulcers, the respondents were able to identify reddening of the skin and blisters formation. However, some responses such as bleeding, being emaciated, and joint sores showed less knowledge. Early signs of pressure ulcers are described as stage 1 in the NPUAP as having non-blanchable erythema of intact skin which can also be painful, firm, soft, warmer or cooler as compared to adjacent tissue (NPUAP, 2016). Signs of an infected ulcer known to nurses included foul smell, fevers, greenish colouration, and purulent. Increasing pain and size of the ulcer, purulent drainage and odour are

described as signs of an acute infection (Kirman, 2017; Levine *et al.*, 2013).

The study also found that respondents had served 6-10 patients with pressure ulcers in the past one month; the majority of those had performed pressure ulcer risk assessment using their own clinical judgement as most had indicated a lack of risk assessment scales in the wards. In a discussion paper by Coleman *et al.* (2014), risk assessment scale such as Braden and Norton scales have been highly criticized as time-consuming and limited due to their inability to directly identify those at risk of developing Pressure ulcers, many hospitals are still using them (Coleman *et al.*, 2018).

Institutional Factors Affecting Management of Pressure Ulcers among Nurses

Pressure reducing devices modifies the patient microclimate such as temperature, friction, moisture and spreads the tissue load over a larger surface area, thereby reducing the weight over bony prominences (Monfre, 2016). Some of the institutional factors affecting the management of pressure ulcers include the lack of pressure ulcers reducing devices causing nurses to improvise pillows in elevation of patients. With only a few ripple mattresses available in the health facilities, more equipment and pressure reducing devices need to be purchased to support patient care. The findings compare with a randomized clinical trial conducted in Brazil, which found reduced incidences of Pressure ulcers among moderate or higher risk critically ill patients who used viscoelastic support surfaces (Bueno de Camargo *et al.*, 2018). This also agrees with the findings of a study conducted in Ethiopia on the prevalence and risk factors associated with Pressure ulcers which reported pressure-relieving devices as significant in reducing the prevalence of Pressure ulcers (Bereded, Salih & Abebe, 2018).

The average nurse to patient ratio was 1:15 in every shift with some respondents been allocated a whole ward due to staff shortage as cited by 95.2% of the nurses. These resulted in a heavy workload and most were unable to give the expected care in the prevention of pressure ulcers. This was higher than that reported by Ebi *et al.* (2019), where 54.7% of health professionals including nurses reported

heavy workload as a challenge in the prevention of pressure (Bereded *et al.*, 2018).

Most facilities lacked guidelines on the prevention of pressure ulcers as per the observations made. Specific to the study 75.8% of the nurses reported the absence of guidelines in the management of pressure ulcers, while the remaining 24.2 % were not sure if the guidelines existed. This is comparable to a study conducted by Nuru *et al.* (2015) on the practice of nurses towards prevention of pressure ulcers where 89.9 % of the nurses were not using any existing guidelines on risk assessment and prevention of pressure ulcers.

Continuous training on the management of pressure ulcers and review of prevention guidelines can provide the nurses with updated knowledge on pressure injury prevention and management (Dalvand *et al.*, 2018). Porter-Armstrong (2018) stated that PU continuous education aims at behaviour modification of nurses', equipping them with current knowledge on management of PU thereby eliminating patient's suffering. Specific to this study 77.4% of the nurses indicated that they had not been trained in the management of pressure ulcers on the job. The findings are comparable with other studies. In a study in Ethiopia on nurses' knowledge of pressure ulcer prevention in public hospitals, lack of programmed training and formulated guidelines about PU prevention in hospitals were seen to significantly affect the practice of Pressure ulcers prevention (Ebi *et al.*, 2019).

CONCLUSIONS

From the first objective, the study concludes that nurses-oriented factors that determine effective management of pressure ulcers includes the work experience, their attitude towards effective management of pressure ulcers, preference of use of pressure ulcer risk assessment tool to clinical judgment and the practice of repositioning immobile patients every two hours to relieve pressure and promote blood circulation.

From objective two, the study concluded that the majority of respondents have sufficient knowledge on the management of pressure ulcers even though

they still face numerous institutional challenges in managing patients.

In the third objective, the study concluded that the institutional factors affecting management of pressure ulcers include; lack of pressure ulcers reducing devices, heavy workload and staff shortage with a higher nurse to patient ratio, lack of universal guidelines on prevention and management of pressure ulcers and lack of on-job training on emerging trends in the management of Pressure ulcers.

Recommendations

Based on the findings from the study, the following recommendations have been made to:

- The health facilities' management committees and the nurse leaders need to nurture new nurses into the profession who may be having challenges adapting to new environments to promote positive attitudes. Continuous creating awareness on nursing core values and professionalism to all nurses. The nurse managers to support health facilities in the adoption of universal guidelines and Pressure ulcers risk assessment tools.
- The health facilities management committees should support an increase in respondents' knowledge on the management of Pressure ulcers through encouraging CMEs, provision of journals and the internet to update them on current nursing practice on Pressure ulcers management. The County government can also support the nurses through scholarships for training in wound care, research funding, and offer study leave for nurses willing to study further in pressure ulcers management.
- The County government through the department of health and all health facilities management committees to develop policies that support and prioritize management of Pressure ulcers through; hiring of more qualified nurses to reduce the nurse-patient ratio and in the purchase of pressure reducing devices such as overlays, cushions.

Further Research

Based on findings and the scope of this study, the following have been suggested as areas of further research:

- Effectiveness of the various approaches used in the management of pressure ulcers within the health facilities in the County.
- Studies on the prevalence of pressure ulcers in various county hospitals.
- Effectiveness of various pressure reducing devices

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