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Pattern of pressure ulcers in a tertiary hospital in south-south Nigeria: A 1- year prospective study

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Abstract---Background: Pressure ulcers are a common cause of increased morbidity in patients who are bedridden or wheelchair-bound. Objectives: This is to look at the pattern of pressure ulcers in our facility with the objectives to determine the demographic distribution such as age and sex, sites and stage of the ulcers, co-morbidities and duration of immobilisation prior to onset of ulcer. Methods: This is a prospective study of patients seen within 12 months in the ward or in the surgical outpatient and followed up till discharge or death. Patients were enlisted into the study as they presented. Those with previous surgical treatment of pressure ulcers at the same site were excluded. Results: AGE: range from 15 to 91 years with a mean age of 63.7 years, modal age of 70 years and peak age group 65-79 years (>45 years of age). One patient (10%) was a 15 year old. M: F= 1.2:1. The duration of immobilization prior to development of ulcer ranged from 2 weeks to 20 years. Most of our patients had cerebrovascular disease, 25.8%, as the co-morbidity causing immobilization. Sacral ulcers (61%) were most common site

followed by trochanteric (22%). Stage 2 pressure ulcers were the commonest stage. Conclusion: From the study, we can see that pressure ulcers are more common in the elderly, more in the sacral region. Prevention is the watchword. With early diagnosis and offloading of pressure, outcome is favourable.

Keywords---pressure, ulcers, pattern, tertiary hospital.

Introduction

Pressure ulcer dates back to ancient Egyptian Mummies as seen in autopsies done by Thompson Rowling in 1961[1]. A pressure ulcer describes all loss of tissue as a result of pressure. Formerly known as decubitus ulcer from the Latin word 'decumbere' which means 'to lie down'[2, 3]. The prevalence varies from 10-18% in acute care to 2.3-25% in long term[3]. It is more in the elderly patients with femoral neck fractures, quadriplegic patients and it is more common in the spinal cord injured (SCI) patients than the rest of the population.[2, 3] In a study by Meehan et al, sacral ulcers were commonest followed by heel; stage 1 being commonest, followed by stage 2. In spine injured patients, sacral was the commonest location in the early phase, then ischial became more common as the patient becomes mobilized on a wheel chair. The cost of prevention is cheaper than its treatment; an average of $30,000 per patient[3], whereas, the cost of treatment was estimated at $100000 per patient by the National Pressure Ulcer Advisory Panel[3, 4]. Death from pressure ulcers are more likely from their co morbidity influenced by nutrition, immobility, decreased tissue perfusion; but sepsis or osteomyelitis can be a direct cause of death in 7-8% of SCI patients.[3]

John Staige Davis, in 1938, was the first person that suggested replacement of scar tissue of a healed pressure sore with flap[5]. Lamon[6] described the first closure of pressure sore wound. Pressure ulcers are caused by uninterrupted pressure that exceeds the closing capillary pressure of the microcirculation (of note is pressure double this applied for >2 hours leads to irreversible tissue ischemic damage[2]. Low pressures over longer times have more damaging effects than high pressures over a short time. Muscles are more susceptible to damage from pressure than the skin probably because of higher metabolic requirements. This results to an inverted cone or flag type (so-called ice berg tip) in areas with great deal of muscles. Humans can tolerate high pressures so far it is evenly distributed. Pressure over bony points is demonstrated using the 'bed of springs and nails' (Lindan, Greenway and Piazza[2, 3]). Higher pressures are found over the occiput, sacrum, buttock and heel in supine position while it can be as high as 100mmHg over the ischial tuberosity in sitting position[2].

However, damage can also be from outside from friction or shear (with linings, slide boards, orthopaedic appliances etc) wherein the skin has more injury. This leads to increased trans-epidermal water loss and moisture accumulation that further increases the coefficient of friction. These are all aided by lifting the patient in bed, sliding, transfer of patients or sliding down in a wheel chair. Shear results in traction, kinking, stretch of blood vessels which can lead to local skin ischemia. The subcutaneous tissue, which lacks tensile strength, is especially

susceptible to shear stress[7]. Moisture predisposes to maceration, incontinence dermatitis which in turn leads to increased coefficient of friction[7]. Urine negates the acidic pH of the skin by introduction of nitrogen derivatives, while faeces increases bacterial load and this may increase susceptibility to infection. On the other hand, dry skin causes cracking and loss of protective natural barrier to microbes. Malnutrition is associated with poor wound healing, weight loss, reduced immunity and are at risk of sepsis, long hospital stay and mortality. There is a strong correlation between pressure ulcer and malnutrition but the causal relationship is not clear.[7]

Neurological injury e.g., spinal cord injury leads to loss of protective sensation that makes one turn in response to prolonged pressure. It also leads to spasticity that increases mechanical stress, alters weight distribution, complicates patient positioning and hygiene. Cooper, in 1994, discovered that pressure ulcer wound beds had decreased PDGF, FGF, EGF levels which may account for the chronicity of the wound[8]. The classification of pressure ulcers has evolved over the years. In 1975, Shea J.D developed a staging system that involves 5 stages[2, 9]. In 1988, the International Association of Enterostomal Therapy (Wound, Ostomy and Continence Nurses Society) developed a 4-stage system[10]. The National Pressure Ulcer Advisory Panel created a pressure injury staging system in 1989, which classifies only pressure-related injuries. The NPUAP system was revised in 2007 to incorporate suspected deep tissue injury. The pioneer NPUAP/EPUAP (European Pressure Ulcer Advisory Panel) guidelines in 2009 further revised the system by adding stage/category. In 2010, 'unstageable' ulcer was added as a category. Finally in April 2016, the term 'injury' replaced 'ulcer', 'suspected' was removed from deep tissue injury, Roman numeral was changed to Arabic numeral and injury from other causes such as moisture-induced and medical device-related injuries were distinguished[11]. It is note-worthy that the term stage does not always infer a progression of the disease neither does the ulcer heal down the line of the stages.

NPUAP	SHEA
1- Non-blanching erythema	1-Limited to epidermis, exposing dermis
2- partial thickness loss	2- Full thickness of dermis to junction of subcutaneous fat
3- full thickness skin loss not exposing bone, muscle or tendon	3- Fat obliterated limited by deep fascia undermining of skin
4- full thickness tissue loss exposing bone, muscle, tendon	4-Bone at the base of ulceration
Unstageable; Deep tissue injury	5-Closed large cavity through a small sinus.

The Wounds, Ostomy, and Continence Nurses in 2016, classified pressure ulcers into avoidable and non-avoidable pressure ulcers. Avoidable pressure ulcer occurs when the health care provider fails to do one or more of the following: assess the individual's clinical condition and pressure ulcer risk factors; develop and implement interventions based on individual needs, patient's treatment aim

and standard medical practice; monitor and assess the impact of strategies or review the interventions. Unavoidable pressure ulcer: develops despite carrying out the above preventive strategies[12].

Aim

The aim is to review the epidemiology of pressure sores in Federal Medical Centre Asaba.

Objectives

- To determine the mean age and modal sex distribution of patients presenting with pressure ulcers.
- To determine the mean duration of immobility prior to the development of pressure ulcers.
- To determine the modal site of pressure ulcers.
- To determine the modal stage of pressure ulcers at presentation.

Subjects, Materials and Method

The study was conducted in Federal Medical Centre Asaba- a tertiary hospital in the south-south geopolitical zone of Nigeria. This is a prospective study of patients seen between July 2018 and June 2019, while in the ward or in the surgical outpatient and followed up till discharge or death. Patients were enlisted into the study as they presented, after obtaining informed consent from them. Those with previous surgical treatment of pressure ulcers at the same site were excluded. The grading was based on the National Pressure Ulcer Advisory Panel staging (2010). The data was entered into a structured proforma. The bio data was obtained including social history. Other relevant history was obtained and the patient examined including a general examination and Glasgow coma scale assessment. Wound swab was taken for microscopy, culture and sensitivity and blood collected for full blood count and erythrocyte sedimentation rate tests. Categorical data were described as means and standard deviation. The number of frequency of the variables were determined Data was analyzed using the SPSS version 23 software.

Results

Thirty one patients had pressure ulcers out of 820 plastic surgery patients in the wards and surgical outpatient clinic within the study period, giving a prevalence of 3.78%. In our study we found an almost equal male: female ratio, the former being higher. Majority of the patients were married and most were above 45 years of age. The mean age was 63.74 years ±14.46 and the modal age was 70 years with a peak age range of 65-79years. See table 1 and table 6. Table 2 shows the background diagnosis of the patients. Cerebrovascular disease accounted for the majority, followed by complications of diabetes mellitus, and then spinal cord injury and metastatic prostate cancer follow in that sequence. The ulcers were detected early in most of the subjects from referrals by the co-managing units while some presented later than 3 weeks from when it was noticed. Just a little above half of the patients were fully conscious, while two-thirds of the remainder

were unconscious. Most of them were chronically ill looking from malnutrition following their co-morbid conditions and 52% of them had fever on presentation. Pain was not a feature in most patients but more of them presented with urinary/faecal incontinence and pallor. See table 3 and table 6.

Culture of wound swab revealed growth of coliforms including Escherichia coli and mixed growth patterns in 4% of cases as shown in table 5. NPUAP Stage II was the commonest stage while the least was stage 1. Stage III and IV each accounted for 23.5% of the grade of ulcers noted (see table 5 and figure 1). Most were bedridden for 2 weeks to 1 month prior to ulcer development (see figure 2). Twenty one of 31(68%) developed the ulcer(s) while on admission, 9 (29%) before admission; 1 (3%) unknown. Sacral ulcers were most common site followed by trochanteric. Thirteen patients had pressure ulcers in more than one site. Some clinical photographs depicting ulcers in the sacral location are shown in figures 3, 4 and 5. The average duration of immobilization prior to ulcer development was 336.5 days with an average duration of admission of 30 days ± 31 days. All the patients had elevated erythrocyte sedimentation rate above the normal range of 1-5mm/hour and a mean PCV of 27.7% (see table 6).

Discussion

In Indonesia, the nosocomial prevalence of pressure ulcer was found to be 3.6%[13] (similar to our own prevalence of 3.78% amongst plastic surgery patients), whereas 49% of spinal cord injured patients in Enugu developed pressure ulcers as noted by Nwadinigwe et al. [14]. The elderly are at higher risk of pressure ulcer development for different reasons. Ischemia is more easily induced and shearing plays a greater role in the elderly than in young people. As the skin ages, it undergoes both structural and physiologic changes that results in a reduced barrier function, increased susceptibility to shearing, and decreased vascularity[3,15] . Bergstrom and Braden[16] noted that subjects who developed pressure ulcers amongst institutionalized elderly persons were older. Amir et al, while trying to explain the decline in pressure ulcer rates in Dutch hospitals discovered that there were fewer cases of cerebrovascular disease and hemi paresis in the later years 2005-2008 than the previous years[17]. It has also been shown that pressure sores are commoner in elderly patients with femoral neck fractures and in quadriplegic patients [3]. This is similar to our findings which show increased incidence in elderly patients with stroke and metastatic prostate cancer affecting the spine.

Pressure ulcers have been found to be more common in spinal cord injured (SCI) patients than in the non-injured population[3, 18]. About 16% of our cases (third commonest co-morbidity) were spinal injured patients which slightly corroborates the above literature finding. The SCI patients developed the pressure ulcer prior to admission. In a study in Ethiopia[19], 16.8% of patients hospitalized in a nursing home had pressure ulcers. . In our study, the age range was 15-91 years with a mean age of 63.7 years and median age of 70 years. This is unlike studies in Ethiopia[19] (age range 18-32 years with median age of 32 years) and Enugu[14] (mean age of 34+/- 4.8 years). There was a slight preponderance in males; similar to that in Enugu[14] (M: F=10:1), Ethiopia (1.05:1). The sacrum was the commonest site similar to various studies- 42% in Enugu[14], 69% in Ibadan[18],

33% (Meehan) [3]. Meehan also noted stage 1 to be the commonest NPUAP grade[3] as against stage 2 which we found in our study. It may be accounted for the fact that patients in our clime present to the plastic surgery unit only when an ulcer is evident. A little above two-thirds of our patients developed the pressure ulcer after admission and 29% before admission (predominantly noted amongst the SCI patients), with a modal bed-ridden state of 2-4 weeks. This is in tandem with Enugu whose peak time for development is 3-4 weeks, but unlike Ibadan where most developed pressure ulcers within 1 week of admission[18]. However, like in our study, more people (47.7%) developed pressure sores while on admission and 20% developed the ulcer prior to admission in Ibadan[18]. The larger frequency of patients developing ulcers while on admission may suggest less optimal nursing care or prevention strategies. Marginally more patients made use of water beds. This was due to gross financial constraints having spent a lot on managing the co-morbidities and the care-givers are rather no longer committed to the pressure ulcer management. This however cannot be said to correlate with the relatively good outcome, which can be ascribed to the 2-hourly turn and proper wound care.

Conclusion

From our study, we can see that pressure ulcers are more common in the elderly and more in the sacral region. Prevention is the watchword. With early diagnosis and offloading of pressure, outcome is favourable.

Limitations of The Study

Clinical history was largely given by care-givers for some cases. Some patients had multiple pressure ulcers with various stages.

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Conflict of Interest: None declared.

Authors Contributions

Dr. Ohiaeri, Ikenna Chimuanya (MWACS): Senior registrar, plastic surgery, (design, conceptualization of the study and data analysis)
Dr. Otene, Cletus Ikechukwu (FWACS): Associate professor of plastic surgery (research supervisor and editing of the final manuscript).
Dr. Akpo, Emmanuel Esaba (FWACS, FMCS, FICS): Associate Professor of general surgery (data collation and editing of the manuscript).
Dr. Asaboro, Sylvester (MBBS): Registrar. (data collection and patient management)
Dr. Akalawu, Martins.U (MBBS): Registrar (data collection and patient management)

Abbreviations

AFNPMCN: Associate fellow National Postgraduate Medical College of Nigeria.
CAP: Cancer of the prostate.
CVA: Cerebrovascular accident.
DM: Diabetes mellitus.
ESR: Erythrocyte Sedimentation Rate.
EPUAP: European Pressure Ulcer Advisory Panel.
F: Female.
FICS: Fellow International College of Surgeons.
FMCS: Fellow Medical College of Surgeons.
FWACS: Fellow West African College of Surgeons.
M: Male.
MBBS: Bachelor of medicine, bachelor of surgery.
MWACS: Member West African College of Surgeons.
NPUAP: National Pressure Ulcer Advisory Panel.
PCV: Packed Cell Volume.
RVD: Retroviral disease.
SCI: Spinal Cord Injury.
WBC: White Blood Cell.

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Table 1
The sociodemographic data of the patients

Variables	N	%
Gender		
Male	16	51.61
Female	15	48.39
Total	31	100.00
Marital status		
Married	15	48.39
Not married	6	19.35
Divorced	3	9.68
Widowed	7	22.58
Total	31	100.00
Age category (yrs)		
< 18	3	9.68
18-45	8	25.81
>45	20	64.52
Total	31	100.00

Table 2
The background diagnosis of the patients

background diagnosis of the patient	Freq.	Percent
CVA	8	25.81
Spinal cord injury	5	16.13
CNS infection	2	6.45
Cerebral palsy	1	3.23
DM	6	19.35
CAP	5	16.13
RVD	1	3.23
Sepsis	1	3.23
head injury	1	3.23
renal failure	1	3.23
Total	31	100.00

Table 3
The patients' clinical characteristics

Clinical variable	Status	N	%
Ulcer duration	early (<1 wk)	14	45.16
	delayed (1-3 wks)	5	16.13
	late (>3 wks)	12	38.71
	Total	31	100
Glasgow Coma Score	<9	10	32.26
	15	16	51.61
	13-14	1	3.23
	9-12	4	12.9
	Total	31	100
Acutely ill on presentation	No	22	81.48
	Yes	5	18.52
	Total	27	100
Chronically ill on presentation	No	6	21.43
	Yes	22	78.57
	Total	28	100
Fever on Presentation	No	15	48.39
	Yes	16	51.61
	Total	31	100
Ulcer pain	No	25	83.33
	Yes	5	16.67
	Total	30	100
Urinary/faecal incontinence	No	7	22.58
	Yes	24	77.42
	Total	31	100

Pallor on presentation	No	8	25.81
	Yes	23	74.19
	Total	31	100

Table 4
The microbiological culture result

Organism	N	%
Negative	4	16.00
E. coli	6	24.00
S. aureus	4	16.00
Pseudomonas	4	16.00
Mixed	1	4.00
Coliforms	6	24.00
Total	25	100.00

Table 5
Ulcer stage of the patients

Ulcer stage	N	%
Stage I	1	1.96
Stage II	16	31.37
Stage III	12	23.53
Stage IV	12	23.53
Unstageable	10	19.61
Total	51	100.00

Table 6
Clinical features of the patients

Variable	Mean	Std. Dev.	Min	Max
Age (yrs)	63.74	14.46	15	91
Duration_of_admission (days)	30.06	30.97	2	128
Immobilisation_duration before ulcer (days)	336.48	1302.76	3	7300
PCV (%)	27.74	6.28	11	40
WBC (/mm^3)	10562.90	4892.78	3000	21500
ESR (/1^{st}hr)	58.69	40.91	7	150

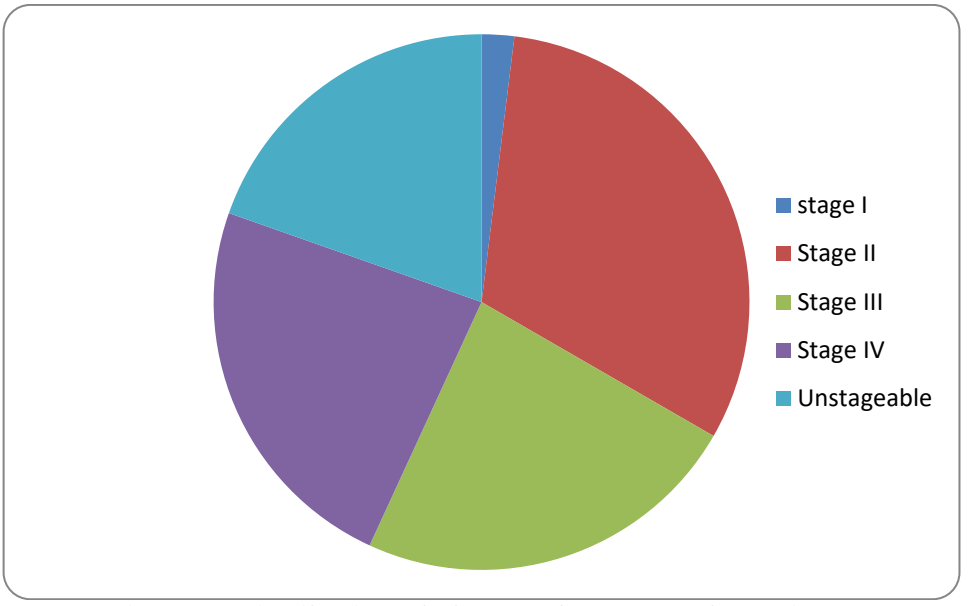

Figure 1. Distribution of ulcer grades among the patients

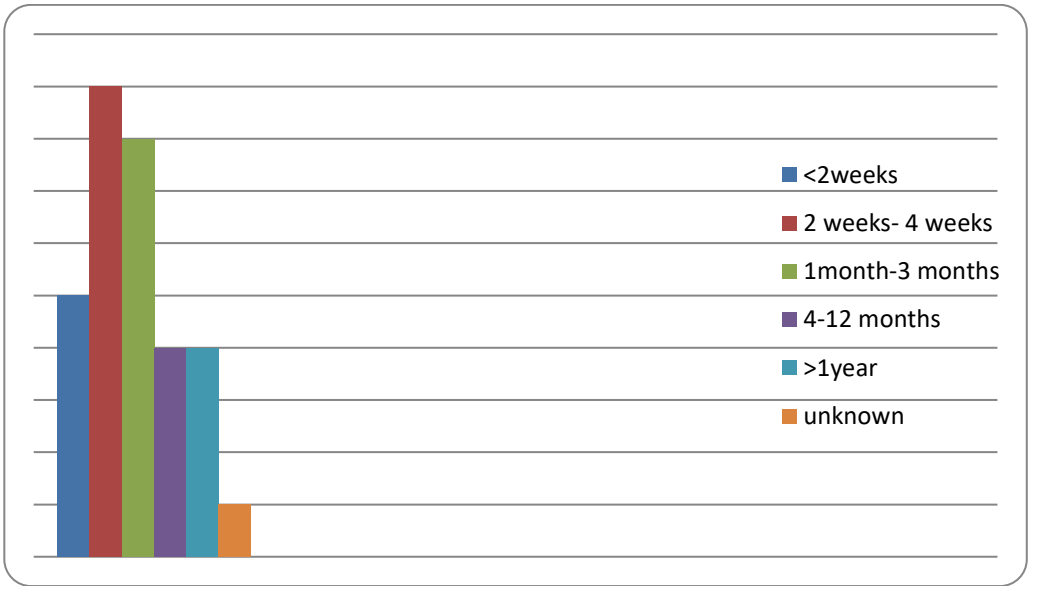

Figure 2. Duration of immobilization prior to ulcer

Figure 3. Stage 2 and 4 sacral pressure ulcers

Figure 4. Stage 3 and unstageable sacral pressure ulcers

Figure 5. Unstageable sacral pressure ulcer

Legends to the tables and figures

Table 1: The sociodemographic data of the patients.
Table 2: The patients' clinical characteristics
Table 3: The microbiological culture result