

Full Length Research Paper

Prevalence and factors associated with healing outcomes of hospital-acquired pressure ulcers among patients with spinal cord injury

Ezema Charles Ikechukwu¹, Idowu Opeyemi Ayodiipo^{2*}, Anekwe David Emeka³, Adelugba Julius Kayode², Nwoba Izuchukwu Michael² and Ogunbameru Temitope Deborah²

¹Department of Medical Rehabilitation, College of Medicine, University of Nigeria, Enugu, Enugu State, Nigeria.

²Department of Physiotherapy, Federal Medical Centre, Ido-Ekiti, Ekiti State, Nigeria.

³School of Physical and Occupational Therapy, McGill University Montreal, Canada.

Accepted 11 January, 2012

Pressure ulcers remain a perennial challenge in the management of patients with spinal cord injury in developing countries due to lack of preventive facilities and trained personnel. This study assessed the prevalence and factors associated with healing outcomes of hospital-acquired pressure ulcers among patients with spinal cord injury in a Nigerian tertiary hospital. A retrospective case chart review of patients with spinal cord injury between January, 1997 and December, 2006 was carried out. Data were gleaned on gender, age, marital status, presence and number pressure ulcers per patient, worst hit body site by pressure ulcer, cause of spinal cord injury, spinal cord injury level, American spinal injury association impairment score (AIS), diabetes status, stage of worst hit body site and outcomes of healing. Data was analyzed using both descriptive and inferential statistics at $\alpha = 0.05$. The prevalence of pressure ulcers in the study was 51.58%. The sacrum and coccyx (56.20%) were the worst hit body sites by pressure ulcers. Gender ($p = 0.00$), aetiology of spinal cord injury ($p = 0.01$) and stage of worst hit body site by PU ($p = 0.00$) were associated with healing outcomes. The prevalence of pressure ulceration was high with a high majority of the ulcers not healing.

Key words: Pressure ulcers, retrospective, spinal cord injury.

INTRODUCTION

The National Pressure Ulcer Advisory Panel (NPUAP) and the European pressure ulcer advisory panel (EPUAP) described pressure ulcers (PU) as localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear" (European pressure ulcer advisory panel and National pressure ulcer advisory panel, 2009). PUs is usually accompanied by a slow rate of healing, discomfort, pain and cost implications (Yoshikawa et al., 2002). PUs is precipitated and perpetuated by both the patient intrinsic factors such as immobility, nutritional status, and incontinence and extrinsic factors such as

extrinsic factors such as pressure, friction, shear stress, and moisture (Yoshikawa et al., 2002; Nixon et al., 2001). Other risk factors documented in literature include race and socioeconomic status (Saunders et al., 2010).

PUs remains a perennial challenge among recumbent and senescent individuals in the developing countries due to lack of preventive facilities and trained personnel (Adejumo and Ingwu, 2010). Therefore, PUs cannot be ignored in the healthcare delivery system, not only because of their deleterious effect on the patient and economy but their occurrence is often used as a marker for the quality of health care delivered to hospitalized patients (Perneger et al., 1998). Among individuals with spinal cord injury (SCI) in the developing nations, PUs poses a serious lifelong threat (Garba and Rintala, 2003) because of sensation impairment (Bates et al., 2009) and the inability of these individuals to relieve pressure on

*Corresponding author. E-mail: Opelove4us@yahoo.com. Tel: +2347036873835.

bony prominences.

Praiseworthy advances at preventing PUs has been documented in the developed nations with the advent of sophisticated equipments such as alternating pressure mattresses/overlays, air fluid beds, low-air-loss beds and devices such as water-filled mattresses, air filled mattresses and gel-filled mattresses/overlays among others (Adejumo and Ingwu, 2010). Despite these innovative concepts and technology, PUs still remains recalcitrant and prevalent among hospitalized and high dependent patients (Chacon et al., 2010; Gunningberg and Stotts, 2008; Grey et al., 2006). A developing nation like Nigeria seems disadvantaged in combating the challenge of PUs due to lack of facilities and trained personnel (Adejumo and Ingwu, 2010). Episodes of PUs are common phenomenon in the Nigerian clinic setting; there is a dearth of empirical data on their prevalence and factors associated with their healing outcomes. This study assessed the prevalence and factors associated with healing outcomes of hospital-acquired pressure ulcers (PUs) among patients with spinal cord injury in a Nigerian tertiary hospital.

METHODS

A retrospective case chart review of patients with SCI between January, 1997 and December, 2006 was carried out at the records department of the National Orthopaedic hospital, Enugu, Nigeria. Data were gleaned on gender, age, marital status, worst hit body site by PU, SCI aetiology, SCI level, American spinal injury association impairment score (AIS), whether patient had diabetes or not, number of ulcers, stage of PU on worst hit body site (the stage of the most problematic pressure found on patient's body), its location and outcomes of healing (healed, not healed or referred for surgery). Ethical approval (NOHE/G.163/XI) was sought and obtained from the institutional review committee of the National Orthopaedic Hospital, Enugu, Nigeria. Data was analyzed using descriptive and inferential statistics at 0.05 alpha on Statistical Package for Social Sciences version 16.

RESULTS

A total of 568 charts of patients with SCI were retrieved. 293 (51.6%) of these patients presented PUs. 28 of the charts of the PUs population were excluded due to incomplete documentation. 265 case charts were found to be valid and used for analysis. The ages of patients ranged from 15 to 87 years with a mean age of 37.41 ±12.18.

Two hundred and thirty six (89.10%) of the patients whose charts were reviewed were males, 83.40% had paraplegia and more than half had complete injuries (AIS A). One hundred and eighty-six patients of the total study sample were married and non-diabetic. The worst hit body sites by PUs in this study were the sacrum and coccyx (56.2%), followed by the feet and ankles (28.7%). This is shown in Table 1.

Outcomes were defined as whether ulcers healed, did not heal or was surgically repaired. 202 (80%) of the

ulcers did not heal, 14.00% (37) were surgically repaired while only 6.00% (16) healed (Table 1). Of all the cases reviewed in this study, only 13 (4.90%) were treated by physiotherapists on account of PUs. Some factors that could be associated with the outcomes of healing were identified. This included gender, worst hit body site by PU (categorized as ischium and trochanter versus sacrum and coccyx versus foot and ankle), SCI aetiology (divided into two groups: motor vehicle accidents versus all other aetiologies), SCI level, whether patient had diabetes or not, and stage of PU on worst hit body site (divided into two groups: stages II or III versus stage IV). Chi square test was used to test for association between these factors and healing outcomes.

From this study, result of healing outcomes showed that PUs in males were likely to heal than in females. ($\chi^2 = 9.26$, $p = 0.01$). Ulcers located at the sacrum and coccyx was more likely to heal than in the ischium and trochanter or foot and ankle ($\chi^2 = 30.59$, $p = 0.00$). PUs of patients who sustained SCI as a result of road traffic accidents were more likely to heal than those of other aetiologies ($\chi^2 = 8.73$, $p = 0.01$). Stage IV ulcer were less likely to heal and more likely to be repaired by surgery than all other stages ($\chi^2 = 1.07$, $p = 0.00$) (Table 1).

DISCUSSION

The prevalence rate of hospital acquired ulcers in National Orthopaedic Hospital, Enugu, Nigeria study was 51.6%. This prevalence rate is higher than that of previous studies: Perneger et al. (1998) [10.3%]; Gunningberg and Stotts (2008) [22.9%]; Rathore et al (2008) [2.5%]. PUs is not totally a developing world problem, it is still adamant in developed nations too, defying the adequate attention that has been given to its prevention (Gunningberg and Stotts, 2008).

This may become a more serious problem in a developing country like Nigeria where most hospitals are unable to afford hi-tech preventive measures such as mattresses/overlays, air fluid beds, low-air-loss beds and devices such as water-filled mattresses, air-filled mattresses and gel-filled mattresses/overlays by most hospitals in Nigeria (Adejumo and Ingwu, 2010; Onche et al., 2004) and most health personnel involved in patient care lacks the essential knowledge of early identification and prevention of PUs (Rathore, 2007).

The worst hit body sites reported in this study were the sacrum and coccyx, followed by the feet and ankles. This finding is consistent with literature. The most common site for the development of PU has been documented to be the sacrum, followed by the heel (Petrie and Hummel, 2000; Perneger et al., 1998). This may be due to the fact that the more fat and muscle are around a muscle/bone interface; the more susceptible it is to PUs (Yoshikawa et al., 2002). The very high percentage of PUs that did not heal (80.0%) in this study is similar to the findings of Garba and Rintala (2003) who reported that out of 57 SCI

Table 1. Characteristic of patients with hospital acquired pressure ulcers.

Characteristic	Number	%
Gender		
Male	236.00	89.10
Female	29.00	10.90
Marital status		
Single	61.00	23.00
Married	186.00	70.20
Divorced	10.00	3.80
Widowed	8.00	3.00
SCI level		
Tetraplegia	44.00	16.60
Paraplegia	221.00	83.40
AIS		
A	168.00	63.40
B	56.00	21.10
C	31.00	11.70
D	10.00	3.80
SCI aetiology		
MVA	194.00	73.20
Falls	9.00	3.40
GSW	57.00	21.50
Others	5.00	1.90
Stage of PU on worst hit body site		
II	41.00	15.50
III	210.00	79.20
IV	14.00	5.30
Worst hit body site by PU		
Sacrum/coccyx	149.00	56.20
R/L ischia	18.00	6.80
R/L trochanters	22.00	8.30
R/L feet/ankle	76.00	28.70
Diabetes		
Yes	11.00	4.20
No	254.00	95.80
Outcome		
Healed	16.00	6.00
Not healed	212.00	80.00
Repaired by surgery	37.00	14.00

Abbreviations: MVA, motor vehicle accidents, GSW, gunshot wounds, R/L, right/ left.

veterans who were admitted for PU treatment, 65% of the PU developed did not heal. Since the prevalence of PU

can be used as a litmus test for the quality of health care provided (Petrie and Hummel, 2000), this may imply that the quality of healthcare obtained in this part of the world still needs an overhauling. Despite the fact that the importance of electro-physical agents in wound care is well documented (Onigbinde et al., 2010; Guihan et al., 2009; Gupta et al., 2009; Rathore et al., 2008; Hanes, 2004; Adegoke and Badmos, 2001) the low involvement of physiotherapists (4.9%) in the management of PUs in the study may be an indication that most patients with PUs are not even referred for physiotherapy. Most hospitals in Nigeria are under-equipped with necessary therapeutic equipment that can be used in the treatment of PUs. This may also be a limiting factor to the role played by physiotherapists in the treatment of PUs and also PUs in female patients were less likely to heal and more likely to be referred for surgery than males. This may be associated with the fact that most females have more body adipose tissues than males. This may reduce the rate of healing of PUs developed.

This study revealed that stage IV ulcers were less likely to heal than all other stages. This may be due to the fact that the whole tissue surrounding such areas have been lost, which may eventually lead to a compromise of the vascular supply further delaying healing (European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, 2009).

Conclusion

The prevalence of hospital acquired pressure ulcers is higher than what is obtained in the developed world, with the sacrum/coccyx being the worst hit body sites. Gender, worst hit body site, aetiology of SCI and stage of worst hit body site by PUs were associated with healing outcomes.

ACKNOWLEDGEMENTS

The authors would like to thank Mr J. K. Adelugba, Dr. Fatai Adeniyi, Mr. Akinsiku Oladapo, Mr. Aladeyelu, Mr. Olagunju for their advice and constructive criticism of this work. The authors would also thank Miss Temitope Sanusi for her appraisal of the final draft of the work.

REFERENCES

- Adegoke BO, Badmos KA (2009). Acceleration of pressure ulcer healing in spinal cord injured patients using interrupted direct current. Afr. J. Med. Med. Sci., 3: 195-197.
- Adejumo PO, Ingwu JA (2010). Nurses' use of water-filled gloves in preventing heel pressure ulcer in the University College Hospital, Ibadan, Nigeria. Int. Wound J., 7: 472-479.
- Bates-Jensen BM, Guiha M, Garber SL, Chin AS, Burns SP (2009). Characteristics of recurrent pressure ulcers in veterans with spinal cord injury. J. Spinal. Cord Med., 1: 34-42.
- Chacon JMF, Blanes L, Hochman B, Ferreira LM (2010). Prevalence of pressure ulcers among the elderly living in long-stay institutions in Sao Paulo. Sao Paulo Med. J., 4.

- European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel (2009). Treatment of pressure ulcers: Quick Reference Guide. Washington DC: National Pressure Ulcer Advisory Panel. Viewed on the 18th of July, 2011
- Garber SL, Rintala DH (2003). Pressure ulcers in veterans with spinal cord injury: A retrospective study. *J. Rehabil. Res. Dev.*, 5: 433–442.
- Grey JE, Enoch S, Harding KG (2006). ABC of wound healing: Pressure ulcers. *BMJ*. 25: 472–475.
- Guhan M, Hastings J, Garber SL (2009). Therapists' Roles in Pressure Ulcer Management in Persons with Spinal Cord Injury. *J. Spinal Cord Med.*, 5: 560–567.
- Gunningberg L, Stotts NA (2008). Tracking quality over time: what do pressure ulcer data show? *Int. J. Qual. Healthc.*, 4: 246–253.
- Gupta A, Taly AB, Srivastava A, Kumar S, Thylloth M (2009). Efficacy of pulsed electromagnetic field therapy in healing of pressure ulcers: A randomized control trial. *Neurol. Ind.*, 57: 622-626.
- Haynes SJ (2004). Pressure ulcer risk assessment and prevention. *Br. J. Commun. Nurs.*, 9: 540–544.
- Nixon J, Brown J, McElvenny D, Mason S, Bond S (2001). Prognostic factors associated with pressure sore development in the immediate post-operative period. *Int. J. Nurs. Stud.*, 37: 279–289.
- Onche II, Yiltok SJ, SK Obiano SK (2004). Pressure ulcers in spinal cord injury patients in Gombe, Nigeria. *Nig. J. Orthop. Trauma.*, 1: 57-60.
- Onigbinde AT, Olafimihan KF, Ojoawo A, Adedoyn RA, Omiyale O, Mothabeng J (2010). The effect of ultraviolet radiation (Type B) on decubitus ulcers. *Int. J. Allied H. Sci. Pract.*, 1.
- Perneger TV, He'liot C, Rae A, Borst F, Gaspoz J (1998). Hospital-Acquired-Pressure Ulcers: Risk Factors and Use of Preventive Devices. *Arch. Int. Med.*, 158: 1940-1945.
- Petrie I, Hummel J (2000). Incidence of pressure ulcer. In Monaghan J. Heel pressure ulcers: the extent of the problem. *J. Tissue. Viability*, 96: 9–11.
- Rathore MFA, Hanif S, Farooq F, Ahmad N, Mansoor SN (2008). Traumatic Spinal Cord Injuries at a Tertiary Care Rehabilitation Institute in Pakistan. *J. Pak. Med. Assoc.*, 2: 53-57.
- Rathore MF, Rashid P, Butt AW, Malik AA, Gill ZA, Haig AJ (2007). Epidemiology of spinal cord injuries in the 2005 Pakistan earthquake. *Spinal Cord*, 45: 658-663.
- Saunders LL, Krause JS, Peters BA, Reed KS (2010). The Relationship of Pressure Ulcers, Race, and Socioeconomic Conditions after Spinal Cord Injury. *J. Spinal Cord Med.*, 4: 387–395.
- Yoshikawa TT, Livesley NJ, Chow AW (2002). Infected Pressure Ulcers in Elderly Individuals. *Clin. Infect. Dis.*, 1390-1396.