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Effect of demographic and clinical characteristics of open wound pressure ulcers in patients at tertiary care hospital of Karachi

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Abstract---Pressure ulcers acquired in a hospital are a common problem in patients with neurological disorders. Although a number of risk factors have been identified, no relationships between risk profile characteristics and pressure ulcer outcomes in hospitalized patients in Karachi have been described. This research aimed to identify the elements that contributed to the emergence of open-wound pressure ulcers in patients with neurological disorders who were being treated in hospitals. A cross-sectional analytical study design was used to

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enroll 93 study participants from Pakistan's Murshid Hospital and Healthcare Centre (MHHCC). The data was collected using a structured questionnaire. The Chi-Square test and an independent t-test were used to analyze the data using SPSS 21 to determine the results. The study discovered that the Glasgow Comma Scale ($p = 0.001$), length of hospital stay ($p = 0.001$), and back care ($p = 0.03$) were statistically associated with the open wound pressure ulcer. In conclusion, hospitalized patients with neurological disorders showed a significant difference between open wound and close PU in terms of mean GCS, length of hospital stay, and back care.

***Keywords*---**pressure ulcer (PU), open wound, neurological disorder, GCS Scale, risk factors.

Introduction

Pressure ulcer (PU) is a type of localized trauma to the skin and/or underlying tissue caused by pressure or pressure combined with shear, typically over a prominent bony structure (Gefen, Brienza, Cuddigan, Haesler, & Kottner, 2022). It progresses from lightly stained skin to deep septic wound cavities that enlarge to encompass muscle and bone (Lahmann & Kottner, 2011). Pressure ulcers have emerged as the third most common disease after malignancies and cardiovascular disease. This disease has a fatality rate that is 2 to 6 times that of other diseases, resulting in 60,000 deaths per year (Schindler et al., 2011). According to a meta-analysis, the average worldwide prevalence of PU via point prevalence was 14.8% (Al Mutairi & Hendrie, 2018), with a corollary review in hospital settings yielding rates ranging from 6 to 18.5% (Tubaishat, Papanikolaou, Anthony, & Habiballah, 2018). The prevalence of PU appearances in the emergency rooms was reported to be 6.31% (Liu, Shen, & Chen, 2016).

PUs are among the most cost-prohibitive of the various medical errors that occur in elderly populations, and they significantly increase the nurses' workload (Mallow, Pandya, Horblyuk, & Kaplan, 2013). According to healthcare professionals, the majority, but not all, PUs are avoidable or preventable if the patient's medical condition is thoroughly assessed. Furthermore, PU risk factors, planning and implementing interventions that are compatible with the patient's needs and goals, acknowledging standards of practise, monitoring and evaluating the impact of interventions, and revising interventions as needed are all part of the process (Black et al., 2011; Dealey et al., 2012).

Pressure ulcers are more prevalent among extremities and bony areas of the hospitalized patients. Evidence showed that multiple risk factors are responsible for PU. The contributing variables are frequently associated with the patient's condition, and treatment delivery system. Multiple research studies on PU clinical risk factors discovered that immobility, longer duration of hospital stay, advancing age (Børsting et al., 2018; Gunningberg, Stotts, & Idvall, 2011), concurrent disorder, and compromised dietary habits were all statistically significant (Ebrahim, Deribe, Biru, & Feleke, 2018). However, repositioning could decrease the amount of pressure in areas of vulnerability of the body (Edsberg et

al., 2016; Mervis & Phillips, 2019). Identifying associated factors is an important consideration in lowering the risk and frequency of PU (Lindgren, Unosson, Krantz, & Ek, 2002). Furthermore, establishing risk factors may be used as a criterion for designing appropriate preventative measures and slowing the progression of the disease (VanGilder, MacFarlane, & Meyer, 2008).

Patients with neurological disorders are more likely to develop pressure ulcers because they are bedridden and reliant on carers. Patients who have had a stroke become malnourished and develop pressure ulcers. (Westergren, Karlsson, Andersson, Ohlsson, & Hallberg, 2001). Similarly, neurological disorders such as epilepsy, Parkinson's disease, and comatose contribute to the development of pressure ulcers. Patients with Parkinson's disease (PD) have difficulty moving due to a severe nervous disorder. Parkinson's disease symptoms include shaking, instability of posture, and difficulty walking and using one's hands. All of these factors can contribute to the development of PU by making the patient dependent on carers (Opara, Małecki, Małecka, & Socha, 2017).

Pressure ulcers are a major health issue in Pakistan as well, but there is no country-level database that can provide health-system-related information, including data on pressure ulcers. Furthermore, while a few research investigations have been conducted in Pakistan, these investigations lack information on the magnitude of pressure ulcers in the country, nor do they inform about pressure ulcer trends and practises in the country. (Aamer, Muhammad, & Sakhi, 2012; Nasreen, Afzal, & Sarwar, 2017). The goal of the study was to identify risk factors for the development of open wound PU in patients being hospitalized with neurological diseases at a private tertiary care facility in Karachi, Pakistan.

Material and Methods

A cross-sectional quantitative study using a purposeful consecutive non-probability based sampling technique was conducted on neurological patients at the Murshid Hospital and Healthcare Centre (MHHCC), a tertiary care hospital in Karachi, from June 30 to September 30, 2021. The study was approved by the Ethical Review Committee of AKU and was conducted in accordance with the ethical principles guiding research, including those of the World Medical Association Declaration of Helsinki. Written informed consent was obtained from all patients or their representatives, and anonymity was ensured. All hospitalized patients who met the inclusion criteria were enrolled in the study, so 97 patients met the eligibility criteria, out of which 93 participants agreed to participate for data collection. Thus, the response rate was 95.9%.

The following were the patient inclusion requirements: Adult patients over the age of 18 who are (i) inpatients, (ii) admitted to the hospital's neurological ward for the past three days, and (iii) who gave their informed consent. The following were the patient exclusion criteria: Patients who were admitted with a Stage-I or higher pressure ulcer, including those who were accepted for one-day care in the operating room and hemodialysis centre, paediatrics and obstetrics patients, and patients who were unable to be discharged due to their unstable medical condition. The primary data was collected from respondents through a structured

questionnaire, which was filled by the researcher during the visit of the selected hospital. The questionnaire included the demographic details of the respondent, special protocols, and preventive devices used in hospitals (Positioning, back care, mobilized bed to chair, physiotherapy, use of air mattress, pillows, air rings and water balloon. The second section included the GCS Scale

Statistical analysis

SPSS version 21 was used to analyze the data. The numeric factor was represented as mean standard deviation, while the categorical variable was represented as frequency and percentage. The independent t-tests and Chi-Square test were applied to compare and identify the association of open vs. closed wound pressure ulcers development with the demographic and clinical risk factors.

Results

The study included 93 patients in total. The researcher divided the subjects into two groups: "Group I" for those without open-wound PU and "Group II" for those with open-wound PU. Tables I and II show the demographic information and clinical characteristics pertaining to the patients. The data collection revealed that the minimum age was 19, and the maximum age was 102 years, as per the inclusion criteria.

Table I
Comparison of Demographic and Clinical Characteristics (Continuous Variables) Of Patients With and Without Open Wound Pressure Ulcers

Variable	Without open wound PU	With open wound PU	P-value
	Mean (SD)	Mean (SD)	
Age	54.27 (17.49)	52.23 (19.77)	0.47
GCS	14.07 (1.79)	12.30 (3.75)	<0.001
Length of Stay	5.31 (1.45)	9.23 (3.74)	<0.001

Data presented as Mean (SD)
Independent t test was applied
p-value < 0.05 significant

Age: The mean age of the patients in group I, as shown in Table I, was 54.27 ± 17.49 years. It was 52.23 ± 19.77 years in group II, with no statistically significant difference between the groups (p = 0.47). This demonstrates that there is no correlation between participant age and the development of open wound pressure ulcers.

Glasgow Coma Scale (GCS) of patients: According to Table I, patients in groups I and II had mean Glasgow Coma Scales (GCS) of 14.07 ±1.79 and 12.30 ± 3.75, respectively, with a highly significant difference between the groups (p 0.001). This finding indicates that participants' GCS levels were strongly correlated with

the occurrence of open wound PU in hospitalized patients with neurological disorders.

Length of Hospital Stay for Patients

The mean length of stay in the hospital is shown in Table I. It was 5.31±1.45 days for group I, and in group II it was 9.23±3.74 days. This demonstrates that the length of participants' hospital stays is significantly correlated with the development of open wound PU, with a significant difference between the groups (p 0.001). In Table II, it is shown that there were 33 participants who were female, of whom 19 patients (35.20%) and 14 patients (35.90%) belonged to Group I and Group II respectively, and there were 60 participants who were male, of whom 35 patients (64.80%) and 25 patients (64.10) belonged to Group I and Group II respectively, with no statistically significant difference between the groups (p = 0.56). This indicates that the gender of the participants has no relation to the occurrence of open wound PU.

Table II
Comparison of Demographic and clinical characteristics (categorical variables) of patients with and without open wound pressure ulcers

Variable	Without open wound PU	With open wound PU	*p* – value
	N (%)	N (%)	
Sex Male Female	 35 (64.80% 19 (35.20%)	 25 (64.10%) 14 (35.90%)	0.56
Limb Paralysis Yes No	 34 (63.0%) 20 (37.0%)	 23 (59.0%) 16 (41.0%)	0.43
Spinal Cord Injury Yes No	 19 (35.20%) 35 (64.80%)	 12 (30.80%) 27 (69.20%)	0.41
Physiotherapy Remedies Yes No	 47 (87.0%) 7 (13.0%)	 38 (97.40%) 1 (2.60%)	0.08
Back Care Yes No	 48 (88.90%) 6 (11.10%)	 28 (71.80%) 11 (28.20%)	0.03
Range of Motion Yes No	 15 (27.80%) 39 (72.20%)	 5 (12.80%) 34 (87.20%)	0.07
BMI transformed/categories Underweight Normal Overweight Obese	 4 (7.50%) 15 (28.40%) 22 (41.50%) 12 (22.60%)	 2 (5.0%) 19 (50.20%) 8 (21.10%) 9 (23.70%)	 0.12
Comorbid Yes	 42 (77.80%)	 24 (61.50%)	0.07

No	12 (22.20%)	15 (38.50%)	
Positioning 2 hourly 4 hourly 8 hourly	 7 (13.0%) 45 (83.30%) 2 (3.70%)	 1 (2.50%) 34 (87.20%) 4 (10.30%)	 0.13
Data presented as Mean (SD) Chi-square test was applied *p*-value < 0.05 significant			

In hospitalized patients with neurological disorders, the data results show no correlation between limb paralysis, spinal cord injury physiotherapy remedies, range of motion, BMI transformed/categories, comorbid, and positioning with the occurrence of open wound PU. Back care was recorded in 48 patients (88.90%) in group I, and 28 patients (71.80%) in group II, and this was significantly associated with the occurrence of open wound PU between group I and II (p = 0.03).

Discussion

Pressure Ulcer (PU) studies in various countries around the world have revealed their prevalence in specific patient groups, such as the elderly or the chronically terminally ill. A few hospital departments, such as neurology, as well as long-term care facilities, have been linked to PU prevalence (Gallagher et al., 2008; Gomes, Bastos, Matozinhos, Temponi, & Velásquez-Meléndez, 2011; Shahin, Dassen, & Halfens, 2009; Souza & Santos, 2007). Numerous studies have made reference to the levels of pertinent factors in the patients. This study showed that advancing age association with PU. Patients were more likely to develop pressure ulcers as they aged. This result agrees with those from other studies (Singh & Singh, 2014; Vanderwee et al., 2011). As with age patients experience thinning skin, muscle, and tissue, as well as vascular sclerosis and fragility. Their sensation and defense mechanisms slow down, they develop cognitive dysfunction, and their capacity for activity decreases. Recovery from a pressure ulcer in an elderly person is challenging. They should be given more consideration because, according to the recommendation, they are a vulnerable population (JM, Nagaoka, Blanes, & Ferreira, 2010).

Furthermore, a longer anticipated length of stay was discovered to be a risk factor. Several investigators reported a similar finding, but no agreement has been reached regarding the relationship between the length of hospitalization and PU (Brito, de Vasconcelos Generoso, & Correia, 2013; VanDenKerkhof, Friedberg, & Harrison, 2011). The Glasgow Coma Scale (GCS) of patients revealed that a low GCS level was significantly associated with the occurrence of open wound PU. In an Indian study with 89 individuals, comparable results of PU development were found to be significantly (p = 0.05) linked to altered GCS levels because patients with altered GCS had compromised mobility and activity capacity. In our study, there was no link between the age of the participants and the development of open wound pressure ulcers. In Sweden, on the other hand, older age has been found to be significantly associated with the occurrence of open wound PU

(Wann-Hansson, Hagell, & Willman, 2008). Because life expectancy in Sweden is high, the mean age of hospitalized patients may be higher than in low-income countries.

Back care is another important factor, therefore cleaning with mild soap and water is sufficient in for stage I PU (Osuala, 2014). The back care remedy was found to be significantly related to the occurrence of open wound PU ($p = 0.03$). Back care played a role in the reduction of PU development in a study conducted in a 247-bed hospital, the Miriam Hospital, in Rhode Island (Padula, Osborne, & Williams, 2008). A study of 75168 participants in Philadelphia found that limb paralysis was significantly associated with PU development (Margolis, Knauss, Bilker, & Baumgarten, 2003).. Another study found a link between PU development and limb paralysis in participants (Alimansur & Santoso, 2019). Physiotherapy techniques (remedies) were found to be insignificant in this study ($p = 0.08$), despite the trend in the literature indicating that physiotherapy is significantly associated with PU development (Worsley, Clarkson, Bader, & Schoonhoven, 2017). The current study found that range of motion (ROM) has no association with PU development, which is consistent with Shimans' study (Shiman et al., 2009), whereas an Indonesian study found that ROM has a significant association with PU development (Asmur, 2018).

Our findings did not support previous research that found links between comorbidity and pressure ulcers (Bry, Buescher, & Sandrik, 2012; Gardiner, Reed, Bonner, Haggerty, & Hale, 2016; Smit, Harrison, Letzkus, & Quatrara, 2016). This could be attributed to knowing that most of the patients in our study had comorbidity and possible selection biases are impossible to rule out. In the present investigation, positioning ($p = 0.13$) was found to have a negligible correlation with open and closed wound pressure ulceration; however, other studies have identified the patient's position as a significant extrinsic factor contributing to pressure ulceration. According to a systematic review done in Ethiopia, pressure is generated at different anatomical sites whenever a person's posture changes, making those areas vulnerable to pressure ulcers (Shibabaw, Aynalem, Yirga, Asmare, & Yirga, 2019).

Conclusion

This study adds to our understanding of the risk factors for pressure ulcer development in patients with neurological disorders. The findings suggest that the Glasgow Comma Scale, length of hospital stay, and back/wound care are factors that may influence the development of open wound pressure ulcers. Because PUs generate major costs,, more research is needed to identify specific risk factors and assess the effectiveness of preventive measures.

References

Aamer, N., Muhammad, U., & Sakhi, J. (2012). Prevalence of bed sores among spinal cord injuried patients of Muzzafarabad and Bagh Azad Jammu Kashmir. J Public Health Biol Sci, 1, 19-22.

Al Mutairi, K. B., & Hendrie, D. (2018). Global incidence and prevalence of pressure injuries in public hospitals: a systematic review. Wound Medicine, 22, 23-31.

Alimansur, M., & Santoso, P. (2019). The main prevention of pressure sores in stroke patients. Paper presented at the PROCEEDING SURABAYA INTERNATIONAL HEALTH CONFERENCE 2019.

Asmur, A. N. (2018). The Effect of Range Of Motion (ROM) Exercise on the Level of Stroke Patient Mobility. Comprehensive Health Care, 2(3), 93-106.

Black, J. M., Edsberg, L. E., Baharestani, M. M., Langemo, D., Goldberg, M., McNichol, L., & Cuddigan, J. (2011). Pressure ulcers: avoidable or unavoidable? Results of the national pressure ulcer advisory panel consensus conference. Ostomy-Wound Management, 57(2), 24.

Børsting, T. E., Tvedt, C. R., Skogestad, I. J., Granheim, T. I., Gay, C. L., & Lerdal, A. (2018). Prevalence of pressure ulcer and associated risk factors in middle-and older-aged medical inpatients in Norway. Journal of clinical nursing, 27(3-4), e535-e543.

Brito, P. A., de Vasconcelos Generoso, S., & Correia, M. I. T. D. (2013). Prevalence of pressure ulcers in hospitals in Brazil and association with nutritional status—a multicenter, cross-sectional study. Nutrition, 29(4), 646-649.

Bry, K. E., Buescher, D., & Sandrik, M. (2012). Never say never: a descriptive study of hospital-acquired pressure ulcers in a hospital setting. Journal of Wound Ostomy & Continence Nursing, 39(3), 274-281.

Dealey, C., Chambers, T., Beldon, P., Benbow, M., Fletcher, J., Fumarola, S., . . . Purser, K. (2012). Achieving consensus in pressure ulcer reporting. Journal of tissue viability, 21(3), 72-83.

Ebrahim, J., Deribe, B., Biru, W., & Feleke, T. (2018). Prevalence and factors associated with pressure ulcer among patients admitted in Hawassa University Referral Hospital, South Ethiopia. J Health Care Prev, 1(105), 2.

Edsberg, L. E., Black, J. M., Goldberg, M., McNichol, L., Moore, L., & Sieggreen, M. (2016). Revised national pressure ulcer advisory panel pressure injury staging system: revised pressure injury staging system. Journal of Wound, Ostomy, and Continence Nursing, 43(6), 585.

Gallagher, P., Barry, P., Hartigan, I., McCluskey, P., O'Connor, K., & O'Connor, M. (2008). Prevalence of pressure ulcers in three university teaching hospitals in Ireland. Journal of tissue viability, 17(4), 103-109.

Gardiner, J. C., Reed, P. L., Bonner, J. D., Haggerty, D. K., & Hale, D. G. (2016). Incidence of hospital-acquired pressure ulcers–a population-based cohort study. International wound journal, 13(5), 809-820.

Gefen, A., Brienza, D. M., Cuddigan, J., Haesler, E., & Kottner, J. (2022). Our contemporary understanding of the aetiology of pressure ulcers/pressure injuries. International wound journal, 19(3), 692-704.

Gomes, F. S. L., Bastos, M. A. R., Matozinhos, F. P., Temponi, H. R., & Velásquez-Meléndez, G. (2011). Avaliação de risco para úlcera por pressão em pacientes críticos. Revista da Escola de Enfermagem da USP, 45, 313-318.

Gunningberg, L., Stotts, N. A., & Idvall, E. (2011). Hospital-acquired pressure ulcers in two Swedish County Councils: cross-sectional data as the foundation for future quality improvement. International wound journal, 8(5), 465-473.

JM, F. C., Nagaoka, C., Blanes, L., & Ferreira, M. (2010). Pressure Ulcer Risk Factors Among the Elderly Living in Long-term Institutions. Wounds: a compendium of clinical research and practice, 22(4), 106-113.

Lahmann, N. A., & Kottner, J. (2011). Relation between pressure, friction and pressure ulcer categories: a secondary data analysis of hospital patients using CHAID methods. International journal of nursing studies, 48(12), 1487-1494.

Lindgren, M., Unosson, M., Krantz, A. M., & Ek, A. C. (2002). A risk assessment scale for the prediction of pressure sore development: reliability and validity. Journal of advanced nursing, 38(2), 190-199.

Liu, P., Shen, W.-Q., & Chen, H.-L. (2016). The Incidence of Pressure Ulcers in the Emergency Department: A Metaanalysis. Wounds: a compendium of clinical research and practice, 29(1), 14-19.

Mallow, P. J., Pandya, B., Horblyuk, R., & Kaplan, H. S. (2013). Prevalence and cost of hospital medical errors in the general and elderly United States populations. Journal of medical economics, 16(12), 1367-1378.

Margolis, D. J., Knauss, J., Bilker, W., & Baumgarten, M. (2003). Medical conditions as risk factors for pressure ulcers in an outpatient setting. Age and ageing, 32(3), 259-264.

Mervis, J. S., & Phillips, T. J. (2019). Pressure ulcers: Pathophysiology, epidemiology, risk factors, and presentation. Journal of the American Academy of Dermatology, 81(4), 881-890.

Nasreen, S., Afzal, M., & Sarwar, H. (2017). Nurses knowledge and practices toward pressure ulcer prevention in general hospital Lahore. Age, 87(166), 34.34.

Opara, J., Małecki, A., Małecka, E., & Socha, T. (2017). Motor assessment in Parkinsons disease. Ann Agric Environ Med, 24(3), 411-415.

Osuala, E. (2014). Innovation in prevention and treatment of pressure ulcer: Nursing implication. Tropical Journal of Medical Research, 17(2), 61-61.

Padula, C. A., Osborne, E., & Williams, J. (2008). Prevention and early detection of pressure ulcers in hospitalized patients. Journal of Wound Ostomy & Continence Nursing, 35(1), 66-75.

Schindler, C. A., Mikhailov, T. A., Kuhn, E. M., Christopher, J., Conway, P., Ridling, D., . . . Simpson, V. S. (2011). Protecting fragile skin: nursing interventions to decrease development of pressure ulcers in pediatric intensive care. American journal of critical care, 20(1), 26-35.

Shahin, E. S., Dassen, T., & Halfens, R. J. (2009). Incidence, prevention and treatment of pressure ulcers in intensive care patients: a longitudinal study. International journal of nursing studies, 46(4), 413-421.

Shibabaw, W., Aynalem, Y. A., Yirga, T., Asmare, Y., & Yirga, T. (2019). Evidence on the Effect of Position Change on Pressure Ulcer among Hospitalized Adult Patients in Ethiopia: Meta-Analysis and Systematic.

Shiman, M. I., Pieper, B., Templin, T. N., Birk, T. J., Patel, A. R., & Kirsner, R. S. (2009). Venous ulcers: a reappraisal analyzing the effects of neuropathy, muscle involvement, and range of motion upon gait and calf muscle function. Wound repair and regeneration, 17(2), 147-152.

Singh, R., & Singh, D. (2014). Chitin membranes containing silver nanoparticles for wound dressing application. International wound journal, 11(3), 264-268.

Smit, I., Harrison, L., Letzkus, L., & Quatrara, B. (2016). What factors are associated with the development of pressure ulcers in a medical intensive care unit? Dimensions of Critical Care Nursing, 35(1), 37-41.

Souza, D. M. S. T. d., & Santos, V. L. C. d. G. (2007). Risk factors for pressure ulcer development in institutionalized elderly. Revista Latino-Americana de Enfermagem, 15, 958-964.

Tubaishat, A., Papanikolaou, P., Anthony, D., & Habiballah, L. (2018). Pressure ulcers prevalence in the acute care setting: a systematic review, 2000-2015. Clinical nursing research, 27(6), 643-659.

VanDenKerkhof, E. G., Friedberg, E., & Harrison, M. B. (2011). Prevalence and risk of pressure ulcers in acute care following implementation of practice guidelines: annual pressure ulcer prevalence census 1994–2008. Journal for Healthcare Quality, 33(5), 58-67.

Vanderwee, K., Defloor, T., Beeckman, D., Demarré, L., Verhaeghe, S., Van Durme, T., & Gobert, M. (2011). Assessing the adequacy of pressure ulcer prevention in hospitals: a nationwide prevalence survey. BMJ Quality & Safety, 20(3), 260-267.

VanGilder, C., MacFarlane, G. D., & Meyer, S. (2008). Results of nine international pressure ulcer prevalence surveys: 1989 to 2005. Ostomy Wound Management, 54(2), 40.

Wann-Hansson, C., Hagell, P., & Willman, A. (2008). Risk factors and prevention among patients with hospital-acquired and pre-existing pressure ulcers in an acute care hospital. Journal of clinical nursing, 17(13), 1718-1727.

Westergren, A., Karlsson, S., Andersson, P., Ohlsson, O., & Hallberg, I. R. (2001). Eating difficulties, need for assisted eating, nutritional status and pressure ulcers in patients admitted for stroke rehabilitation. Journal of clinical nursing, 10(2), 257-269.

Worsley, P. R., Clarkson, P., Bader, D. L., & Schoonhoven, L. (2017). Identifying barriers and facilitators to participation in pressure ulcer prevention in allied healthcare professionals: a mixed methods evaluation. Physiotherapy, 103(3), 304-310.