Pressure ulcers in the medical wards of RIPAS Hospital: Incidence and risk factors

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ABSTRACT

Introduction: Pressure ulcers are very common, however their incidence varies widely between hospitals. To date there are no published data available for pressure ulcers in Brunei Darussalam. This study was designed to look at the incidence and risk factors of pressure ulcers among medical patients in RIPAS Hospital. **Materials and Methods:** All medical patients admitted to all five medical wards during the month of May 2010 were included and identified. A proforma based on the European Pressure Ulcer Advisory Panel (EPUAP) model was used and modified to include several factors that may contribute to the risk of developing new pressure ulcers. The proforma was completed by the attending physician during the patient's admission and then subsequently followed up by the parent admitting team until discharge. **Results:** There were a total of 305 patients (104 male and 201 female) with a mean age of 48.9 ± 20.4 years. There were five patients with pressure ulcers (1.6%), four of which developed during hospital stay and one patient admitted with an ongoing pressure ulcer. All five patients were female, had co-morbidities, were bed-bound and unwell during admission. On comparison to those without pressure ulcers, patients were significantly older, had more co-morbidities, being bed bound, admissions to intensive care unit and had lower serum haemoglobin ($p<0.05$), albumin ($p<0.05$) and total protein ($p<0.05$) on admission. Two patients died during their in-patient stay due to other medical illness. The remaining patients had prolonged hospital stay (over 30 days). **Conclusions:** The study showed an incidence of 1.6% pressure ulcers among medical patients in RIPAS Hospital. We identified several factors that are significant in increasing patients' risk of developing pressure ulcers.

Keywords: Complications, infection, morbidity, mortality, pressure sores

INTRODUCTION

Pressure ulcers, also known as pressure sores or bed sores, are areas of localised damage to the skin and underlying tissue and usually occur over bony prominence. They are believed to occur from a combination of extrinsic forces such as pressure, shear and friction [1] and intrinsic factors such as age, malnourishment and consciousness level that influence a person's tissue tolerance. [2] The pres-

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Table 1: The European Pressure Ulcer Advisory Panel (EPUAP) catergorisation of pressure ulcers/sores.

Category	Description
Grade I	Intact skin with non-blanchable erythema of a localised area usually over a bony prominance.
Grade II	Partial thickness skin loss involving epidermis or dermis. May also present as intact or open/ruptured serum-filled or sero-sanginous filled blister.
Grade III	Full thickness skin loss involving damage or necrosis of subcutaneous tissue extending to but not through, underlying fascia, bone, tendon or joint capsule.
Grade IV	Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, tendon or joint capsule. Slough and eschar maybe present.

sure exerted over the skin is referred to as the 'interface pressure' and, if significant may cause the occlusion of blood vessels, eventually leading to tissue damage, necrosis and ulcer formation.

Although pressure ulcers are not uncommon, its prevalence may vary widely between hospitals. In the United Kingdom, new pressure ulcers occur in 4% to 10% of patients admitted to district general hospitals. [3] Pressure ulcers are generally accepted as a major burden to the healthcare system; prolonged hospital stay to opportunistic infections, reducing quality of life and increasing mortality, and to their carers, social and

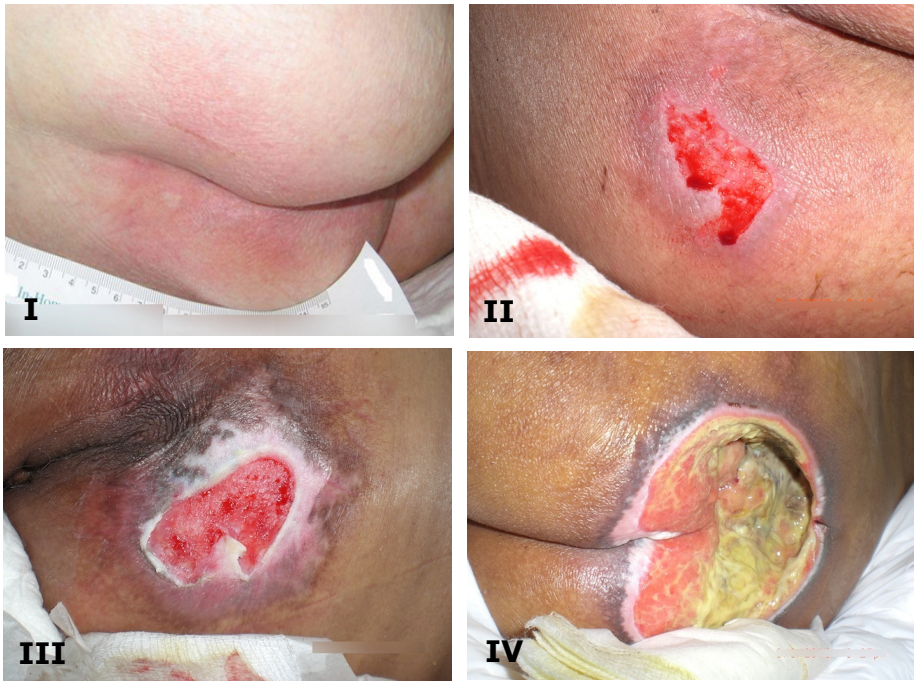

Fig. 1: Grades of pressure ulcers/sores (I to IV).

financial hardship. To date there are no published data available for pressure ulcers in our local setting. This study prospectively looks at the incidence of pressure ulcers among patients admitted to the medical wards and ascertain baseline factors that may contribute to its development.

MATERIALS AND METHODS

Pressure ulcers can be graded and helps to standardised management. The European Pressure Ulcer Advisory Panel (EPUAP) categorised pressure ulcers into four categories/ grades [24] (Table 1 and Figure 1).

The study included all patients admitted to medical wards 4, 19, 20, 21 and 22 for the month of May 2010. It also included any patients who were already admitted in these wards prior to May 1st 2010. For patients already admitted, their initial admission dates were entered in our data. A proforma was developed based on the EPUAP model for assessing patients at risk of developing pressure ulcers and modified and adapted to local application standards.

The proforma incorporated several facets which include patient demographics such as age, gender and ethnic group, and also admission diagnosis and co-morbidities. Using the EPUAP model, we looked at seven main risk factors for the formation of pressure ulcers and also looked at the serum haemoglobin, albumin and total protein levels. The selected risk factors included reduced mobility (bed bound), malnourished state, clinically unwell resulting in catabolic and reduced mobility state, reduced Glasgow Coma Score (GCS), previous stroke resulting in reduced mobility, previous pressure ulcers and admissions to the intensive care units (ICU) as these have been shown to be associated with pressure sores development. [1, 6-8]

The proforma also included regular pressure ulcer monitoring and was filled in by the attending physicians during patients' admission and subsequently followed-up by the parent admitting team until discharge. They were required to enter the date of new pressure ulcers as soon as it is observed and its grade on discharge. The nursing staff of each wards were unaware of the study and were thus following their most current practices.

Statistical analysis

The data were coded and entered in the Neo Office Spreadsheet Calculator (Version 3.0 patch 3, Sun Microsystems Inc., USA) for analysis. The data was coded and later entered into the Statistical Package for Social Sciences (SPSS, Version 10.0, Chicago, Il, USA) program for analysis. Mann-Whitney U test and Fischer exact test was used where appropriate. Level of significant was taken when *p* value was less than 0.05.

RESULTS

During the one month study period, there were a total of 305 medical admissions with 104 male and 201 female patients. The mean age of patients was 48.9 ± 20.4 years.

There were five patients identified with pressure ulcers giving a prevalence of 1.6%. Four developed their pressure ulcers after admissions while one patient was admitted with an ongoing pressure ulcer. All five patients were female with a mean age of 69.0 ± 16.9 years. They were all bed-bound and were clinically unwell during admission. One

Table 2: Comparisons between patients with and without pressure ulcers.

	Pressure ulcers		
Factors	**Yes**	**No**	***p* value**
Age (years)	69.0 ± 16.9	48.6 ± 20.3	0.047
Bed bound	5 (100)	3 (1.0)	<0.001
Malnourishments	3 (60)	2 (0.7)	<0.001
Previous stroke	1 (20)	5 (1.7)	0.003
Unwell on admissions	5 (100)	18 (6.0)	<0.001
Intensive care unit admission	2 (40)	1 (0.3)	<0.001
Previous pressure ulcers	1 (20)	0 (0.0)	<0.001
Low GCS	2 (40)	1 (1.0)	<0.001
Serum haemoglobin (gm/dL)	9.5 ± 0.9	12.5 ± 8.7	0.029
Serum albumin (gm/L)	25.3 ± 6.4	35.7 ± 7.1	0.012
Serum total protein (gm/L)	62.3 ± 9.5	72.3 ± 9.0	0.038

patient required ICU admission during her hospital stay and another with a history of previous stroke. The minimum length of stay for these five patients was 30 days while two of the patients died in the hospital.

Four patients had pressure ulcers located in their sacral area and one patient had a pressure ulcer at the occiput, an uncommon site. All new ulcers were first documented with a minimum grade of two and all these ulcers were of similar grade on discharge including the two deceased patients.

Comparisons between patients with and without pressure ulcers showed that significant risk factors includes female gender, older age, presence of co-morbid conditions, being bed bound, previous strokes, admission to the ICU and lower serum haemoglobin, albumin and protein (Table 2).

DISCUSSION

The study showed that the incidence of pressure ulcers was 1.6% among patients in RIPAS medical wards. The most important risk factor for pressure ulcer development is the mobility of patients. Additional risk factors include admission to ICU, previous pressure ulcers, low serum albumin and haemoglobin. All our patients were immobile either due to previous stroke or severe illness. Prolonged immobility can induce pressure ulcer development even in patients without additional risk factors. However, for patients with these risk factors, the time to pressure ulcer development may be shorter.

Generally our figure is much lower to what have been reported in the literature. In the United Kingdom, the reported rates was between four to 10% and a recent study looking at both medical and surgical wards in Selayang Hospital, Malaysia reported a prevalence of 4.05% and 2.05% respectively.[9] Interestingly among our patients, all the pressure ulcers were grade II and above. There was no patient with grade I pressure ulcers detected in our study. It is very likely that, grade I pressure sores cases were missed as some of the nurses may not be aware that focal area of erythema over bony prominence is considered as grade I pressure sores and thus may not have reported it. It is also

possible, they may have forgotten cases with grade I pressure ulcers as with regular turning of patients, progression had been averted. Therefore, these may have contributed to the low prevalence in our study.

Bergstrom *et al.* and Braden *et al.* have shown that individuals over 65 years of age are at greater risk than the general population of developing pressure ulcers. [7, 12] In agreement, our patients were also elderly with a median age of 68 years old. This is not surprising considering that advancing age is associated with an increase in cardiovascular and neurological disease resulting in mobility problem, and changes to the resilience and elasticity of the skin, all contributory factors to pressure ulcers development.

With regards to gender, there have been contradicting evidence to support gender as a risk factor. In our study, all of the identified patients were female. Brandeis *et al*. found the male gender to be a risk factor among nursing homes residence with odds ratio 1.9, (95% CI 1.2 to 3.6). [13] Others have not found gender to be a risk factor. [12] Most other studies have not examined gender as a significant risk factor to developing pressure ulcers. It is very unlikely that gender itself is a risk factor but rather a reflection of the demographic of our patients. In fact two third of our patients were female.

Among the laboratory parameters, we had looked at serum haemoglobin, albumin and total protein and all were significantly lower among patients with pressure ulcers.

Serum haemoglobin level can be considered as an indicator for tissue oxygenation and therefore a surrogate marker for pressure ulcers development. Several studies have shown that anaemia (low haemoglobin or low haematocrit level) to be associated with pressure ulcer presence. However the level at which this is significant is variable; 11.5 ± 1.7 gm/dL compared with 12.0 ± 1.6 gm/dL (p= 0.02), by Berlowitz *et al*., but not significant in multivariate analysis, 11.7 ± 0.5 gm/dL and 13.2 ± 0.5 gm/dL by Breslow *et al*. [15] Rochon *et al*. [16] found a level less than 14.0 gm/dL to be significantly associated with the presence of pressure ulcers (Odds Ratio 2.5, 95% CI 1.5, 4.1) compared with haemoglobin above 14.0 gm/dL.

Decreased serum albumin level has also been shown to be important in several cross-sectional studies. [1, 7] This is not unexpected as serum albumin is a marker of nutritional status and potential for wound healing. One study showed that low serum albumin to be a useful predictor of pressure ulcers. [17] However, two other studies did not find albumin as a predictor of pressure ulcer development in prospective studies. [7, 14]

There are several limitations with our study. First our study period can be considered short and given the population size, the overall number of patients with pressure ulcers accumulated was small. Second, we had only included patients admitted to the medical wards and therefore, our result cannot be generalised to patients with other disorders. Third, as discuss earlier, the prevalence was an underestimation as the nursing staffs were unaware of the study being conducted. Fourth, being single centre based, our result may also not be generalised to another hospital as there may be differences in practices or

preventive steps implemented. However, the main strength of our study was the prospective nature where all the required information was collected.

In conclusion, the incidence of pressure ulcers in our medical wards is lower than the reported rates. But this may not be the true picture as new ulcers were only identified at grade II or above. Factors identified in this study should be incorporated into our daily practice to help identify patients who are at risk and steps taken to prevent their development. We should also have steps in place to manage pressure ulcers as effectively as possible.

REFERENCES

1: Allman RM. Pressure ulcer prevalence, incidence, risk factors, and impact. Clin Geriatr Med. 1997;13: 421–36.

2: Bonomini J. Effective interventions for pressure ulcer prevention. Nurs Stand. 2003; 52: 45–50.

3: Department of Health. The Essence of Care 2010. 2010. Available from http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_119969. (Accessed date 15th December 2010).

4: Bliss M. Geriatric Medicine. In: Bader D., ed, Pressure Sores – Clinical Practice and Scientific Approach, Macmillan Press, London: 1990. 65–80.

5: Scott EM. The prevention of pressure ulcers in the operating department. J Wound Care 2000; 8:18–21.

6: Berlowitz DR, Wilking SVB. The short-term outcome of pressure sores. J Am Geriatr Soc. 1990; 38:748–52.

7: Bergstrom N, Braden B. A prospective study of pressure sore risk among institutionalized elderly. J Am Geriatr Soc. 1992; 40:747–58.

8: Clark M, Watts S. The incidence of pressure sores in a National Health Service Trust hospital during 1991. J Adv Nurs. 1994; 20:33–6.

9: Mohd Ismail AR, Abdullah AA, Sukiman H, Johari MH. Common medical problems in surgical wards and common surgical problems in medical wards in Hospital Selayang (with special attention to pressure sore). 2010. Available from http://www.scribd.com/doc/34792708/Mini-Research-Hosp-Selayang-Fu (Accessed 10th December 2010).

10: Woodward M. Risk Factors for Pressure Ulcers – Can They Withstand the Pressure? Primary intentions: 52-61. 1999. Available from http://www.awma.com.au/journal/library/0702_01.pdf (Accessed date 15th October 2010).

11: Rycroft-Malone J. Pressure ulcer risk assessment and prevention. Technical Report. 2000. Royal College of Nursing. Available from http://www.rcn.org.uk/_data/assets_pdf_file/0004/109840/pressure_ulcer_risk_assess_1.pdf (Accessed 10th December 2010).

12: Bergstrom N, Braden B, Kemp M. Multi-site study of incidence of pressure ulcers and the relationship between risk level, demographic characteristics, diagnoses, and prescription of preventative interventions. J Am Geriatr Soc. 1996; 44:22–30.

13: Brandeis GH, Ooi WL, Hossain M. A longitudinal study of risk factors associated with the formation of pressure ulcers in nursing homes. J Am Geriatr Soc. 1994; 42:388–93.

14: Berlowitz DR, Wilking SVB. Risk factors for pressure sores: A comparison of cross-sectional and cohort-derived data. J Am Geriatr Soc. 1989; 37:1043–50.

15: Breslow RA, Hallfrisch J, Goldberg AP. Malnutrition in tubefed nursing home patients with pressure sores. JPEN J Parenter Enteral Nutr. 1991; 15:663–8.

16: Rochon P, Beaudet M, McGlinchey-Berroth R. Risk assessment for pressure ulcers: and adoption of the National Pressure Ulcer Advisory Panel risk factors to spinal cord injured patients. JAPS 1993; 16:169–77.

17: Anthony D, Reynolds T, Russel L. An investigation into the use of serum albumin in pressure sore prediction. J Adv Nurs. 2000; 32:359-65.

18: Hatanaka N, Yamamoto Y, Ichihara K, et al. A new predictive indicator for development of pres-

sure ulcers in bedridden patients based on common laboratory tests results. J Clin Pathol 2008; 61:514-8.

19: Norton D, McLaren R, Exton-Smith AN. An Investigation of Geriatric Nursing Problems in Hospital. Churchill Livingstone, Edinburgh, New York, 1975.

20: Defloor T, Schoonhoven L, Fletcher J, Furtado K, Heyman H, Lubbers M. Statement of the European Pressure Ulcer Advisory Panel -- Pressure ulcer classification. J WOCN. 2005; 32:302–6.

21 : Reddy M, Gill SS, Rochon PA. Prevention of pressure ulcers: a systematic review. JAMA. 2006; 296:974–84.

22: National Institute for Health and Clinical Excellence (2005). The Prevention and treatment of pressure ulcers. NICE Clinical Guideline 29. Available from http://www.nice.org.uk/nicemedia/pdf/CG029publicinfo.pdf (Accessed 26th September 2010).

23: Cullum N, Deeks J, Sheldon TA, Song F. Fletcher AW. Beds, mattresses and cushions for preventing and treating pressure sores (Cochrane Review). In: The Cochrane Library, Issue. Oxford, Update software. 2000.

24: European Pressure Ulcer Advisory Panel-Pressure ulcer prevention and treatment Guidelines, EPUAP, Oxford. 1998.

25: Nixon J, Cranny G, Iglesias C, Nelson EA, Hawkins K, Phillips A. Randomised, controlled trial of alternating pressure mattresses compared with alternating pressure overlays for the prevention of pressure ulcers. PRESSURE (pressure relieving support surfaces) trial. BMJ 2006; 332:1413–5.

26: Collier ME. Pressure ulcer development and principles for prevention. In Miller M and Glover D. Wound management theory and practice. London. United Kingdom. 1999.

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