Prevalence of Pressure Ulcers in a Brazilian Hospital: Results of a Cross-sectional Study

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Abstract
Technological advances in recent decades have extended survival time of critically ill hospitalized patients but their unstable physiological state and limited mobility increase their risk for pressure ulcers. On two different days (June 16 and October 20, 2004), pressure ulcer prevalence in patients hospitalized at the São Paulo Hospital, Brazil was assessed. On study day 1, 43 of the 376 inpatients (prevalence, 11.4%) and on study day 2, 35 of 340 inpatients (prevalence, 10.3%) had pressure ulcers. No significant differences in patient or ulcer characteristics between the two study days were observed. Ulcer prevalence was highest among patients in the intensive care unit (average 32.7%). Most patients had one ulcer (61.5%), classified as Stage II (47%), located in the sacral area (47%), and were considered at high risk according to their Braden Scale scores (60% had a score ≤11). The results obtained were not unexpected and confirmed the need to improve quality of care by establishing pressure ulcer prevention protocols. Additional studies to optimize prevention efforts and improve the existing evidence-base are necessary, especially in patient care units with high pressure ulcer rates.

Key Words: prevalence study, pressure ulcer, acute care hospital, Brazil

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Technological advances in recent decades have increased the survival time of critically ill hospitalized patients, but their unstable physiological state and limited mobility increase their risk for pressure ulcers.¹

A pressure ulcer is a 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 and/or friction. A number of contributing or confounding factors are associated with pressure ulcers; the significance of these factors is yet to be elucidated.² Pressure ulcers are a major in-hospital complication and a serious problem for healthcare institutions, patients, and their family members. These wounds also are a great challenge for clinicians relevant to high incidence and prevalence and difficulties associated with treatment and prevention.

The European Pressure Ulcer Advisory Panel (EPUAP) conducted a pressure ulcer prevalence pilot study in approximately 5,000 hospitals located in five European countries (Belgium, Italy, Portugal, Sweden and the United Kingdom). A total of 5,947 patients was assessed on November 14 and 15, 2001; of these, 1,078 (18.1%) had one or more pressure ulcers. The prevalence of pressure ulcers ranged from 8.3% (Italy) to 22.9% (Sweden).³ Studies conducted in the US reported pressure ulcer prevalence rates ranging from 4% to 12% in hospitalized patients.⁴

A few epidemiological studies in Brazil have assessed the prevalence and incidence of pressure ulcers in long-term care facilities⁵ and one hospital.⁶,⁷ These studies reported a prevalence of 25.6% among patients in intensive care units (ICUs)⁸ and a prevalence of 10.95% among the elderly population liv-
The purpose of this cross-sectional study was to assess the prevalence of pressure ulcers at the São Paulo Hospital, which uses a nurse-care management system (Nursing Care System [NCS]). Pressure ulcer occurrence was of great concern, not only because data are lacking regarding the extent of the problem, but also because no protocol existed for the prevention and treatment of these lesions in this institution before this study; all interventions were initiated at the nurse’s discretion.

Material and Methods

The study was approved by the Research Ethics Committee of the São Paulo Hospital (UNIFESP-EPM) 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.

Using a cross-sectional study design, the prevalence of pressure ulcers was assessed at two different time points among patients admitted to São Paulo Hospital, a university hospital with 752 beds distributed across different inpatient units, including medical, surgical, intensive care, and emergency units. The pediatric, psychiatric, and obstetric wards were excluded from the study because patients in these wards are at low risk for developing pressure ulcers.

Pressure ulcer prevalence rates were obtained on two different days (June 16 and October 20, 2004) by counting the number of persons with an ulcer in the total patient population on that day. Because this was a prevalence study, patients who were admitted with a pressure ulcer and those who developed an ulcer following admission were included. No protocols for pressure ulcer prevention existed at the time of data collection.

On both study days, all hospital units included in the study were visited by the same researcher (first author), who evaluated all patients with previously identified pressure ulcers, as well as all patients with impaired mobility that could have been overlooked by the unit nurse because the skin was still intact. Pressure ulcers were staged according to the National Pressure Ulcer Advisory Panel (NPUAP) staging system (2002), pressure ulcer location was recorded, and pressure ulcer risk was assessed using the Braden scale by the researcher, a nurse who received intensive training on pressure ulcer assessment and documentation from an enterostomal therapy nurse before the data collection days. The total number of patients in each hospital unit was recorded at each visit and patient demographic and clinical data were collected from patient records, when possible, through interviews.

All data were collected and recorded using a paper-based instrument developed for this study and later entered into an Excel spreadsheet (Microsoft, Redmond, WA) for statistical analysis. Statistical analysis was performed using Pearson’s chi-square test, Student’s t-test, and Fisher’s exact test and Analysis of Variance. All statistical tests were carried out at a significance level of 5%.

Results

General patient comparisons. On the first study day, of the 376 hospitalized patients, 43 (prevalence, 11.4%) had a pressure ulcer. On the second study day, 35 ulcers were noted among 340 hospitalized patients (prevalence, 10.3%). On both days, the prevalence was highest in the ICUs and lowest in the surgical units (see Figure 1). The number of days since admission for all patients with pressure ulcers ranged from 1 to 224 days (mean, 36 days). A review of demographic data showed that the only significantly different factor among the patient populations on the two study dates was underlying patient condition of patients with pressure ulcers (P = 0.045) (see Table 1). The mean age of patients with pressure ulcers was 60.9 years (range 16–93 years) in June and 57.7 years (range 17–96 years) in October.

The majority of all patients (61.5%) had a single pressure ulcer and 47% were located in the sacral region (see Table 2). No significant differences were noted in the total Braden scale score either between days of data collection (P = 0.188) or between the different wards (P = 0.370), according to the two-way analysis of variance.

Among the patients with pressure ulcers, 15 (34.9%) had urinary incontinence on study day one and 13 (37.1%) on study day two (mean 36% for both dates). Fecal incontinence was present in the majority of patients on both study days: 26 (60.5%) patients on day one and 22 (62.9%) patients on day two (mean, 61.7%).

The most commonly used medications were antimicrobial drugs (69.7%), antihypertensive medication (39.5%), analgesics and anti-inflammatory drugs (32.9%), and sedatives (15.2%).

Braden scores. Most of pressure ulcer patients (82.6%) scored 3 (adequate) on the Braden nutrition subscale. With regard to sensory perception subscale, 15 (34.9%) patients...
with pressure ulcers scored 2 (very limited) and 3 (slightly limited) on study day one, while on study day two 10 (28.6%) patients with pressure ulcers scored 1 (totally limited).

On study day one, 23 (53.4%) patients had a score of 2 (very moist) on the Braden skin moisture subscale, while 19 (54.3%) patients had a score of 3 (occasionally moist) on study day two. Most patients were bedridden and completely immobile. On both study days, the majority of patients (63%) had a Braden subscale score of 1 for activity, mobility, and friction and shear.

Discussion

Pressure ulcers are considered a quality-of-care indicator in hospital settings.16 In addition, pressure ulcer care can be quite costly. A 2007 publication17 notes the cost of pressure ulcer care has not been studied in Brazil but US cost estimates range from $5 billion to $9 billion US annually. In a 1998 study, Miot18 evaluated the cost-effectiveness of prevention relative to pressure ulcer treatment in 204 hospitals and reported that the daily individual cost for prevention is 2.5 times less than the corresponding treatment cost.

The prevalence of pressure ulcers found in the present study (10.9%) is consistent with previously reported rates.1,14,19 International studies have reported pressure ulcer prevalence rates of between 3% and 14% in general hospitals.20 Gawron4 conducted a cross-sectional study in the US among 440 hospitalized patients of all ages (obstetric patients and neonates were excluded from the sample) and reported a 12% pressure ulcer prevalence rate. The prevalence rates in the current study were lower than the 18.63% reported by Rogenski et al9 following a cross-sectional study involving 102 inpatients in a university hospital in the city of São Paulo, Brazil.

Patient demographics.

Gender. In the present study, most patients with pressure ulcers (55.1%) were men, a finding consistent with results of other prevalence studies.19,21,22 Current results also confirm those reported by Blanes et al,21 who found that 57.7% of 78 patients with pressure ulcers in a public hospital in São Paulo were men. However, the male-female pressure ulcer ratio is not consistent across all prevalence and incidence studies and some have reported a predominance of pressure ulcers in women.7,10,23,24 Souza and Santos,7 reporting the results of a quantitative, prospective cohort study to determine the incidence of pressure ulcers, reported a predominance of women (62.8%) among the 94 elderly patients with pressure ulcers who were residents of four long-stay institutions for the elderly (LSIE) in Minas Gerais, Brazil.

Skin color. The present study found a predominance of pressure ulcers in patients with white skin (mean, 85.8%). Skin structure varies among skins of different colors; black skin is more resistant to external aggression, such as moisture and friction;2 this may explain the smaller number of pressure ulcers found in this population.21

Age. In the current study, 50% of patients with pressure ulcers were 61 years of age or older. The association between pressure ulcer prevalence and advanced age has been described and current results are consistent with previous observations.8,22,25,26 Thoroddsen26 performed a cross-sectional nationwide study to determine the point prevalence of pressure ulcers in a hospital setting in Iceland. Of the 642 patients observed on the day of study, 57 were identified as having pressure ulcers; 81% of the patients affected with pressure ulcers were 70 years or older.

Education and occupation. With regard to educational level of the patients with pressure ulcers, 9% were illiterate and 48% had not completed primary education. This result is in agreement with the findings of Blanes et al,21 who also pointed out that patients with low educational level are more likely to have difficulty recalling and comprehending information on the prevention and treatment of pressure ulcers. Of the 78 patients with pressure ulcers, 32.1% were homemakers and 32.1% had diverse occupations, such as realtor, construction worker, welder, merchant, and plastic artist, among others.

Length of stay. Length of hospital stay is an important factor associated with pressure ulcer development. Winkler27 re-

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**Figure 1 Prevalence of pressure ulcers on each data collection day according to the hospital unit.**

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Reported that 7.7% of the bedridden patients in hospitals may develop pressure ulcers within one week, and the presence of pressure ulcers may prolong the length of hospital stay. In the present study, the mean length of hospital stay before the study day was 44.2 days. No significant differences in mean days since admission between the first and second study day were noted.

Comorbid factors. The 78 patients with pressure ulcers were admitted to the hospital for diverse causes: 25.6% were in the postoperative period after major and complex surgeries, such as exploratory laparotomy and myocardial revascularization. These surgical procedures require the patient to remain in the supine position for a long period of time, which may result in the pressure ulcer development, especially in the sacral and calcaneal regions. Multiple fractures were found in 16.7% of the patients, resulting in a marked reduction in patient mobility and activity, contributing to pressure ulcer development. Systemic arterial hypertension was identified in 53.3% and diabetes was present in 22.5% of the patients with pressure ulcers. Diabetes is an important factor in the etiopathogenesis of pressure ulcers, causing peripheral neuropathy that results in decreased sensitivity, microcirculatory and immunological changes, and changes in the healing process.35,29

Skin moisture. Another important factor in the development of pressure ulcers is the exposure of the skin to excessive moisture due to urinary and fecal incontinence and perspiration. Moisture macerates and weakens the external layers of the skin, making them more susceptible to injuries, especially those caused by friction and shear.7, 4, 2, 8, 30, 31 In a cross-sectional study of the prevalence of pressure ulcers in 365 elderly patients living in six LSIE in São Paulo, Brazil, Chacon et al reported that 27.5% of the participants had urinary incontinence and 40% had fecal incontinence. In the current study, 35.9% of patients had urinary incontinence, 61.5%...
found that 22.22% of the pressure ulcers were located in the sacral region and that most of the ulcers (51.85%) were Stage I. In the present study, 47% of ulcers found on examination were Stage II, which is in agreement with other authors\(^7,8,14,33,34\) who have reported a higher incidence of Stage II, Stage III, and Stage IV pressure ulcers. Olson et al\(^9\) reported that Stage II pressure ulcers are mostly found in patients with systemic diseases affecting blood perfusion, such as cardiorespiratory diseases and diabetes.

Risk per the Braden scale. Based on the Braden scale risk score, 60.2% of the 78 patients with pressure ulcers were at high and 21.8% were at moderate risk, while more than 70% of patients had low scores on activity, mobility, and friction and shear subscales. These results suggest that Braden scale assessment is important for all patients, especially in those who are bedridden.

In the present study, most of the patients with pressure ulcers had low scores on activity, mobility, and friction and shear subscales, indicating that special attention should be given to acutely ill hospitalized patients, including daily examination and reevaluation of the patient’s risk for pressure ulcer, especially in those in ICUs.\(^9,30\)

### Risk per hospital unit

The use of sedatives, analgesics and muscle relaxants, common in patients in ICU, reduces mobility, activity and sensory perception.\(^24\) In the current study, pressure ulcer prevalence was highest in the ICUs (32.7%). Bours et al\(^14\) conducted studies in The Netherlands and found a pressure ulcer prevalence of 28.7% in ICU patients. Very high pressure ulcer prevalence rates among ICU patients in Brazil were reported by Rogenski et al\(^9\) (66.6%) and by Cardoso et al\(^11\) (55%). In the present study, patients in the emergency room also had a high pressure ulcer prevalence (mean prevalence, 18.6%), suggesting that many patients are admitted with these ulcers as well as that preventive measures should be provided expeditiously because some patients have long waits in the ER.

Overall, the pressure ulcer prevalence at the São Paulo Hospital was consistent with results reported following different Brazilian and international studies.\(^16,17,20,33-37\)

### Limitations

had fecal incontinence, and 43.6% of patients were using a vesical catheter.

Medications. The use of sedatives and the continuous use of antihypertensive medications, analgesics, and steroidal and nonsteroidal anti-inflammatory drugs are also factors that influence pressure ulcer development. Sedatives, analgesics, and anti-inflammatory drugs reduce pain but affect mobility. Hypotensive agents may affect blood flow, reducing tissue perfusion, making the tissue more susceptible to pressure.\(^7,8,21,32\)

Among the most used medications were antimicrobial drugs (69.2%), followed by antihypertensive medications (39.7%), analgesics and anti-inflammatory drugs (33.3%), and sedatives (15.4%). Souza and Santos\(^7\) reported 52.5% of the elderly with pressure ulcers living in LSIE used neuroleptics or psychotropics and Chacon et al\(^4\) reported that 45% of elderly pressure ulcer patients used antihypertensive drugs. Pressure ulcer location, number, and stage. Similar to results of other prevalence studies, the most common ulcer location was the sacral area (47%) and most patients had one ulcer (61.5%).

### Table 2. Pressure ulcer patients: Braden Scale scores and ulcer variables

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Study Day 1 (June)</th>
<th>Study Day 2 (October)</th>
<th>Mean (Days 1 and 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>%</td>
</tr>
<tr>
<td>Braden score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤11 (high risk)</td>
<td>27 62.8</td>
<td>20 57.1</td>
<td>60.3</td>
</tr>
<tr>
<td>12 – 14 (moderate risk)</td>
<td>12 27.9</td>
<td>5 14.3</td>
<td>21.8</td>
</tr>
<tr>
<td>15 – 16 (low risk)</td>
<td>2 4.7</td>
<td>5 14.3</td>
<td>9.0</td>
</tr>
<tr>
<td>≥ 17 (no risk)</td>
<td>2 4.7</td>
<td>5 14.3</td>
<td>9.0</td>
</tr>
<tr>
<td>Number of PU per patient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>29 67.4</td>
<td>19 54.3</td>
<td>61.5</td>
</tr>
<tr>
<td>2</td>
<td>8 18.6</td>
<td>6 17.1</td>
<td>17.9</td>
</tr>
<tr>
<td>3</td>
<td>4 9.3</td>
<td>6 17.1</td>
<td>12.8</td>
</tr>
<tr>
<td>4</td>
<td>1 2.3</td>
<td>3 8.6</td>
<td>5.1</td>
</tr>
<tr>
<td>6</td>
<td>1 2.3</td>
<td>1 2.9</td>
<td>2.6</td>
</tr>
<tr>
<td>Total number of PU</td>
<td>67 100</td>
<td>67 100</td>
<td>100</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sacral</td>
<td>36 53.7</td>
<td>27 40.3</td>
<td>47.0</td>
</tr>
<tr>
<td>Trochanter (R)</td>
<td>6 9.0</td>
<td>3 4.5</td>
<td>6.7</td>
</tr>
<tr>
<td>Trochanter (L)</td>
<td>5 7.5</td>
<td>4 6.6</td>
<td>6.7</td>
</tr>
<tr>
<td>Calcaneus (R)</td>
<td>11 16.4</td>
<td>12 17.9</td>
<td>17.1</td>
</tr>
<tr>
<td>Calcaneus (L)</td>
<td>4 6.0</td>
<td>9 13.4</td>
<td>9.7</td>
</tr>
<tr>
<td>Other locations</td>
<td>5 7.5</td>
<td>12 17.9</td>
<td>12.7</td>
</tr>
<tr>
<td>Staging</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage I (pre-ulcer)</td>
<td>19 28.4</td>
<td>24 35.8</td>
<td>32.1</td>
</tr>
<tr>
<td>Stage II</td>
<td>35 52.2</td>
<td>28 41.8</td>
<td>47.0</td>
</tr>
<tr>
<td>Stage III</td>
<td>11 16.4</td>
<td>7 10.5</td>
<td>13.4</td>
</tr>
<tr>
<td>Stage IV</td>
<td>2 3.6</td>
<td>1 1.4</td>
<td>2.2</td>
</tr>
<tr>
<td>Staging was not possible</td>
<td>0 0</td>
<td>7 10.5</td>
<td>5.2</td>
</tr>
</tbody>
</table>

PU = pressure ulcer; N = number of patients; R = right; L = left
No statistically significant differences between variables were noted

Rogenski et al\(^9\) found that 22.22% of the pressure ulcers were located in the sacral region and that most of the ulcers (51.85%) were Stage I. In the present study, 47% of ulcers found on examination were Stage II, which is in agreement with other authors\(^7,8,14,33,34\) who have reported a higher incidence of Stage II, Stage III, and Stage IV pressure ulcers. Olson et al\(^9\) reported that Stage II pressure ulcers are mostly found in patients with systemic diseases affecting blood perfusion, such as cardiorespiratory diseases and diabetes.

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Overall, the pressure ulcer prevalence at the São Paulo Hospital was consistent with results reported following different Brazilian and international studies.\(^16,17,20,33-37\)
In addition to the effects of the study methodology used, the validity of all pressure ulcer prevalence studies is limited by known variations between geographic regions, population groups, and institution type. As a result, the ability to compare study outcomes is limited and interpretations must be made with caution. Additional studies, especially evaluations of the incidence of pressure ulcers in Brazilian healthcare settings, are necessary to facilitate the development and implementation of preventative protocols of care and improve overall quality of care.

Conclusion

The prevalence of pressure ulcers at the São Paulo Hospital was found to be 11.4% in June 2004 and 10.3% in October 2004 (average 10.9%). Although generally consistent with results of other prevalence studies, the findings confirm that protocols for the prevention and treatment of pressure ulcers are necessary in this hospital, especially in the ICUs. Additional studies to optimize prevention efforts and improve the evidence-base of current practice are needed.

References