Prevalence is the proportion of all cases of a condition among a population considered at risk for developing that condition at one point in time — an indicator of the extent of a particular health problem on a set day. Determining prevalence can provide useful information about the magnitude of a health problem. Measuring pressure ulcer (PU) prevalence has been shown to have important implications for basic nursing and quality control. Numerous studies on PU prevalence have been conducted in western countries over the past 20 years with widely varying findings. The first PU prevalence survey to capture reliable data throughout the US and set the benchmark for PU measurement was conducted in 1989. Subsequently, this survey has been conducted every 2 years in the US and after 2003, some facilities in other countries such as Canada, Saudi Arabia, and Australia also participated. Overall and nosocomial PU prevalence rates in these studies were 9.2% and 5.6%, respectively in 1989, and 15.5% and 10% in 2003 and 2004. In subsequent years, the reported international overall and nosocomial PU prevalence rates were 13.5% and 6.2%, respectively, in 2006 and 13.7% and 6.1%, respectively, in 2007. In the UK pediatric population, PU prevalence was 0.47% in 1998. In Canada, the PU prevalence rate was 29.7% in a teaching hospital in 1996 and the national mean prevalence rate was 26% in 2006.

A Cross-sectional Descriptive Study of Pressure Ulcer Prevalence in a Teaching Hospital in China

Guanghong Zhao, RN, PhD; Elizabeth Hiltabidel, MSN, RN, CWOCN; Yilan Liu, RN, PhD; LingLing Chen, RN, MSN; and Yongzhen Liao, RN, MSN

Abstract
Surveying pressure ulcer (PU) prevalence is a common practice in some western countries and has served as a tool to improve prevention policies and procedures. Although attention on PU prevention has increased in China, no PU prevalence baseline information is available to help guide care. To obtain this baseline information, a cross-sectional descriptive study was conducted in a 3,000-bed teaching hospital in Wuhan. On the morning of the study, trained clinicians audited the total hospital patient population (61 nursing units, 2,913 inpatients) using the PU survey tool designed by National Database of Nursing Quality Indicators. The majority of the patients (1,648, 56.6%) were male, average patient age was 43.91 (±21.20) years, range 1 to 94 years. The overall PU prevalence rate was 1.8% (52 patients/79 ulcers). The hospital-acquired prevalence rate was 1.54% (0.82% when Stage I ulcers were excluded). Prevalence rates were highest in the ICU (45.5%) and most ulcers (53.2%) were located in the sacral-coccyx area. The results of this study suggest that overall PU prevalence rates are low compared to data from other countries. Differences in patient acuity, average patient length-of-stay, and prevention practices may explain these observations. The results of this study can guide hospital prevention efforts and serve as a benchmark for PU prevalence studies in China.

Key Words: cross-sectional study, pressure ulcer prevalence, nursing, patient safety

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Dr. Zhao is Director, Department of Nursing, Union Hospital of Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China. Ms. Hiltabidel is a member of the Visiting Nurses Association of the Inland Counties, Riverside, CA. Dr. Yilan is an Associate Professor, Vice Director; Ms. Chen is a nursing student; and Ms. Liao is a staff nurse, Department of Nursing, Union Hospital of Tongji Medical College, Huazhong University of Science and Technology., Please address correspondence to: Liu Yilan, RN, PhD, Department of Nursing, Union Hospital of Tongji Medical College, Huazhong University of Science and Technology, 1277 Jiefang Avenue, Wuhan, 430022, China; email: yilan@yahoo.com.
A European study published in 2007 and conducted in five countries (Belgium, Italy, Portugal, UK, and Sweden) reported PU prevalence (Stage I through Stage IV, based on the National Pressure Ulcer Advisory Panel [NPUAP] scale) of 18.1%. In individual countries in Europe, the reported PU prevalence rates were 11.7% in Germany in 2001–2002, 12.8% to 20.3% in the Netherlands in 2006, and 18.5% in three teaching hospitals in Ireland in 2008. Studies in Australia reported point PU prevalence of 10% in a teaching hospital in 1997 and 6% in 18 hospitals in northern New South Wales in 2001.

In China, PU prevalence has not yet been reported for either individual hospitals or on a national level. However, PU management has long been a part of basic patient care and considered a nursing care quality indicator. Traditionally, an ulcer that occurred in the hospital was considered shameful for nursing and the unit was punished by means of fine, naming, blaming, and the like. Recently, China has experienced a cultural and practice change from blaming the individual to preventing ulcers by identifying risk. The Ministry of Health of the People’s Republic of China now requires each hospital to establish a management protocol to prevent and manage PU and to implement a mechanism to assess ulcer size.

Many initiatives have been implemented to prevent the development of PU in hospital patients in China. However, people usually use data reported by clinical nursing staff to measure the effectiveness of preventive intervention. For example, in one study, the number of patients with pressure ulcers was divided by the number of bedridden patients to find a pre-intervention rate of 0.18% and a post intervention rate of 0.04%. Another study compared the number of patients with nosocomial ulcers to the number of patients assessed at high risk for PU (Norton score: ≤14) and determined pre- and post intervention rates of 5.88% and 0.00%, respectively. No study thus far has reported using surveyed PU prevalence as an indicator to measure the effectiveness of the management protocol.

In the US, per the Agency for Healthcare Research and Quality (AHRQ), the risk-adjusted rate of PU is a safety indicator and per Germany’s National Agency for Quality Assurance. PU status is part of the national quality assurance program for hip fracture, hip prosthesis, and heart surgery. It is evident that it is necessary to explore PU prevalence in hospitals to set the benchmark for further measurement that per the Ministry of Health now will be conducted every 6 months.

The purpose of this descriptive cross-sectional study was to create a baseline database in a 3,000-bed teaching hospital by assessing the prevalence, severity, and anatomical location of PU in an acute care hospital.

**Methods**

**Participants and instruments.** All patients in a 3,000-bed teaching hospital on the day of study were eligible to participate. The investigator translated the National Database of Nursing Quality Indicators® (NDNQI) Pressure Ulcer Prevalence Survey Scale into Chinese for data collection. The items audited included hospital unit, patient gender, age, Norton scale score (PU risk assessment) on admission, PU preventive measures, presence of PU, and PU history (present on admission or hospital-acquired). The number of ulcers per patient and ulcer anatomical location and stage also were assessed. For ulcer staging, the 1989 NPUAP staging system was used where a Stage I ulcer was described as nonblanchable erythema of intact skin, Stage II involves the epidermis and possibly the dermal skin layers, Stage III extends into subcutaneous tissue layer, and Stage IV includes full-thickness skin loss with damage to muscle and possibly bone; when black eschar is present in the wound bed, the ulcer cannot be accurately staged and is labeled “unstageable.” The stage deep tissue injury was not used in this audit.

**Procedures.** The study was approved by the hospital ethical committee; before skin inspection, the patient or family member (if the patient could not communicate) was asked to provide oral informed consent. Patient identifying data were not collected. The data were collected by trained personnel, including hospital wound care clinicians, supervisors, head nurses, and graduate students. In total, 30 teams (each two-person team responsible for one to four units based on patient census) covering 61 units were assigned to collect the data.

Data collectors received 2 hours of training regarding the purpose of the audit, the data collection instrument, and specific instrument details such as proposed steps in the audit and PU definitions and staging. At the end of instruction, the trainees were asked to identify the stage of an ulcer from a picture provided by the instructor and were provided a question-and-answer opportunity. A session also was conducted on each unit level to explain the project and to enable data collectors to request assistance and cooperation in the activity. Head nurses were assured the results would not be taken as quality judgment.
Data collection was conducted and completed the morning after the training (March 10, 2009). Data collectors reviewed charts for patient demographic data and PU risk assessment and score and inspected each patient’s skin at bedside. During the data collection procedures, two research assistants from the nursing department visited the units to ensure the plan was properly implemented, answer questions, and provide support when necessary.

**Data analysis.** All data were entered into Microsoft Excel spreadsheets and converted into SPSS 12.0 (Chicago, IL) by two research assistants. For descriptive purposes, means, standard deviation, and percentages were used. A t-test was used to compare the age of patients with and without PU and a chi-squared test was used to compare PU rates by Norton risk score (≤14 or >14).

**Results**

**Patient characteristics.** On the morning of the study, there were 3,010 inpatients and audits of 2,913 (96.7%) were completed. The majority of the patients (1,648, 56.6%) were male; 1,265 (43.4%) were female. Average patient age was 43.91 (±21.20) years, range 1 to 94 years. The average age of persons with a PU (n = 52) was 63.48 (± 19.49) years and the average age of patients without a PU (n = 2,861) was 43.56 (±21.06) (t = 7.369, P < 0.001).

**Pressure ulcer prevalence.** Of the 2,913 patients audited, 52 had 79 PU for an overall point-prevalence of 1.8%. The nosocomial PU prevalence rate was 1.54%; the ulcers of seven patients were present on admission. Patients with PU were identified in 18 of 61 nursing units — the ICU had the highest prevalence rate (5 of 11, 45.5%), followed by the neurological (7 of 99, 7.1%), and geriatric units (12 of 176, 6.8%). No PU were found in patients under 18 years old. Nurses assessed risk of developing PU among 168 patients on admission using the Norton scale and found 95 patients considered as at risk (score ≤ 14) for PU development. The prevalence of PU among patients assessed as being at risk was 29.5% compared to 0.6% for patients not assessed as being at risk or whose chart did not contain a risk assessment (P < 0.001) (see Table 1).

**Stage and location.** More than half of the ulcers (51.9%) were Stage I. When Stage I ulcers are excluded, the PU prevalence rate was 0.82%. PU were most commonly located in sacral and coccyx areas (69.2) (see Table 2).

**Preventive measures.** Preventative measures were implemented among all 197 patients assessed as being at risk. Changing position was the most frequently used preventive measure, followed by nutritional support and other measures (see Table 3).

**Discussion**

This is the first formal PU prevalence audit performed in a teaching hospital in China. This activity resulted from the establishment of a culture of safety in the hospital, which has been shown to augment nurse awareness of pressure ulcer concerns and subsequently improve patient outcomes.25

The PU prevalence rate at the time of the study was 1.8%. This prevalence rate is much lower than those reported in western countries such as US, Canada, Germany, Ireland, Australia.3,11-17 This may be partially due to differences in patient acuity and average length of stay (LOS). The average LOS in Chinese hospitals is 10.9 days26 compared to 5.6 days in the US.27 This is due, in part, to the fact that in China, patients scheduled for elective surgery are usually admitted at least 1 day before the procedure; whereas, in the US, patients are often admitted the day of surgery. All patients, including pre-operative patients, were included in this study.

Stage and pressure ulcer location (Stage I and sacrum-coccyx) distribution were consistent with study findings in other countries, as was the observation that prevalence rates were highest in the ICU, followed by neurological and geriatric wards.13,28 In this study, patients with PU were much older than patients without PU, which was consistent with findings in other cross-sectional survey design studies.29

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**Table 1. Pressure ulcer (PU) prevalence by Norton risk score (n = 2,913)**

<table>
<thead>
<tr>
<th>Norton risk score</th>
<th>PU present</th>
<th>No PU</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤14</td>
<td>28</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>&gt;14</td>
<td>17</td>
<td>2,781</td>
<td>2,811</td>
</tr>
</tbody>
</table>

a Norton risk score ≤14
b Norton risk score >14

χ²=437.228, P < 0.001

**Table 2. Pressure ulcer stage and location (n = 79)**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Number of pressure ulcers</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>41</td>
<td>51.9</td>
</tr>
<tr>
<td>II</td>
<td>20</td>
<td>25.3</td>
</tr>
<tr>
<td>III</td>
<td>6</td>
<td>7.6</td>
</tr>
<tr>
<td>IV</td>
<td>4</td>
<td>5.1</td>
</tr>
<tr>
<td>Unstageable</td>
<td>8</td>
<td>10.1</td>
</tr>
</tbody>
</table>

Location

| Sacrum            | 12     | 15.2   |
| Coccyx            | 13     | 16.5   |
| Sacrum-coccyx     | 17     | 21.5   |
| Buttocks          | 10     | 12.7   |
| Ankle             | 10     | 12.7   |
| Iliac crest       | 6      | 7.6    |
| Knee              | 5      | 6.3    |
| Heel              | 2      | 2.5    |
| Occipital area    | 2      | 2.5    |
| Spine             | 1      | 1.3    |
| Toes              | 1      | 1.3    |
The low point prevalence rate in this hospital may also be the result of preventive nursing care measures. The results of this study suggest that preventive measures should be implemented for the vast majority (62.2%) of patients considered at risk for PU development.

Although collecting prevalence data is an important initiative in China and PU prevention is a focus of basic nursing care, there is room for improvement. Because no similar data are available in China, no comparison can be made among hospitals but the data generated by this study can serve as a baseline for additional research in this and other hospitals in China. It also confirmed that only selected patients currently undergo PU and PU risk screenings but that they are necessary for all hospital admissions. For example, in this audit, an ulcer was identified in a patient in the otolaryngology department, a unit where PU risk is rarely assessed. Selecting target patients for risk assessment may miss some patients who would benefit from assessment; thus, nursing staff may neglect to implement PU prevention measures for these patients. Second, the importance of implementing preventive measures for patients with risk cannot be underestimated. Third, each hospital in China needs to assess its own baseline regarding pressure ulcer prevalence rates and contribute to a national database as soon as possible. Last, the effectiveness of existing PU management protocols should be assessed regularly.

Conclusion

The results of the first formal PU prevalence audit performed in a teaching hospital in China suggest that PU prevalence rates are generally low compared to results of similar studies conducted in other countries. Findings related to PU risk, severity, and location were similar to those reported by others. Although the ability to generalize study findings to other hospitals in China is limited, the careful selection and training of all clinicians who assessed the patients increases researcher confidence that the results obtained are valid. The study results establish a benchmark for future audits in China and beyond and reinforce the importance of preventive measures and quality care regardless of hospital unit. Ongoing research to obtain PU benchmark/quality improvement information is warranted.

Table 3. Frequency of preventive measures implemented for at-risk patients (n = 197)

<table>
<thead>
<tr>
<th>Preventive measures</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turning</td>
<td>117 (4)</td>
</tr>
<tr>
<td>Nutritional support</td>
<td>67 (2.3)</td>
</tr>
<tr>
<td>Hydrocolloid dressing</td>
<td>34 (1.2)</td>
</tr>
<tr>
<td>Pressure shifting devices</td>
<td>57 (1.9)</td>
</tr>
<tr>
<td>Other measures</td>
<td>17 (0.5)</td>
</tr>
</tbody>
</table>

References