The Prevalence and Characters of Pressure Injuries in Hospital: A Hospital Study in Southeast China

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Research Article

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Abstract

Background and objective:

Hospital-acquired pressure injuries (HAPIs) carry many adverse consequences (such as pain, wound odors, long lengths of hospital stay), and are a concern internationally. The aim of this study was to describe the incidence, clinical and epidemiological features of HAPI in a tertiary hospital.

Methods

A retrospective, qualitative study was conducted from 2017 to 2018. A questionnaire was designed around the existing literature about HAPI, including general information, Braden Scale scores (on admission, the moment that patients developed HAPI, and discharge), and the assessment of HAPI.

Results

419 patients had HAPI, representing an incidence of 0.12%. On average, patients developed HAPI after 12 days. The intensive care unit (ICU; 79,18.9%) saw the largest number of patients with HAPI. HAPIs were most commonly at Stage 2 (71.4%) and of a sacral location (42.3%). Braden Scale scores at first development of HAPI were lower than those on admission or discharge (with a low score signifying high risk).

Conclusion

The incidence of HAPI in a tertiary hospital was lower than at other hospitals. Braden Scale scores predicted the highest HAPI risk occurring at the point where HAPI were first developed.

Introduction

Pressure injury (PI) is defined as “localized damage to the skin and/or underlying soft tissue, usually over a bony prominence, or related to medical or other devices, as a result of intense and/or prolonged pressure, or pressure in combination with shear”. PI is a concern internationally international^[1]. PI is associated with a series of adverse effects, such as affective discomfort caused by pain, unpleasant wound odors that hinder appetite, a feeling of powerlessness, the extension of hospital stay, and an increased risk of morbidity and mortality^[2–5]. Economically, the average cost of PI treatment varied from \$12 USD for stage I PI to \$66,834 USD for grade IV PI^[6]. Considering the clinical and cost implications of PI, it is necessary to identify the relevant risk factors and take proper preventive measures for high-risk patients^[7]. The potential risk factors of PI reported in previous studies include age, immobility, inactivity,

length of hospital stay, skin pressure, diabetes mellitus, vascular disease, trauma, smoking, skin moisture, and hematological or nutritional status^[8–13].

Hospital-acquired pressure injury (HAPI) refers to pressure injury occurring in a hospital setting. Even though various assessment scales have been developed and used in clinical practice (such as the Braden Scale, the Norton Scale)^[14, 15], the incidence of HAPI is still high^[6, 16]. Currently, most studies have been concentrated on HAPI in the intensive care unit (ICU) because patients in ICU are most vulnerable. The incidence rate of HAPI in ICU has been estimated at between 13.6% and 39.3%^[16–18]. In addition to patients in ICU, those with respiratory disease, cancer, patients aged 65 years or over, patients with dementia or Alzheimer's, and pediatric patients under the age of 3 years are also considered at high risk of HAPI in general hospitals^[5, 19, 20]. Currently, HAPI treatment has been a significant component of continuous service quality improvement in nursing^[5]. To our knowledge, few studies have reported on the incidence of HAPI in general hospitals. Thus, the aim of this study was to describe the incidence and clinical and epidemiological features of HAPI in a tertiary hospital in Wenzhou.

Methods

Design and participants

This was a retrospective and observational study. The data of hospital electronic medical records were retrospectively collected, with the consent of the Ethics Committee of the First Affiliated Hospital of Wenzhou Medical University, the patient's informed consent is waived. The study was approved by the human research ethics committee of the First Affiliated Hospital of Wenzhou Medical University. All methods were performed in accordance with the relevant guidelines and regulations. The study was conducted between 2017 and 2018. Patients who had HAPI during hospitalization were included in the study, except patients who already had HAPI on admission and remained in the department for less than 24 hours.

Instrument

In this study, a questionnaire was designed based on the existing literature about HAPI^[1, 2, 5, 14–19]. The questionnaire contents comprised the following Sect. (1) General information, namely age, sex, height, weight, body mass index, chronic medical history, operation history, education level, smoking history, admission time, admission diagnosis, department, PI occurrence (outside the hospital/ hospital-acquired), and discharge time. (2) The Braden Scale score (performed on admission, on development of HAPI, and at discharge), a risk factor assessment tool for HAPI which consists of six subscales reflecting the degree of sensory perception, nutrition, mobility, activity, moisture, and shear/friction. The Braden Scale score ranges from 6 to 23, with a lower score indicating a greater risk of developing HAPI^[14, 21]. (3) The HAPI assessment, including stage (HAPI stages I–IV, unstageable PI, deep tissue PI, medical device-related PI and mucosal membrane PI^[1]) and location (sacrum, hip, buttock, heel, ischial tubercle, elbow,

occipital eminence, scapula, internal and external ankles, and other areas). (4) HAPI prognosis (i.e. healing, not healing, dead).

Before the formal investigation, a research group was constructed, and the purpose, content, method, and considerations of the study were determined by this group. All members of the group had experience in the nursing care of HAPI. Two nurses in the group were responsible for data collection and completing HAPI questionnaires.

Statistical analysis

Statistical analyses were completed using IBM SPSS statistic 25.0 software (IBM Corporation, Chicago, IL, USA). A paired t-test was performed to determine the significance of differences between the Braden Scale scores at each time point. Statistical significance was considered at a level of $p < 0.05$.

Result

The description of HAPI

There were 341,941 hospitalized patients in the selected hospital between 2017 and 2018. A total of 419 patients (117 female and 302 male) were reported as having HAPI, representing an incidence of 0.12%. Among patients with hospital-acquired HAPI, the length of hospital stay ranged from 1 to 132 days. Patients developed HAPI in between 1 and 47 days, with the average time taken to develop HAPI being 12 days. ICU (79, 18.9%) was the department with the largest number of patients with HAPI, with the respiratory intensive care unit (RICU) being second (38, 9.1 %).

In patients with HAPI, there were 68 stage I HAPI, 317 stage II HAPI, 15 stage III HAPI, 0 stage IV HAPI, 18 unstageable HAPI, and 16 deep tissue HAPI. 22 patients had more than one PI each. The most common anatomical location of HAPI was the sacrum (188,42.3%), followed by the heel (46,10.4%). The stages of HAPI are shown in Table 1.

Table 1
HAPI stage

Stages	Frequency (n)	Percentage (%)
Stage 1	68	15.3
Stage 2	317	71.4
Stage 3	15	34.0
Stage 4	0	0.0
Unstageable	18	41.0
Deep tissue	16	36.0
Mucosal Membrane PI	10	22.0
Total	444	100

Braden Scale scores

Braden Scale scores on admission ranged from 6 to 24, with 144 patients having a Braden Scale score of less than 16. At the point when the patient developed HAPI, the Braden Scale scores ranged from 6 to 21, with 368 patients having a Braden Scale score of less than 16. At discharge, Braden Scale scores ranged from 9 to 22, with 22 patients scoring less than 16. Braden Scale scores at the point of HAPI development were lower than those on admission or at discharge. Braden Score of HAPI patients on Admission, Occurrence, and Departure are shown in Table 2.

Table 2
Braden Score of HAPI patients on Admission, Occurrence, and Departure

	Braden Score ≤ 16	Percentage (%)
On Admission	144	34.4
Occurrence	368	87.8
Departure	22	5.3

Implementation of preventive measures

Among the sample of 419 patients, 339 patients were treated by turning them over every 2 hours before HAPI occurred, 193 patients were treated using air mattresses, 108 patients were treated with the application of preventive dressings and other preventive measures. After HAPI had developed, 367 patients were treated by turning them over every 2 hours, 352 patients were treated using air mattresses, and 384 patients were treated with the application of dressings and other measures. Implementation of preventive measures are shown in Table 3.

Table 3
Implementation of preventive measures

	Before	After
Turning over every 2 hours	339	367
Air mattress	193	352
Dressing application	108	384

Discussion

This study represents one of the few attempts to describe HAPI in the tertiary hospital setting. In this study, the incidence of HAPI was 0.12%. Most cases of HAPI in our study were patients with hospital-acquired HAPI. The incidence of HAPI is a key quality of care indicator. HAPI incidence can also be used as a parameter in evaluating strategies and protocols for the prevention of HAPI^[16]. On average, 7–23% of patients in Europe and North America developed HAPI during their hospitalization period^[22]. A report on the National Medicare Patient Safety Monitoring System in the US^[2] found the incidence of hospital-acquired HAPI to be 4.5%. The incidence of HAPI in our study was lower than that previously reported, partly due to the sample size, the impact of the Chinese Hospital Association's patient safety goals (potentially leading to underreporting of PI), and the setting of a different country's healthcare system. Duration of hospital stay is a HAPI risk factor^[5, 13], with the risk-adjusted length of hospital stay being 4.8 days^[2]. The present study found that patients developed HAPI after an average of 12 days' hospital admission. HAPI significantly influences morbidity and mortality in hospitalized patients, particularly those in ICU. Strazzieri-Pulido *et al.*^[16] reported the incidence of HAPI to be 18.7 %, while Zarei *et al.*^[6] found that 8.9% of ICU patients developed HAPI during their ICU stay. In our study, ICU was the department with the highest HAPI incidence (n = 79; 18.9%), and of course, a patient can have multiple HAPI^[5, 18]. The present findings are in broad agreement with the published literature, in that less severe stages of HAPI (i.e. stage I, stage II) were found to be the most common^[19]. HAPI related to medical devices, or the mucosal membrane were found to be the least common in the present study. The most commonly reported location of HAPI was found to be the sacrum, in agreement with previous studies^[2, 5, 23].

A risk assessment scale for PI prevention is a tool for assigning each patient a score according to a series of parameters which are thought to indicate risk factors of acquiring PI^[24]. The Braden Scale^[21] has been widely used and been demonstrated to have the best reliability and validity indicators^[18, 24], and can be reliably used to predict HAPI incidence in a single patient^[18]. The present study found the Braden Scale scores at the time that patients developed HAPI were lower than those on admission and at discharge. Braden Scale scores are classified into five levels, with a score of less than 12 representing high risk^[14]. We found the number of patients who had Braden Scale scores of less than 12 at the point where the

HAPI was first developed was higher than on admission or at discharge. Further, the assessment of HAPI risk factors using the Braden scale was not effective in reducing the incidence of PI.

PI is the cause of substantial patient burden, including pain, disability, and extended hospital stays. PI also is an important risk factor associated with mortality^[2]. Our study reflected that not all patients with HAPI had healed by the time of discharge, and the rate of healing needs to improve. To our knowledge, research studies into the outcome of PI are rare. This may be due to the cross-sectional nature of most studies, with the outcomes of patients with HAPI not being followed up^[5, 19].

Limitations

The present study was a single-center study, with retrospective data collection. Any erroneous or missing values in the data, which could have been systematic, would have biased the findings.

Conclusion

The incidence of HAPI in a tertiary hospital was lower than that reported in previous studies. Stage 2 PI was the most common, with the most common anatomical location being the sacrum. Braden Scale scores at the point patients developed HAPI were lower than on admission and at discharge, signifying that the highest risk of acquiring HAPI occurs at this point. Studies to monitor the progression of patients with HAPI post-discharge are needed to understand the healing process and improve recovery rates.

Declarations

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalty.

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