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### Title

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### Permalink

<https://escholarship.org/uc/item/8m0419pj>

### Journal

Wound Management & Prevention, 65(2)

### ISSN

2640-5237

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### Publication Date

2019-01-15

### DOI

10.25270/wmp.2019.2.1419

Peer reviewed

# A Descriptive Study of Hospital- and Community-acquired Pressure Ulcers/Injuries

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## ABSTRACT

Hospital-acquired pressure ulcers/injuries (HAPU/I) have been a major focus of research, but information about community-acquired pressure ulcer/injuries (CAPU/I) is limited. **PURPOSE:** The aim of this study was to compare HAPU/I and CAPU/I in a 620-bed academic medical center in the western United States. **METHODS:** This descriptive study involved prospective/retrospective data collected from the National Data for Nursing Quality Indicators, including pressure ulcer stage (January 1, 2015, through December 31, 2017); the hospital's incident reporting system (January 1, 2017, through December 31, 2017); electronic medical records (EMR) as needed for verification; and the hospital's pressure ulcer registry (January 1, 2012, through December 31, 2017), developed by both EMR and manual extraction. Data regarding point prevalence, length of stay (LOS), source of admission, ulcer stage, and frequency of hospital encounters from patients at least 18 years of age with a pressure ulcer/injury documented in their records were abstracted. Data from pregnant or incarcerated persons and persons with missing or incomplete information on staging or origin of admission were excluded. Variables were analyzed using descriptive statistics. **RESULTS:** The number of patients with data reviewed for point prevalence was 1787 for 2015, 1989 for 2016, and 1917 for 2017. For 2015, the average CAPU/I and HAPU/I point prevalence was 6.6% and 0.8%, respectively; for 2016, 6.0% and 1.5%, respectively; and for 2017, 6.9% and 0.9%, respectively. The average LOS for patients analyzed for 2017 admitted with a CAPU/I or HAPU/I was 10.5 days and 38.9 days, respectively. Hospital encounters were more frequent in the CAPU/I than in the HAPU/I group, with 821 CAPU/I encounters compared to 45 HAPU/I encounters. The majority of patients with a HAPU/I (80%) or CAPU/I (65.4%) were admitted from home. **CONCLUSION:** In this study, CAPU/I were more prevalent than HAPU/I and most patient encounters originated from home. More descriptive research that includes staging and source of admission is needed to document the rate of CAPU/I and characteristics of HAPU/I compared to CAPU/I in order to optimize pressure ulcer/injury practices across the continuum of care.

**KEYWORDS:** clinical study, pressure ulcers, prevalence, community-acquired, hospital-acquired

**INDEX:** *Wound Management & Prevention* 2019;65(2):14-19 doi: 10.25270/wmp.2019.2.1419

**POTENTIAL CONFLICTS OF INTEREST:** none disclosed

Hospital-acquired pressure ulcer/injuries (HAPU/I) are considered never events and have been a major focus of nursing quality improvement programs within hospitals since 2008.<sup>1</sup> However, scant attention has been paid to community-acquired pressure ulcer/injuries (CAPU/I) or pressure ulcers that occur at home or in nursing homes.

Past pressure ulcer/injury incidence and prevalence studies have mainly focused on HAPU/I. The etiology

of HAPU/I in the acute care setting as compared to CAPU/I in patients at home or in nursing homes may be different.<sup>2,3</sup> In their case-controlled study of data collected over 5 years on sacral pressure ulcers, Kirkland-Kyhn et al<sup>2</sup> found low perfusion (as measured by blood pressure) in the acute care setting to be the most significant risk factor for the development of deep tissue injury (DTI) that evolved into Stage 3, Stage 4, or unstageable pressure ulcers. During

this comparison study of intensive care units (ICUs) between patients who did ( $n = 47$ ) and did not ( $n = 72$ ) develop sacral DTIs, no significant difference in Braden scores and related risk factors was noted between the 2 groups. El-Marsi et al<sup>3</sup> conducted a retrospective review of 145 ICU patients with similar findings (hypotension was significantly associated with pressure ulcers). Regardless of their etiology, the outcomes from retrospective studies were similar<sup>3,4</sup>: Stage 3

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and Stage 4 pressure ulcers lead to major disability and increased health and economic burden for patients, caregivers, health care facilities, and payors.<sup>4</sup>

A limited number of studies focusing on CAPU/I were found in the literature. Corbett et al<sup>5</sup> conducted a retrospective, descriptive study to identify prehospital location and demographics for pressure ulcers present on admission (POA). This study, conducted at an academic medical center in New England (N = 1022), described acute care hospital admissions of patients with CAPU to be 7.4%; 21.4% were receiving home care services before admission, 76.1% were admitted from the community, and 23.9% were admitted from long-term care facilities. In a cross-sectional, observational study conducted in the United Kingdom (N = 491 929), Stevenson et al<sup>6</sup> found data collection methods challenging and interpretation complicated when collecting CAPU/I prevalence data. When assessing data from different community sites (home, long-term care, residence homes, and rehabilitation centers), pressure ulcer prevalence rates were found to be between 0.40 and 0.77 per 1000 adults.

Literature that describes measuring and tracking CAPU/I in acute care hospitals and emergency departments (ED) is scarce despite patients living longer<sup>7</sup> with multiple comorbidities that would contribute to increased pressure ulcer rates.<sup>2,8</sup> Few studies<sup>5,6</sup> have described CAPU/I acute care hospital admission incidence, prevalence, source of admission, length of stay (LOS), ED visits, and/or have compared HAPU to CAPU/I data.

The aim of this study is to describe HAPU/I and CAPU/I point prevalence rates, LOS, source of admission, and reported encounters (hospital admissions/ED visits) from home, skilled nursing facilities (SNF), and long-term care facilities. For the purposes of this study, further discussion of the source of admission will use the term *SNF* for both skilled and long-term care facilities.

## METHODS

**Setting.** The study was conducted in a 620-bed academic medical center, part of an integrated health system, located

in an urban setting in the western United States. This descriptive case controlled study was approved by the Internal Review Board and involved the collection of prospective and retrospective data from multiple electronic data collection sources, including the National Data for Nursing Quality Indicators<sup>9</sup> (NDNQI) and the hospital's incident reporting (IR) system, electronic medical record (EMR), and pressure ulcer registry. Because not all data collected were complete, the authors used the EMR to validate and supplement missing data.

**Inclusion/exclusion criteria.** All patients at least 18 years old with a nurse-reported (IR- and EMR-documented) pressure ulcer/injury at least once during their admission were included for comparison. No data involving pregnant women or incarcerated persons were knowingly included in the data collection. Patients who had incomplete pressure ulcer/injury staging or origin of admission data that were not available in EMR or the IR system also were excluded.

### Data sets.

**NDNQI.** NDNQI hospital quarterly surveys from January 1, 2015, to December 31, 2017, were included in order to measure the point prevalence of HAPU/I as compared to CAPU/I. Data were collected using the NDNQI<sup>9</sup> quarterly (whole hospital) survey for HAPU/I and CAPU/I present on the day of the survey or point prevalence rates. On the day of the survey, the EMR captured information needed to complete the NDNQI data form C. Approximately 10 to 50 nurses who had completed the NDNQI standardized education online modules joined the wound team (wound certified nurses) to visually evaluate the pressure areas of every patient in the hospital to collect the quarterly survey data. All HAPU/I and CAPU/I were staged during the quarterly surveys, and assessments were validated by wound certified nurses in real time.

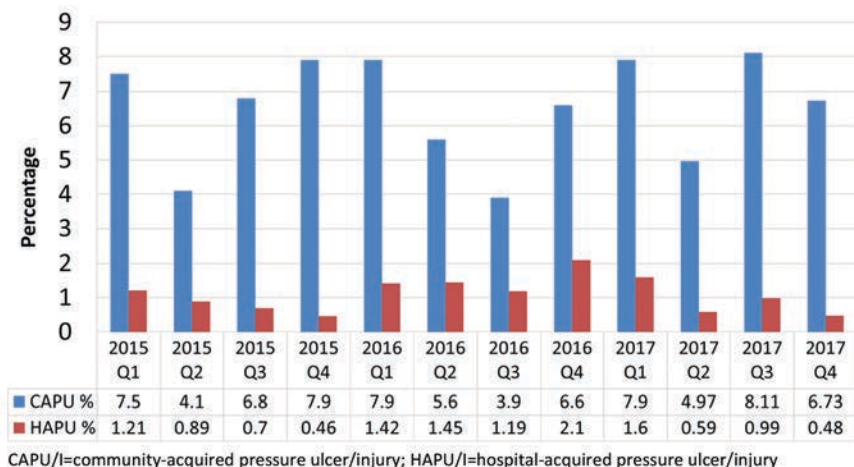
**IR.** Data from the IR system (designed for quality improvement and regulatory purposes) were collected starting January 1, 2017, and ending December 31, 2017. The authors' hospital policy requires all

## KEYPOINTS

- Studies examining the rate and characteristics of community-acquired pressure ulcers/injuries (CAPU/I) are limited.
- The authors examined several hospital databases for a period of 6 years to describe the characteristics of patients with a CAPU/I or hospital-acquired pressure ulcer/injury (HAPU/I).
- The overall HAPU/I point prevalence rate ranged from 0.46% to 2.1%, and the average CAPU/I rate was between 3.9% and 8.11%.
- Length of stay was shorter in patients with a CAPU/I than in patients with a HAPU/I, but patients with a CAPU/I had more frequent hospital admissions and emergency department visits.
- Most patients who developed a HAPU/I or CAPU/I were admitted from home, not from skilled or long-term nursing facilities.
- More attention to, and research on, the prevention and care of pressure ulcers in the community is needed.

nurses to submit an IR for every pressure ulcer/injury occurrence whether POA or hospital-acquired. Pressure ulcer/injury data were collected and maintained in a Quality and Safety pressure ulcer registry by the principal investigators and 2 quality and safety analysts. A retrospective review was conducted of all patients who were reported to have a HAPU/I or CAPU/I who were admitted or had ED visits. The study sample included all encounters (hospital admission or ED visits) of patients who were captured in the IR system; these data were abstracted. Following identification of a HAPU/I or CAPU/I POA by IR, patients were entered into a pressure ulcer/injury Excel spreadsheet. For pressure ulcer/injury, POA, the source of admission (home or SNF), and the stage of wound was categorized (Stage 1 or Stage 2 versus Stage 3 or greater) for both HAPU/I and CAPU/I. All staging was validated by wound

# HOSPITAL- VERSUS COMMUNITY-ACQUIRED PRESSURE ULCER/INJURY



**FIGURE 1.** Quarterly hospital- and community-acquired pressure ulcers/injuries point prevalence rates.

certified nurses and rechecked in the EMR. The length of hospital stay was calculated from the IR system database and confirmed by EMR review.

**EMR.** The variables for data collection were determined from available existing EMRs; stage of pressure ulcer/injury (documented by wound certified nurse), LOS, source of admission, and readmissions and ED visits or total encounters were validated by the certified wound nurses and primary investigators.

A best practice alert for pressure ulcer/injury POA was used to highlight any patients that may have been missed within the IR system. Weekly reports were generated in order to measure the number of patients with pressure ulcer/injury within the hospital on any given week. This report was checked against the IR reports to ensure capture of all pressure ulcer/injury admissions and readmissions.

**HAPU/I and CAPU/I Registry.** Data were collected on patients who had developed HAPU/I using EMR records from January 1, 2012, to December 31, 2017. The CAPU/I registry was developed by triangulating data from the IR system, EMR reports, and EMR validation. Additional data (LOS, admission source, number of admissions or ED visits, and pressure ulcer/injury stage) were collected prospectively on HAPU/I as they occurred in patients in the hospital. The HAPU/I were entered into Excel spreadsheets to form a registry; this registry was used for a previous study conducted on the risk factors involved in the development of HAPU/I.<sup>2</sup> The CAPU/I registry was created using data from January 1, 2017, to January 1, 2018 from the incident reporting system and EMR, validated by certified wound care nurses, then added to a CAPU/I registry. The HAPU/I and CAPU/I registries were used for comparison.

**Data analysis.** The databases were reviewed by 2 quality and safety analysts and the primary investigators. Variables were extracted and validated by analysts, wound certified nurses, and the primary investigators. The data were entered manually into the Excel spreadsheets. Descriptive statistics were analyzed using average and median, with range noted for continuous variables and percentage for categorical variables. Data analysis was performed using Excel 2010 (Microsoft Corp, Redmond, WA).

## RESULTS

**Point prevalence.** The total hospital population surveyed for the NDNQI was 1787, 1989, and 1917 for years 2015, 2016, and 2017, respectively; completed information noted 45 HAPU/I and 821 CAPU/I from January 2017 to December 31, 2017. The overall HAPU/I point prevalence rate from the total hospital population surveyed for the 3 years ranged from 0.46% to 2.1% (2015 = 0.8%; 2016 = 1.5%; and 2017 = 0.9%), with an average of 1.09%. The point prevalence rate for patients in the hospital with CAPU/I POA ranged between 3.9% and 8.11% (2015 = 6.6%; 2016 = 6.0%; and 2017 = 6.9%), with an average of 6.5% from the entire hospital population (see Figure 1).

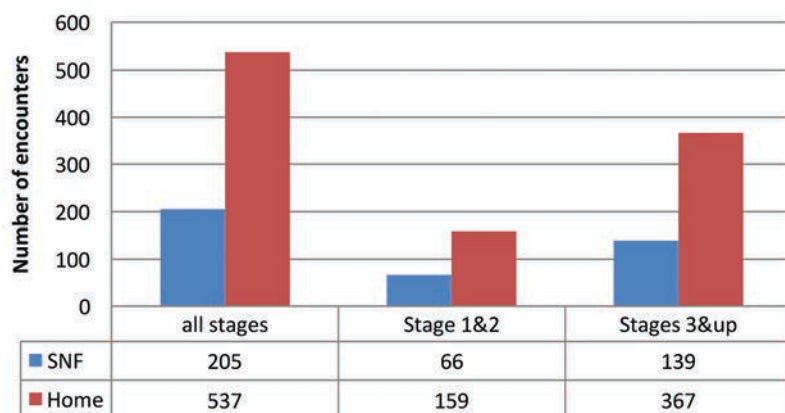
**LOS.** The IR system noted 2340 skin-related encounters, with 934 staged pressure ulcer/injury submissions that were completed during the nurse evaluation. After excluding the encounters of patients lacking pressure ulcer/injury stage or information on source of admission, 866 encounters were included in this comparison study.

Patients with HAPU/I reported in the IR system (n = 45) had an average LOS of

**TABLE. LENGTH OF STAY (LOS)**

	TOTAL ENCOUNTERS FOR ALL STAGES	STAGE 1 AND STAGE 2 ENCOUNTERS	STAGE 3 AND HIGHER ENCOUNTERS	LOS DAYS (AVERAGE, RANGE) FOR ALL STAGES	LOS DAYS (AVERAGE, RANGE) FOR STAGE 1 AND STAGE 2	LOS DAYS (AVERAGE, RANGE) FOR STAGE 3 AND HIGHER
CAPU/I	821	254	566	10.5 (1-373)	9.7 (1-76)	10.9 (1-373)
HAPU/I	45	39	6	38.9 (6-272)	30.9 (6-102)	87.4 (23-272)

CAPU/I=community-acquired pressure ulcer/injury; HAPU/I=hospital-acquired pressure ulcer/injury



SNF=long-term care and skilled nursing facilities

**FIGURE 2.** Hospital encounters of patients with a community-acquired pressure ulcer/injury by ulcer stage and source of admission

38.9 days (range 6–272 days, median 22 days). When the HAPU/I patients were divided into 2 groups according to severity of stage, reported HAPU/I included 39 patients with Stage 1 and Stage 2 pressure ulcers and 6 patients with Stage 3 and above. The LOS for the Stage 1 and Stage 2 group averaged 30.9 days (range 6–102 days, median 20 days). The 6 patients who had a Stage 3, Stage 4, and unstageable ulcers/injuries or DTI had an average LOS of 87.4 days (range 23–272 days, median 50 days).

According to the 2017 IR system data, 821 encounters involving CAPU/I occurred, with an average LOS of 10.5 days (range 1–373 days, median 6 days). By stage for CAPU/I, 254 encounters involved persons with a Stage 1/Stage 2 ulcer, with an average LOS of 9.7 days (range 1–76 days, median 6 days); for advanced pressure ulcer/injury stages, 566 CAPU/I patient encounters were recorded and these patients had an average LOS of 10.9 days (range 1–373 days, median 6 days) (see Table).

**Source of admission.** After reviewing the IR system for 2017 and validating with the EMR, of the 45 patients with a reported HAPU/I, 3 (6.7%) were admitted from a SNF, 6 (13.3%) were transferred from outside acute care facilities, and 36 (80%) were admitted from home.

Analysis of CAPU/I encounters reported in the IR system (n = 821) indicated

205 encounters (25%) were from a SNF, 537 (65.4%) from home, and 79 (9.6%) were transferred from other acute care facilities. Further analysis of the Stage 1 and Stage 2 CAPU/I revealed 66 encounters involved patients admitted from a SNF and 159 originated from home. For advanced stages of CAPU/I (Stage 3, Stage 4, and unstageable), 139 encounters were admitted from SNF and 367 encounters occurred among patients admitted from home (see Figure 2, which does not include encounters with patients [n = 79] transferred from acute care facilities).

**Hospital admission/ED visit encounter frequency for HAPU/I (after discharge) compared with CAPU/I.** The IR system and EMR revealed that of the 45 HAPU/I patients, only 1 (with a Stage 2 ulcer) had 2 ED encounters in 2017. Among the 67 patients with Stage 3, Stage 4, and unstageable pressure ulcers/injuries over 6 years, only 1 HAPU/I patient (who had a closed Stage 4 pressure ulcer/injury) returned to the authors' facility.

In order to analyze CAPU/I encounter frequency, the CAPU/I registry was used and validated with the EMR. Among the 821 encounters (hospital admissions or ED visits), 477 individual patients were identified; of those, 127 (26.6%) had 2 or more encounters during 2017. Upon further analysis, the majority of CAPU/I patients who had 2 or more encounters

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were found to have originated from home (77%). One patient, who lived at home with a Stage 4 CAPU/I, had 16 hospital encounters for 2017 alone.

### DISCUSSION

Study results indicate that during the 3-year study period of NDNQI prevalence, CAPU/I were more prevalent than HAPU/I, with an average CAPU/I prevalence of 6.5% and an average HAPU/I prevalence of 1.09%. Even though CAPU/I are significantly more prevalent than HAPU/I, the authors note a dearth of research, information, or resources for CAPU/I prevention as compared to HAPU/I. One might presume this lack of attention to CAPU/I is due to differences in the cost of care, reimbursement, or incidence of HAPU/I as compared to CAPU/I. However, a recent study<sup>9</sup> suggests no significant difference in the cost of treating Stage 4 HAPU/I versus CAPU/I. The high cost of providing care for patients with pressure ulcers is multifactorial. Patients who develop CAPU/I are disproportionately older and immobile, and they may have impaired nutrition, incontinence issues, and be at the end of life.<sup>8,10</sup> In addition to these impairments, the actual pressure ulcer/injury requires ongoing nursing care as well as painful, expensive, and prolonged treatments.<sup>8</sup>

The authors also found within these multiple datasets that many CAPU/I were not captured as POA in the EMR. Nurses (and physicians) often did not identify CAPU/I POA (unless verified by a wound certified nurse) and did not stage pressure ulcer/injuries if identified. The Centers for Medicare and Medicaid Services<sup>1</sup> (CMS) reported that claims with a primary or secondary diagnosis of pressure ulcer/injury with no listed stage is a common occurrence; in Fiscal Year 2010, the percentage of claims with pressure ulcer site reported with no accompanying pressure ulcer stage in academic medical centers was reported to be as high as 58%.

What is also notable when comparing HAPU/I with CAPU/I data is that patients who develop a HAPU/I had a prolonged length of hospital stay. Given the fact that HAPU/I patients had a longer

LOS, it can be surmised that this population has a higher acuity. This assumption is supported by previous research<sup>2</sup> that found 100% of the advanced stage HAPU/I developed while the patient was in the ICU in a low perfusion state.

In this study, the majority of HAPU/I and CAPU/I patient encounters were admitted from home. A review of the literature did not find previous studies on source of admission for patients who develop HAPU/I; with regard to CAPU/I source of admission, Corbett et al<sup>5</sup> noted a 15.5%, 30-day readmission rate for CAPU/I, with more than 51.5% of the CAPU/I patients admitted subsequently discharged to a health care facility and 33% discharged home. Initially, the current authors presumed many of their hospital/ED encounters were originating from SNF and were surprised to learn that most (537, 65.4%) of their CAPU/I encounters were with patients living at home.

The authors' hospital HAPU/I registry (data collected from January 1, 2012, through December 31, 2017) revealed patients that developed Stage 3, Stage 4, and unstageable pressure ulcers/injuries did not return to the hospital with an open wound over the 6-year study period, suggesting the HAPU/I etiology may be a more acute event.

On the other hand, 127 patients with CAPU/I had multiple (2 or more per year) readmissions, suggesting the chronic nature of CAPU/I. In addition, this observation could indicate many patients may have had poor caregiver support and a lack of resources such as a specialty surface at home. The authors found CAPU/I were chronic, leading to multiple acute hospital/ED encounters and a higher percentage of patients with Stage 3, Stage 4, and unstageable pressure ulcers/injuries.

More research to include EMR review should be performed in order to analyze the demographics, primary diagnosis, mortality rates, and perfusion states of persons with a HAPU/I or CAPU/I. Per the differences in LOS and readmissions as well as a literature review of HAPU/I, the authors suspect, in addition to the possible absence

of appropriate support surfaces and nursing care in the home, HAPU/I and CAPU/I may have different etiologies.

### STUDY LIMITATIONS

One limitation of this study is the use of multiple sources and incomplete documented evidence because no one source had complete information. The IR and EMR systems did not require nurses to assign a stage to pressure ulcers/injuries, subsequently limiting/excluding potential participants and underestimating prevalence rates and severity of stage. The HAPU/I registry and EMR data used to report Stage 3, Stage 4, and unstageable pressure ulcers/injuries and DTIs, were accurate, because these data were confirmed with the wound certified nurses daily and as a HAPU/I occurred. However, a complete database for CAPU/I was lacking, despite having 2340 IRs for 2017. Complete information regarding staging and source of admission was missing. As a result, many potential study participants in the IR system were excluded from the study.

### IMPLICATIONS FOR PRACTICE

Quality and safety entities use pressure ulcer/injury outcome data to assess nursing quality of care. HAPU/I incidence includes multiple measurements of pressure ulcers/injuries on patients with prolonged length of hospitalization; there is very little focus on assessing or tracking patients with CAPU/I. In addition, when comparing hospitals, quality and safety entities should consider using the CMS patient safety issue (PSI-o3) as the inclusion/exclusion criteria for a standardized measurement.

Professionals must ensure CAPU/I are identified early as pressure ulcer/injury POA and gather important data to help with education and support in preventing CAPU/I. Supportive data should include the patient's origin/setting when the CAPU/I developed. Once the origin is identified, educational support and opportunities for prevention and treatment could be targeted to the specific needs in that area.

An early identification risk tool for patients at high risk for developing CAPU/I

