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# The Origin of Present-on-admission Pressure Ulcers/Injuries Among Patients Admitted from the Community: Results of a Retrospective Study

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## ABSTRACT

Research about community-acquired pressure ulcer/injuries (CAPU/I) remains limited. **PURPOSE:** The aim of this descriptive, retrospective study was to quantify the number of patients with pressure ulcers/injuries (PU/Is) present on admission (POA), with particular attention to patient residence (home or skilled/long-term care facility [SNF]). **METHODS:** Data from the electronic medical records (EMR) and the incident reporting system of a 620-bed integrated health system in northern California from January 1, 2017, to December 31, 2017, were examined and used to create a registry that included patient demographics, length of stay (LOS), source of admission (home versus SNF), co-existing conditions, and documentation on end of life and death. A manual chart review was conducted to confirm the accuracy of data entered into the registry. All patients at least 18 years old and with a nurse-reported incident and EMR-documented PU/I that was listed as POA were included; pediatric, pregnant, or incarcerated patients were excluded. Extracted variables included demographic data, stage of PU/I on admission, and major diagnosis (or co-existing condition) by groups (spinal cord injuries [tetraplegia, paraplegia], neurological conditions, end-stage renal disease, cardiac and vascular disease, end of life [EOL], and death while in hospital during the year 2017). Descriptive analysis was used to examine the data. **RESULTS:** Of the 2340 records of patients with an PU/I POA, 477 were complete and analyzed. The majority (336, 70.4%) originated from home. Patients admitted from home were younger than those admitted from SNF (average age 62.9 and 71.5 years, respectively) and had a higher proportion of co-existing paraplegia/tetraplegia (24.4% vs 12.8%). More than 60% of all patients had a stage 3, stage 4, or unstageable PU/I. **CONCLUSION:** The majority of patients with a PU/I POA were admitted from home. Additional research and improved efforts to help high-risk individuals living at home prevent and manage PU/Is are needed.

**KEYWORDS:** community-acquired pressure ulcers, pressure ulcers present on admission, pressure ulcers acquired at home

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## INTRODUCTION

Pressure ulcers/injuries (PU/Is) that occur on patients while they are in the hospital (hospital-acquired pressure ulcer/injuries [HAPU/I]) have been a measure of nursing quality within hospitals since 2008.<sup>1</sup> Although HAPU/I are seen as never events, scant attention has been paid to community-acquired pressure ulcer/injuries (CAPU/I) — that is, PU/Is

that occur at home and in skilled nursing (SNF) or in long-term care (LTC) facilities. According to retrospective<sup>2</sup> and prevalence<sup>3</sup> studies, the etiologies of HAPU/Is and CAPU/Is arguably may be different. Some research suggests acute care hospital patients that develop stage 3, stage 4, and unstageable HAPU/I have a greater incidence of hypotension (diastolic below 49 mm Hg).<sup>2</sup> Whether a PU/I

develops in a hospital or in the community, the outcome is the same: retrospective analysis of stage 3 and stage 4 PU/Is has shown these ulcers lead to major disability and increased health and economic burden for patients, caregivers, health care facilities, and payers.<sup>4,5</sup>

Few previous studies focusing on CAPU/I were found in the literature; one was descriptive,<sup>6</sup> one was observational,<sup>7</sup>

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and a cross-sectional, observational study<sup>8</sup> conducted in the United Kingdom involving 2 different sites (N = 604 170) found a greater number of CAPU/I than expected. In that study, data collected on the prevalence of CAPU/I showed rates to range between 0.40 and 0.77 per 1000 adults, with the majority of PU/Is in 1 site originating in nursing homes and in the second site from patients' own homes, with a mean age of 77.6 years for both sites combined.

Corbett et al<sup>6</sup> conducted a descriptive study at an academic medical center in New England (N = 1022). Among acute care hospital admissions, 7.4% had a CAPU/I, 21.4% were receiving home care services prior to admission, 76.1% were admitted from home, and 23.9% were admitted from LTC facilities.

Literature is scarce on acute hospital admissions of patients with PU/Is from the home, SNF, or LTC despite patients living longer<sup>9</sup> and/or with multiple comorbidities that would contribute to PU/Is.<sup>2,10</sup> Few studies<sup>6,8</sup> have compared the site of origin (ie, from home vs. a SNF or LTC facility) of PU/Is present on admission (POA).

The purpose of this retrospective, descriptive study was to quantify the number of patients with PU/Is POA by examining acute hospital admissions, length of stay (LOS), comorbid conditions, end-of-life (EOL) care, and the number of hospital deaths for patients with all stages of PU/Is. For purposes of this study, further discussion on the source of admission will use the term *SNF* for both skilled nursing and long-term care facilities. The term *home* will refer to patients admitted from home, persons who are homeless, and persons living in a hotel.

The study intended to address the following questions:

1. What is the difference in percentage of patients with PU/Is admitted from home as compared with a SNF?
2. What is the LOS for patients from home as compared with a SNF?
3. What are the stages of PU/Is admitted from home as compared with a SNF?
4. What is the percentage of patients from certain comorbid condition groups admitted with PU/Is from home and from a SNF? What percent of patients with PU/Is were admitted for EOL care from home and from a SNF? What percent of the total patients admitted (with PU/Is POA) died during their hospital stay (from home and from a SNF)? What percent of patients (with PU/Is POA) admitted for EOL care died during their admission?

### METHODS

**Setting.** The study was conducted at a 620-bed academic medical center, part of an integrated health system located in an urban setting in northern California. This descriptive study was approved by the Internal Review Board. Data were collected retrospectively from the facility's PU/I registry and validated using the electronic medical record (EMR) on all patients admitted to the hospital from January 1 through December 31, 2017, who had a PU/I POA documented within the EMR.

**Inclusion criteria.** All patients at least 18 years old and with a nurse-reported incident (IR) and EMR-documented PU/I that was listed as POA were included. Home source of admission was considered as home, homeless, trailer, or hotel; admissions from a SNF included SNF, rehabilitation hospital, or a LTC facility. Criteria stipulated only patients with documented PU/I POA and staged in the EMR were included.

**Exclusion criteria.** All pediatric patients (<18 years of age) were excluded from this study, as well as all patients who were admitted or transferred from acute care hospitals outside the system. No data involving pregnant women or incarcerated persons were knowingly included in the data collection. Patients with incomplete data for PU/I staging or origin of admission in the EMR also were excluded.

**PU/I registry.** The PU/I registry was created for this study with data collected from the IR system and the EMR system by the authors' facility quality and safety

### KEYPOINTS

- The authors examined records of patients admitted with a pressure ulcer/injury (PU/I) from home or long-term/skilled nursing care facilities (SNFs).
- The majority of patients (336 of 477) were admitted from home and most patients (304, 63%) had a stage 3, stage 4, or unstageable ulcer.
- Patients admitted from home had a higher proportion of mobility limitations (eg, paraplegia, tetraplegia) than patients admitted from SNFs.
- The authors conclude more research on community-acquired pressure ulcers and efforts to help prevent and manage PU/Is in the home are needed.

nurse analyst and the principal investigators (PIs) from January 1, 2017, to December 31, 2017. The authors conducted a retrospective review of all patients with PU/Is POA who were admitted to the hospital or had ED visits during that time period. As per hospital policy, following nurse identification of all POA PU/Is, the admission nurse chose the POA section in the EMR and completed an IR. The PIs and the analyst validated the presence of the PU/I POA in the EMR and entered the data into a PU/I spreadsheet that comprised the PU/I registry. The study sample included all individual patients who were entered and validated within the EMR and had complete data (staging and source of admission) and listed as having a PU/I POA. For all PU/Is POA, the source of admission was categorized into 2 groups (home or SNF) and the stage of the wound was categorized into 2 groups (stage 1/2 and stage 3/4/unstageable/deep tissue injury [DTI]).

Weekly reports from the EMR were generated in order to assess the number of patients admitted to the hospital with PU/Is POA on any given week. This report was checked against the pressure

**TABLE 1. DEMOGRAPHIC INFORMATION**

| ADMISSION SOURCE         | N=477 | AVERAGE AGE (RANGE), YEARS | GENDER MALE (M) FEMALE (F) | AVERAGE LENGTH OF STAY (RANGE) | STAGES 1/2  | STAGES 3/4/ UNSTAGEABLE |
|--------------------------|-------|----------------------------|----------------------------|--------------------------------|-------------|-------------------------|
| HOME                     | 336   | 62.9 (18-103)              | M=191, F=145               | 10.8 (1-165)                   | 119 (35.4%) | 217 (64.6%)             |
| SKILLED NURSING FACILITY | 141   | 71.5 (30-100)              | M=76 F=65                  | 9.4 (1-146)                    | 54 (38.3%)  | 87 (61.7%)              |

**TABLE 2. CO-EXISTING CONDITIONS AND DEATH**

| ADMISSION SOURCE (N)           | PARAPLEGIA/TETRAPLEGIA N (%) | NEUROLOGICAL CONDITIONS N (%) | DIALYSIS N (%) | CARDIOVASCULAR N (%) | CANCER N (%) | END OF LIFE N (%) | DEATH N (%) |
|--------------------------------|------------------------------|-------------------------------|----------------|----------------------|--------------|-------------------|-------------|
| HOME (336)                     | 82 (24.4%)                   | 43 (12.8%)                    | 29 (8.6%)      | 17 (5.1%)            | 32 (9.5%)    | 24 (7.1%)         | 68 (20.2%)  |
| SKILLED NURSING FACILITY (141) | 18 (12.8%)                   | 32 (22.7%)                    | 17 (12.1%)     | 11 (7.8%)            | 9 (6.4%)     | 12 (8.5%)         | 38 (27.0%)  |

ulcer registry to ensure all PU/I data were captured.

**Factors extracted/assessed.** Variables extracted through manual chart review by 2 PIs and the analyst included demographic data, including age, LOS (automatically calculated by EMR), and stage of PU/I POA as assessed by certified wound care nurses. All PU/Is POA were staged within 48 hours of admission. Patients were not admitted directly for PU/I treatment. Therefore, the authors extracted the major diagnosis (or co-existing condition) as listed on the problem list in the EMR on admission. Co-existing conditions were separated into groups according to co-existing diagnosis. The identification of groups occurred in an iterative process; some patients fell into several groups (eg, dialysis and spinal cord injury). Patients qualifying for multiple groups were included within the analysis for all relevant groups. These groups include:

1. Spinal cord injuries — tetraplegia, paraplegia;
2. Neurological conditions — Parkinson’s Disease, amyotrophic lateral sclerosis, stroke, dementia, multiple sclerosis;
3. End-stage renal disease — currently receiving dialysis treatment;
4. Cardiac and vascular disease —

myocardial infarction, amputations, congestive heart failure;

5. EOL — patient must have documented “comfort care” or “EOL care” on admission; and
6. Death while in hospital during the year 2017.

**Data analysis.** Descriptive statistics using average and median, with range for continuous variables and percentage for categorical variables, were used to analyze the data. Data analysis was performed using Excel 2010 (Microsoft Corp; Redmond, WA).

**RESULTS**

During the 1-year study period, 2340 patient encounters were documented as PU/Is POA and captured within the hospital IR system. Complete data on CAPU/I were available for 477 (20.4%) of these patients; 336 (70.4%) of patients were admitted from home and 141 (29.6%) were admitted from a SNF. Patients admitted from home were younger than patients admitted from a SNF (average age 62.9 [range 18-103] years vs. average age 71.5 [range 30-100] years, respectively). The hospital LOS was longer for patients admitted from home compared to a SNF (average LOS 10.8 [range 1-165] days vs. average LOS 9.4 [range 1-146] days, respectively). PU/I stages

POA were similar for patients admitted from home or SNF, but there were a greater number of stage 3/4/unstageable/DTIs (217, 64.6%) of POA PU/Is from home as compared with persons admitted from SNFs (87, 61.7%) (see Table 1). The patients admitted from home had slightly higher percentage of advanced PU/Is stages than patients from SNFs (64.6% vs. 61.7%).

The 2 co-existing conditions with the highest number of admissions for both home and SNF were in the categories *paraplegia/tetraplegia* and *neurological conditions*. However, patients admitted from home had nearly twice the incidence of comorbid conditions of paraplegia/tetraplegia (82, 24.4%) as the SNF population (18, 12.8%). Patients admitted from home had a lower percentage of neurological comorbidities (43, 12.8%) than patients with neurological co-existing conditions admitted from a SNF (32, 22.7%). All other comorbidity categories demonstrated a <3% difference between home and SNF admissions (see Table 2); however, 6% fewer patients admitted from home than from a SNF died while in hospital (68 [20.2%] vs. 38 [27.0%], respectively) despite similar percentages of patients having documentation for admission for “EOL or comfort care” (see Table 2).

DISCUSSION

Recent studies show the number of patients with advanced PU/Is is higher in the community than in the hospital.<sup>6,11</sup> This greater number of patients with PU/Is from home makes sense anecdotally, because more people are at home than in SNF and patients in a SNF have 24/7 caregiver support. Corbett et al<sup>6</sup> found 76.1% of hospital admissions of patients with PU/Is came from home as compared to LTC facilities. The current study found 70.4% of patients were admitted from home as compared to 29.6% admitted from SNFs. Stevenson et al<sup>8</sup> found the average age for CAPU/I in the community was 77.6 years; the current study population was younger (average age of admission from home and SNFs was 62.2 years and 61.5 years, respectively).

Current study results suggest PU/Is occur at home at higher rates than

in SNFs or LTC facilities. Much of the literature<sup>10,12</sup> suggests patients who develop PU/Is are disproportionately older, immobile, have impaired nutrition and incontinence issues, and may be at EOL. However, the current study results showed patients admitted from home were younger and had a higher rate of immobility (82 persons [24.4%] had paraplegia/tetraplegia) than persons admitted from a SNF (18 persons with paraplegia tetraplegia [12.8%]) and that these persons were less likely to have access to nursing care at home, problems perhaps related to insurance qualifiers (Medicaid/Medicare) for care.

Slightly more patients within the study sample with a cancer diagnosis were admitted from home versus a SNF (see Table 2). This finding was in alignment with research conducted by Brink et al<sup>13</sup> who studied patients in the home

care setting and found more patients diagnosed with terminal cancer stayed home rather than enter a SNF or LTC.

Chronic stage 4 PU/Is may not close over time, but this amount of time is poorly defined.<sup>14</sup> Chronic PU/Is may start superficially as stage 1 or stage 2 then progress to a full-thickness or stage 3, stage 4, or unstageable PU/I. This trajectory may be avoided with early Braden-related interventions, including pressure redistribution, improved nutrition, and moisture control.<sup>10</sup> Some stage 4 PUs take years to close or do not close at all and may require reconstructive surgery.<sup>10</sup> The authors suspect the high percentage of these deeper ulcers documented in study are indicative of the fact they had been there for a prolonged period of time as opposed to having developed more recently. The current authors found the

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|--|--|
| <p><b>Pathogenic Bacteria:</b></p> <ul style="list-style-type: none"> <li><i>Acinetobacter baumannii</i></li> <li>Carbapenem Resistant <i>E. coli</i> (CRE)</li> <li><i>Clustidium difficile</i> (including spores)</li> <li><i>Enterobacter coli</i></li> <li>Medicillin Resistant <i>Staphylococcus aureus</i> (MRSA)</li> <li><i>Proton mirabilis</i></li> <li><i>Pseudomonas aeruginosa</i></li> <li><i>Serratia marcescens</i></li> </ul> | <p><b>Staphylococcus aureus</b></p> <p>Vancomycin Resistant <i>Enterococcus faecalis</i> (VRE)</p> <p><b>Pathogenic Fungi:</b></p> <ul style="list-style-type: none"> <li><i>Aspergillus niger</i></li> <li><i>Candida albicans</i></li> </ul> <p><b>Spores:</b></p> <ul style="list-style-type: none"> <li><i>Clustidium difficile</i></li> </ul> <p><b>Pathogenic Virus:</b></p> <ul style="list-style-type: none"> <li>HIV</li> </ul> |
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highest number of patients from home and SNFs admitted with a POA PU/I had stage 3, stage 4, and unstageable ulcers. Similar to current findings, retrospective cohort studies<sup>7,15</sup> have found patients developed full-thickness ulcers while in a SNF or LTC, even with the best of care. However, patients at home typically do not have 24-hour access to skilled caregivers, specialty beds, turning equipment, and immediate incontinence care that would help them avoid developing a PU/I. This may explain why within this study, more than twice as many patients were admitted to the hospital from home than from a SNF with PU/Is at advanced stages (see Table 1).

Patients within the SNF group died during the study period at a more than 6% higher rate than those admitted from home; however, SNF patients were older and had a higher rate of neurological disease (eg, paraplegia or tetraplegia). A systematic review article<sup>16</sup> on EOL PU/Is (ie, Kennedy Terminal Ulcer [KTU]) describes a type of skin breakdown signaling impending death, appearing suddenly (most often on the sacrum), and progressing rapidly, despite appropriate clinical interventions. In 1877, Dr. Jean-Martin Charcot<sup>17</sup> described the same phenomena, naming the skin ulceration *decubitus ominosus*, noting skin breakdown occurred shortly before death, similar to the KTU. Several researchers have argued whether KTUs are related to skin failure rather than to a PU/I<sup>18</sup> that occurs in concordance with the decreased perfusion,<sup>2</sup> ischemia, and multiorgan failure<sup>19</sup> of the dying process. One retrospective cohort study<sup>5</sup> concluded LTC residents who had PU/Is were more likely to die due to “frailty and high disease burden, and death was not a direct result of the ulcer.”

As professionals, clinicians must ensure that CAPU/Is are identified early and gather important data to help with education and support in preventing CAPU/Is among persons at risk. Supportive data should include the origin of the patient when the CAPU/Is developed. Once the origin is identified, educational support and opportunities for prevention and

treatment could be targeted specifically to home caregivers or staff in facilities.

An additional and important study finding was that the documentation about source of admission and PU stage was incomplete in the vast majority of records.

**Considerations for the care continuum.** Although the general goal is to have a patient age in place (despite diagnosis), future policy should include wound clinics with access to specialty equipment for assessing and treating patients who are at risk for the development of PU/Is. As an alternative, nurse practitioners should be able to assess and order treatment for patients while conducting full assessments of the patient and the wound during home visits. Current Centers for Medicare and Medicaid Services (CMS) rulings suggest that if patients can leave their home, they do not qualify for home care.<sup>1</sup> The results of this study suggest a need for PU/I preventative care and treatment to improve quality of life of patients with long-term limited mobility or for those at EOL. Identifying POA PU/Is lends itself as an educational opportunity for patient/family/CMS regarding the development of PU/Is in persons with acute and chronic diseases and persons at EOL, no matter their setting.

Discharge planning of hospitalized patients with a Braden score that suggests they are at risk of developing a PU/I must include measures to help prevent their development. Education at hospital discharge or in clinics should include a list of resources and basic pressure redistribution surfaces should be supplied at the time of discharge from the hospital or clinic.

In addition, the development and testing of a PU/I risk scale for home care is needed. Patient lift assistive devices should be available in all primary care clinics in order to evaluate the skin of patients with low mobility or at high risk.

Patients (and family caregivers) struggle to manage the care of advanced stage PUs but often want to remain in the home setting. Patients who do not or cannot change their lifestyles enough to prevent or close advanced PU/Is need access to chronic/palliative wound care.

Palliative chronic wound care and clinical support in accordance with patient goals should be provided with nursing support as appropriate.

## LIMITATIONS

The study may be limited because much of the data were incomplete for entry into the authors' PU/I registry (ie, a complete database for the CAPU/Is registry was unavailable, despite having 2340 IRs for 2017). The missing data may have changed the percentages of patients within each category, including the outcome death within 1 year of measurement. Because the authors had limited complete and valid information regarding staging, nomenclature, and source of admission, many potential patient records in the IR system were excluded from the study. Finally, considering the design of the study, conclusions about the rate of PU/I development in the home or SNF setting must be interpreted with caution. It is possible that fewer SNF or LTC residents who happened to have a PU/I were admitted because they had access to nursing care resources, whereas persons living at home typically do not. Overall admission rates by patient residence were not examined.

## CONCLUSION

The purpose of this retrospective, descriptive study was to quantify the number of patients with PU/Is POA to an acute care hospital from home or from a SNF or LTC setting. The results also indicate that PU/I documentation in acute care facilities remains less-than-optimal. The vast majority of patients admitted with PU/Is were admitted from home. Patients living at home were also younger and had a higher rate of spinal cord injuries. The percentage of advanced stage PU/I (stage 3, stage 4, or unstageable) was similar regardless of care setting. The percentage of patients on dialysis, with cardiovascular disease, death within 1 year, and EOL care was slightly higher in the SNF group. The percentage of cancer patients with PU/Is was slightly higher in the home versus the SNF group. The results of this study suggest that robust incidence and

prevalence studies in the community are needed and that discharge planning of high-risk patients should include PU/I prevention education and the provision of needed resources. ■

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