Published in final edited form as:

J Healthc Qual. 2010 ; 32(6): 44–51. doi:10.1111/j.1945-1474.2010.00076.x.

Development and Implementation of a Hospital-Acquired Pressure Ulcer Incidence Tracking System and Algorithm

Sunniva Zaratkiewicz, JoAnne D. Whitney, Jeanne R. Lowe, Shirley Taylor, Fran O'Donnell, and Paula Minton-Foltz

Abstract

Hospital-acquired pressure ulcers (HAPUs) are a national concern due to patient morbidity, treatment cost, and reimbursement issues. Stages III and IV pressure ulcers (PUs) that occur during hospitalization are among the conditions considered preventable by the Centers for Medicare and Medicaid Services (CMS). Harborview Medical Center (HMC), located in Seattle, WA, is a Level 1 trauma/burn center and safety net hospital serving diverse populations. HMC is committed to providing excellence in care including optimal skin care and PU prevention to people from all walks of life. At HMC a new system for monitoring daily PU incidence, completing monthly multidisciplinary intensive reviews on HAPUs, and application of an algorithm used to determine if HAPUs were avoidable was developed and implemented. This system has assisted HMC in addressing PU tracking, prevention, compliance with regulatory mandates and has improved skin-related outcomes.

Keywords

Hospital-acquired pressure ulcer; Incidence tracking; Never events; Pressure ulcer; Prevention

Background

Chronic wound, including pressure ulcers (PUs), are a growing concern in healthcare delivery. Comparison of 1993 to 2006 data indicates an increase of 86.4% in hospitalizations where PUs were noted (Russo, Steiner, Spector, 2008). In acute care settings, there is increasing focus on preventable adverse events in an effort to improve patient safety, reduce medical errors, and meet regulatory requirements. This is stimulated in part by new state and federal initiatives that impact mandatory reporting and reimbursement for these conditions that have in recent years been defined as avoidable or “never events.” In the state of Washington, mandatory reporting to the Department of Health of Stages III and IV hospital-acquired pressure ulcers (HAPUs) began in 2006 (Washington State Department of Health, 2006).

Pressure ulcers (PUs) acquired during hospitalization, evaluated as either Stages III or IV are considered among the eight preventable conditions identified by the Centers for Medicare and Medicaid Services (CMS) (Centers for Medicare and Medicaid Services, 2009). Since October of 2008, hospitals no longer receive higher Medicare payments related to the ulcer specific care of patients who acquire Stages III or IV PUs during their inpatient stay. Private insurers are also adopting these reimbursement restrictions (Mattie & Webster, 2008). PUs documented in hospitalized patients are often a secondary diagnosis rather than the primary reason for hospitalization (Armstrong et al., 2008). In 2007, CMS reported 257,412 cases of secondary,

Stages III or IV PUs, at a cost per case of US\$43,180 (CMS, 2009). However, this may be a serious underestimation of the problem, because physician discharge diagnoses may not include presence of a PU even when the patient has a Stage III or Stage IV ulcer (NPUAP, 2001). Physicians often see PU detection and prevention as a nursing issue and fail to include this data in their discharge summaries, which are used by coders for billing purposes.

Prevention of PUs in acute care hospitals is certainly not new, but it is an area of heightened focus and several recent papers report efforts to reduce or prevent HAPUs (Armstrong et al., 2008; Chicano & Drolshagen, 2009; McInerney, 2008). It is common for hospitals to evaluate PU rates through prevalence surveillance methods. However, this type of monitoring is performed at an interval (e.g. quarterly) and does not provide sufficient data or frequent enough follow-up to characterize patterns of HAPUs and evaluation of system level interventions. At Harborview Medical Center, a Level 1 trauma center and safety net hospital in the Pacific Northwest, a different, novel approach was implemented using a daily incidence tracking system, Certified Wound Care Nurses (CWCNs), metrics tracking, and an intensive HAPU intensive review process guided by an algorithm. This paper describes the system development in detail and how it has influenced HAPU incidence and PU prevention strategies at this large, complex institution.

It is important to note that although this tracking system began with implementation of the electronic medical record (EMR) the system is not dependent on the EMR. This tracking system could be modified for use with other EMRs and in facilities with paper charting.

Incidence Tracking via EMR

PU Documentation

The EMR was implemented in 2007 and is an important component in how we have employed the incidence tracking system at our facility. The EMR offers multiple ways for staff to chart on PUs as described below.

On admission the EMR prompts nurses to chart if a patient has a present-on-admission (POA) PU as part of the initial admission documentation. This information is of high importance and significant value considering the recent CMS guidelines reflecting nonpayment for HAPUs.

The EMR provides two primary areas outside of the admission documentation for nurses to document PU presence and characteristics. The first of these is the question “does the patient have a PU?” This is a simple yes/no answer which nurses complete with their patient assessments each shift. If the patient has a PU a more in-depth form is generated via the EMR. The RN caring for the patient completes this required documentation which includes elements including wound location, stage, measurements, wound base, wound edges, periwound skin, drainage, and odor. This PU form automatically generates in the EMR when the patient is first noted to have a PU, and thereafter weekly on Mondays in order to document changes in ulcer status. Each time the RN accesses a patient’s chart for whom a PU is documented, the EMR prompts them to fill out the PU form until it is completed. It is expected that this form will be completed weekly in its entirety for all PUs (HA or POA); however, the RN may choose to complete this form more frequently if patient condition warrants. The information in this documentation is accessible by all disciplines, thus encouraging interdisciplinary care of PUs. Respiratory therapists chart in the same EMR and document on any oral or neck PUs that they may find in assessment of their patients. Ulcers in these locations are often secondary to endotracheal tubes or their securement devices. This EMR-documented information is also accessible to all disciplines. Respiratory therapists’ documentation has been invaluable for capturing PUs occurring in intubated patients which may have otherwise been missed.

The CWCNs at the facility document on the PUs for which they provide consultation using the Clinical Notes portion of the EMR, which is accessible to all disciplines. When the CWCN completes documentation of their assessment on a PU, they electronically send a complete note with recommendations for care to the primary provider(s) for review and cosignature. Because this hospital is a teaching facility, this note is most frequently sent to both the attending physician and the resident assigned to the patient. This process ensures communication of PU status and recommended care to the medical team, and has proven to increase physician understanding of PU identification, assessment, and care.

Incidence Tracking Process

Staff RNs complete skin assessments for their patients each shift and chart this assessment in the EMR. Part of the charting process includes a simple check box asking the question, “does the patient have a PU?” as previously described. This documentation is used to generate a daily, automatic report through one of the institution’s network servers. If the documentation indicates that the patient has a PU, the patient will be included in a daily PU census report that is sent each morning by 7 a.m. to the CWCNs.

A CWCN reviews this report and cross references the patients on this list with the previous day’s census list to verify any patients already being followed or those who have been charted as having POA PUs. The hospital’s nursing supervisor brings the report information to the morning charge nurse meetings for both medical surgical acute units and intensive care units. At these meetings the nursing supervisor alerts the charge RNs to any patients on their units that are included in the report. With this information, the charge RN notifies the appropriate staff RN of their patient(s) who are on the daily list. It is the staff RN’s responsibility to complete a full skin assessment on these patients and assess for PU presence. The patient’s RN contacts the CWCN through a dedicated confidential phone line where the nurse may leave a message for the CWCN. The message provides information on whether the patient on the Daily PU Report actually has a PU and, if so, the location; if the PU was POA or HA; or if the patient does not have a PU in the case where the charting of a PU was made in error. If the patient in question does have a PU the staff RN completes an incident report for all HAPUs regardless of staging. The CWCN checks the PU reporting line multiple times throughout the day and adds any patients identified as having HAPUs to the patient consult list. The CWCN then assesses the patient’s PU(s), recommends interventions, and follows the patient weekly until the PU is healed or the patient discharges.

Contents of the Daily PU Report

The daily PU report includes: patient medical record number, name, unit (location), bed number, location of PU, POA documentation, and respiratory therapist documentation. This report consists of information from multiple areas of the medical record. The first, already mentioned, is the yes/no question “does the patient have a PU” which is part of the nurses’ assessment each shift. The other areas of the EMR that this report draws information from are: oral, skin, and neck assessments by respiratory therapists; admission documentation; and PU documentation forms. Drawing together documentation data from several different sources and different clinical disciplines allows more accurate capture and confirmation of PU presence throughout the EMR (Figure 1).

Intensive Review Process and Metrics Tracking

Monthly, dedicated meetings are held to review HAPU metrics tracking reports and provide intensive review and discussion of patients with HAPUs. The intensive review is conducted by a multidisciplinary team with representatives from Nursing, Medicine, Patient Safety, Administration, Quality Improvement, Clinical Education, CWCNs, Respiratory Therapy, Occupational Therapy, Dietary, and Clinical Data Systems. Cases are presented and evaluated

by the review team with recommendations for practice or system changes as appropriate and guided by clinical data.

This multidisciplinary team created an algorithm that is used as part of the intensive review process for each HAPU. The algorithm assesses modifiable and nonmodifiable risk factors specific to this level 1 trauma hospital's patient population (Figure 2).

Modifiable risk factors identified in the algorithm include the following:

- Was the patient turned every 2 hr?
- Was a skin inspection completed each shift by the bedside RN?
- Was the skin kept dry?
- Was a pressure redistribution surface used (if appropriate)?
- If a nonexpanding device was used (orthotic device, splint, etc.) was it assessed and readjusted for fit?
- Were clinical resources utilized (CWCN, OT, RT, Orthotic specialist, other)?
- Was patient education provided?

Nonmodifiable risk factors include the following:

- Risk factors associated with medically required treatment: (a) Poor tissue perfusion (e.g., massive edema secondary to fluid resuscitation, vasopressor use) (b) Continual wet tissue (e.g., weeping tissue, weeping wounds) (c) Unexpandable medical device (e.g., sheeting of an unstable pelvis until patient is stable for surgery).
- Risk factors related to pathophysiology: (a) Inability to turn (e.g., hemodynamic instability, respiratory instability, unstable spine) (b) Continually wet tissue (e.g., weeping wounds, uncontrollable body secretions) (c) High risk tissue (poor nutritional status, vascular insufficiency [ex. arterial insufficiency, arterial emboli, diabetes] (d) Inability to use pressure redistribution device due to other conditions (e.g., unstable spine or pelvis).
- Risk factors associated with behavior: (a) Inability to decrease pressure on at risk area (s) (e.g., psychiatric noncompliance, patient refusal, behavior by neurologically impaired).

A major goal of the HAPU intensive review process is to implement the six essential elements of PU prevention and IHI metrics (Table 1). An additional goal is to limit costs of HAPUs. This can result in substantial savings considering the estimated average cost per single full-thickness ulcer of US\$43,180 and penalties associated with "never events" (CMS, 2009). The intensive review process is also designed to assess if HAPUs were found in early stages (I or II), evaluate PU-related care, and assess when preventive interventions were unsuccessful if this was due to the patient's inherent disease or injury-related etiology.

Through the HAPU Metrics meetings the following data are monitored and evaluated:

1. HAPU incidence rates per 100 admissions and per 1,000 patient-days.
2. Percent compliance with major tenets of the IHI campaign to prevent HAPUs.
3. Percent of HAPU early detection (Stages I or II). Percentage by stage at which HAPU was first identified, Suspected Deep Tissue Injuries (SDTIs) and Unstageable PUs are tracked in our incidence system but not included in early detection numbers as these PUs do not follow a specific PU progression trajectory. SDTIs and Unstageable PUs commonly indicate full-thickness injury below the epidermis or necrotic tissue

obscuring the wound base (NPUAP, 2007). Through autolytic or treatment-directed debridement, the necrotic tissue is removed as part of the healing process and the wound may appear to worsen. In fact, this denotes a natural process in the course of healing.

4. Trauma risk PU incidence rate as identified through the use of the PU algorithm, depicted in Figure 2, created to assist in determination of avoidable versus unavoidable PUs in the high-risk trauma patient population.
5. Percentage distribution of risk factors for HAPUs.

Expected Benefits

The overall goals and anticipated benefits related to the system are to decrease patient morbidity and cost associated with HAPUs. The system was also implemented with the purpose of identifying educational needs directed toward PU prevention, identification, assessment, and care. With prevention of HAPUs as a goal, the system has also been helpful in guiding thinking about factors specific to the trauma/safety net hospital population that is served. Identification and better understanding of modifiable risk factors has directed changes in medical devices, how they are used, and care processes that can be changed in order to decrease incidence of HAPUs.

Challenges Encountered

The incidence tracking, evaluation, and intensive review process involves many individuals and is resource intensive. It was anticipated that some challenges would be encountered as the program was implemented and this has proven to be true. These include issues around manpower resources and documentation. Having a sufficient number of CWCNs to monitor and assist in this project has been a challenge. The department of Patient Care Services is meeting the challenge currently by increasing the number of CWCNs. This is accomplished not by adding FTEs but through training of nurses who are already members of the nurse educator/clinical nurse specialist team, expanding their expertise in wound management and scope of responsibility. In this way we have modified work responsibilities in this department to better address the skin and wound care needs of our facility. Another challenge has been establishing consistent documentation by staff nurses as the EMR is a relatively new system for the facility and has undergone multiple updates and changes since its inception. The evolving EMR has posed challenges to consistent documentation. Modifications were developed and implemented to simplify use and support informative and consistent documentation. A third challenge is related to SDTI and Unstageable PU identification and documentation. These two new definitions, released in 2007 from the National Pressure Ulcer Advisory Panel are now recognized within the PU staging categories. Identification of ulcers within the categories of SDTI and Unstageable will have important implications for ulcer prevention, detection and management as the natural presentation of these stages of ulcers and their clinical course is better understood and captured in documentation systems (NPUAP, 2007).

Results

Retrospective analysis of data from November 2007 through March 2009 shows that hospital-wide the HAPU incidence rate per 1,000 patient-days decreased from 1.89 to 0.86 and rate per 100 admissions has decreased from 1.4 to 0.6. The proportion of stages I and II HAPU increased from 60% to 100% while rates of more severe HAPUs decreased from 40% to 0%. Data indicate increased detection of HA-PUs and identification of ulcers at earlier severity stages. Over 57% of HAPUs occur in ICU patients. Data on the distribution of risk factors that are tracked has provided insight into areas where there is a need for more focused education with emphasis on

evidence-based, effective patient care to prevent and treat PUs. A typical graphical display of this data are shown in Figures 3–5.

Conclusion

The major goals of the HAPU tracking system are to facilitate early identification of HAPU and to decrease the rates of PU incidence through appropriate preventive care. Results indicate improved early identification of HA-PUs, which facilitates initiation of effective care, staff education, and improvements in practice.

The data collected, and the valuable information gathered through the intensive review process, has guided further improvements in patient care. Specific education needs focused on HAPU prevention and care have been identified and measures to improve care implemented. This has led to education for patient care units with higher incidence levels and providing nurses with strategies for preventing HAPUs in specific anatomical locations. The system has assisted identification of medical devices that are required for care in the trauma population that place patients at risk (e.g., endotracheal tube securement devices or skeletal stabilization equipment). The identification of risk with these devices has resulted in modifications of either the device or how it is used to reduce risk of HAPU. These efforts have included working with vendors to improve their products and reduce subsequent HAPU risk within our patient population. The success of this incidence-tracking model combined with the intensive, multidisciplinary review and metrics tracking is demonstrated through a decline in HAPU rate and no Department of Health reportable PUs for three quarters.

References

- Armstrong DG, Ayello EA, Capitulo KL, Fowler E, Krasner DL, Levine JM, et al. New opportunities to improve pressure ulcer prevention and treatment. *Journal of Wound Ostomy Continence Nursing* 2008;35:485–492.
- Centers for Medicare & Medicaid Services Medicare Program. Proposed Changes to the Hospital Inpatient Prospective Payment Systems and Fiscal Year 2009 Rates. Proposed Additions to Hospital Acquired Conditions for Fiscal Year 2009. 2009. Retrieved February 19, 2009, from www.cms.hhs.gov/apps/media/press/factsheet.asp?Counter=3042&intNumPerPage=10&checkDate=&checkKey=&srchType=1&numDays=3500&srchOpt=0&srchData=&keywordType=All&chkNewsType=6&intPage=&showAll=&pYear=&year=&desc=false&cboOrder=date#_ftn1
- Chicano SG, Drolshagen C. Reducing hospital-acquired pressure ulcers. *Journal of Wound Ostomy Continence Nursing* 2009;36(1):45–50.
- Institute for Healthcare Improvement. Retrieved April 16, 2009, from www.ihi.org/IHI/Topics/PatientSafety/SafetyGeneral/ImprovementStories/FSRelieveThePressureAndReduceHarm.htm
- Mattie AS, Webster BL. Centers for medicare and medicaid services “never events” an analysis and recommendations to hospitals. *Health Care Management* 2008;27:338–349.
- McInerney JA. Reducing hospital acquired pressure ulcer prevalence through a focused prevention program. *Advanced Skin Wound Care* 2008;21:75–78.
- National Pressure Ulcer Advisory Panel [NPUAP]. Updated Staging System. 2007. Retrieved April 16, 2009, from www.npuap.org/pr2.htm
- National Pressure Ulcer Advisory Panel [NPUAP]. Pressure ulcers in America: Prevalence, incidence, and implications for the future. An executive summary of the National Pressure Ulcer Advisory Panel monograph. *Advances in Skin and Wound Care* 2001;14:208–215. [PubMed: 11902346]
- Russo, CA.; Steiner, C.; Spector, W. Rockville, MD: Agency for Healthcare Research and Quality; 2008. Hospitalizations related to pressure ulcers among adults 18 years and older, 2006 Healthcare Cost and Utilization Project Statistical Brief #64. Retrieved June 14, 2009, from www.hcup-us.ahrq.gov/reports/statbriefs/sb64.pdf

Washington State Department of Health. Hospital licensing regulations. 2006. Retrieved June 14, 2009, from <http://www.doh.wa.gov/hsqa/fsl/crs/pdf/FinalROP.pdf>

Biographies

Sunniva Zaratkiewicz, BSN, RN, CWCN, is a Skin and Wound Clinical Nurse Educator at Harborview Medical Center, a Level 1 trauma center, in Seattle, WA. Sunniva consults on acute, chronic, and complex wounds in both inpatient and outpatient settings. Additionally, she provides wound care education and training, and has been a guest lecturer at regional and national conferences. Sunniva is actively involved in quality and process improvement committees at Harborview Medical Center and participates in regional and national pressure ulcer steering and benchmarking committees.

JoAnne D. Whitney, PhD, RN, CWCN, FAAN, is a Nurse Scientist at Harborview Medical Center, Seattle WA, and Professor, and Vice Chair for Research, University of Washington, School of Nursing (UW SON), department of Biobehavioral Nursing and Health Systems. She provides research consultation and support for evidence based practice and staff nurse led research at Harborview Medical Center, and teaches undergraduate and graduate nursing students at UW SON. She holds the Harborview Medical Center Endowed Professorship in Critical Care Nursing and teaches in the UW Continuing Nursing Education nationally accredited Wound Management Education Program.

Jeanne R. Lowe, PhD, RN, CWCN, is a PhD Candidate at the University of Washington's School of Nursing, Seattle, WA. She is currently working as a research assistant on a study that looks at the development of pressure ulcers in residents of long-term care facilities that have been recognized for excellent care. She is also a research associate with the Puget Sound VA HSR&D Center of Excellence, working with a research group to improve wound care for veterans.

Shirley Taylor, MN, RN, CCNS, CCRN, CWCN, is the Burn and Wound Clinical Nurse Specialist at Harborview Medical Center, Seattle, WA. She has over 20 years clinical experience in critical care, medical-surgical, home care, burns, and wound care. She consults on acute, chronic, and complex wounds for both inpatients and outpatients. She provides wound care education and training and has been a guest lecturer at local and regional conferences.

Fran O'Donnell, RN, BSN, is a Burn and Wound Clinical Nurse Educator at Harborview Medical Center in Seattle, WA. Fran consults on acute, chronic, and complex wounds for both inpatients and outpatients. She provides burn and wound care education and training and has been a guest lecturer at local and regional conferences.

Paula Minton-Foltz, MSN, RN, is an Assistant Administrator for Patient Care Services at Harborview Medical Center in Seattle, WA. Paula oversees patient care quality and patient safety operations.

Date	Time	Location	Size	Depth	Color	Shape	Stage	Notes
11/1/11	08:00	Right Hip	2cm x 1cm	1cm	Red	Round	1	Initial assessment
11/1/11	12:00	Left Hip	1cm x 1cm	0.5cm	Red	Round	1	Initial assessment
11/1/11	04:00	Right Hip	2cm x 1cm	1cm	Red	Round	1	Initial assessment
11/1/11	08:00	Right Hip	2cm x 1cm	1cm	Red	Round	1	Initial assessment
11/1/11	12:00	Left Hip	1cm x 1cm	0.5cm	Red	Round	1	Initial assessment
11/1/11	04:00	Right Hip	2cm x 1cm	1cm	Red	Round	1	Initial assessment
11/1/11	08:00	Right Hip	2cm x 1cm	1cm	Red	Round	1	Initial assessment
11/1/11	12:00	Left Hip	1cm x 1cm	0.5cm	Red	Round	1	Initial assessment
11/1/11	04:00	Right Hip	2cm x 1cm	1cm	Red	Round	1	Initial assessment
11/1/11	08:00	Right Hip	2cm x 1cm	1cm	Red	Round	1	Initial assessment

Figure 1.
Sample of Daily Pressure Ulcer Report Used to Identify Patients. Data Are Representative of
a Typical Daily Report

Name _____ MR# _____

If Hospital Acquired Pressure Ulcer at Stage III, IV, or unstageable or deep tissue injury:

- A** Applicable to Modifiable risk factors?
(Document which were **NOT** applied, e.g. A1)
1. Turn Q 2 hours
 2. Skin inspection Q shift
 3. Skin kept dry
 4. Pressure relief surface used (if appropriate)
 5. Non- expanding devices readjusted for fit
 6. Clinical resources utilized (CWCN, orthotic specialist, etc.)
 7. Patient education provided (if appropriate)
- B** Non-Modifiable Risk Factors?
(Document those which **were present**, e.g. B2a)
- 1. Medically required treatment created risk factors**
 - a. Poor tissue perfusion (massive edema, vasopressors)
 - b. Continual wet tissue (weeping tissue, weeping wounds)
 - c. Unexpandable Medical Device (sheeting)
 - 2. Pathophysiology created risk factors**
 - a. Inability to turn (hemodynamically unstable, respiratory instability, unstable spine)
 - b. Continual wet tissue (weeping wounds, uncontrollable bodily secretions)
 - c. High risk tissue (poor nutritional status, vascular insufficiency [diabetic, PVD, arterial emboli])
 - d. Inability to use pressure relief device (unstable spine)
 - 3. Behaviorally created risk factors**
 - a. Inability to decrease pressure on at risk area (psychiatric non-compliance, patient refusal, behavior by neurologically impaired)

This document was created specifically for, and collected and maintained by a quality improvement program or committee and is not subject to discovery or introduction into evidence in any civil action. See RCW 70.41.200, RCW 4.24.250, RCW 43.70.510 and RCW 70.168.090.

Figure 2.
Algorithm of Modifiable and Non-Modifiable Risk Factors for Pressure Ulcer Incidence

Figure 3.
HAPU Rate Per 1,000 Patient-Days and Per 100 Admissions November 2007–March 2009

Figure 4.
Risk Factors for Pressure Ulcers: Overall Review

Figure 5.
HAPU Stages at Discovery Per Month November 2007–March 2009

Table 1**Six Elements of Pressure Ulcer Prevention and Institute for Healthcare Improvement Metrics**

1	Conduct a pressure ulcer admission assessment for all patients.
2	Reassess all patients for risk daily.
3	Inspect skin of at-risk patients daily.
4	Manage moisture.
5	Optimize nutrition/hydration.
6	Minimize pressure.

Institute for Healthcare Improvement (2009).