

Appendix Table 1. Pressure Ulcer Stages, as defined by the National Pressure Ulcer Advisory Panel

Stage	Description
I	<p>Non-blanchable erythema “Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area. The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. Category I may be difficult to detect in individuals with dark skin tones. May indicate ‘at risk’ persons.”</p>
II	<p>Partial thickness “Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled or sero-sanguinous filled blister. Presents as a shiny or dry shallow ulcer without slough or bruising.* This category should not be used to describe skin tears, tape burns, incontinence associated dermatitis, maceration or excoriation. *Bruising indicates deep tissue injury.”</p>
III	<p>Full thickness skin loss “Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Slough maybe be present but does not obscure the depth of tissue loss. May include undermining and tunneling. The depth of a Category/Stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput, and malleolus do not have (adipose) subcutaneous tissue and Category/Stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep Category/Stage III pressure ulcers. Bone/tendon is not visible or directly palpable.”</p>
IV	<p>Full thickness tissue loss “Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present. Often includes undermining and tunneling. The depth of a Category/Stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and these ulcers can be shallow. Category/Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon or joint capsule) making osteomyelitis or osteitis likely to occur. Exposed bone/muscle is visible or directly palpable.”</p>
Unstageable	<p>Full thickness skin or tissue loss – depth unknown “Full thickness tissue loss in which actual depth of the ulcer is completely obscured by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed. Until enough slough and/or eschar are removed to expose the base of the wound, the true depth cannot be determined; but it will be either a Category/Stage III or IV. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as ‘the body’s natural (biological) cover’ and should not be removed.”</p>
Suspected Deep Tissue Injury – depth unknown	<p>“Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer, or cooler as compared to adjacent tissue. Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment.”</p>

Source: The National Pressure Ulcer Advisory Panel

Appendix Text 1. Evaluation of Pressure Ulcer Diagnosis ICD-9-CM Code Use in 2009

Location-specific codes (707.0X) required since 2005 describe pressure ulcers in terms of anatomic location (such as pressure ulcer on lower back) without capability to describe ulcer severity or “stage.” Stage-specific codes initiated in October 2008 describe only pressure ulcer stage. By ICD-9-CM official guidelines for coding, two codes are needed to completely describe a pressure ulcer after October 1, 2008: code from the location-specific 707.0 list, and a code from the stage-specific 707.2 list. Additional recommendations to coders include that a pressure ulcer code can only be listed once. For example, if the patient had two pressure ulcers in the same location (such as on bilateral buttocks, location code 707.05), the code 707.05 would be listed only once; also, if the two ulcers were of the same stage, only one stage-specific code would be listed. Therefore, administrative data for a hospitalization could have an uneven number of location-specific and stage-specific codes. However, the present-on-admission status of the location-specific codes should be compatible with the present-on-admission status of the stage-specific codes.

Although coder guidelines recommend listing both a location-specific and stage-specific pressure ulcer code to describe a pressure ulcer completely in administrative data submitted for payment, only the stage-specific pressure ulcer codes are used for public reporting purposes to generate hospital rates of hospital-acquired pressure ulcers on Medicare’s Hospital Compare website. Therefore, for this analysis, we identified cases of hospital-acquired pressure ulcers by having at least one stage-specific pressure ulcer (of the stages specified in Table 1) labeled as a hospital-acquired condition. **Appendix Table 3** describes how often each stage of pressure ulcer was listed as a diagnosis in administrative data.

Yet, we also performed an analysis of how coders were applying the location-specific and stage-specific codes as we were concerned that hospital rates of HAPUs by administrative data may be much lower as measured by stage-specific codes if hospital coders continued to list only location-specific codes as was the usual practice before October 2008. In 2009, most hospitals (195 out of 196) listed the newer stage-specific pressure ulcer codes for at least 1 of their

discharges with pressure ulcer diagnoses, indicating at least some awareness of the newer pressure ulcer codes. As detailed in **Appendix Table 4**, comparing any use of pressure ulcer code (all stages, all locations, listed as a principal or secondary diagnosis, and listed as hospital-acquired or present-on-admission), 62 499 discharges listed at least one older location-specific pressure ulcer codes and 60 847 listed at least one newer stage-specific (including all stages) pressure ulcer codes. 60 227 discharges (95.4% of all discharges containing either old or new pressure ulcer codes) contained both the location-specific and stage-specific codes.

As noted in the text, the use of either the location-specific or stage-specific pressure ulcer codes did not alter the results of our comparison of rates from administrative data to rates by surveillance data. Hospital rates of HAPUs (all stages) identified by older location-specific codes were similarly low (mean of 0.24% CI: 0.21, 0.26% of discharges) compared to rates identified either by stage-specific codes (mean of 0.22% CI: 0.20, 0.25% of discharges, when including all stages) or location- and stage-specific codes combined (mean of 0.24%, CI: 0.21, 0.27). Thus, much lower rates of HAPUs were generated from administrative data compared to surveillance data, regardless of newer and/or older codes were used in administrative data.

Appendix Table 2. Pressure Ulcer Diagnosis ICD-9-CM Codes^a

Location-specific Pressure Ulcer Codes^b implemented 2005	Stage-specific Pressure Ulcer Codes^{a,b} implemented October 1, 2008
707.00 Pressure Ulcer, unspecified site	707.20 Pressure Ulcer, unspecified stage <i>The 707.20 code should be assigned when there is no documentation regarding the stage of the pressure ulcer.</i>
707.01 Pressure Ulcer, elbow	
707.02 Pressure Ulcer, upper back	
707.03 Pressure Ulcer, lower back	
707.04 Pressure Ulcer, hip	707.21 Pressure Ulcer, stage I
707.05 Pressure Ulcer, buttock	707.22 Pressure Ulcer, stage II
707.06 Pressure Ulcer, ankle	707.23 Pressure Ulcer, stage III
707.07 Pressure Ulcer, heel	707.24 Pressure Ulcer, stage IV
707.09 Pressure Ulcer, other site	707.25 Pressure Ulcer, unstageable <i>The 707.25 code is used for “pressure ulcers whose stage cannot be clinically determined (e.g., the ulcer is covered by eschar or has been treated with a skin or muscle graft) and pressure ulcers that are documented as deep tissue injury but are not documented as due to trauma.”^c</i>

ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification

^aTwo codes are needed to completely describe a pressure ulcer after October 1, 2008:

a code from the location-specific 707.0 list, and a code from the stage-specific 707.2 list.

^bHospital-acquired pressure ulcers are identified by a pressure ulcer diagnosis code

labeled also as “hospital-acquired” by the present-on-admission variable, in accordance with CMS guidelines with the present-on-admission variable being coded as N (not present on admission) or U (could not be determined because of insufficient documentation).

^cImportant Note: Code 707.25 is used in administrative data to describe both “unstageable” and “deep tissue injury” pressure ulcers, unlike National Pressure Ulcer Advisory Panel pressure ulcer stages (**Appendix Table 1**) which provide a distinct category/stage for “unstageable” and “deep tissue injury” pressure ulcers.

Appendix Table 3: Frequency of Pressure Ulcer Diagnoses by Stage in Administrative Data

Stage-specific Pressure Ulcer ICD-9-CM Codes	Hospital-acquired Pressure Ulcer Diagnoses (without a present-on-admission pressure ulcer diagnosis) N (% of admissions)*
707.20 “unspecified stage”	540 (0.03)
707.21 stage I	1067 (0.05)
707.22 stage II	2512 (0.13)
707.23 stage III	288 (0.01)
707.25 stage IV	83 (0.004)
707.25 “unstageable”	189 (0.01)**

ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification

*Individual admissions could have more than 1 pressure ulcer diagnosis listed.

**30 (16%) of 189 admissions that described a pressure ulcer as “unstageable” also included a hospital-acquired pressure ulcer of stages II-IV.

Appendix Table 4. Patterns of location-specific and stage-specific pressure ulcer codes in 2009, among hospitalizations including a pressure ulcer code in administrative discharge data

Pattern	N (%)
Total discharges with at least one location-specific OR stage-specific pressure ulcer code (all stages included)	63119 (100%)
Discharges with at least one location-specific code AND one stage-specific pressure ulcer code with compatible present-admission status codes	60025 (95.1%)
Discharges with at least one location-specific code AND one stage-specific pressure ulcer code with incompatible present-admission status codes	202 (0.3%)
Discharges with only location-specific codes	2272 (3.6%)
Discharges with only stage-specific codes	620 (1.0%)

Appendix Table 5. Definition of study variables

Dataset	Definition applied for study variable
Administrative data from HCUP	<p>HAPU stages 2 and above by administrative data = administrative HAPU2+</p> <p>Percentage of discharges in calendar year 2009 without any present-on-admission pressure ulcer(s) by either location-specific or stage-specific codes and with at least one of the following pressure ulcer ICD-9-CM codes listed as hospital-acquired:</p> <ul style="list-style-type: none"> 707.22 Pressure ulcer, stage II 707.23 Pressure ulcer, stage III 707.24 Pressure ulcer, stage IV 707.25 Pressure ulcer, unstageable <p>Note: Hospital coders are instructed to assign the 707.25 code in administrative data to describe both “unstageable” and “deep tissue injury” pressure ulcers.</p>
Surveillance data collected by CALNOC, as publicly reported on CalHospitalCompare	<p>HAPU stages 2 and above by surveillance data = surveillance HAPU2+</p> <p>Percentage of examined patients by hospital-wide periodic point-prevalence exams in calendar year 2009 without any ulcers documented as present when the patient was admitted to the hospital, and with at least one hospital-acquired pressure ulcer documented on the day of examination that was not documented as present within 24 hours of hospital admission</p> <p>Pressure ulcers collected in this dataset were staged by study team members applying pressure ulcer stages as defined by the National Pressure Ulcer Advisory Panel and detailed in Appendix Table 1. Pressure ulcers included in the surveillance HAPU2+ measure were stages II and greater defined as stages II, III, IV and unstageable but did not include deep tissue injuries.</p>

HCUP: Healthcare Cost and Utilization Project; CALNOC: Collaborative Alliance for Nursing Outcomes; ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification

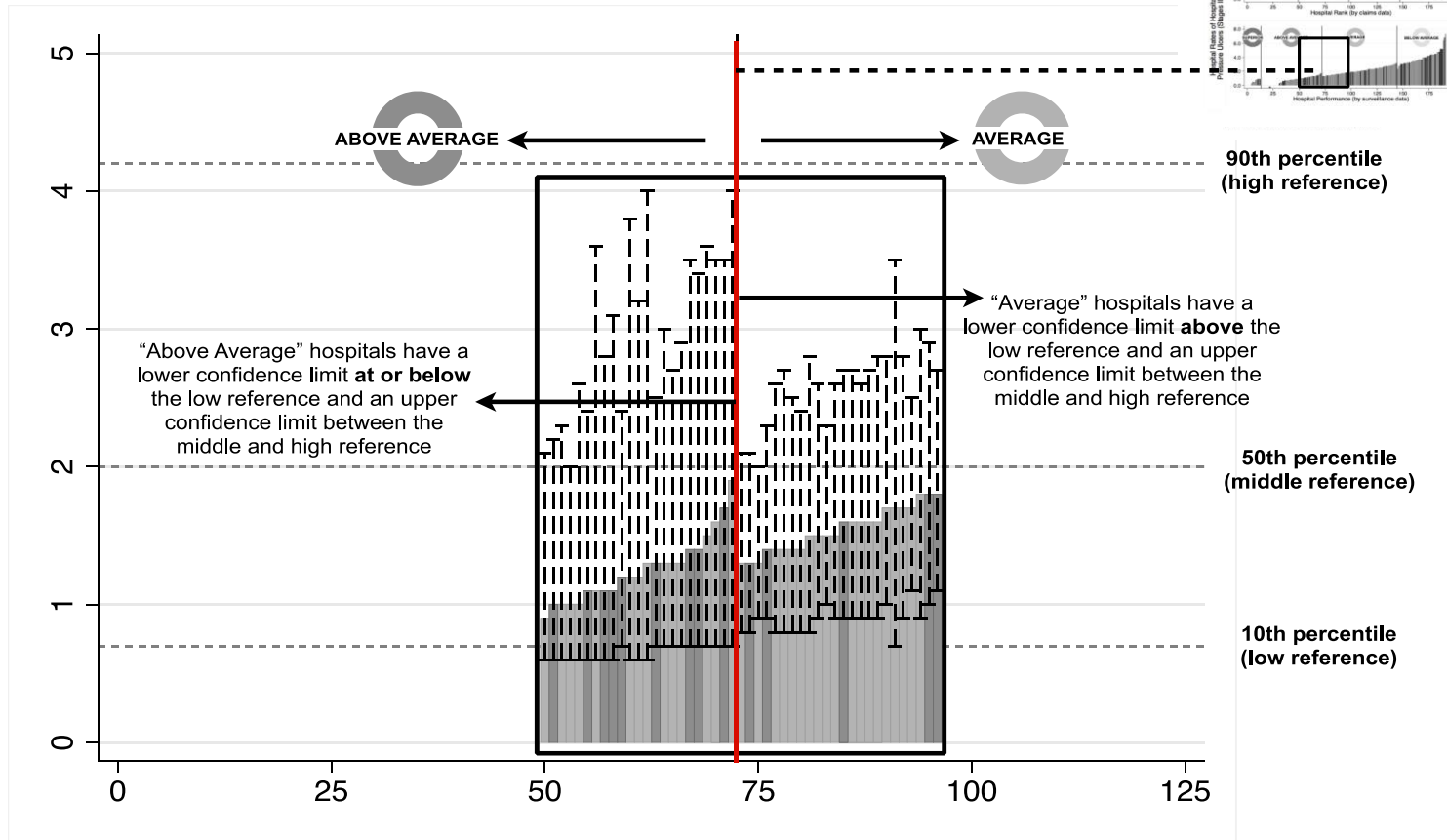
Appendix Table 6. Surveillance Data CHART Grade Assignments

CHART grade assignments are made by comparing each hospital's lower and upper confidence limit for their pressure ulcer rate to the boundaries determined by the 10th, 50th and 90th percentiles (low, middle and high reference, respectively) of all hospital rates. The table below maps the hospital's lower confidence limit (LCL) and upper confidence limit (UCL) to the corresponding CHART grade assignment.

Below Low Reference	Between the Low and Middle Reference	Between Middle and High Reference	Above High Reference	CHART Performance Grade
LCL	UCL			1 - Superior
LCL & UCL				1 - Superior
LCL		UCL		2 - Above Average
	LCL & UCL			2 - Above Average
		LCL & UCL		3 - Average
	LCL	UCL		3 - Average
		LCL	UCL	4 - Below Average
	LCL		UCL	4 - Below Average
			LCL & UCL	5 - Poor
LCL			UCL	6.1 - After Analysis, Too Few Cases to Score

CHART: California Hospital Assessment and Reporting Taskforce

Appendix Figure: The CHART Grading Method



To assign a performance grade CHART compares a hospital's lower and upper confidence limits for the pressure ulcer prevalence rate to percentile cutoffs (see Appendix Table 6). This makes it possible for a hospital with a higher point estimate for their pressure ulcer prevalence rate (hospitals immediately to the left of the red line) to receive a better grade than their peer hospitals with lower point estimates (hospitals immediately to the right of the red line).

CHART: California Hospital Assessment and Reporting Taskforce