

NATIONAL QUALITY FORUM

Measure Submission and Evaluation Worksheet 5.0

This form contains the information submitted by measure developers/stewards, organized according to NQF's measure evaluation criteria and process. The evaluation criteria, evaluation guidance documents, and a blank online submission form are available on the [submitting standards web page](#).

NQF #: 0337	NQF Project: Patient Safety Measures-Complications Project
(for Endorsement Maintenance Review)	
Original Endorsement Date: May 15, 2008 Most Recent Endorsement Date: May 15, 2008 Last Updated Date: Sep 14, 2011	
BRIEF MEASURE INFORMATION	
De.1 Measure Title: Pressure Ulcer Rate (PDI 2)	
Co.1.1 Measure Steward: Agency for Healthcare Research and Quality	
De.2 Brief Description of Measure: Percent of discharges among cases meeting the inclusion and exclusion rules for the denominator with ICD-9-CM code of pressure ulcer in any secondary diagnosis field and ICD-9-CM code of pressure ulcer stage III or IV (or unstagable) in any secondary diagnosis field	
2a1.1 Numerator Statement: Discharges among cases meeting the inclusion and exclusion rules for the denominator with ICD-9-CM code of pressure ulcer in any secondary diagnosis field and ICD-9-CM code of pressure ulcer stage III or IV (or unstagable) in any secondary diagnosis field.	
2a1.4 Denominator Statement: All surgical and medical discharges under age 18 defined by specific DRGs or MS-DRGs	
2a1.8 Denominator Exclusions: Exclude cases:	
<ul style="list-style-type: none"> - neonates - with length of stay of less than 5 days - with preexisting condition of pressure ulcer (see Numerator) (principal diagnosis or secondary diagnosis present on admission) - in MDC 9 (Skin, Subcutaneous Tissue, and Breast) - with an ICD-9-CM procedure code for debridement or pedicle graft before or on the same day as the major operating room procedure (surgical cases only) - with an ICD-9-CM procedure code of debridement or pedicle graft as the only major operating room procedure (surgical cases only) - Transfer from a hospital (different facility) - Transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF) - Transfer from another health care facility - MDC 14 (pregnancy, childbirth, and puerperium) - with missing discharge gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing) 	
See Pediatric Quality Indicators Appendices:	
<ul style="list-style-type: none"> - Appendix I – Definitions of Neonate, Newborn, Normal Newborn, and Outborn - Appendix J – Admission Codes for Transfers 	
Link to PDI appendices: http://qualityindicators.ahrq.gov/Downloads/Software/SAS/V43/TechnicalSpecifications/PDI%20Appendices.pdf	
1.1 Measure Type: Outcome	
2a1. 25-26 Data Source: Administrative claims	
2a1.33 Level of Analysis: Facility	
1.2-1.4 Is this measure paired with another measure? No	

De.3 If included in a composite, please identify the composite measure (title and NQF number if endorsed):
 0532 Ped Patient Safety for Selected Indicators (composite)

STAFF NOTES (issues or questions regarding any criteria)

Comments on Conditions for Consideration:

Is the measure untested? Yes No If untested, explain how it meets criteria for consideration for time-limited endorsement:

1a. Specific national health goal/priority identified by DHHS or NPP addressed by the measure (check De.5):
 5. Similar/related endorsed or submitted measures (check 5.1):
 Other Criteria:

Staff Reviewer Name(s):

1. IMPACT, OPPORTUNITY, EVIDENCE - IMPORTANCE TO MEASURE AND REPORT

Importance to Measure and Report is a threshold criterion that must be met in order to recommend a measure for endorsement. All three subcriteria must be met to pass this criterion. See [guidance on evidence](#).
Measures must be judged to be important to measure and report in order to be evaluated against the remaining criteria.
[\(evaluation criteria\)](#)

1a. High Impact: H M L I
 (The measure directly addresses a specific national health goal/priority identified by DHHS or NPP, or some other high impact aspect of healthcare.)

De.4 Subject/Topic Areas (Check all the areas that apply): Surgery : General Surgery
 De.5 Cross Cutting Areas (Check all the areas that apply): Safety

1a.1 Demonstrated High Impact Aspect of Healthcare: Patient/societal consequences of poor quality

1a.2 If "Other," please describe:

1a.3 Summary of Evidence of High Impact (Provide epidemiologic or resource use data):
 Using data from 19 states from 2006 to 2008, with over five million pediatric hospitalizations, HealthGrades reported that pediatric patients who experienced this event had 6.15% mortality and a total excess cost of \$1.3 billion (HealthGrades, 2010). In a study utilizing data from the Healthcare Cost and Utilization Project (HCUP) from 2000 to 2007, Friedman et al. reported a 34.5% increase in PU rates from 2000 to 2007.(6) It is unclear whether this increase is due to improved reporting or increasing prevalence during pediatric hospitalizations. The authors cautioned that "present on admission data" were not used and the sample of hospitals varied over the years.

However, similar results were reported from an earlier study by Sedman and colleagues, using the National Association of Children's Hospitals and Related Institutions aggregate Case Mix Comparative Database for 1999-2002, with 1.92 million discharges from 31 states (50 hospitals in 1999, increasing to 67 in 2002). In this study, PU rates increased each year from 4.14 per 1000 discharges in 1999 to 4.33 per 1000 discharges in 2002. Pressure ulcers were noted frequently for children with poor perfusion (i.e., those undergoing extracorporeal membrane oxygenation or requiring adrenergic agents to support blood pressure, with resultant poor skin perfusion).(2)

In a case control study using nearest-neighbor propensity score matching, the AHRQ pediatric-specific PSI were used to identify adverse events in 431,524 discharges from 38 freestanding, academic, not-for-profit pediatric hospitals affiliated with the Child Health Corporation of American and participating in the Pediatric Health Information System database in 2006. They reported a PU rate of 4.52 per 1,000 discharges, which is similar to the AHRQ reported rate of 4.33 per 1,000 discharges for the same year. Records with a PU event had mean excess length of stay of 8.07 days and mean excess hospital charges of \$59,225, relative to matched controls. The excess charges came from all hospital cost centers, including pharmacy (\$10,959), supplies (\$4,663), laboratory (\$7,276), imaging (\$1,284), and other clinical activities (\$11,345).

- 1a.4 Citations for Evidence of High Impact cited in 1a.3:** (1) Scanlon MC, Harris JM, Levy F, Sedman A. Evaluation of the agency for healthcare research and quality pediatric quality indicators. *Pediatrics* 2008; 121:e1723.
- (2) Sedman A, Harris JM, Schulz K, et al. Relevance of the agency for healthcare research and quality patient safety indicators for Children's hospitals. *Pediatrics* 2005; 115, 135-145.
- (3) Kronman MP, Hall M, Slonim AD, Shah SS. Charges and lengths of stay attributable to adverse patient-care events using pediatric- specific quality indicators: a multicenter study of freestanding children's hospitals. *Pediatrics* 2008;121(6):e1653-e1659.
- (4) Bardach NS, Chien AT, Dudley RA. Small numbers limit the use of the inpatient pediatric quality indicators for hospital comparison. *Acad Pediatr* 2010;10(4):266-273.
- (6) Friedman B, Berdahl T, Simpson LA, McCormick MC, Owens PL, Andrews R, Romano PS. Annual report on health care for children and youth in the United States: focus on trends in hospital use and quality. *Acad Pediatr*. 2011 Jul-Aug;11(4):263-79. Epub 2011 Jun 2.

1b. Opportunity for Improvement: H M L I

(There is a demonstrated performance gap - variability or overall less than optimal performance)

1b.1 Briefly explain the benefits (improvements in quality) envisioned by use of this measure:

This indicator is intended to flag cases of pressure ulcer that arise during a hospital stay. Acutely ill and immobilized neonates and children are at risk for PU development. Pressure ulcers cause considerable harm to patients and may lead to increased hospital costs and length of stay. Pressure ulcers may predispose the patient to infection, sepsis, and treatment that may require surgical intervention. Occipital pressure ulcers may cause permanent alopecia, embarrassment, and body image disturbances (1). Over 82% of the PU events in adults are thought to preventable.(2) Given the anatomical and physiological differences between adults and children, the number of preventable events in children and neonates may differ, as suggested by the relatively large number of events (49% of true positive events) in one study (cited below) that were categorized by pediatric practitioners as not clearly preventable.(3) However, stakeholder groups such as the Pediatric Affinity Group (American Academy of Pediatrics, Child Health Corporation of America, National Association of Children's Hospital and Related Institutions, and National Initiative for Children's Healthcare Quality) agree that the goal should be to eliminate PU in the pediatric population and that PU in pediatric patients should and can be prevented.(4)

- (1) McCord S, McElvain V, Sachdeva R, Schwartz P, Jefferson L. Risk Factors Associated With Pressure Ulcers in the Pediatric Intensive Care Unit. *J WOCN*. 2004;31: 179-183.
- (2) National Pressure Ulcer Advisory Panel, White Paper. Pressure Ulcer in Neonates and Children. Accessed on September 11, 2011. <http://www.npuap.org/documents/PediatricPressureUlcers.pdf>
- (3) Scanlon MC, Harris JM, Levy F, Sedman A. Evaluation of the agency for healthcare research and quality pediatric quality indicators. *Pediatrics* 2008; 121:e1723.
- (4) Pediatric Affinity Group (American Academy of Pediatrics, Child Health Corporation of America, National Association of Children's Hospital and Related Institutions, and National Initiative for Children's Healthcare Quality). Institute for Healthcare Improvement Online Pediatric Supplement for "How-to-guide for Preventing Pressure Ulcers" accessed on September 13, 2011, <http://www.nichq.org/pdf/FINALPressureUlcers.pdf>.

1b.2 Summary of Data Demonstrating Performance Gap *(Variation or overall less than optimal performance across providers):*
[For Maintenance – Descriptive statistics for performance results for this measure - distribution of scores for measured entities by quartile/decile, mean, median, SD, min, max, etc.]

In regard to figures below:

rates are risk adjusted rates per 1,000 (except where a US figure is presented, which is a per 1,000 observed rate)

1st figure: estimate

2nd figure: standard error

3rd figure: p value relative to marked group (marked group = "c")

4th figure: p value: current year relative to prior year

Key:

"c": Reference for p-value test statistics

*** Data do not meet criteria for statistical reliability, data quality, or confidentiality

Hospital characteristic:

Location of inpatient treatment:

Northeast c 3.582 0.224 0.023

Midwest 3.439 0.173 0.615 0.181

South 4.256 0.119 0.008 0.007

West 3.383 0.202 0.512 0.556

Ownership/control:

Private, not-for-profit c 3.520 0.095 0.109

Private, for-profit 2.714 0.290 0.008 0.867

Public 5.810 0.202 0.000 0.000

Teaching status:

Teaching 4.274 0.095 0.000 0.693

Nonteaching c 2.603 0.161 0.071

Location of hospital (NCHS):

Large central metropolitan 3.647 0.122 0.000 0.083

Large fringe metropolitan c 4.645 0.149 0.562

Medium metropolitan 3.981 0.203 0.008 0.091

Small metropolitan 2.053 0.354 0.000 0.041

Micropolitan *** DNC

Not metropolitan or micropolitan *** DNC

Bed size of hospital:

Less than 100 3.366 0.515 0.389 0.148

100 - 299c 2.900 0.167 0.351

300 - 499 3.814 0.151 0.000 0.735

500 or more 4.408 0.125 0.000 0.049

1b.3 Citations for Data on Performance Gap: [*For Maintenance – Description of the data or sample for measure results reported in 1b.2 including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*]

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007, and AHRQ Quality Indicators, version 3.1.

1b.4 Summary of Data on Disparities by Population Group: [*For Maintenance – Descriptive statistics for performance results for this measure by population group*]

In regard to figures below:

rates are risk adjusted rates per 1,000 (except where a US figure is presented, which is a per 1,000 observed rate)

1st figure: estimate

2nd figure: standard error

3rd figure: p value relative to marked group (marked group = "c")

4th figure: p value: current year relative to prior year

Key:

"c": Reference for p-value test statistics

*** Data do not meet criteria for statistical reliability, data quality, or confidentiality

Patient characteristic:

Age groups for pediatric conditions

0-4 c 1.836 0.107 0.053

5-9 3.740 0.197 0.000 0.000
 10-14 3.731 0.174 0.000 0.049
 15-17 6.566 0.192 0.000 0.175

Gender:

Male c 4.704 0.115 0.000
 Female 2.651 0.108 0.000 0.004

Median income of patient's ZIP code:

First quartile (lowest income) 3.581 0.151 0.000 0.000
 Second quartile 3.304 0.165 0.000 0.114
 Third quartile 3.998 0.168 0.012 0.000
 Fourth quartile (highest income) c 4.609 0.176 0.000

Location of patient residence (NCHS):

Large central metropolitan 4.034 0.150 0.451 0.916
 Large fringe metropolitan c 3.874 0.151 0.881
 Medium metropolitan 3.761 0.202 0.653 0.105
 Small metropolitan 3.063 0.266 0.008 0.066
 Micropolitan 3.452 0.272 0.175 0.858
 Not metropolitan or micropolitan 4.810 0.358 0.016 0.091

Expected payment source:

Private insurance c 3.527 0.127 0.081
 Medicare 3.878 1.063 0.743 0.140
 Medicaid 4.177 0.117 0.000 0.373
 Other insurance 3.332 0.331 0.583 0.292
 Uninsured / self-pay / no charge 3.550 0.537 0.967 0.004

1b.5 Citations for Data on Disparities Cited in 1b.4: [*For Maintenance* – Description of the data or sample for measure results reported in 1b.4 including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included]

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2007, and AHRQ Quality Indicators, version 3.1.

1c. Evidence (Measure focus is a health outcome OR meets the criteria for quantity, quality, consistency of the body of evidence.)

Is the measure focus a health outcome? Yes No **If not a health outcome**, rate the body of evidence.

Quantity: H M L I Quality: H M L I Consistency: H M L I

Quantity	Quality	Consistency	Does the measure pass subcriterion1c?
M-H	M-H	M-H	Yes <input type="checkbox"/>
L	M-H	M	Yes <input type="checkbox"/> IF additional research unlikely to change conclusion that benefits to patients outweigh harms: otherwise No <input type="checkbox"/>
M-H	L	M-H	Yes <input type="checkbox"/> IF potential benefits to patients clearly outweigh potential harms: otherwise No <input type="checkbox"/>
L-M-H	L-M-H	L	No <input type="checkbox"/>

Health outcome – rationale supports relationship to at least one healthcare structure, process, intervention, or service

Does the measure pass subcriterion1c?
 Yes IF rationale supports relationship

1c.1 Structure-Process-Outcome Relationship (Briefly state the measure focus, e.g., health outcome, intermediate clinical outcome, process, structure; then identify the appropriate links, e.g., structure-process-health outcome; process- health outcome; intermediate clinical outcome-health outcome):

Pressure ulcer (PU) is a health outcome measure. These events are considered to be almost entirely preventable. For example,

the 2011 Update of the NQF Serious Reportable Events in Healthcare includes "Any Stage 3, Stage 4, and unstageable pressure ulcers acquired after admission/presentation to a healthcare setting," excluding "progression from Stage 2 to Stage 3 if Stage 2 was recognized upon admission and pressure ulcers that develop in areas where deep tissue injury is documented as present on admission/presentation." Similarly, these ulcers are classified as "hospital-acquired conditions" by the Center for Medicare & Medicaid Services, based on a similar ICD-9-CM specification as PDI 02 (Version 4.4).

Most PU prevention and treatment protocols for pediatric patients have been extrapolated from adult practice guidelines. Although additional evidence-linked clinical practice guidelines that specially address the unique needs of the pediatric population are needed, there are several areas that experts agree upon. According to the IHI Pediatric Supplement for Preventing Pressure Ulcers, implementation of the six components of care outlined in their guide can reliably decrease PU in the pediatric population.(1) These components can be further collapsed into two major steps: the identification of patients at risk and the implementation of reliable prevention strategies. These care components are adopted from processes shown to be effective in the adult population and follow the steps outlined in other national guidelines such as those by the National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, and Association of Women's Health, Obstetrics and Neonatal Nurses.(2)(3) Essential care components based include:

1. Conduct a PU admission assessment for all patients using a structured approach to identify individuals at risk of developing pressure ulcers (process-health outcome). Upon admission to any acute care hospital, the admission assessment should include both a PU risk assessment (an evaluation of the risk of developing a PU) and a skin assessment (to detect existing PU and skin breakdown). Key factors that contribute to the risk of developing a PU include the following: age, immobility, incontinence, inadequate nutrition, sensory deficiency, multiple co-morbidities, circulatory abnormalities, and dehydration. The risk assessment must include an assessment of: mobility, incontinence, sensory deficiency, and nutritional status (including dehydration). The most commonly used PU risk assessment scale in US hospitals is the adult Braden Scale. This scale has been modified for the pediatric population (aged 21 days to 8 years) as the Braden Q Scale. It consists of 7 subscales: 1. mobility, 2. activity, 3. sensory perception, 4. moisture, 5. friction-shear, 6. nutrition, and 7. tissue perfusion and oxygenation. Scores range from 7 to 28, with low scores indicating high risk for PU development and high scores associated with low PU risk. Evidence to support use of the Braden Q scale among at-risk children is limited. For example, a 1997 study by Huffines and Logsdon involving 322 pediatric intensive care patients reported sensitivity of 83% and specificity of 81%.(4)
2. Periodically reassess patient PU risk (process-health outcome). Reassessment of risk should be based on the acuity of the patient and awareness of when PU occurs in a particular clinical setting. For example, children managed in an intensive care unit should have an initial assessment at admission and be reassessed at least every 48 hours, or whenever the patient's condition changes or deteriorates (such as changes in mobility, nutrition, or tissue perfusion/oxygenation).
3. Inspect skin daily (process-health outcome). Skin integrity may deteriorate in a matter of hours in hospitalized patient. Common sites for PU formation in children differ from those in the adult – the primary site for infants and toddlers is the occiput, versus the sacrum for older children.
4. Implement prevention strategies according to the needs of the patient as determined through the risk assessment, skin assessment, PU risk assessment, and clinical judgment. Such strategies include managing moisture, optimizing nutrition and hydration, and minimizing pressure.

(1) Pediatric Affinity Group (American Academy of Pediatrics, Child Health Corporation of America, National Association of Children's Hospital and Related Institutions, and National Initiative for Children's Healthcare Quality). Institute for Healthcare Improvement Online Pediatric Supplement for "How-to-guide for Preventing Pressure Ulcers" accessed on September 13, 2011, <http://www.nichq.org/pdf/FINALPressureUlcers.pdf>.

(2) National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel. Pressure ulcer prevention recommendations. In: Prevention and treatment of pressure ulcers: clinical practice guideline. Washington (DC): National Pressure Ulcer Advisory Panel; 2009. p. 21-50. [214 references]

(3) Association of Women's Health, Obstetrics and Neonatal Nurses (AWHONN) & National Association of Neonatal Nurses (NANN). (2001). Evidenced-Based Clinical Practice Guideline: Neonatal Skin Care. Washington, DC: AWHONN.

(4) Huffness B, Lodgson MC. The neonatal skin risk assessment scale for predicting skin breakdown in neonates. *Issues Comprehensive Nurs.* 1997; 20: 103-114.

(5) Gray M. Which pressure ulcer risk scales are valid and reliable in a pediatric population? *J WOCN.* 2004; 31(4): 157-160.

The exact proportion of PDI 02 events that is preventable, with optimal nursing technique, is unknown. However, in one series of 138 confirmed cases from 28 participating hospitals in the National Association of Children's Hospitals and Related Institutions (Scanlon MC, Harris JM II, Levy F, et al. Evaluation of the agency for healthcare research and quality pediatric quality indicators. *Pediatrics* 2008; 121:e1723-31), 71 (51%) were deemed preventable, 29 (21%) were deemed nonpreventable, and 38 (28%) were characterized as having uncertain preventability. This determination was made independently by clinicians at each site, who lacked formal training but were guided by teleconference discussions. The authors concluded that the average children's hospital in the US reports 2.1-3.2 preventable PDI 02 events each year. In a previous review of 118 cases from 14 children's hospitals (Scanlon MC, Miller M, Harris JM, Schulz K, Sedman A. Targeted chart review of pediatric patient safety events identified by the Agency for Healthcare Research and Quality's patient safety indicators methodology. *J Patient Saf* 2006; 2:191-7), using similar methods, 54% were deemed preventable, 36% were deemed unpreventable, and 10% were classified as "unable to determine."

1c.2-3 **Type of Evidence** (*Check all that apply*):
Clinical Practice Guideline

1c.4 **Directness of Evidence to the Specified Measure** (*State the central topic, population, and outcomes addressed in the body of evidence and identify any differences from the measure focus and measure target population*):

Not applicable

1c.5 **Quantity of Studies in the Body of Evidence** (*Total number of studies, not articles*): Not applicable

1c.6 **Quality of Body of Evidence** (*Summarize the certainty or confidence in the estimates of benefits and harms to patients across studies in the body of evidence resulting from study factors. Please address: a) study design/flaws; b) directness/indirectness of the evidence to this measure (e.g., interventions, comparisons, outcomes assessed, population included in the evidence); and c) imprecision/wide confidence intervals due to few patients or events*): Not applicable

1c.7 **Consistency of Results across Studies** (*Summarize the consistency of the magnitude and direction of the effect*): Not applicable

1c.8 **Net Benefit** (*Provide estimates of effect for benefit/outcome; identify harms addressed and estimates of effect; and net benefit - benefit over harms*):

Not applicable

1c.9 **Grading of Strength/Quality of the Body of Evidence.** Has the body of evidence been graded? No

1c.10 If body of evidence graded, identify the entity that graded the evidence including balance of representation and any disclosures regarding bias: Not applicable

1c.11 **System Used for Grading the Body of Evidence:** Other

1c.12 If other, identify and describe the grading scale with definitions: Not applicable

1c.13 **Grade Assigned to the Body of Evidence:** Not applicable

1c.14 **Summary of Controversy/Contradictory Evidence:** Not applicable

1c.15 **Citations for Evidence other than Guidelines** (*Guidelines addressed below*):

Not applicable

1c.16 Quote verbatim, the specific guideline recommendation (Including guideline # and/or page #):
 Not applicable

1c.17 Clinical Practice Guideline Citation: Not applicable

1c.18 National Guideline Clearinghouse or other URL: Not applicable

1c.19 Grading of Strength of Guideline Recommendation. Has the recommendation been graded? No

1c.20 If guideline recommendation graded, identify the entity that graded the evidence including balance of representation and any disclosures regarding bias:

1c.21 System Used for Grading the Strength of Guideline Recommendation: Other

1c.22 If other, identify and describe the grading scale with definitions: Not applicable

1c.23 Grade Assigned to the Recommendation: Not applicable

1c.24 Rationale for Using this Guideline Over Others: Not applicable

Based on the NQF descriptions for rating the evidence, what was the developer's assessment of the quantity, quality, and consistency of the body of evidence?

1c.25 Quantity: Moderate 1c.26 Quality: Moderate 1c.27 Consistency: Moderate

1c.28 Attach evidence submission form:

1c.29 Attach appendix for supplemental materials:

Was the threshold criterion, *Importance to Measure and Report*, met?

(1a & 1b must be rated moderate or high and 1c yes) Yes No

Provide rationale based on specific subcriteria:

For a new measure if the Committee votes NO, then STOP.

For a measure undergoing endorsement maintenance, if the Committee votes NO because of 1b. (no opportunity for improvement), it may be considered for continued endorsement and all criteria need to be evaluated.

2. RELIABILITY & VALIDITY - SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES

Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)

Measure testing must demonstrate adequate reliability and validity in order to be recommended for endorsement. Testing may be conducted for data elements and/or the computed measure score. Testing information and results should be entered in the appropriate field. Supplemental materials may be referenced or attached in item 2.1. See [guidance on measure testing](#).

S.1 Measure Web Page (In the future, NQF will require measure stewards to provide a URL link to a web page where current detailed specifications can be obtained). Do you have a web page where current detailed specifications for this measure can be obtained? Yes

S.2 If yes, provide web page URL: http://qualityindicators.ahrq.gov/modules/pdi_resources.aspx

2a. RELIABILITY. Precise Specifications and Reliability Testing: H M L I

2a1. Precise Measure Specifications. (The measure specifications precise and unambiguous.)

2a1.1 Numerator Statement (Brief, narrative description of the measure focus or what is being measured about the target population, e.g., cases from the target population with the target process, condition, event, or outcome):

Discharges among cases meeting the inclusion and exclusion rules for the denominator with ICD-9-CM code of pressure ulcer in any secondary diagnosis field and ICD-9-CM code of pressure ulcer stage III or IV (or unstagable) in any secondary diagnosis field.

2a1.2 Numerator Time Window *(The time period in which the target process, condition, event, or outcome is eligible for inclusion):*
User may specify the time window; generally one calendar year

2a1.3 Numerator Details *(All information required to identify and calculate the cases from the target population with the target process, condition, event, or outcome such as definitions, codes with descriptors, and/or specific data collection items/responses):*

ICD-9-CM Pressure ulcer diagnosis codes:

7070*

PRESSURE ULCER

70700

PRESSURE ULCER SITE NOS (OCT04)

70701

PRESSURE ULCER, ELBOW (OCT04)

70702

PRESSURE ULCER, UP BACK (OCT04)

70703

PRESSURE ULCER, LOW BACK (OCT04)

70704

PRESSURE ULCER, HIP (OCT04)

70705

PRESSURE ULCER, BUTTOCK (OCT04)

70706

PRESSURE ULCER, ANKLE (OCT04)

70707

PRESSURE ULCER, HEEL (OCT04)

70709

PRESSURE ULCER, SITE NEC (OCT04)

*No longer valid in FY2005

ICD-9-CM Pressure ulcer stage diagnosis codes*:

70723

PRESSURE ULCER, STAGE III

70724

PRESSURE ULCER, STAGE IV

70725

PRESSURE ULCER, UNSTAGEBL

* Valid for discharges on or after 10/1/2008

2a1.4 Denominator Statement *(Brief, narrative description of the target population being measured):*

All surgical and medical discharges under age 18 defined by specific DRGs or MS-DRGs

2a1.5 Target Population Category *(Check all the populations for which the measure is specified and tested if any):* Children's Health

2a1.6 Denominator Time Window *(The time period in which cases are eligible for inclusion):*

User may specify the time window; generally one calendar year

2a1.7 Denominator Details *(All information required to identify and calculate the target population/denominator such as definitions, codes with descriptors, and/or specific data collection items/responses):*

See Pediatric Quality Indicators Appendices:

- Appendix A – Operating Room Procedure Codes

- Appendix B – Surgical Discharge DRGs

- Appendix C – Surgical Discharge MS-DRGs

- Appendix D – Medical Discharge DRGs
- Appendix E – Medical Discharge MS-DRGs

Link to PDI appendices:

<http://qualityindicators.ahrq.gov/Downloads/Software/SAS/V43/TechnicalSpecifications/PDI%20Appendices.pdf>

2a1.8 Denominator Exclusions *(Brief narrative description of exclusions from the target population):*

Exclude cases:

- neonates
- with length of stay of less than 5 days
- with preexisting condition of pressure ulcer (see Numerator) (principal diagnosis or secondary diagnosis present on admission)
- in MDC 9 (Skin, Subcutaneous Tissue, and Breast)
- with an ICD-9-CM procedure code for debridement or pedicle graft before or on the same day as the major operating room procedure (surgical cases only)
- with an ICD-9-CM procedure code of debridement or pedicle graft as the only major operating room procedure (surgical cases only)
- Transfer from a hospital (different facility)
- Transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF)
- Transfer from another health care facility
- MDC 14 (pregnancy, childbirth, and puerperium)
- with missing discharge gender (SEX=missing), age (AGE=missing), quarter (QTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing)

See Pediatric Quality Indicators Appendices:

- Appendix I – Definitions of Neonate, Newborn, Normal Newborn, and Outborn
- Appendix J – Admission Codes for Transfers

Link to PDI appendices:

<http://qualityindicators.ahrq.gov/Downloads/Software/SAS/V43/TechnicalSpecifications/PDI%20Appendices.pdf>

2a1.9 Denominator Exclusion Details *(All information required to identify and calculate exclusions from the denominator such as definitions, codes with descriptors, and/or specific data collection items/responses):*

ICD-9-CM Debridement or pedicle graft procedure codes:

8345

OTHER MYECTOMY

8622

EXC WOUND DEBRIDEMENT

8628

NONEXCIS DEBRIDEMENT WND

8670

PEDICLE GRAFT/FLAP NOS

8671

CUT & PREP PEDICLE GRAFT

8672

PEDICLE GRAFT ADVANCEMEN

8674

ATTACH PEDICLE GRAFT NEC

8675

REVISION OF PEDICLE GRFT

2a1.10 Stratification Details/Variables *(All information required to stratify the measure results including the stratification variables, codes with descriptors, definitions, and/or specific data collection items/responses):*

PDI 2 stratifies rates by high-risk vs. lower risk groups.

High risk group:

ICD-9-CM Hemiplegia, paraplegia, or quadriplegia diagnosis codes:

33371
 ATHETOID CEREBRAL PALSY
 3420
 FLACCID HEMIPLEGIA
 34200
 FLCCD HMIPLGA UNSPF SIDE
 34201
 FLCCD HMIPLGA DOMNT SIDE
 34202
 FLCCD HMIPLG NONDMNT SDE
 3421
 SPASTIC HEMIPLEGIA
 34210
 SPSTC HMIPLGA UNSPF SIDE
 34211
 SPSTC HMIPLGA DOMNT SIDE
 34212
 SPSTC HMIPLG NONDMNT SDE
 34280
 OT SP HMIPLGA UNSPF SIDE
 34281
 OT SP HMIPLGA DOMNT SIDE
 34282
 OT SP HMIPLG NONDMNT SDE
 3429
 HEMIPLEGIA, UNSPECIFIED
 34290
 UNSP HMIPLGA UNSPF SIDE
 34291
 UNSP HMIPLGA DOMNT SIDE
 34292
 UNSP HMIPLGA NONDMNT SDE
 3430
 INFANTILE CEREBRAL PALSY, DIPLEGIC
 3431
 INFANTILE CEREBRAL PALSY, HEMIPLEGIC
 3432
 INFANTILE CEREBRAL PALSY, QUADRIPLGIC
 3433
 INFANTILE CEREBRAL PALSY, MONOPLEGIC
 3434
 INFANTILE CEREBRAL PALSY INFANTILE HEMIPLEGIA
 3438
 INFANTILE CEREBRAL PALSY OTHER SPECIFIED INFANTILE CEREBRAL PALSY
 3439
 INFANTILE CEREBRAL PALSY, INFANTILE CEREBRAL PALSY, UNSPECIFIED
 3440
 QUADRIPLGIA AND QUADRIPARESIS
 34400
 QUADRIPLGIA, UNSPECIFD
 34401
 QUADRPLG C1-C4, COMPLETE

34402
 QUADRPLG C1-C4, INCOMPLT
 34403
 QUADRPLG C5-C7, COMPLETE
 34404
 QUADRPLG C5-C7, INCOMPLT
 34409
 OTHER QUADRIPLEGIA
 3441
 PARAPLEGIA
 3442
 DIPLEGIA OF UPPER LIMBS
 3443
 MONOPLGIA OF LOWER LIMB
 34430
 MONPLGA LWR LMB UNSP SDE
 34431
 MONPLGA LWR LMB DMNT SDE
 34432
 MNPLG LWR LMB NONDMNT SD
 3444
 MONOPLGIA OF UPPER LIMB
 34440
 MONPLGA UPR LMB UNSP SDE
 34441
 MONPLGA UPR LMB DMNT SDE
 34442
 MNPLG UPR LMB NONDMNT SD
 3445
 UNSPECIFIED MONOPLGIA
 3446
 CAUDA EQUINA SYNDROME
 34460
 CAUDA EQUINA SYNDROME, WITHOUT MENTION OF NEUROGENIC BLADDER
 34461
 CAUDA EQUINA SYNDROME, WITH NEUROGENIC BLADDER
 3448
 OTHER SPECIFIED PARALYTIC SYNDROMES
 34481
 LOCKED-IN STATE
 34489
 OTH SPCF PARALYTIC SYND
 3449
 PARALYSIS, UNSPECIFIED
 43820
 LATE EF-HEMPLGA SIDE NOS
 43821
 LATE EF-HEMPLGA DOM SIDE
 43822
 LATE EF-HEMIPLGA NON-DOM
 43830
 LATE EF-MPLGA UP LMB NOS
 43831
 LATE EF-MPLGA UP LMB DOM

43832
LT EF-MPLGA UPLMB NONDOM
43840
LTE EF-MPLGA LOW LMB NOS
43841
LTE EF-MPLGA LOW LMB DOM
43842
LT EF-MPLGA LOWLMB NONDM
43850
LT EF OTH PARAL SIDE NOS
43851
LT EF OTH PARAL DOM SIDE
43852
LT EF OTH PARALS NON-DOM
43853
LT EF OTH PARALS-BILAT
7687
HYPOXIC-ISCHEMIC ENCEPH
76870
HYPOXIC-ISCHEMIC ENCEPHALOPATHY, UNSPECIFIED (OCT09)
76872
MODERATE HYPOXIC-ISCHEMIC ENCEPHALOPATHY (OCT09)
76873
SEVERE HYPOXIC-ISCHEMIC ENCEPHALOPATHY (OCT09)
ICD-9-CM Spina bifida diagnosis codes:
74100
SPINA BIFIDA, W HYDROCEPHALUS UNSPECIFIED REGION
74101
SPINA BIFIDA, W HYDROCEPHALUS CERVICAL REGION
74102
SPINA BIFIDA, W HYDROCEPHALUS DORSAL REGION
74103
SPINA BIFIDA, W HYDROCEPHALUS LUMBAR REGION
74190
SPINA BIFIDA, W/O HYDROCEPHALUS UNSPECIFIED REGION
74191
SPINA BIFIDA, W/O HYDROCEPHALUS CERVICAL REGION
74192
SPINA BIFIDA, W/O HYDROCEPHALUS DORSAL REGION
74193
SPINA BIFIDA, W/O HYDROCEPHALUS LUMBAR REGION
7687
HYPOXIC-ISCHEMIC ENCEPH
ICD-9-CM Anoxic brain damage diagnosis codes:
3481
ANOXIC BRAIN DAMAGE
7685
SEVERE BIRTH ASPHYXIA
ICD-9-CM Continuous mechanical ventilation procedure code:
9672
ADD CONTINUOUS MECHANICAL VENTILATION >=96 HRS

Low risk group:
All patients not qualifying as high risk.

2a1.11 Risk Adjustment Type (Select type. Provide specifications for risk stratification in 2a1.10 and for statistical model in 2a1.13): **Statistical risk model** 2a1.12 If "Other," please describe:

2a1.13 Statistical Risk Model and Variables (Name the statistical method - e.g., logistic regression and list all the risk factor variables. Note - risk model development should be addressed in 2b4.):

The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, birthweight (500g groups), age in days (29-60, 61-90, 91+), age in years (in 5-year age groups), modified CMS DRG and AHRQ CCS comorbidities. The reference population used in the regression is the universe of discharges for states that participate in the HCUP State Inpatient Data (SID) for the years 2008, a database consisting of 43 states and approximately 6 million pediatric discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.

Covariates used in this measures:

Age in Years 13 to 18

Age in Years 6 to 13

MDC 1

High Risk (hemiplegia, paraplegia, or quadriplegia, spina bifida, anoxic brain, other continuous mechanical ventilation code for 96 or more consecutive hours)

2a1.14-16 Detailed Risk Model Available at Web page URL (or attachment). Include coefficients, equations, codes with descriptors, definitions, and/or specific data collection items/responses. Attach documents only if they are not available on a webpage and keep attached file to 5 MB or less. NQF strongly prefers you make documents available at a Web page URL. Please supply login/password if needed:

URL

<http://qualityindicators.ahrq.gov/Downloads/Software/SAS/V43/Risk%20Adjustment%20Tables%20PDI%204.3.pdf>

Not applicable

2a1.17-18. Type of Score: **Rate/proportion**

2a1.19 Interpretation of Score (Classifies interpretation of score according to whether better quality is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score): **Better quality = Lower score**

2a1.20 Calculation Algorithm/Measure Logic(Describe the calculation of the measure score as an ordered sequence of steps including identifying the target population; exclusions; cases meeting the target process, condition, event, or outcome; aggregating data; risk adjustment; etc.):

Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs six steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates. Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. For indicators that are not risk-adjusted, this is the reference population rate. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. For indicators that are not risk-adjusted, this is the same as the observed rate. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The shrinkage estimate reflects a reliability adjustment unique to each indicator

2a1.21-23 Calculation Algorithm/Measure Logic Diagram URL or attachment:

URL

<http://qualityindicators.ahrq.gov/Downloads/Resources/Publications/2011/QI%20Empirical%20Methods%2005-03-11.pdf>

Not applicable

2a1.24 Sampling (Survey) Methodology. If measure is based on a sample (or survey), provide instructions for obtaining the

sample, conducting the survey and guidance on minimum sample size (response rate):

Not applicable

2a1.25 **Data Source** (Check all the sources for which the measure is specified and tested). If other, please describe:

Administrative claims

2a1.26 **Data Source/Data Collection Instrument** (Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.): Healthcare Cost and Utilization Project State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality, Rockville, MD.

2a1.27-29 **Data Source/data Collection Instrument Reference Web Page URL or Attachment:** URL

<http://www.hcup-us.ahrq.gov/sidoverview.jsp>

Not applicable

2a1.30-32 **Data Dictionary/Code Table Web Page URL or Attachment:**

URL

<http://qualityindicators.ahrq.gov/Downloads/Software/WinQI/V43/AHQ%20QI%20Software%20Instructions,%20WinQI.pdf>

Not applicable

2a1.33 **Level of Analysis** (Check the levels of analysis for which the measure is specified and tested): Facility

2a1.34-35 **Care Setting** (Check all the settings for which the measure is specified and tested): Hospital/Acute Care Facility

2a2. **Reliability Testing.** (Reliability testing was conducted with appropriate method, scope, and adequate demonstration of reliability.)

2a2.1 **Data/Sample** (Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included):

HCUP State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). 2008. Agency for Healthcare Research and Quality, Rockville, MD. Includes approximately 6 million pediatric discharges for 2,500 hospitals.

2a2.2 **Analytic Method** (Describe method of reliability testing & rationale):

The signal to noise ratio is the ratio of the between hospital variance (signal) to the within hospital variance (noise). The formula is $\text{signal} / (\text{signal} + \text{noise})$. The ratio itself is only a diagnostic for the degree of variance in the risk-adjusted rate systematically associated with the provider. Therefore, what matters is the magnitude of the variance in the "smoothed" rate (that is, the variance in the risk-adjusted rate after the application of the univariate shrinkage estimator based on the signal ratio).

2a2.3 **Testing Results** (Reliability statistics, assessment of adequacy in the context of norms for the test conducted):

What the data demonstrate is systematic variation in the provider level rate of 0.647 to 3.222 per 1,000 from the 5th to 95th percentile after a signal ratio of 0.324 is applied as the shrinkage estimator (that is, after accounting for variation due to random factors).

California data from 2005-2007, which included "present on admission" reporting, were used to determine the percentage of hospitals with patient volumes sufficient to readily use the QI for tracking performance over time. The unadjusted event rate was 3.1 per 1,000 when POA cases were not excluded and 1.4 per 1,000 when POA information was used, as in current AHRQ software. Only 4 of 353 California hospitals (1.1%), with 24% of the eligible discharges statewide, had sufficient patient volume to detect a hypothetical doubling of the PDI 01 rate. This problem could be minimized by focusing public reporting of this indicator on hospitals that meet a minimum pediatric volume threshold, or by incorporating it into a more robust composite measure. (Bardach NS, Chien AT, Dudley RA. Small numbers limit the use of the inpatient pediatric quality indicators for hospital comparison. Acad Pediatr 2010; 10(4):266-73)

2b. **VALIDITY. Validity, Testing, including all Threats to Validity:** H M L I

2b1.1 Describe how the measure specifications (measure focus, target population, and exclusions) are consistent with the evidence cited in support of the measure focus (criterion 1c) and identify any differences from the evidence:

No identified differences using Version 4.3 software.

2b2. Validity Testing. (*Validity testing was conducted with appropriate method, scope, and adequate demonstration of validity.*)

2b2.1 Data/Sample (*Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*):

The most recent study of the criterion validity of PDI 02 was based on a consecutive sample of 254 flagged cases from 28 participating hospitals in the National Association of Children's Hospitals and Related Institutions (NACHRI) from 2003 through 2005 (Scanlon MC, Harris JM II, Levy F, et al. Evaluation of the agency for healthcare research and quality pediatric quality indicators. *Pediatrics* 2008; 121:e1723–31). Records were reviewed independently by clinicians at each site, who lacked formal training but were guided by teleconference discussions. A previous review of 118 flagged cases from 14 self-selected children's hospitals in the NACHRI Pediatric PSI Collaborative (Scanlon MC, Miller M, Harris JM, Schulz K, Sedman A. Targeted chart review of pediatric patient safety events identified by the Agency for Healthcare Research and Quality's patient safety indicators methodology. *J Patient Saf* 2006; 2:191-7) used similar methods.

2b2.2 Analytic Method (*Describe method of validity testing and rationale; if face validity, describe systematic assessment*):

Forty-four distinct professional clinical organizations and hospital associations were invited to submit nominations. These organizations were selected based on the applicability of the specialty or subspecialty to the candidate quality indicators. Nineteen organizations submitted nominations: Ambulatory Pediatric Association, American Academy of Allergy Asthma and Immunology, American Academy of Family Physicians, American Academy of Pediatrics, American College of Chest Physicians, American College of Nurse-Midwives, American Society of Pediatric Hematology/Oncology, American Society of Pediatric Nephrology, California Academy of Family Physicians, Child Health Corporation of America, National Association of Children's Hospitals and Related Institutions, National Association of Pediatric Nurse Practitioners, Pediatric Infectious Diseases Society, Society for Academic Emergency Medicine, Society for Adolescent Medicine, Society for Pediatric Anesthesia, Society of Critical Care Medicine, Society of Pediatric Nurses, and Society of Thoracic Surgeons.

These professional organizations nominated a total of 125 clinicians. All nominees were invited to participate, if eligible, in the evaluation of indicators available in Phase I and Phase II. In order to be eligible to participate, nominees were required to spend at least 30% of their work time on patient care, including hospitalized patients. From the 70 nominees accepting the invitation; five clinicians were ineligible to participate. Nominees were asked to provide information regarding their practice characteristics, including specialty, subspecialty, and setting (i.e., urban vs. rural location, region of country, and service to underserved populations), primary hospital of practice (i.e., funding source), and involvement in education (i.e., clinical training, academic affiliation).

To ensure appropriate clinical expertise on each panel, we identified the specialties that would be required to properly evaluate the indicators assigned to that panel. Panelists were selected so that each panel had diverse membership in terms of practice characteristics and setting. Thus, when a specific geographic area or type of clinician (e.g. academic) was over-represented by the pool of eligible nominees, randomly drawn members from that specific sub-group were contacted first to fill the panels. In addition, conference call scheduling logistics influenced assignments. From the 65 eligible nominees, 45 individuals accepted our invitation to participate on a specific panel.

Four panels were formed to evaluate indicators grouped as follows: Medical and surgical indicators, surgical only indicators, neonatal indicators and prevention indicators. All panels had diversity in the geographic location of panelists, and their type of practice.

Criterion validity is analyzed by calculating positive predictive value (PPV), which is defined as the percentage of reported events that are confirmed as true events based upon application of a "criterion (gold) standard." In the cited studies, the criterion standard was based on review of randomly or chronologically sampled medical records by an experienced clinician, using a standard data collection tool and guidelines.

2b2.3 Testing Results (*Statistical results, assessment of adequacy in the context of norms for the test conducted; if face validity, describe results of systematic assessment*):

Face validity was systematically assessed using an expert panel process, as described in our original submission documents (McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudry K. Measures of Pediatric Health Care Quality Based on Hospital Administrative Data: The Pediatric Quality Indicators. Rockville, MD: Agency for Healthcare Research and Quality, 2006). Specifically, this indicator was reviewed by a pediatric specialty panel with ten pediatric clinicians, including one neonatologist, one infectious disease specialist, one ambulatory care pediatrician, one hospitalist, one cardiovascular surgeon, one oncologist, two surgeons, one interventional radiologist, and one critical care physician. Median ratings were 7 (on a scale of 1-9) with indeterminate agreement on usefulness for internal quality improvement, 7 with indeterminate agreement for comparative

reporting, and 7 with indeterminate agreement for preventability. Interestingly, the expert panel felt that the indicator was most useful when tracking high risk populations, including patients with hemiplegia, paraplegia, quadriplegia (e.g., due to cerebral palsy), spina bifida, muscular dystrophies, and neurologic impairment due to trauma. Panelists also noted that “skin breakdown” or “sores” in newborns rarely stem from gravity alone, but rather from friction from equipment and other processes. These sores may not be identified as decubiti, so they are likely to be coded differently. For this reason, newborns were excluded from the PDI 02 denominator.

Studies targeting the validity of administrative data to measure HA PU in the pediatric population are limited. The larger, more recent study published in 2008 estimated a PPV of 54%, which is substantially higher than the PPV estimates for the adult version of this indicator (e.g., 30% [95% CI, 22-40%] and 26% [95% CI, 22-30%] for PSI 03). Fewer details are reported from the earlier (2006) study, but Table 1 in that paper suggests a PPV of at least 54% to 64%. The great majority of false positives were due to ulcers that were actually present on admission (i.e., 93 of 116 false positives in the NACHRI study), which would automatically be excluded by users with “present on admission” (POA) data. Adjusting for the availability of POA data, the estimated PPV in the 2008 NACHRI study was 86%. The remaining false positives were largely attributable to confusion over skin irritation or breakdown, due to friction or tape, versus pressure-related injury. Coding variation was especially notable in small infants, who have since been excluded from the PDI 02 denominator.

No data about the sensitivity of PDI 02 are available at this time, although the limited data available for PSI 03 suggests a need for further study.

POTENTIAL THREATS TO VALIDITY. (*All potential threats to validity were appropriately tested with adequate results.*)

2b3. Measure Exclusions. (*Exclusions were supported by the clinical evidence in 1c or appropriately tested with results demonstrating the need to specify them.*)

2b3.1 Data/Sample for analysis of exclusions (*Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*):

HCUP State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). 2008. Agency for Healthcare Research and Quality, Rockville, MD. Includes approximately 6 million pediatric discharges for 2,500 hospitals.

2b3.2 Analytic Method (*Describe type of analysis and rationale for examining exclusions, including exclusion related to patient preference*):

Exclude cases with preexisting condition of pressure ulcer (see Numerator) (principal diagnosis or secondary diagnosis present on admission)

If the user’s data lacks present on admission information, then the likelihood that the outcome of interest and the covariates are present on admission is estimated using a Markov Chain Monte Carlo (MCMC) estimation procedure. That likelihood is then used to adjust the observed and expected rates.

2b3.3 Results (*Provide statistical results for analysis of exclusions, e.g., frequency, variability, sensitivity analyses*):

Too few cases to report

2b4. Risk Adjustment Strategy. (*For outcome measures, adjustment for differences in case mix (severity) across measured entities was appropriately tested with adequate results.*)

2b4.1 Data/Sample (*Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*):

HCUP State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). 2008. Agency for Healthcare Research and Quality, Rockville, MD. Includes approximately 6 million pediatric discharges for 2,500 hospitals.

2b4.2 Analytic Method (*Describe methods and rationale for development and testing of risk model or risk stratification including selection of factors/variables*):

Risk-adjustment models use a standard set of categories based on readily available classification systems for demographics, severity of illness and comorbidities. Within each category, covariates are initially selected based on a minimum of 30 cases in the outcome of interest. Then a stepwise regression process on a development sample is used to select a parsimonious set of covariates where $p < .05$. Model is then tested on a validation sample.

The risk-adjustment model for PDI 02 includes age categories; a principal diagnosis of neurologic disease; a comorbid condition of hemiplegia, paraplegia, quadriplegia, spina bifida or anoxic brain damage; and continuous mechanical ventilation code for 96 or more consecutive hours.

2b4.3 Testing Results (*Statistical risk model: Provide quantitative assessment of relative contribution of model risk factors; risk model performance metrics including cross-validation discrimination and calibration statistics, calibration curve and risk decile plot, and assessment of adequacy in the context of norms for risk models. Risk stratification: Provide quantitative assessment of relationship of risk factors to the outcome and differences in outcomes among the strata*):
c-statistic 0.727

2b4.4 If outcome or resource use measure is not risk adjusted, provide rationale and analyses to justify lack of adjustment: Not applicable

2b5. Identification of Meaningful Differences in Performance. (*The performance measure scores were appropriately analyzed and discriminated meaningful differences in quality.*)

2b5.1 Data/Sample (*Describe the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*):

HCUP State Inpatient Databases (SID). Healthcare Cost and Utilization Project (HCUP). 2008. Agency for Healthcare Research and Quality, Rockville, MD. Includes approximately 6 million pediatric discharges for 2,500 hospitals.

2b5.2 Analytic Method (*Describe methods and rationale to identify statistically significant and practically/meaningfully differences in performance*):

Posterior probability distribution parameterized using the Gamma distribution

2b5.3 Results (*Provide measure performance results/scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance*):

Raw Rates (numerator / denominator):

5th	25th	Median	75th	95th
0.000647	0.001138	0.001602	0.002178	0.003222

2b6. Comparability of Multiple Data Sources/Methods. (*If specified for more than one data source, the various approaches result in comparable scores.*)

2b6.1 Data/Sample (*Describe the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*):

Not applicable

2b6.2 Analytic Method (*Describe methods and rationale for testing comparability of scores produced by the different data sources specified in the measure*):

Not applicable

2b6.3 Testing Results (*Provide statistical results, e.g., correlation statistics, comparison of rankings; assessment of adequacy in the context of norms for the test conducted*):

Not applicable

2c. Disparities in Care: H M L I NA (*If applicable, the measure specifications allow identification of disparities.*)

2c.1 If measure is stratified for disparities, provide stratified results (*Scores by stratified categories/cohorts*): In regard to figures below:

rates are risk adjusted rates per 1,000 (except where a US figure is presented, which is a per 1,000 observed rate)

1st figure: estimate

2nd figure: standard error

3rd figure: p value relative to marked group (marked group = "c")

4th figure: p value: current year relative to prior year

Key:

"c": Reference for p-value test statistics

*** Data do not meet criteria for statistical reliability, data quality, or confidentiality

Patient characteristic:

Age groups for pediatric conditions

0-4 c 1.836 0.107 0.053

5-9 3.740 0.197 0.000 0.000

10-14 3.731 0.174 0.000 0.049

15-17 6.566 0.192 0.000 0.175

Gender:

Male c 4.704 0.115 0.000

Female 2.651 0.108 0.000 0.004

Median income of patient's ZIP code:

First quartile (lowest income) 3.581 0.151 0.000 0.000

Second quartile 3.304 0.165 0.000 0.114

Third quartile 3.998 0.168 0.012 0.000

Fourth quartile (highest income) c 4.609 0.176 0.000

Location of patient residence (NCHS):

Large central metropolitan 4.034 0.150 0.451 0.916

Large fringe metropolitan c 3.874 0.151 0.881

Medium metropolitan 3.761 0.202 0.653 0.105

Small metropolitan 3.063 0.266 0.008 0.066

Micropolitan 3.452 0.272 0.175 0.858

Not metropolitan or micropolitan 4.810 0.358 0.016 0.091

Expected payment source:

Private insurance c 3.527 0.127 0.081

Medicare 3.878 1.063 0.743 0.140

Medicaid 4.177 0.117 0.000 0.373

Other insurance 3.332 0.331 0.583 0.292

Uninsured / self-pay / no charge 3.550 0.537 0.967 0.004

2c.2 If disparities have been reported/identified (e.g., in 1b), but measure is not specified to detect disparities, please explain:

Not applicable

2.1-2.3 Supplemental Testing Methodology Information:

URL

http://qualityindicators.ahrq.gov/Downloads/Modules_Non_Software/Modules%20Development%20Bullet/pdi_development.zip

Not applicable

Steering Committee: Overall, was the criterion, *Scientific Acceptability of Measure Properties*, met?

(Reliability and Validity must be rated moderate or high) Yes No

Provide rationale based on specific subcriteria:

If the Committee votes No, STOP

3. USABILITY

Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. **(evaluation criteria)**

C.1 Intended Actual/Planned Use (Check all the planned uses for which the measure is intended): [Public Reporting, Quality Improvement \(Internal to the specific organization\)](#)

3.1 Current Use (Check all that apply; for any that are checked, provide the specific program information in the following questions): [Public Reporting, Quality Improvement \(Internal to the specific organization\)](#)

3a. Usefulness for Public Reporting: H M L I
 (The measure is meaningful, understandable and useful for public reporting.)

3a.1. Use in Public Reporting - disclosure of performance results to the public at large (If used in a public reporting program, provide name of program(s), locations, Web page URL(s)). If not publicly reported in a national or community program, state the reason AND plans to achieve public reporting, potential reporting programs or commitments, and timeline, e.g., within 3 years of endorsement: [**For Maintenance** – If not publicly reported, describe progress made toward achieving disclosure of performance results to the public at large and expected date for public reporting; provide rationale why continued endorsement should be considered.]

This measure is used for reporting in 1 realm.
 Kentucky (Norton Healthcare, a hospital system)
 Norton Healthcare Quality Report
<http://www.nortonhealthcare.com/body.cfm?id=157>

3a.2. Provide a rationale for why the measure performance results are meaningful, understandable, and useful for public reporting. If usefulness was demonstrated (e.g., focus group, cognitive testing), describe the data, method, and results: A research team from the School of Public Affairs, Baruch College, under contracts with the Department of Public Health, Weill Medical College and Battelle, Inc., has developed a pair of Hospital Quality Model Reports at the request of the Agency for Healthcare Research & Quality (AHRQ). These reports are designed specifically to report comparative information on hospital performance based on the AHRQ Quality Indicators (QIs). The work was done in close collaboration with AHRQ staff and the AHRQ Quality Indicators team.

The Model Reports (discussed immediately above) are based on:

- Extensive search and analysis of the literature on hospital quality measurement and reporting, as well as public reporting on health care quality more broadly;
- Interviews with quality measurement and reporting experts, purchasers, staff of purchasing coalitions, and executives of integrated health care delivery systems who are responsible for quality in their facilities;
- Two focus groups with chief medical officers of hospitals and/or systems and two focus groups with quality managers from a broad mix of hospitals;
- Four focus groups with members of the public who had recently experienced a hospital admission; and
- Four rounds of cognitive interviews (a total of 62 interviews) to test draft versions of the two Model Reports with members of the public with recent hospital experience, basic computer literacy but widely varying levels of education

3.2 Use for other Accountability Functions (payment, certification, accreditation). If used in a public accountability program, provide name of program(s), locations, Web page URL(s): [Not applicable](#)

3b. Usefulness for Quality Improvement: H M L I
 (The measure is meaningful, understandable and useful for quality improvement.)

3b.1. Use in QI. If used in quality improvement program, provide name of program(s), locations, Web page URL(s): [**For Maintenance** – If not used for QI, indicate the reasons and describe progress toward using performance results for improvement].

The Pediatric Quality Indicators (PDIs) are a set of measures that can be used with hospital inpatient discharge data to provide a perspective on the quality of pediatric healthcare. Specifically, PDIs screen for problems that pediatric patients experience as a result of exposure to the healthcare system and that may be amenable to prevention by changes at the system or provider level.

The following are several entities that use the PDI in quality improvement:

- 1) Child Health Corporation of America (CHCA)
 CHCA reports performance in all PDIs to its 42 member hospitals for their tracking and use in quality improvement. [CHCA](#)

members are large freestanding pediatric hospitals.

2) National Association of Children’s Hospitals and Related Institutions (NACHRI)

As a benefit of membership, NACHRI reports all provider level PDIs to its approximately 85 member children’s hospitals for their quality improvement applications.

3) University Healthcare Consortium (UHC)

UHC is an alliance of 103 academic medical centers and 219 of their affiliated hospitals. UHC reports this and other AHRQ QIs to their member hospitals for their internal quality improvement purposes.

3b.2. Provide rationale for why the measure performance results are meaningful, understandable, and useful for quality improvement. If usefulness was demonstrated (e.g., QI initiative), describe the data, method and results:

The AHRQ QI support line receives approximately 150 user queries per month and almost 50 user per month download the AHRQ QI PDI software. Users have used the PDI since the release in 2006.

Users can readily use the risk-adjusted rate and the observed to expected results to identify opportunities for improvement for specific patient populations based on default stratifiers or risk adjustment model covariates. In addition, comparative data from the AHRQ SID and NIS databases provides relative performance information.

Overall, to what extent was the criterion, *Usability*, met? H M L I

Provide rationale based on specific subcriteria:

4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

4a. Data Generated as a Byproduct of Care Processes: H M L I

4a.1-2 How are the data elements needed to compute measure scores generated? (Check all that apply).

Data used in the measure are:

Coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims)

4b. Electronic Sources: H M L I

4b.1 Are the data elements needed for the measure as specified available electronically (Elements that are needed to compute measure scores are in defined, computer-readable fields): ALL data elements in electronic claims

4b.2 If ALL data elements are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources:

4c. Susceptibility to Inaccuracies, Errors, or Unintended Consequences: H M L I

4c.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measurement identified during testing and/or operational use and strategies to prevent, minimize, or detect. If audited, provide results:

Coding professionals follow detail guidelines, are subject to training and credentialing requirements, peer review and audit.

4d. Data Collection Strategy/Implementation: H M L I

A.2 Please check if either of the following apply (regarding proprietary measures):

4d.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data, missing data, timing and frequency of data collection, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues (e.g., fees for use of proprietary measures):

The AHRQ QI software has been publicly available at no cost since 2001; Users have over ten years of experience using the AHRQ QI software in SAS and Windows.

Overall, to what extent was the criterion, *Feasibility*, met? H M L I

Provide rationale based on specific subcriteria:

OVERALL SUITABILITY FOR ENDORSEMENT

Does the measure meet all the NQF criteria for endorsement? Yes No

Rationale:

If the Committee votes No, STOP.

If the Committee votes Yes, the final recommendation is contingent on comparison to related and competing measures.

5. COMPARISON TO RELATED AND COMPETING MEASURES

If a measure meets the above criteria and there are endorsed or new related measures (either the same measure focus or the same target population) or competing measures (both the same measure focus and the same target population), the measures are compared to address harmonization and/or selection of the best measure before a final recommendation is made.

5.1 If there are related measures (*either same measure focus or target population*) or competing measures (*both the same measure focus and same target population*), list the NQF # and title of all related and/or competing measures:

5a. Harmonization

5a.1 If this measure has EITHER the same measure focus OR the same target population as [NQF-endorsed measure\(s\)](#): Are the measure specifications completely harmonized?

5a.2 If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden:

5b. Competing Measure(s)

5b.1 If this measure has both the same measure focus and the same target population as NQF-endorsed measure(s): Describe why this measure is superior to competing measures (*e.g., a more valid or efficient way to measure quality*); OR provide a rationale for the additive value of endorsing an additional measure. (*Provide analyses when possible*):
Not applicable

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner): [Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850](#)

Co.2 Point of Contact: [John, Bott, Contractor, AHRQ Quality Indicators Measure Expert Center for Delivery, Organization and Markets, John.Bott@ahrq.hhs.gov, 301-427-1317-](#)

Co.3 Measure Developer if different from Measure Steward: [Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850](#)

Co.4 Point of Contact: [John, Bott, Contractor, AHRQ Quality Indicators Measure Expert Center for Delivery, Organization and Markets, John.Bott@ahrq.hhs.gov, 301-427-1317-](#)

Co.5 Submitter: [John, Bott, Contractor, AHRQ Quality Indicators Measure Expert Center for Delivery, Organization and Markets, John.Bott@ahrq.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality](#)

Co.6 Additional organizations that sponsored/participated in measure development:
[University of California-Davis](#)
[Stanford University](#)
[Battelle Memorial Institute](#)

Co.7 Public Contact: [John, Bott, Contractor, AHRQ Quality Indicators Measure Expert Center for Delivery, Organization and](#)

Markets, John.Bott@ahrq.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development

Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.

Multi-specialty Panel and Surgical Panel members are listed in the technical report:

http://qualityindicators.ahrq.gov/Downloads/Modules_Non_Software/Modules%20Development%20Bullet/pdi_development.zip

Ad.2 If adapted, provide title of original measure, NQF # if endorsed, and measure steward. Briefly describe the reasons for adapting the original measure and any work with the original measure steward: [This indicator was originally proposed by lezzoni et al. as part of the Complications Screening Program \(CSP "sentinel events"\)](#)

Measure Developer/Steward Updates and Ongoing Maintenance

Ad.3 Year the measure was first released: 2006

Ad.4 Month and Year of most recent revision: 08, 2011

Ad.5 What is your frequency for review/update of this measure? Annual

Ad.6 When is the next scheduled review/update for this measure? 12, 2011

Ad.7 Copyright statement: Not applicable

Ad.8 Disclaimers: Not applicable

Ad.9 Additional Information/Comments: Not applicable

Date of Submission (MM/DD/YY): 09/14/2011