



Measure Information

This document contains the information submitted by measure developers/stewards, but is organized according to NQF's measure evaluation criteria and process. The item numbers refer to those in the submission form but may be in a slightly different order here. In general, the item numbers also reference the related criteria (e.g., item 1b.1 relates to sub criterion 1b).

Brief Measure Information

NQF #: 0138

Corresponding Measures:

De.2. Measure Title: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Co.1.1. Measure Steward: Centers for Disease Control and Prevention

De.3. Brief Description of Measure: Standardized Infection Ratio (SIR) of healthcare-associated, catheter-associated urinary tract infections (UTI) will be calculated among patients in bedded inpatient care locations, except level II or level III neonatal intensive care units (NICU).

This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavior health hospitals.

1b.1. Developer Rationale: The use of this measure will promote CAUTI prevention activities that will lead to improved patient outcomes including reduction of avoidable medical costs, and patient morbidity and mortality through reduced need for antimicrobials and reduced length of stay.

S.4. Numerator Statement: Total number of observed healthcare-associated CAUTI among patients in bedded inpatient care locations (excluding patients in Level II or III neonatal ICUs).

S.6. Denominator Statement: Total number of predicted healthcare-associated CAUTI among inpatient care locations under surveillance for CAUTI during the data period, based on the national CAUTI baseline Data is calculated using the facility's number of catheter days and the following significant risk factors:

- Acute Care Hospitals: CDC Location, Facility bed size, Medical school affiliation, and Facility type
- Critical Access Hospitals: Medical school affiliation
- Long-Term Acute Hospitals: Average length of stay, Setting type, and Location type
- Inpatient Rehabilitation Facilities: Setting type, Proportion of admissions with traumatic and non-traumatic spinal cord dysfunction, Proportion of admissions with stroke

S.8. Denominator Exclusions: The following are not considered indwelling catheters by NHSN definitions:

1. Suprapubic catheters
2. Condom catheters
3. "In and out" catheterizations
4. Nephrostomy tubes

Note, that if a patient has either a nephrostomy tube or a suprapubic catheter and also has an indwelling urinary catheter, the indwelling urinary catheter will be included in the CAUTI surveillance.

De.1. Measure Type: Outcome

S.17. Data Source: Electronic Health Data, Electronic Health Records, Other, Paper Medical Records

S.20. Level of Analysis: Facility, Other, Population : Regional and State

IF Endorsement Maintenance – Original Endorsement Date: Aug 10, 2009 **Most Recent Endorsement Date:** Oct 23, 2019

IF this measure is included in a composite, NQF Composite#/title:

IF this measure is paired/grouped, NQF#/title:

De.4. IF PAIRED/GROUPED, what is the reason this measure must be reported with other measures to appropriately interpret results?

1. Evidence, Performance Gap, Priority – Importance to Measure and Report

Extent to which the specific measure focus is evidence-based, important to making significant gains in healthcare quality, and improving health outcomes for a specific high-priority (high-impact) aspect of healthcare where there is variation in or overall less-than-optimal performance. **Measures must be judged to meet all sub criteria to pass this criterion and be evaluated against the remaining criteria.**

1a. Evidence to Support the Measure Focus – See attached Evidence Submission Form

[NQF_CAUTI_evidence_final_review.docx](#)

1a.1 For Maintenance of Endorsement: Is there new evidence about the measure since the last update/submission?

Do not remove any existing information. If there have been any changes to evidence, the Committee will consider the new evidence. Please use the most current version of the evidence attachment (v7.1). Please use red font to indicate updated evidence.

Yes

1b. Performance Gap

Demonstration of quality problems and opportunity for improvement, i.e., data demonstrating:

- considerable variation, or overall less-than-optimal performance, in the quality of care across providers; and/or
- Disparities in care across population groups.

1b.1. Briefly explain the rationale for this measure (e.g., how the measure will improve the quality of care, the benefits or improvements in quality envisioned by use of this measure)

If a COMPOSITE (e.g., combination of component measure scores, all-or-none, any-or-none), SKIP this question and answer the composite questions.

The use of this measure will promote CAUTI prevention activities that will lead to improved patient outcomes including reduction of avoidable medical costs, and patient morbidity and mortality through reduced need for antimicrobials and reduced length of stay.

1b.2. Provide performance scores on the measure as specified (current and over time) at the specified level of analysis. (*This is required for maintenance of endorsement. Include mean, std dev, min, max, interquartile range, scores by decile. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities include.*) This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use.

When SIRs are compared over time, assessment of performance can be made. Although CAUTIs that include those caused by yeast declined on wards from 2012 through 2014, they failed to decline in ICUs, where they increased and then remained elevated from 2012 through 2014 (Figure 5). However, using the more clinically-relevant CAUTI definition that no longer includes yeast, and applying this retrospectively as well as in the new baseline, there have been consistent year-to-year declines in CAUTIs in both ICUs and wards from 2012 through 2016. For figures related to performance data please see

<https://www.cdc.gov/hai/data/portal/progress-report.html>

CAUTI using 2015 baseline:

National Catheter-associated UTI SIR in 2015 is 0.993 = 28,712 observed / 28,910.634 predicted

National Catheter-associated UTI SIR in 2016 is 0.930 = 26,983 observed / 29,002.430 predicted

National catheter-associated UTI SIR in 2017 is 0.880 = 24,865 observed / 28,241.960 predicted

Percent Change 2016 v. 2015 6% decrease

There was about a 5% statistically significant decrease in CAUTI between 2016 and 2017

2015-

facilities: 3,658

Median: 0.872

Range, at 5% and 95%: (0.000 – 2.369)

2016-

facilities: 3,644

Median: 0.819

Range, at 5% and 95%: (0.000 – 2.184)

The 2017 National and State Healthcare-associated infections progress report:
<https://www.cdc.gov/hai/data/portal/progress-report.html>

The Healthcare-associated Infections in the United States, 2006-2016: A Story of Progress located here:
<https://www.cdc.gov/hai/surveillance/data-reports/data-summary-assessing-progress.html>

The 2016 National and State Healthcare-associated Infection Data Report:
<https://www.cdc.gov/hai/data/portal/progress-report.html>

1b.3. If no or limited performance data on the measure as specified is reported in 1b2, then provide a summary of data from the literature that indicates opportunity for improvement or overall less than optimal performance on the specific focus of measurement.

1b.4. Provide disparities data from the measure as specified (current and over time) by population group, e.g., by race/ethnicity, gender, age, insurance status, socioeconomic status, and/or disability. (*This is required for maintenance of endorsement. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included.*) For measures that show high levels of performance, i.e., “topped out”, disparities data may demonstrate an opportunity for improvement/gap in care for certain sub-populations. This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use.

No studies provide evidence of a direct relationship between social risk and HAIs. Instead, they provide evidence that social risk factors are associated with an increased risk of chronic disease conditions, suboptimal care for those conditions, compromised functional status, exposure to nursing homes, and colonization with bacterial pathogens. While these associations may be meaningful, they do not establish a direct relationship between social risk factors and HAIs.

1b.5. If no or limited data on disparities from the measure as specified is reported in 1b.4, then provide a summary of data from the literature that addresses disparities in care on the specific focus of measurement. Include citations. Not necessary if performance data provided in 1b.4

Among patients hospitalized with acute cardiovascular disease, pneumonia, and major surgery, Asian and Hispanic patients had significantly higher rates of HAIs than white, non-Hispanic patients.

Bakullari, Anila, Mark L. Metersky, Yun Wang, Noel Eldridge, Sheila Eckenrode, Michelle M. Pandolfi, Lisa Jaser, Deron Galusha, and Ernest Moy. "Racial and Ethnic Disparities in Healthcare-Associated Infections in the United States, 2009–2011." *Infection Control and Hospital Epidemiology* 35, no. S3 (2014): S10-16. doi:10.1086/677827

2. Reliability and 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. **Measures must be judged to meet the sub criteria for both reliability and validity to pass this criterion and be evaluated against the remaining criteria.**

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2a.1. Specifications The measure is well defined and precisely specified so it can be implemented consistently within and across organizations and allows for comparability. eMeasures should be specified in the Health Quality Measures Format (HQMF) and the Quality Data Model (QDM).

De.5. Subject/Topic Area (check all the areas that apply):

Infectious Diseases (ID)

De.6. Non-Condition Specific(check all the areas that apply):

Primary Prevention, Safety, Safety : Complications, Safety : Healthcare Associated Infections

De.7. Target Population Category (Check all the populations for which the measure is specified and tested if any):

Children, Elderly, Populations at Risk, Populations at Risk : Dual eligible beneficiaries, Populations at Risk : Individuals with multiple chronic conditions, Populations at Risk : Veterans, Women

S.1. Measure-specific Web Page (Provide a URL link to a web page specific for this measure that contains current detailed specifications including code lists, risk model details, and supplemental materials. Do not enter a URL linking to a home page or to general information.)

<https://www.cdc.gov/nhsn/pdfs/pscmanual/7psccauticurrent.pdf>, <https://www.cdc.gov/nhsn/acute-care-hospital/cauti/index.html>;

S.2a. If this is an eMeasure, HQMF specifications must be attached. Attach the zipped output from the eMeasure authoring tool (MAT) - if the MAT was not used, contact staff. (Use the specification fields in this online form for the plain-language description of the specifications)

This is not an eMeasure Attachment:

S.2b. Data Dictionary, Code Table, or Value Sets (and risk model codes and coefficients when applicable) must be attached. (Excel or csv file in the suggested format preferred - if not, contact staff)

Attachment Attachment: [Copy_of_nhsn-data-dictionary.xlsx](#)

S.2c. Is this an instrument-based measure (i.e., data collected via instruments, surveys, tools, questionnaires, scales, etc.)? Attach copy of instrument if available.

No, this is not an instrument-based measure Attachment:

S.2d. Is this an instrument-based measure (i.e., data collected via instruments, surveys, tools, questionnaires, scales, etc.)? Attach copy of instrument if available.

S.3.1. For maintenance of endorsement: Are there changes to the specifications since the last updates/submission. If yes, update the specifications for S1-2 and S4-22 and explain reasons for the changes in S3.2.

Yes

S.3.2. For maintenance of endorsement, please briefly describe any important changes to the measure specifications since last measure update and explain the reasons.

Scope of measurement has been broadened to include some patient care areas outside of intensive care units (ICUs) and to also include oncology hospitals as urinary catheters are utilized broadly in these locations. The standardized infection ratio is a summary metric suitable for quarterly and annual reporting of CAUTI data. The SIR can be used to describe performance in a particular calendar quarter or annually and can be used to measure change in performance over those time periods. The adjusted ranking metric (ARM) has been added and is a suitable summary measure to rank facilities and is preferred to the SIR for that purpose. The ARM also can be used to measure performance of facilities over time. Risk models were updated using the 2015 incidence and risk factor data.

S.4. Numerator Statement (Brief, narrative description of the measure focus or what is being measured about the target population, i.e., cases from the target population with the target process, condition, event, or outcome) DO NOT include the rationale for the measure.

IF an OUTCOME MEASURE, state the outcome being measured. Calculation of the risk-adjusted outcome should be described in the

calculation algorithm (S.14).

Total number of observed healthcare-associated CAUTI among patients in bedded inpatient care locations (excluding patients in Level II or III neonatal ICUs).

S.5. 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, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)

IF an OUTCOME MEASURE, describe how the observed outcome is identified/counted. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).

1. Definition of Infection that is Present on Admission (POA): An infection where all of the elements of an infection definition are present during the two calendar days before the day of admission, the first day of admission (day 1) and/or the day after admission (day 2) and are documented in the medical chart. Infections that are POA should not be reported as healthcare-associated infections (HAI) and are not reported as CAUTI. Symptoms must be documented in the chart by a healthcare professional during the POA time frame (e.g., nursing home documents fever prior to arrival to the hospital, patient reports fever >38.0°C). Physician diagnosis alone cannot be accepted as evidence of a urinary tract infection that is POA.

2. Definition of Healthcare-associated Infection (HAI): Any infection reported to NHSN must meet the definition of an NHSN HAI, that is, a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) that was not present on admission to the acute care facility. An infection is considered an HAI if the date of event of the NHSN site-specific infection criterion occurs on or after the 3rd calendar day of admission to an inpatient location where day of admission is calendar day 1. All elements of the site-specific infection criterion must occur during the infection window period.

3. Definition of Infection Window Period: The NHSN Infection Window Period is defined as the 7-days during which all site-specific infection criteria must be met. It includes the day the first positive diagnostic test that is an element of the site-specific infection criterion, was obtained, the 3 calendar days before and the 3 calendar days after.

4. Definition of CAUTI: A UTI (either a Symptomatic Urinary Tract Infection [SUTI], or an asymptomatic bacteremic urinary tract infection [ABUTI]) where an indwelling urinary catheter was in place for more than 2 consecutive days in an inpatient location on the date of event, with day of device placement being Day 1, AND an indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for more than 2 consecutive days in an inpatient location and then removed, the UTI date of event must be the day of discontinuation or the next calendar day to be catheter-associated.

5. Definition of indwelling catheter: A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a drainage bag (including leg bags). These devices are also called Foley catheters. Condom or straight in-and-out catheters are not included nor are nephrostomy tubes or suprapubic catheters unless a indwelling urinary catheter is also present. Indwelling urethral catheters that are used for intermittent or continuous irrigation are included in CAUTI surveillance.

6. NHSN UTI criteria: Symptomatic Urinary Tract Infection criteria or Asymptomatic Bacteremic Urinary Tract Infection criteria. See below:

A Symptomatic Urinary Tract Infection (SUTI) that is catheter associated must meet A) or B) below:

A) Patient must meet 1, 2, and 3 below:

1. Patient had an indwelling urinary catheter that had been in place for more than 2 consecutive days as an inpatient on the date of event (day of device placement = Day 1) AND was either:

- Present for any portion of the calendar day on the date of event†,

OR

- Removed the day before the date of event†

2. Patient has at least one of the following signs or symptoms:

- fever (>38.0°C) (To use fever in a patient > 65 years of age, the IUC needs to be in place for more than 2 consecutive days in an inpatient location on date of event and is either still in place OR was removed the day before the DOE.)
- suprapubic tenderness*

- costovertebral angle pain or tenderness*
- urinary urgency ^
- urinary frequency ^
- dysuria ^

3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of $\geq 10^5$ CFU/ml (See Comments). All elements of the UTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN).

† When entering event into NHSN choose “INPLACE” for Risk Factor for Urinary Catheter

‡ When entering event into NHSN choose “REMOVE” for Risk Factor for Urinary Catheter

*With no other recognized cause (see Comments)

^ These symptoms cannot be used when catheter is in place. An indwelling urinary catheter in place could cause patient complaints of “frequency” “urgency” or “dysuria”.

B) Patient must meet 1, 2, and 3 below:

1. Patient is ≥ 1 year of age

2. Patient has at least one of the following signs or symptoms:

- fever ($>38.0^\circ\text{C}$)
- hypothermia ($<36.0^\circ\text{C}$)
- apnea*
- bradycardia*
- lethargy*
- vomiting*
- suprapubic tenderness*

3. Patient has a urine culture with no more than two species of organisms, at least one of which is a bacterium of $\geq 10^5$ CFU/ml. All elements of the SUTI criterion must occur during the Infection Window Period

*With no other recognized cause

‡ If patient had an indwelling urinary catheter in place for more than 2 consecutive days in an inpatient location, and catheter was in place on the date of event or the previous day the CAUTI criterion is met. If no such indwelling urinary catheter was in place, UTI (non-catheter associated) criterion is met.

Note: Fever and hypothermia are non-specific symptoms of infection and cannot be excluded from UTI determination because they are clinically deemed due to another recognized cause.

An Asymptomatic Bacteremic Urinary Tract Infection (ABUTI) that is catheter associated must meet the following:

Patient must meet 1, 2, and 3 below:

1. Patient has no signs or symptoms of SUTI 1 or 2 according to age

2. Patient has a urine culture with no more than two species of organisms, at least one of which is a bacterium of $\geq 10^5$ CFU/ml

3. Patient has organism identified** from blood specimen with at least one matching bacterium to the bacterium identified in the urine specimen, or meets LCBI criterion 2 (without fever) and matching common commensal(s) in the urine. All elements of the ABUTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN).

** Organisms identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST)).

7. Definition of Location of Attribution: The inpatient location where the patient was assigned on the date of the UTI event.

8. Definition of Date of Event: The date when the first element used to meet the UTI criterion occurred during the infection window period.

9. Definition of Repeat Infection Timeframe (RIT): The RIT is a 14-day timeframe during which no new infections of the same type are reported. The date of event is Day 1 of the 14-day RIT. Additional pathogens recovered during the RIT from the same type of infection are added to the event. The RIT will apply at the level of specific type of infection with the exception of BSI, UTI, and PNEU where the RIT will apply at the major type of infection.

S.6. Denominator Statement *(Brief, narrative description of the target population being measured)*

Total number of predicted healthcare-associated CAUTI among inpatient care locations under surveillance for CAUTI during the data period, based on the national CAUTI baseline Data is calculated using the facility's number of catheter days and the following significant risk factors:

- Acute Care Hospitals: CDC Location, Facility bed size, Medical school affiliation, and Facility type
- Critical Access Hospitals: Medical school affiliation
- Long-Term Acute Hospitals: Average length of stay, Setting type, and Location type
- Inpatient Rehabilitation Facilities: Setting type, Proportion of admissions with traumatic and non-traumatic spinal cord dysfunction, Proportion of admissions with stroke

S.7. Denominator Details *(All information required to identify and calculate the target population/denominator such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b.)*

IF an OUTCOME MEASURE, describe how the target population is identified. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).

Numbers of indwelling urinary catheter days attributed to each location are counted for each data period using the following definitions and guidelines. All indwelling urinary catheter days for each location and data period are summed.

1. Definition of indwelling catheter day: For each patient, a day that an indwelling urinary catheter was present at the time of the indwelling urinary catheter day count.

2. CDC Location (acute care hospitals, long term acute care hospitals): Each patient care area in a facility that is monitored in NHSN is "mapped" to one or more CDC Locations. The specific CDC Location code is determined by the type of patients cared for in that area according to the 80% Rule. That is, if 80% of patients are of a certain type (e.g., pediatric patients with orthopedic problems) then that area is designated as that type of location (in this case, an Inpatient Pediatric Orthopedic Ward).
https://www.cdc.gov/nhsn/pdfs/pscmanual/15locationsdescriptions_current.pdf

3. Medical school affiliation categories:

- a. Major – facility has a program for medical students and post-graduate medical training
- b. Graduate – facility has a program for post-graduate medical training (i.e., residency and/or fellowships)
- c. Undergraduate: facility has a program for medical students only

4. Facility bedsize: Number of beds set up and staffed in the healthcare facility

5. Setting (Freestanding or Within a Hospital): Describes physical placement of LTACH or IRF and does not define financial or administrative relationship with other healthcare facility types.

6. Definition for Facility Physician Education Status: Teaching statuses: major, graduate, undergraduate - Major: Facility has a program for medical students and post-graduate medical training; Graduate: Facility has a program for post-graduate medical training (i.e., residency and/or fellowships); Undergraduate: Facility has a program for medical students only.

7. Proportion of admissions within a diagnostic category: number of admissions during the calendar year where the primary

diagnosis of that type (e.g. traumatic spinal cord dysfunction) divided by the total number of admissions during the calendar year

S.8. Denominator Exclusions (Brief narrative description of exclusions from the target population)

The following are not considered indwelling catheters by NHSN definitions:

1. Suprapubic catheters
2. Condom catheters
3. "In and out" catheterizations
4. Nephrostomy tubes

Note, that if a patient has either a nephrostomy tube or a suprapubic catheter and also has an indwelling urinary catheter, the indwelling urinary catheter will be included in the CAUTI surveillance.

S.9. Denominator Exclusion Details (All information required to identify and calculate exclusions from the denominator such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b.)

See S. 10

S.10. Stratification Information (Provide all information required to stratify the measure results, if necessary, including the stratification variables, definitions, specific data collection items/responses, code/value sets, and the risk-model covariates and coefficients for the clinically-adjusted version of the measure when appropriate – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format with at S.2b.)

CAUTI data is stratified by facility-specific and individual patient location data (i.e., bedsize of location, affiliation and level of affiliation with a medical school [Teaching statuses: major, graduate, undergraduate, not affiliated - See definitions S.7. above.

S.11. Risk Adjustment Type (Select type. Provide specifications for risk stratification in measure testing attachment)

Statistical risk model

If other:

S.12. Type of score:

Ratio

If other:

S.13. 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

S.14. Calculation Algorithm/Measure Logic (Diagram or 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; time period for data, aggregating data; risk adjustment; etc.)

The Standardized Infection Ratio (SIR) for annual and quarterly data aggregation and analysis of CAUTI events is calculated for each healthcare facility for a specified time period. The SIR is an indirect standardization method for summarizing healthcare associated infection (HAI) experience, including CAUTI events, in a single group of data or across any number of stratified groups of data. To produce the SIR:

1. Identify number of observed healthcare-associated CAUTIs for a given time period by adding the total number of observed CAUTIs across the facility.
2. Calculate the number of predicted healthcare-associated CAUTIs for each CDC location using a negative binomial regression model and the risk factors described above.
3. Calculate the number of predicted healthcare-associated CAUTIs for the facility and time period by adding the predicted number of CAUTIs for each location across the facility.
4. Divide the number of observed healthcare-associated CAUTIs (1 above) by the number of predicted healthcare-associated CAUTIs (3 above) to obtain the SIR.
5. Perform a Poisson test to compare the SIR obtained in 4 above to the nominal value of 1. P-value and confidence interval will be calculated, which can be used to assess significance of SIR.

(The NHSN analysis tool will perform the calculations once the patient infection data, denominator information, and related facility-level information are entered into the system.)

The Adjusted Ranking Metric (ARM) for annual data aggregation and analysis of HAI events, including CAUTI events, combines the

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method of indirect standardization used to calculate the unadjusted SIR described above with a Bayesian random effects hierarchical model to account for the potentially low precision and/or reliability inherent in the unadjusted SIR. A Bayesian posterior distribution constructed through Monte Carlo Markov Chain sampling is used to produce the adjusted numerator. The ARM enables more meaningful statistical differentiation between hospitals by accounting for differences in patient case-mix, exposure volume (e.g. patient days, indwelling urinary catheter days, central line-days, surgical procedure volume), and unmeasured factors that are not reflected in the unadjusted SIR and that cause variation between healthcare facilities. Accounting for these sources of variability enables better measure discrimination between facilities and leads to more reliable performance rankings. To produce the ARM:

1. Identify the number of CAUTI in each location
2. Obtain the adjusted number of observed CAUTIs by using a Bayesian posterior distribution constructed through Monte Carlo Markov Chain sampling which results from a Bayesian random effects model.
3. Total these numbers for an observed number of CAUTIs
4. Obtain the predicted number of CAUTIs in the same locations by multiplying the observed indwelling urinary catheter days according to the factors significantly associated with predicting CAUTI incidence as identified through a Log-linear Negative Binomial Regression Model.
5. Divide the total number of adjusted CAUTI events ("3" above) by the predicted number of CAUTIs ("4" above).
6. Result = ARM

S.15. Sampling (If measure is based on a sample, provide instructions for obtaining the sample and guidance on minimum sample size.)

IF an instrument-based performance measure (e.g., PRO-PM), identify whether (and how) proxy responses are allowed.

Not based on sample or survey

S.16. Survey/Patient-reported data (If measure is based on a survey or instrument, provide instructions for data collection and guidance on minimum response rate.)

Specify calculation of response rates to be reported with performance measure results.

Not PRO-PM

S.17. Data Source (Check ONLY the sources for which the measure is SPECIFIED AND TESTED).

If other, please describe in S.18.

Electronic Health Data, Electronic Health Records, Other, Paper Medical Records

S.18. Data Source or Collection Instrument (Identify the specific data source/data collection instrument (e.g. name of database, clinical registry, collection instrument, etc., and describe how data are collected.)

IF instrument-based, identify the specific instrument(s) and standard methods, modes, and languages of administration.

NHSN Urinary Tract Infection form; NHSN Denominators for Intensive Care Unit (ICU)/Other Locations (not NICU or SCA) form; NHSN Denominators for Specialty Care Areas/Oncology form.

S.19. Data Source or Collection Instrument (available at measure-specific Web page URL identified in S.1 OR in attached appendix at A.1)

Available at measure-specific web page URL identified in S.1

S.20. Level of Analysis (Check ONLY the levels of analysis for which the measure is SPECIFIED AND TESTED)

Facility, Other, Population : Regional and State

S.21. Care Setting (Check ONLY the settings for which the measure is SPECIFIED AND TESTED)

Inpatient/Hospital, Other:Oncology hospital, Post-Acute Care

If other:

S.22. COMPOSITE Performance Measure - Additional Specifications (Use this section as needed for aggregation and weighting rules, or calculation of individual performance measures if not individually endorsed.)

2. Validity – See attached Measure Testing Submission Form

CAUTI_NQF_testing_Final_revision2.26.19_-003-.docx

2.1 For maintenance of endorsement

Reliability testing: If testing of reliability of the measure score was not presented in prior submission(s), has reliability testing of the measure score been conducted? If yes, please provide results in the Testing attachment. Please use the most current version of the testing attachment (v7.1). Include information on all testing conducted (prior testing as well as any new testing); use red font to indicate updated testing.

Yes

2.2 For maintenance of endorsement

Has additional empirical validity testing of the measure score been conducted? If yes, please provide results in the Testing attachment. Please use the most current version of the testing attachment (v7.1). Include information on all testing conducted (prior testing as well as any new testing); use red font to indicate updated testing.

Yes

2.3 For maintenance of endorsement

Risk adjustment: For outcome, resource use, cost, and some process measures, risk-adjustment that includes social risk factors is not prohibited at present. Please update sections 1.8, 2a2, 2b1,2b4.3 and 2b5 in the Testing attachment and S.140 and S.11 in the online submission form. NOTE: These sections must be updated even if social risk factors are not included in the risk-adjustment strategy. You MUST use the most current version of the Testing Attachment (v7.1) -- older versions of the form will not have all required questions.

Yes - Updated information is included

3. Feasibility

Extent to which the specifications including measure logic, require data that are readily available or could be captured without undue burden and can be implemented for performance measurement.

3a. Byproduct of Care Processes

For clinical measures, the required data elements are routinely generated and used during care delivery (e.g., blood pressure, lab test, diagnosis, medication order).

3a.1. Data Elements Generated as Byproduct of Care Processes.

Generated or collected by and used by healthcare personnel during the provision of care (e.g., blood pressure, lab value, diagnosis, depression score), Abstracted from a record by someone other than person obtaining original information (e.g., chart abstraction for quality measure or registry), Other

If other: CAUTI and catheter days must be collected by trained hospital staff from information available in clinical data sources. The standard population's CAUTI rates are available from the NHSN Report. The NHSN analysis tool will automatically calculate SIRs. Some of the data used in the measure can be mined from electronic data sources.

3b. Electronic Sources

The required data elements are available in electronic health records or other electronic sources. If the required data are not in electronic health records or existing electronic sources, a credible, near-term path to electronic collection is specified.

3b.1. To what extent are the specified data elements available electronically in defined fields (i.e., data elements that are needed to compute the performance measure score are in defined, computer-readable fields) Update this field for maintenance of endorsement.

Some data elements are in defined fields in electronic sources

3b.2. If ALL the data elements needed to compute the performance measure score are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources. For maintenance of endorsement, if this measure is not an eMeasure (eCQM), please describe any efforts to develop an eMeasure (eCQM).

NHSN is moving towards an electronically captured CAUTI measure for future use. However, development and testing is not complete at this time.

3b.3. If this is an eMeasure, provide a summary of the feasibility assessment in an attached file or make available at a measure-

specific URL. Please also complete and attach the NQF Feasibility Score Card.

Attachment:

3c. Data Collection Strategy

Demonstration that the data collection strategy (e.g., source, timing, frequency, sampling, patient confidentiality, costs associated with fees/licensing of proprietary measures) can be implemented (e.g., already in operational use, or testing demonstrates that it is ready to put into operational use). For eMeasures, a feasibility assessment addresses the data elements and measure logic and demonstrates the eMeasure can be implemented or feasibility concerns can be adequately addressed.

3c.1. Required for maintenance of endorsement. Describe difficulties (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.

IF instrument-based, consider implications for both individuals providing data (patients, service recipients, respondents) and those whose performance is being measured.

CAUTI surveillance in hospitals participating in CDC surveillance systems since the 1990s, and the CAUTI measure has been endorsed by NQF in 2 measure sets since 2004. The criteria for UTI were streamlined in 2009 and the asymptomatic bacteriuria specific site of UTI dropped as it was felt to represent colonization rather than infection.

3c.2. Describe any fees, licensing, or other requirements to use any aspect of the measure as specified (e.g., value/code set, risk model, programming code, algorithm).

There are no fees to utilize NQF measure 0138. Participants must sign a Rules of Behavior document which states that they will follow the CAUTI surveillance protocol in its entirety and report data that is in accordance with this manual.

4. Usability and Use

Extent to which potential audiences (e.g., consumers, purchasers, providers, policy makers) are using or could use performance results for both accountability and performance improvement to achieve the goal of high-quality, efficient healthcare for individuals or populations.

4a. Accountability and Transparency

Performance results are used in at least one accountability application within three years after initial endorsement and are publicly reported within six years after initial endorsement (or the data on performance results are available). If not in use at the time of initial endorsement, then a credible plan for implementation within the specified timeframes is provided.

4.1. Current and Planned Use

NQF-endorsed measures are expected to be used in at least one accountability application within 3 years and publicly reported within 6 years of initial endorsement in addition to performance improvement.

Specific Plan for Use	Current Use (for current use provide URL)

4a1.1 For each CURRENT use, checked above (update for maintenance of endorsement), provide:

- Name of program and sponsor
- Purpose
- Geographic area and number and percentage of accountable entities and patients included
- Level of measurement and setting

1) Name: Hospital Inpatient Quality Reporting Program (HIQR)

Sponsor: Centers for Medicare and Medicaid Services

Purpose: To improve health, improve care and lower cost (triple aims) of Medicare beneficiaries.

Geographic area and number and percentage of accountable entities and patients included: Nationwide, currently covers all acute care hospitals with ICUs (approximately 3300).*

Level of measurement and setting: Facility-Level, acute inpatient hospital

2) Name: Prospective Payment System Exempt Cancer Hospital Quality Reporting Program

#0138 National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure, Last Updated: Oct 23, 2019

Sponsor: Centers for Medicare and Medicaid Services

Purpose: To establish a quality reporting program for PPS-Exempt Cancer Hospital to improve health, improve care and lower cost (triple aims) of Medicare beneficiaries.

Geographic area and number and percentage of accountable entities and patients: 11 Patient Prospective Payment Exempt Cancer Hospitals in 7 U.S. states with 19,203 average discharges each in FY 2012*.

Level of measurement and setting: Facility-Level, PPS-Exempt cancer hospital

3) Name: Inpatient Rehabilitation Facility (IRF) Quality Reporting Program

Sponsor: Centers for Medicare and Medicaid Services

Purpose: To establish a quality reporting program for IRFs to improve health, improve care and lower cost (triple aims) of Medicare beneficiaries.

Geographic area and number and percentage of accountable entities and patients: All 50 U.S. States are included, 371,288 IRF discharges in 2011*.

Level of measurement and setting: Facility-Level, acute inpatient hospital

4) Name: Long Term Care Hospital (LTCH) Quality Reporting Program

Sponsor: Centers for Medicare and Medicaid Services

Purpose: To establish a quality reporting program for LTCHs to improve health, improve care and lower cost (triple aims) of Medicare beneficiaries.

Geographic area and number and percentage of accountable entities and patients included: All 442 Medicare certified long-term care hospitals are required to participate to receive 100% of reimbursement money due. In 2012, this included 202,050 patient discharges*.

Level of measurement and setting: Facility-Level, LTAC inpatient

5) Name: Hospital Value-Based Purchasing

Sponsor: Centers for Medicare and Medicaid Services

Purpose: To establish a quality reporting program to improve health, improve care and lower cost (triple aims) of Medicare beneficiaries.

Geographic area and number and percentage of accountable entities and patients included: 2808 entities*

Level of measurement and setting: Facility-Level, acute inpatient hospital

6) Name: Hospital-Acquired Condition Reduction Program (HACRP)

Sponsor: Centers for Medicare and Medicaid Services

Purpose: To establish a quality reporting program to improve health, improve care and lower cost (triple aims) of Medicare beneficiaries.

Geographic area and number and percentage of accountable entities and patients included: 3,216 entities*

Level of measurement and setting: Facility-Level, acute inpatient hospital

*provided by Centers for Medicare and Medicaid Services

4a1.2. If not currently publicly reported OR used in at least one other accountability application (e.g., payment program, certification, licensing) what are the reasons? (e.g., Do policies or actions of the developer/steward or accountable entities restrict access to performance results or impede implementation?)

N/A

4a1.3. If not currently publicly reported OR used in at least one other accountability application, provide a credible plan for implementation within the expected timeframes -- any accountability application within 3 years and publicly reported within 6 years of initial endorsement. (Credible plan includes the specific program, purpose, intended audience, and timeline for implementing the measure within the specified timeframes. A plan for accountability applications addresses mechanisms for data aggregation and reporting.)

N/A

4a2.1.1. Describe how performance results, data, and assistance with interpretation have been provided to those being measured or other users during development or implementation.

How many and which types of measured entities and/or others were included? If only a sample of measured entities were included, describe the full population and how the sample was selected.

NHSN has developed numerous training resources to assist users with the proper understanding and interpretation of this measure. Several webinars and written training materials have been provided. Annual in-person trainings are held to discuss the SIR

calculations, risk adjustment, and proper interpretation. Training materials are available online to all hospitals enrolled in NHSN, as well as external partners such as state health departments, quality improvement organizations, and healthcare corporations. NHSN users can run monthly analysis reports within NHSN to view their SIR data. On an annual basis, NHSN publishes national and state-level SIRs in the National and State HAI Progress Report.

4a2.1.2. Describe the process(es) involved, including when/how often results were provided, what data were provided, what educational/explanatory efforts were made, etc.

SIR results are available to NHSN users at any time, based on their current data entry. Data provided within the analysis report includes numerator, denominator, SIR, p-value, and 95% confidence interval. Educational materials are available on the NHSN website that explain each data element

4a2.2.1. Summarize the feedback on measure performance and implementation from the measured entities and others described in 4d.1.

Describe how feedback was obtained.

Feedback on measure performance and implementation is obtained via email to the NHSN helpdesk email system. Feedback is provided to us by hospital staff, physicians, epidemiologists, statisticians, state and local health department staff, quality improvement staff, and other personnel. An online survey is provided to all live-training attendees who provide feedback on whether objectives were met, usefulness of the training, and whether additional training is needed.

4a2.2.2. Summarize the feedback obtained from those being measured.

Feedback from Hospitals and states: Based on results from a polling survey, hospitals have indicated that they are running SIR analysis reports within NHSN on a monthly basis, and that they use SIRs for prevention activities in their hospital. State health departments are using the SIR for public reporting purposes and to help target facilities for additional prevention. Feedback was received via email regarding the extent of risk adjustment and the limitations

4a2.2.3. Summarize the feedback obtained from other users

Feedback from consumers, media, policy, etc. on measure performance and implementation is obtained via email to the NHSN helpdesk email system. Feedback is provided to us by hospital staff, physicians, epidemiologists, statisticians, state and local health department staff, quality improvement staff, infection prevention and other personnel. See 4.a2.2.1.

4a2.3. Describe how the feedback described in 4a2.2.1 has been considered when developing or revising the measure specifications or implementation, including whether the measure was modified and why or why not.

Feedback from all stakeholders is considered when developing and implementing the SIR. Different risk factor variables were analyzed for potential inclusion in the statistical model due to input from users. Additional training formats, such as live chats and "quick learn" videos, were created in order to address different training environment that best meet the needs of our audience. We have also provided live demonstrations to users showing how to generate their SIRs in NHSN based on earlier feedback received. 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.

Improvement

Progress toward achieving the goal of high-quality, efficient healthcare for individuals or populations is demonstrated. If not in use for performance improvement at the time of initial endorsement, then a credible rationale describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

4b1. Refer to data provided in 1b but do not repeat here. Discuss any progress on improvement (trends in performance results, number and percentage of people receiving high-quality healthcare; Geographic area and number and percentage of accountable entities and patients included.)

If no improvement was demonstrated, what are the reasons? If not in use for performance improvement at the time of initial endorsement, provide a credible rationale that describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

To a substantial extent the quality measure is a driver of patient care practices and particularly decisions on catheter insertion and removal. The trend data in section 1b. display the reductions in catheter utilization over time and the reduction in the SIR for this measure before and after the 2015 rebaseline. Combined with declining non-yeast CAUTI SIRs, which change in relation to the

number of CAUTIs per urinary catheter days, declines in the device (i.e. urinary catheter) use highlight the net benefit to patients afforded by both safer and reduced urinary catheter use. Reducing unnecessary urinary catheter use is a key prevention strategy for CAUTI.

4b2. Unintended Consequences

The benefits of the performance measure in facilitating progress toward achieving high-quality, efficient healthcare for individuals or populations outweigh evidence of unintended negative consequences to individuals or populations (if such evidence exists).

4b2.1. Please explain any unexpected findings (positive or negative) during implementation of this measure including unintended impacts on patients.

Patient medical records and other sources of patient data must be reviewed to determine if the patient meets the necessary criteria for a healthcare-associated CAUTI. It is possible that reviewers may miss symptoms or fail to identify that patients meet criteria thereby under-reporting CAUTI events. Data collectors might also intentionally under-report CAUTIs. Both of these actions would result in an SIR that is calculated to be lower than actual. Alternatively, patients may be identified as having a CAUTI when in fact they do not meet CAUTI criteria and thereby calculate an SIR that is higher than actual. In addition, it is possible SIRs may be miscalculated. The NHSN reporting tool includes business logic to minimize misclassification of CAUTI and inaccurate reporting of catheter days and the NHSN system generates SIR rates automatically, reducing the possibility of manual error in SIR calculation. In addition, site visits can be conducted to audit data validity and this has been done for other infection types by some of the states using NHSN as their mandatory reporting tool (for example, see New York's audit process summary:

http://www.health.state.ny.us/statistics/facilities/hospital/hospital_acquired_infections/2008/docs/hospital-acquired_infection.pdf, p20).

NHSN has developed a validation toolkit which includes an audit tool for U.S. state health departments to analyze a facility's CAUTI data for over and under-reporting to NHSN.

Concerns have been expressed about unintended consequences of the CAUTI measure on catheter use in spinal cord injury patients. More specifically, concerns have focused on the premature removal of indwelling urinary catheters without institution of proper bladder management and with unintended adverse consequences on renal function. However, only anecdotal data have been cited to substantiate these concerns, without compelling evidence of a connection to the measure itself. Safe bladder management in spinal cord injury patients is a priority, and if management is unsafe then interventions should target improvements in clinical practices where they are needed. CAUTI is also a prevention priority in spinal cord injury patients, and efforts to prevent these infections should be driven by quality measure data.

4b2.2. Please explain any unexpected benefits from implementation of this measure.

5. Comparison to Related or 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.

5. Relation to Other NQF-endorsed Measures

Are there related measures (conceptually, either same measure focus or target population) or competing measures (conceptually both the same measure focus and same target population)? If yes, list the NQF # and title of all related and/or competing measures.

No

5.1a. List of related or competing measures (selected from NQF-endorsed measures)

5.1b. If related or competing measures are not NQF endorsed please indicate measure title and steward.

5a. Harmonization of Related Measures

The measure specifications are harmonized with related measures;

OR

The differences in specifications are justified

5a.1. If this measure conceptually addresses EITHER the same measure focus OR the same target population as NQF-endorsed measure(s):

Are the measure specifications harmonized to the extent possible?

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

5b. Competing Measures

The measure is superior to competing measures (e.g., is a more valid or efficient way to measure);

OR

Multiple measures are justified.

5b.1. If this measure conceptually addresses 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.)

Appendix

A.1 Supplemental materials may be provided in an appendix. All supplemental materials (such as data collection instrument or methodology reports) should be organized in one file with a table of contents or bookmarks. If material pertains to a specific submission form number, that should be indicated. Requested information should be provided in the submission form and required attachments. There is no guarantee that supplemental materials will be reviewed.

Attachment [Attachment: NHSN_Data_Dictionary_7.2-635231324141894764.xlsx](#)

Contact Information

Co.1 Measure Steward (Intellectual Property Owner): Centers for Disease Control and Prevention

Co.2 Point of Contact: Daniel, Pollock, dap1@cdc.gov, 404-639-4237-

Co.3 Measure Developer if different from Measure Steward: Centers for Disease Control and Prevention

Co.4 Point of Contact: Daniel, Pollock, dap1@cdc.gov, 404-639-4237-

Additional Information

Ad.1 Workgroup/Expert Panel involved in measure development

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

The Healthcare Infection Control Practices Advisory Committee (HICPAC) consists of experts in the field of HAI surveillance, prevention, and control to provide advice and guidance to CDC. The measure was vetted through the technical panel of HICPAC that informed subsequent changes to measure development.

<https://www.cdc.gov/hicpac/about.html>

Measure Developer/Steward Updates and Ongoing Maintenance

Ad.2 Year the measure was first released: 2004

Ad.3 Month and Year of most recent revision: 01, 2014

Ad.4 What is your frequency for review/update of this measure? when needed as NHSN definitions/protocols are updated

Ad.5 When is the next scheduled review/update for this measure? 04, 2019

Ad.6 Copyright statement:

Ad.7 Disclaimers:
Ad.8 Additional Information/Comments: