Partnership for Quality Measurement
Powered by Battelle

National Consensus Development and Strategic Planning for Health Care Quality Measurement

# Spring 2025 Cycle Endorsement and Maintenance (E&M) Comment Summary Guide (Advisory Group Feedback)

## MANAGEMENT OF ACUTE EVENTS AND CHRONIC CONDITIONS

**JUNE 2025**

Prepared by:
Battelle
505 King Avenue, Columbus, Ohio 43201

The analyses upon which this publication is based were performed under Contract Number 75FCMC23C0010, entitled, "National Consensus Development and Strategic Planning for Health Care Quality Measurement," sponsored by the Department of Health and Human Services, Centers for Medicare & Medicaid Services. *Restricted:* Use, duplication, or disclosure is subject to the restrictions as stated in Contract Number 75FCMC23C0010 between the Government and Battelle.

# Table of Contents



Version 1.0 | June 2025 | The analyses upon which this publication (or document) is based were performed under Contract Number 75FCMC23C0010, entitled, “National Consensus Development and Strategic Planning for Health Care Quality Measurement,” sponsored by the Department of Health and Human Services, Centers for Medicare & Medicaid Services. *Restricted:* Use, duplication, or disclosure is subject to the restrictions as stated in Contract Number 75FCMC23C0010 between the Government and Battelle.

## List of Tables



## List of Figures



Version 1.0 | June 2025 | The analyses upon which this publication (or document) is based were performed under Contract Number 75FCMC23C0010, entitled, "National Consensus Development and Strategic Planning for Health Care Quality Measurement," sponsored by the Department of Health and Human Services, Centers for Medicare & Medicaid Services. *Restricted:* Use, duplication, or disclosure is subject to the restrictions as stated in Contract Number 75FCMC23C0010 between the Government and Battelle.

# Overview of Spring 2025 Measures for Review

During this measure review cycle, developers and stewards submitted nine measures to the Management of Acute Events and Chronic Conditions committee for endorsement consideration (Table 1). The table lists measures in the order the Advisory Group meeting reviewed them.

**Table 1. Overview of Measures Under Endorsement Review**

| CBE Number | Measure Title | New/Maintenance | Developer/Steward |
|---|---|---|---|
| 0642 | Cardiac Rehabilitation Patient Referral from an Inpatient Setting | Maintenance | American College of Cardiology (ACC) |
| 0964 | Therapy with Aspirin, P2Y12 Inhibitor, and Statin at Discharge Following PCI in Eligible Patients | Maintenance | American College of Cardiology |
| 1879 | Adherence to Antipsychotic Medications for Individuals with Schizophrenia | Maintenance | American Institutes for Research (AIR)/Centers for Medicare & Medicaid Services (CMS) |
| 0753 | 30-Day Post-Operative Colon Surgery (COLO) and Abdominal Hysterectomy (HYST) Surgical Site Infection (SSI) Standardized Infection Ratio (SIR) | Maintenance | Centers for Disease Control and Prevention (CDC) |
| 0138 | Catheter-Associated Urinary Tract Infection (CAUTI) Standardized Infection Ratio | Maintenance | CDC, National Healthcare Safety Network (NHSN) |
| 0139 | Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratio | Maintenance | CDC, National Healthcare Safety Network |
| 3503e | Rate of Severe Hypoglycemia Among Hospitalized Patients | Maintenance | Mathematica/CMS |
| 3558 | Initial Opioid Prescribing for Long Duration (IOP-LD) | Maintenance | Pharmacy Quality Alliance (PQA, Inc.) |
| 3493 | Risk-standardized Complication Rate (RSCR) following Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) for Eligible Clinicians and Eligible Clinician Groups | Maintenance | Yale Center for Outcomes Research and Evaluation (CORE)/CMS |

## Advisory Group Feedback

The Advisory Group convened on June 9, 2025. Twenty-six of 31 (83.9%) active Advisory Group members attended to share feedback and ask questions regarding the measures under endorsement review. Developers/stewards of the respective measures also attended and

provided responses to the Advisory Group questions. After the meeting, developers/stewards had the opportunity to submit additional written responses to Advisory Group member feedback and questions. The measure evaluation summaries of this comment summary guide contain overviews of the Advisory Group member discussions and developer/steward responses.

To support the review of the public comments and Advisory Group summaries, the number of comments received or number of individuals who shared similar comments, feedback, and/or questions is represented as “a few” (two to three individuals), “several” (four to six individuals), and “many” (more than six individuals).

# Measures Under Endorsement Review

## CBE 0642: Cardiac Rehabilitation Patient Referral from an Inpatient Setting [American College of Cardiology]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Closing Care Gaps Domain:** A patient representative said they appreciated that the developer disclosed their findings related to the optional Closing Care Gaps domain. The findings specified that individuals on Medicaid insurance were less likely to receive a cardiac rehabilitation referral, that younger patients were more likely to be referred, and that white patients were more likely than Black patients to be referred. | N/A. |
| **Patient Experience:** Many committee members, including patient representatives, stated that the measure either needed to become or have a balancing measure that captures the reality of a patient's experience once they have a referral. They highlighted access issues such as living in rural or urban settings, being in a health care desert, and long wait times. One committee member also said as the developer considers new measures, to think about what degrees these factors are the responsibility of the hospital or inpatient setting.<br>One committee member shared that while they were on a Medicare Advantage plan and had a cardiac referral, they were not able to have an appointment for 7 or 8 weeks, which they described as "terrifying."<br>Another committee member said that while they appreciated the physician or clinician not being held accountable for the many factors that impact a patient's ability to make and get to an appointment, they felt that this measure does not currently capture what is important to patients: long-term outcomes, rather than simply receiving the referral.<br>One committee member suggested that a potential new measure not be the sole responsibility of this developer and that CMS and PQM should put forth recommendations so people who do have expertise in this area can potentially work on a new measure. | This measure's intent is to see if a referral was provided and not if the patient does anything with the referral.<br>A task force is revisiting the measure, the results of which will be published shortly.<br>This measure is still important because some physicians do not feel compelled to write a referral if they do not believe the patient will attend the rehabilitation appointment. This measure should continue until that mindset is changed. |
| **Patient-Centered Care:** In response to the developer's comment | The developer did not specifically address this comment during the |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| above that some physicians may not refer to rehabilitation if they do not believe the patient will follow up, a committee member said the patient needs to be put at the center of care, which means the physicians educate patients the best they can and developers can be creative in how they construct measures. | meeting. |
| **Travel Time:** One committee member pointed out that the measure uses 60 minutes of travel time. They asked how that would work for individuals who are traveling by bus, particularly as patients who are more vulnerable are more likely to be traveling by public transport rather than having their own transportation. | The developer did not specifically address this comment during the meeting. |
| **Facility Disadvantages:** A committee member asked if a health system is at a disadvantage for this measure if they are a safety net hospital or are not part of a large network. | While the denominator has exceptions based on patient status, that is not directly tied to hospital resource issues. The developer will bring this feedback to their task force. |
| **Telehealth:** A few committee members recommended the developer include telehealth in the measure. | While the measure allowed telemedicine at the height of the COVID-19 pandemic, it has since been phased out. During the meeting, the developer did not have additional information on the rationale for this decision. |
| **Face Validity:** A committee member commented that face validity is a lower form of validity for a measure that has been around for some time. | There are no other measures against which to test this measure. |
| **Presentation:** One committee member commended the developer for their measure submission materials, saying they reflected the amount of engagement and work that had gone into the measure. | N/A. |
| **Improvements:** A few committee members said that considering the length of time the measure has been used, they would have expected the improvements to be stronger. They indicated that the measure may not account for factors that can impact the measure, such as the access issues indicated above. | The developer did not specifically address this comment during the meeting. |

## CBE 0964: Therapy with Aspirin, P2Y12 Inhibitor, and Statin at Discharge Following PCI in Eligible Patients [American College of Cardiology]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Closing Care Gaps Domain:** A patient representative said they appreciated that the developer disclosed their findings related to the optional Closing Care Gaps domain. | The developer is focused on equity and diversity and intends to incorporate concepts such social determinants of health (SDOH) into their measures. |
| **Patient Experience:** Several committee members, including a patient representative, expressed similar concerns for this measure as 0642: that many factors can occur between a provider issuing a prescription and the patient taking the medication, including ability to travel to a pharmacy, insurance coverage, and pharmacy resources. They expressed concern that the measure does not examine the correct gap to improve outcomes for patients and that a new measure may be needed.<br>A patient representative added that because insurance does not cover aspirin, tracking whether a patient obtained and took the medication is even more difficult.<br>A few committee members acknowledged that while looking at actual distribution outcomes may not be easy and may be expensive, there are methodologies to do so. | The developer is interested in more patient input. While patient follow-up was originally envisioned as part of this measure, a CMS division promoting patient privacy stopped the developer from being able to access data on whether prescriptions were being filled. |
| **Reliability:** A committee member asked why the developer chose to use split-half methodology and Cronbach's alpha for agreement between the samples. The committee member said they believed there were better methods for the developer's intended purposes. | The developer's statisticians did not attend the meeting, so the developer did not have a response during the meeting. |
| **Contraindications:** A committee member asked if the measure considers individuals who have secondary conditions for which aspirin would be contraindicated. | The measure's exclusions include contraindications. |

## CBE 1879: Adherence to Antipsychotic Medications for Individuals with Schizophrenia [AIR/CMS]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Importance:** A few committee members, including a patient representative, said they felt that this measure was important and appreciated that it included interventions to improve adherence. Another committee member added that this can be an especially difficult population to work with, but that medication adherence has been shown to decrease mortality rates and hospital rates. This individual emphasized that they did not want the measure to be removed because of its difficulty. | Medication adherence is important and makes a difference in people's lives and functionality. |
| **Depot Medications:** A committee member asked for clarification on how the measure accounts for depot injections. | The measure accounts for depot injections by using information from Medicare Part D. The developer verified that the information is almost always correct by looking at the associated days' supply for each prescription, which, for depot injections, is 28 days. Deviation from the day supply was uncommon.<br>In addition, adherence is higher for patients on long-acting medications (such as depot injections) compared to patients on oral medications or short-acting medications. |
| **Improvements:** A few committee members asked the developer to talk about the improvements they have seen from the measure. | Measuring improvements over time for this measure can be difficult because it is reported as part of the Merit-based Incentive Payment System (MIPS) program. Participants in MIPS chose which measures they want to report on, so they often select measures they believe they are performing well on. When the developer tested the self-reported data, the results were around 95%; for claims data, the results were around 78%. Because of that, the developer was not sure if improvement has occurred or if the results are high because of who chose to report.<br>The developer has a set of recommendations that summarize opportunities and actions where providers can have influence.<br>In terms of when a measure should be retired, that is a program-level decision. This measure still has substantial uptake in MIPS, suggesting that clinicians and clinician groups find it useful.<br>CMS confirmed it can be difficult for them to assess the impact of a |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| | given measure. Part of what they consider at a program level is whether physicians have enough measures that are applicable to the care they provide. |
| **Clinician Access to Information:** A committee member asked how measure information comes back to the clinician. | Part of the framework of the measure is that clinicians who are not able to report on and receive performance results will not participate in the measure. |
| **Insurance Status:** A committee member highlighted that the measure may miss or not properly capture individuals who are uninsured because the Proportion of Days Covered (PDC) portion of the measure relies on insurance claims. | Because this work is for CMS and uses Medicare data, insurance coverage outside of Medicare (or lack thereof) cannot be examined.<br>However, the developer included differences they observed in terms of race/ethnicity and geography. (In terms of adherence rates, 81% for white individuals, 72% for Black individuals, and 75% for Hispanic individuals.) |
| **Community Health Organizations:** A patient representative asked how the measure considers community health organizations and other organizations that help with adherence and access. | The developer did not specifically examine the role of these types of organizations. |
| **Feasibility:** One committee member highlighted that their system does not currently report on the measure, but if they did, there would be a burden and cost associated with figuring out how to capture the data. They stated that because this measure has been around for some time, this is likely not a major issue but may be something to consider if the measure expands. | The burden of how health systems interact with vendors to collect measure data is not specific to this measure. |
| **Psychiatric Patients vs. General Population:** A committee member asked if the developer has seen higher improvement rates for the general population as opposed to psychiatric patients. | They had not. |

## CBE 0753: 30-Day Post-Operative Colon Surgery (COLO) and Abdominal Hysterectomy (HYST) Surgical Site Infection (SSI) Standardized Infection Ratio (SIR) [CDC]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Importance:** A patient representative with lived experience in this area of health care said this measure was important to them because | N/A. |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| surgical site infections are sometimes missed or not reported. | |
| **Hysterectomy Rates:** A patient representative said they were surprised that the HYST is the second-most-common surgery and asked if it was possible that the procedure is happening too frequently. | The developer did not specifically address this comment during the meeting. |
| **Trauma Cases:** A few committee members asked for clarification on how the measure accounts for trauma cases. | As the statisticians developed the risk adjustment models for the surgery types, they looked at all the risk factors the developer collects data on. For COLO, trauma was identified as a significant risk factor and included in the risk-adjustment model.<br>While trauma-case patients may have additional risk factors for SSI, facilities still should use prevention practices. For this reason, the measure includes trauma cases.± |
| **Specific Types of Surgery:** A committee member asked why the measure focuses on only COLO and HYST rather than having one measure that includes all surgeries if the goal is to prevent SSI.<br>Another committee member stated that they believed a single measure covering all surgeries would have downsides from a feasibility perspective. They said they like an approach that allows facilities to participate in the surgeries most relevant to them. | Preventing infection is important for any patient undergoing surgery. While there are some commonalties in infection prevention for all surgeries, surgeries have different risk factors, so the developer has different risk models depending on the type of surgery. (They collect data on 39 types of surgeries.)<br>To date, these are the two procedures that have gone through the endorsement process. The developer will consider this feedback and weigh the value of a single surgical measure versus measures broken out by surgery type. |
| **New Procedures:** A committee member asked if the measure accounts for newer procedures for hysterectomies, such as laparoscopic or robotic procedures. | Laparoscopic procedures are included in the measure. A robotic procedure could be included if it has a qualifying code.± |
| **Reliability:** A committee member noted that as more cases shift to the outpatient setting, the denominator for the measure shrinks, meaning that individual cases can have more impact. The committee member asked the developer if they will add outpatient procedures to the measure or if they had looked at whether the data have become less reliable because of the shift to outpatient. | Tracking outpatient surgeries is important, especially as more surgeries transition to that setting. Rather than add outpatient surgeries to this measure, the developer would create a new measure because the facilities are different. The new measure would then need to go through the endorsement process.<br>The measure's reliability can decrease with fewer surgeries. |
| **Validation:** A committee member asked how the developer knows if facilities are reporting infections in a comparable manner across regions and states. | To ensure facilities report the infections similarly, the developer provides yearly training to help facilities understand the data elements and the pieces of protocol they need to abstract from the chart. For state health departments and other entities performing external validation, the developer provides toolkits. CMS also conducts its own |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| | validation audits. |
| **Immunocompromised Patients:** A patient representative asked how the measure considers patients with pre-existing immunocompromised statuses. | Immunocompromised patients are included in the measure because data are not collected on whether a patient is immunocompromised. |
| **Facility-Level Variables:** A committee member expressed concern over the inclusion of facility-level variables, noting that those variables cannot be changed to improve quality of care and that the measure did not include those variables during the measure's last endorsement review. They said that risk adjustment should only use patient-level variables.<br>Another committee member said they felt the measure did need to adjust for facility-level variables, such as trauma center status. Otherwise, facilities or providers who have a higher number of trauma cases (which will likely result in a higher rate of SSI) may be unfairly penalized. | The developer's approach is to explain the variation in outcomes. Primarily, they use patient-level data, which are prominent in explaining differences in risk in these procedures. However, if there are additional factors, such as facility size, they felt they would be remiss to not include those.± |
| **Other Methods Concerns:**<br>• **Feature-Selection Method:** A committee member stated that literature has shown that feature-selection method can lead to potential human bias. Specifically, they added that stepwise regression is an outdated approach and encouraged the developer to look at less complex and more transparent methods that are easier to interpret.<br>• **Decile Plots and Conceptual Model:** The same committee member said they did not see the decile plots or conceptual model for the measure and that a p value alone is not sufficient. They also wanted an explanation for the different categorical cut points. They added that the provided conceptual model is a pipeline rather than a conceptual model.<br>• **Between Variance:** A different committee member asked for clarification on how the developer calculates the between-facility variance.<br>• **Within-Variance Calculations:** The committee member also asked if the developer could provide a source for the approach | • In terms of feature-selection method and stepwise regression, the model was more of a stage-wise approach than a stepwise approach, and that it is not stepwise in terms of an automated algorithm. Instead, the developer watches the process at all stages.<br>• In terms of decile plots and the conceptual model, the developer has them and can provide them again. (See Figures A1 and A2 for the decile plots; the conceptual model is available here.)<br>• In terms of determining the cut points, determination is not based on just the p value but involves a lot of statistical analysis. The developer is trying to produce the best product they can by weighing statistical significance, model fit, and assessment through multiple means.<br>• In terms of estimating reliability, the measure uses a signal-to-noise approach, and the components are the variances within and variances between facilities. The developer leveraged previously reported-on methods from RAND in Adam's 2009 primer.± |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| they use for within-variance calculations. They expressed concern that the method is not consistent with Adam's beta-binomial because Adam's does not apply to risk-adjusted measures. | |

±The developer's full written response can be found in Appendix A.

## CBE 0138: Catheter-Associated Urinary Tract Infection (CAUTI) Standardized Infection Ratio [CDC, National Healthcare Safety Network]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Importance:** Several committee members, including patient representatives, said this measure is important, highlighting that following this measure rigorously results in better patient safety and outcomes, particularly for more vulnerable patient populations. | N/A. |
| **Reliability for Smaller Hospitals:** A committee member expressed concern about use of the measure in publicly reported venues, such as Hospital Compare, for smaller hospitals, given that lack of reliability for that population. | When using signal-to-noise methods, a lower volume can translate into lower reliability. The developer is researching how to better account for that lower reliability. |
| **Different Practices:** A patient representative commented on how hospitals may have different practices in terms of how to keep patients safe from infection, such as when to remove a catheter. They said they were curious how these different practices affect tracking and predicting outcomes. | Facilities should look across a variety of clinical practice guidelines to determine what is most appropriate for the facility and patient population to make the best decisions for their patients. |
| **Measure Calculation:** A committee member asked for clarification on why the denominator uses the predicted number of CAUTIs rather than the actual number. | All the developer's SIR measures are a ratio of actual events divided by predicted. In other words, the numerator is the actual or observed number of infections; the denominator is based on patient-level and facility-level risk factors and how many infections would be predicted based on those. |
| **Methods Concerns:** A committee member expressed concerns about:<br>• The use of facility-level variables potentially obscures the | • While discussing CBE #0753, the developer shared their approach and reasoning for including facility-level variables in their measures: They endeavor to explain the variation in outcomes by primarily using patient-level data. However, if |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| quality of care.<br>• Outdated feature-selection method. Specific to the feature-selection method, the committee member also asked for clarification on:<br>  ○ Which pseudo-R-squared calculation they did.<br>  ○ Why they used a logistic regression rather than a linear regression.<br>• Decile plots and an analytical pipeline not being provided. | there are additional factors, such as facility size, they felt they would be remiss to not include those.<br>• In terms of the logistic regression model, the measure uses a count model and not a logistic or linear model. Because there is no standard way to show validation results for count models, the developer uses the pseudo-R-squared calculation with dispersion in the model to show improvement.± |
| **False Positives:** A committee member said they believe the measure should have exclusions for false positives. They added that for teaching hospitals, new residents need to be reminded of the circumstances under which samples are collected, so these facilities may have a higher rate of false positives as people learn. | Regarding false positives, the developer would need to do more validation, and that type of evaluation is costly. In addition, ensuring that the culture is obtained in the correct manner could fall under practices that facilities should be improving upon, so the measure perhaps should not adjust for that.<br>The developer evaluated hospital type, including teaching hospitals, as part of their risk model. |
| **Inclusion Criteria:** A patient representative asked if the measure includes individuals with acutely placed catheters or individuals who come in with catheters. Another patient representative asked if the measure tracks external catheters. | If a patient comes in with a catheter, they are still eligible to have a CAUTI event reported on day 3.<br>In terms of external catheters, facilities should monitor outcomes when they explore alternative methods. The developer is open to the possibility of exploring tracking alternative catheters that are not currently included. |
| **Public Comment on Spinal Cord Injury:** A committee member asked the developer to speak to a public comment from the American Spinal Injury Association (ASIA), the Academy of Spinal Cord Injury Professionals (ASCIP), and the United Spinal Association on the exclusion of spinal cord injury patients. | As of January 2025, the developer has introduced a new field to identify CAUTI events in patients with spinal cord injury-associated neurogenic bladder to enhance their understanding of CAUTI occurrences in this vulnerable population. Currently, the field is optional but will become mandatory. This will not exclude this patient population, but once the developer has sufficient data, they will present their findings and recommendations.<br>Patients with neurogenic bladder require careful monitoring for CAUTI due to their increased risk, which is associated with prolonged indwelling catheterization, to ensure high-quality, safe care.<br>Multiple guidelines, including those from the American Urological Society as well as the Consortium for Spinal Cord Medicine, |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| | recommend that catheterization be based on numerous factors, including the patient's condition, symptoms, and associated risk of different types of catheters. According to the Healthcare Infection Control Practices Advisory Committee guidelines and Consortium for Spinal Cord Medicine guidelines, it is advisable to explore alternatives to indwelling catheters as part of CAUTI prevention. That decision should be based on evidence and involve shared decision-making between the clinicians, the patients, and the families.<br>Removal of a urinary catheter should never be motivated by a facility's desire to avoid penalties related to CAUTI occurrences.± |

±The developer's full written response can be found in Appendix A.

## CBE 0139: Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratio [CDC, National Healthcare Safety Network]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Importance:** Several committee members, including patient representatives, said this measure is important, highlighting that following this measure rigorously results in better patient safety and outcomes, particularly for more vulnerable patient populations. | N/A |
| **Measure Calculation:** A committee member asked for clarification on why the denominator uses the predicted number of infections rather than the actual number. | All the developer's SIR measures are a ratio of actual events divided by predicted. In other words, the numerator is the actual or observed number of infections; the denominator is based on patient-level and facility-level risk factors and how many infections would be predicted based on those. |
| **Broad Measure Topic:** A few committee members, including a patient representative, said the measure topic is broad. They asked if the developer had considered breaking the measure into smaller categories. | While facilities may need different processes for different populations and scenarios, the measure is intended to function at a high level and encourage facilities to drive infection prevention across the board. |
| **Catheter Type:** A patient representative asked if the type of catheter matters. | Any catheter that meets the central line catheter definition within the NHSN is included and not risk adjusted separately. |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Reliability for Smaller Hospitals:** A committee member expressed concern about the use of the measure in publicly reported venues, such as Hospital Compare, for smaller hospitals, given the lack of reliability for that population. | When using signal-to-noise methods, a lower volume can translate into lower reliability. The developer is researching how to better account for that lower reliability.<br>For this measure, the developer models patients in the Neonatal Intensive Care Unit (NICU) as well as in specialized care. |
| **Methods Concerns:** In writing, a committee member expressed concerns about:<br>• The use of facility-level variables potentially obscures the quality of care.<br>• Outdated feature-selection method. Specific to the feature-selection method, the committee member also asked for clarification on:<br>  ○ Which pseudo-R-squared calculation they did.<br>  ○ Why they used a logistic regression rather than a linear regression.<br>• Decile plots and an analytical pipeline not being provided. | The developer did not address this comment specific to this measure during the meeting.± |

±The developer's full written response can be found in Appendix A.

## CBE 3503e: Rate of Severe Hypoglycemia Among Hospitalized Patients [Mathematica/CMS]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Importance:** A patient representative said this is an important measure as it monitors patients who can turn critical quickly. Another patient representative said they appreciated that the measure improves outcomes and cuts costs. | N/A |
| **Twenty-Four-Hour Window:** A committee member expressed concern over the measure focusing on the initial 24 hours a patient is hospitalized. They stated that determining the correct insulin during that window can be challenging because the provider may not know the patient's care at home and will not know how the patient will | If a patient is given a hypoglycemic medication, they should be closely monitored to not let their blood glucose fall to <40 mg/dL, which is a severe event that should never happen. Neurologic complications can begin to occur at that threshold. The American Diabetes Association and Endocrine Society agree that the <40 mg/dL threshold is |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| initially react. | considered severe. In addition, the measure allows for a re-test after 5 minutes to ensure that the initial reading is not an error.<br>However, the developer appreciated the potential uncertainty regarding treatment and will take the feedback to their expert workgroup. |
| **Improvements:** A committee member asked if the measure had a non-electronic version that has demonstrated improvement over time. | There is only the electronic version of the measure.<br>The measure is currently voluntarily reported and will be mandatory in 2026. The developer has compared the year of Hospital Inpatient Quality Reporting program data (consisting of 552 hospitals and over 550,000 patients) to the 2019 initial testing data (consisting of six hospitals and over 13,000 patients) and seen improvement over time with additional room for improvement. The small sample size of the 2019 data is a potential limitation. |
| **Feasibility:** A committee member asked the developer to speak on how feasible the measure is as an electronic clinical quality measure (eCQM). | The developer did not specifically address this comment during the meeting. |
| **Exclusions:** A committee member asked if the measure has exclusions based on patient condition to reflect the difference between expected complications and preventable safety events. | While hypoglycemic events do happen, a severe hypoglycemic event, such as <40 mg/dL, should not.<br>Critically ill patients and patients with a do-not-resuscitate status are unlikely to receive hypoglycemic medication and be included in the measure. |
| **Inclusions:** A patient representative asked if the measure includes patients who are hospitalized for other medical issues and then have a hypoglycemic issue or patients who are required to turn off their personal insulin devices upon admission. | If they are administered hypoglycemic medication, they are included in the measure. |

## CBE 3558: Initial Opioid Prescribing for Long Duration (IOP-LD) [PQA, Inc.]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Closing Care Gaps:** Several committee members, including patient representatives, highlighted the importance of this measure for closing | N/A. |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| care gaps, particularly because overdose death rates increase depending on race. | |
| **Continuous Enrollment:** One patient representative asked the developer to consider removing the requirement that the patient must be continuously enrolled to be tracked by the measure. They noted that people who experience job and income security are unlikely to be continuously enrolled and are at heightened risk for opioid use. Another added that determining whether a patient has an initial prescription may be difficult if they routinely change insurance. | The continuous enrollment piece has benefits and drawbacks. While some individuals will not stay on Medicaid for an entire year, the continuous enrollment piece allows access to data that helps ensure that the prescriptions truly are initial prescriptions. To help with the initial prescription element, the measure includes a 90-day lookback period. If a plan or provider is not familiar with the patient, the measure errs on the side of not limiting access to opioids. |
| **Access:** A few committee members, including patient representatives, highlighted the issues that overprescribing opioids have caused, particularly in the past. One patient representative shared a story about how they had been offered more opioids than they reasonably wanted prior to 2020 while another shared that their child had developed heart conditions due to prescribed opioids.<br><br>However, a few other committee members, including other patient representatives, shared stories of family members who needed to be on opioids for chronic pain and had difficulty continuing their medication regime after moving to a new state. They cautioned that while opioid abuse is a critical issue, some patients do need these medications. They highlighted that a balance needs to be found between deciding when to use opioids to manage chronic pain and putting appropriate safeguards in place. They also advised being careful about how the measure defines "long duration" for that reason. | The developer agreed with the committee's overall feedback about opioid access and have also heard that plans and other entities are now being too restrictive. The measure's intention is to promote care coordination rather than limit care options.<br><br>There is a vast amount of evidence showing that individuals who are new to opioids and receive an initial prescription for 2 weeks are at heightened risk of ongoing use. But if someone receives, 5, 6, or 7 days or opioids, and they are still in pain, the measure does not penalize a provider for issuing subsequent prescriptions. The measure's intention is to minimize unintended effects on patients by ensuring that facilities and providers have mechanisms in place for timely re-evaluation and adjustment of pain management. |
| **Timeframe:** A committee member asked for clarification on how the 7 cumulative days work. They asked if they had an event that resulted in them using opioids for 5 days and then a different event that resulted in them using opioids for a further 3 days if they would be included in the measure. | The developer and their technical expert panel (TEP) wanted to avoid situations such as the example, where a patient may need additional opioids for ongoing pain. Therefore, they tally the cumulative number by looking at the date of the initial prescription plus an extra 2 days. (So, for example, if a patient had an initial prescription on March 15, the measure would look at March 15-March 17 and total how many days of supply the patient was prescribed during that timeframe to see if that number is greater than 7.) |
| **Pediatric Population:** A few committee members said they would like the measure to include teenagers because that population is having more surgeries that may result in opioid prescriptions. | The developer is interested in examining the evidence for pediatrics and will convey the committee members' feedback. Rather than expanding this measure, they would likely create a complementary |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| | measure. |
| **Dentists and Other Provider Types:** One patient representative indicated concern that dentists do not fall under this measure because they issue large quantities of opioids and are not monitored well. Another patient representative asked if the measure differentiates between what type of provider orders the prescription. One committee member asked if the developer had performed any analysis around "doctor shopping." | Dentistry is an important consideration that the Dental Quality Alliance may be more well suited to address.<br>However, if a prescription is filled through the health plan, resulting in a prescription claim, the measure captures the claim, regardless of what type of provider (including a dentist) writes the prescription. For that reason, whether the patient moves from doctor to doctor is irrelevant. |
| **Prescription Claims Limitations:** A patient representative pointed out that the measure will miss individuals who do not pay for a medication through their insurance. | This issue is a limitation of the health care system, particularly as people try to tackle affordability issues related to medications. |
| **Validity:** A committee member asked if the developer had considered validating the measure using data from large health plans. | The measure was originally tested with health plan data and is currently used within the Part D program. |
| **Inclusion Criteria:** A patient representative asked if a patient who has private insurance as well as Medicaid and Medicare would fall under the measure. | Anyone who is enrolled in a Part D plan and uses the prescription benefit would fall under the measure. |
| **Comparisons Across States:** A patient representative noted that states apply Medicaid in different ways across adult populations, which may make comparisons difficult. | The developer did not specifically address this comment during the meeting. |
| **Strong Analyses:** A committee member praised the developer for their thorough analyses (noting that they included social risk factors) and clear presentation of all results. They suggested using a penalized regression feature-selection method. | N/A. |

## CBE 3493: Risk-standardized Complication Rate (RSCR) following Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) for Eligible Clinicians and Eligible Clinician Groups [Yale CORE/CMS]

### Advisory Group Feedback

| Feedback/Questions | Summary of Developer Response |
|---|---|
| **Alternative Methods:** A patient representative asked if the measure encourages or considers alternative treatments before surgery. | *The Battelle facilitator stated that alternative methods are outside the measure's scope.* |

| Feedback/Questions | Summary of Developer Response |
|---|---|
| | This measure only captures once the THA or TKA procedures begin, but earlier interventions can be effective, and insurance usually only covers these procedures if those earlier interventions have already happened. |
| **Importance:** A few patient representatives said they considered this to be an important measure. | N/A. |
| **Measure Expansion:** A few patient representatives encouraged the developer to include patients under 65. One representative also said the developer should consider including Medicare Advantage patients, as the measure currently only covers fee-for-service patients. | *The Battelle facilitator stated that the developer is limited by use of Medicare data, which only covers adults 65 and over.*<br>The developer indicated that there is no national source of claims data to capture people under 65. Payers and individual hospitals could use the measure to capture those younger individuals, but the results would not be public.<br>The developer will let CMS know of the suggestion to include Medicare Advantage. |
| **Unplanned Readmission Rates:** A committee member asked if unplanned readmission rates should be considered a complication. | *The Battelle facilitator shared that a complementary measure does look at readmission rates (CBE #1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty [TKA]).*<br>In terms of unplanned readmission rates, the developer cannot see when a patient is in a hospital outpatient department (HOPD) setting and switches to inpatient. They can see when a patient moves from an ambulatory surgical center (ASC) setting to inpatient and will consider adding that. |
| **Patient-Reported Outcomes:** A patient representative said they would like to see an emphasis on patient-reported outcomes, either by integrating those elements into this measure or by creating a complementary measure. | *The Battelle facilitator said that a patient-reported outcome measure for THA/TKA already exists (CBE #3639 Clinician-Level and Clinician Group-Level Total Hip Arthroplasty and/or Total Knee Arthroplasty [THA and TKA] Patient-Reported Outcome-Based Performance Measure [PRO-PM]). The developer could still consider creating a composite measure.* |

# Appendix A

## CBE 0753: 30-Day Post-Operative Colon Surgery (COLO) and Abdominal Hysterectomy (HYST) Surgical Site Infection (SSI) Standardized Infection Ratio (SIR) [CDC] – Full Responses Written by Developer

| Feedback/Questions | Full Developer Response |
|---|---|
| **Trauma Cases:** A few committee members asked for clarification on how the measure accounts for trauma cases. | The NHSN Patient Safety Component SSI Protocol is available to all acute care/critical access hospitals including those performing surgeries related to trauma, which are relatively low volume [approximately 3.2% with the 2022 rebaseline]. The 2022 baseline for the Complex 30-day model uses trauma, among other factors, as a predictor of infection following colon surgery (COLO). COLOs reported as Trauma = Yes are compared to those reported with Trauma = No to assess the likelihood/risk of infection. The results of the 2022 baseline model for COLO using the Complex 30-day SSI SIR model show that COLOs reported as Trauma = Yes is the risk group while those reported with Trauma = NO is the referent group. The factor trauma is an important risk indicator for SSIs in COLO surgical procedures, as it was found significant ($p<0.001$) in our multivariable model. Trauma patients therefore are given additional patient risk in calculating the SIR. The summation of patient risk is calculated in the denominator of the SIR (expected occurrence of SSIs). Therefore, a HIGHER patient risk will bring down the SIR ratio. While it may not be possible to control for the trauma itself, surveillance for these events is a critical part of developing effective strategies for prevention of SSIs. Details of the 2022 rebaseline Complex 30-day model for COLO and HYST are published in the new SIR Guide. |
| **New Procedures:** A committee member asked if the measure accounts for newer procedures for hysterectomies, such as laparoscopic or robotic procedures. | For NHSN SSI surveillance and reporting purposes, procedures performed via a laparoscopic and open approach are included in SSI surveillance—this includes both colon surgery (COLO) and abdominal hysterectomy (HYST) procedures. In addition, NHSN captures whether a laparoscope (Scope) is used during the surgery as a data element, on the denominator for procedure webform, for any procedure entered in the NHSN application. A robotic procedure could be included if it has a qualifying code. |
| **Facility-Level Variables:** A committee member expressed concern | *The developer provided tables that outline the eligible risk variables* |

| Feedback/Questions | Full Developer Response |
|---|---|
| over the inclusion of facility-level variables, noting that those variables cannot be changed to improve quality of care and that the measure did not include those variables during the measure's last endorsement review. They said that risk adjustment should only use patient-level variables.<br><br>Another committee member said they felt the measure did need to adjust for facility-level variables, such as trauma center status. Otherwise, facilities or providers who have a higher number of trauma cases (which will likely result in a higher rate of SSI) may be unfairly penalized. | *they tested. Please see Tables A1 and A2.* |
| **Other Methods Concerns:**<br>• **Feature-Selection Method:** A committee member stated that literature has shown that feature-selection method can lead to potential human bias. Specifically, they added that stepwise regression is an outdated approach and encouraged the developer to look at less complex and more transparent methods that are easier to interpret.<br>• **Decile Plots and Conceptual Model:** The same committee member said they did not see the decile plots or conceptual model for the measure and that a p value alone is not sufficient. They also wanted an explanation for the different categorical cut points. They added that the provided conceptual model is a pipeline rather than a conceptual model.<br>• **Between Variance:** A different committee member asked for clarification on how the developer calculates the between-facility variance.<br>• **Within-Variance Calculations:** The committee member also asked if the developer could provide a source for the approach they use for within-variance calculations. They expressed concern that the method is not consistent with Adam's beta-binomial because Adam's does not apply to risk-adjusted measures. | • **Decile Plots and Conceptual Model:** *Colo:* C-statistic: 0.636 indicating moderate model discrimination (Optimism corrected c-statistic 0.635). Hosmer-Lemeshow: Value=11.59 (8DF), p-value 0.1705. Because the p value is >0.05 there is NOT evidence to say they observed/expected rates are different, passing calibration testing. (See Figure A1.)<br><br>*Hyst:* C-statistic: 0.627 indicating moderate model discrimination (Optimism Corrected c-statistic 0.624). Hosmer-Lemeshow: Value=13.32 (8DF), p-value 0.1014. Because the p value is >0.05 there is NOT evidence to say they observed/expected rates are different, passing calibration testing. (See Figure A2.)<br><br>The conceptual model can be found here. On October 30, 2024, Battelle held a Measure Developer Workshop. One of the purposes of the webinar was for Battelle to describe their comprehensive strategy for measure endorsement, which included sharing best practices for measure submissions. Battelle also provided examples of "good" measure submissions for process and outcome measures. The What Good Looks Like (Outcome Measure) reference document provides the following conceptual model (Figure A3) under question 4.4.2a [If risk factors are addressed by any method (4.4.1)] Attach Conceptual Model. The CDC NHSN conceptual models are based off this conceptual model that Battelle references in their What Good Looks Like (Outcome Measure), which can be found on the E&M Resources page of |

| Feedback/Questions | Full Developer Response |
|---|---|
| | the Battelle website.<br><br>• **Between Variance and Within-Variance Calculations:** We appreciate the reviewer's comments about the methods used for estimating reliability. The concept and reason why we referenced the Adams J.L 2009 paper was to support the assertion that a signal-to-noise reliability approach is viable for estimating reliability. There was no intent to state that we completely aligned our methods to the exact details and design setting in the Adams paper.<br>*The below text is an updated version of the methods included in Section 5.2.2 Methods of Reliability Testing within our measure submission:*<br>Signal-to-noise (SNR) reliability testing was performed to distinguish measure scores between facilities (Adams J.L. 2009). The annual standardized infection ratio (SIR) is defined as the sum of observed (O) events at the facility divided by the sum of predicted (P) events calculated from the risk-adjustment model. Signal-to-noise reliability testing denotes between-facility variance and within-facility variance (Adams J.L. 2009). The SNR for each facility SIR is calculated using both the between-facility and within-facility variance across eligible facilities with predicted number ≥1. The between-facility variance is simply the total variance of the SIR facility distribution. However, the within-facility variance of the SIR for each facility was then calculated as Var(O/P) where P is a constant, a nuisance factor with no random variation. The observed (O) was assumed to follow a Poisson distribution with a mean parameter lambda approximated by P. The result is Var(O/P) = Var(O)/P2 = P/P2 = 1/P. Signal to noise reliability scores can range from 0 to 1. A reliability of zero implies that all the variability in a measure is attributable to measurement error. A reliability of one implies that all the variability is attributable to real difference in performance. |

**Table A1: Tested COLO Risk Variables for CBE 0753**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| Duration_group | ☒ | Procedure duration | Derived variable | Categorical | 1: <=66<br>2: 67-107<br>3: 108-145<br>4: 146-232<br>5: 233-296<br>6: >=297 | - |
| BMI_group | ☒ | BMI | Derived variable | Categorical | <40<br>>=40<br>**Round bmi_val to 1E-12 before put into categories. | - |
| Age_group | ☒ | Age of patient at procedure date | Derived variable | Categorical | 1: 18-39<br>2: 40-62<br>3: 63-79<br>4: 80-109 | - |
| asa_cat | ☒ | ASA score | Derived variable | Categorical | 1/2<br>3/4/5 | - |
| scope | ☒ | Scope | Analysis Dataset | Categorical | Y, N | - |
| Medaff | ☐ | Medical school affiliation | Analysis Dataset | Categorical | Y, N | This is the parent variable of medtype_new |
| Medtype_new | ☒ | Medical school affiliation type | Analysis Dataset | Categorical | M<br>G/U/N | - |
| onc | ☒ | Oncology facility | Analysis Dataset | Categorical | 1: factype='HOSP-ONC'<br>0: factype ^='HOSP-ONC' | - |
| diabetes | ☐ | Diabetes | Analysis Dataset | Categorical | Y, N | Non-significant variable |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| bedsize | ☒ | Number of beds | Analysis Dataset | Categorical | <319,<br>>=319 | - |
| Swclass2 | ☒ | Wound class | Analysis Dataset | Categorical | CC, CO/D | - |
| emergency | ☒ | Emergency | Analysis Dataset | Categorical | Y, N | - |
| anesthesia | ☒ | Anesthesia | Analysis Dataset | Categorical | Y, N | - |
| trauma | ☒ | Trauma | Analysis Dataset | Categorical | Y, N | - |
| closure | ☐ | Closure | Analysis Dataset | Categorical | PRI, OTH | Non-significant in the present of other variables |
| CAH | ☐ | Critical Access Hospital | Analysis Dataset | Categorical | Y: factype='HOSP-CAH' N: factype ^='HOSP-CAH' | Non-significant variable |
| Gender | ☒ | Gender | Analysis Dataset | Categorical | M, F | - |

**Table A2: Tested HYST Risk Variables for CBE 0753**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| Duration_group | ☒ | Procedure duration | Derived variable | Categorical | 1: <=79<br>2: 80-136<br>3: 137-188<br>4: >=189 | - |
| BMI_group | ☒ | BMI | Derived variable | Categorical | 1: <30<br>2: >=30 | - |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | | | **Round bmi_val to 1E-12 before put into categories. | |
| Age_group | ☒ | Age of patient at procedure date | Derived variable | Categorical | 1: 18-47<br>2: 48-55<br>3: 56-109 | - |
| asa_cat | ☒ | ASA score | Derived variable | Categorical | 1/2<br>3/4/5 | - |
| scope | ☒ | Scope | Analysis Dataset | Categorical | Y, N | - |
| Medaff | ☐ | Medical school affiliation | Analysis Dataset | Categorical | Y, N | This is the parent variable of medtype_new |
| Medtype_new | ☒ | Medical school affiliation type | Analysis Dataset | Categorical | Major<br>Other | - |
| onc | ☒ | Oncology facility | Analysis Dataset | Categorical | 1: factype='HOSP-ONC'<br>0: factype ^='HOSP-ONC' | - |
| diabetes | ☒ | Diabetes | Analysis Dataset | Categorical | Y, N | - |
| numbeds | ☐ | Number of beds | Analysis Dataset | Continuous | Range: 6-1342 | Non-significant in the present of other variables. |
| Swclass | ☐ | Wound class | Analysis Dataset | Categorical | C, CC, CO, D | Non-significant in the present of other variables |
| emergency | ☐ | Emergency | Analysis Dataset | Categorical | Y, N | Non-significant variable. |
| anesthesia | ☐ | Anesthesia | Analysis Dataset | Categorical | Y, N | Non-significant variable. |
| trauma | ☐ | Trauma | Analysis Dataset | Categorical | Y, N | Non-significant variable. |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| closure | ☐ | Closure | Analysis Dataset | Categorical | PRI, OTH | Non-significant variable. |
| CAH | ☐ | Critical Access Hospital | Derived Variable | Categorical | Y: factype='HOSP-CAH' N: factype ^='HOSP-CAH' | Non-significant variable |
| Gender | ☐ | Gender | Analysis Dataset | Categorical | M, F | Non-significant variable. |

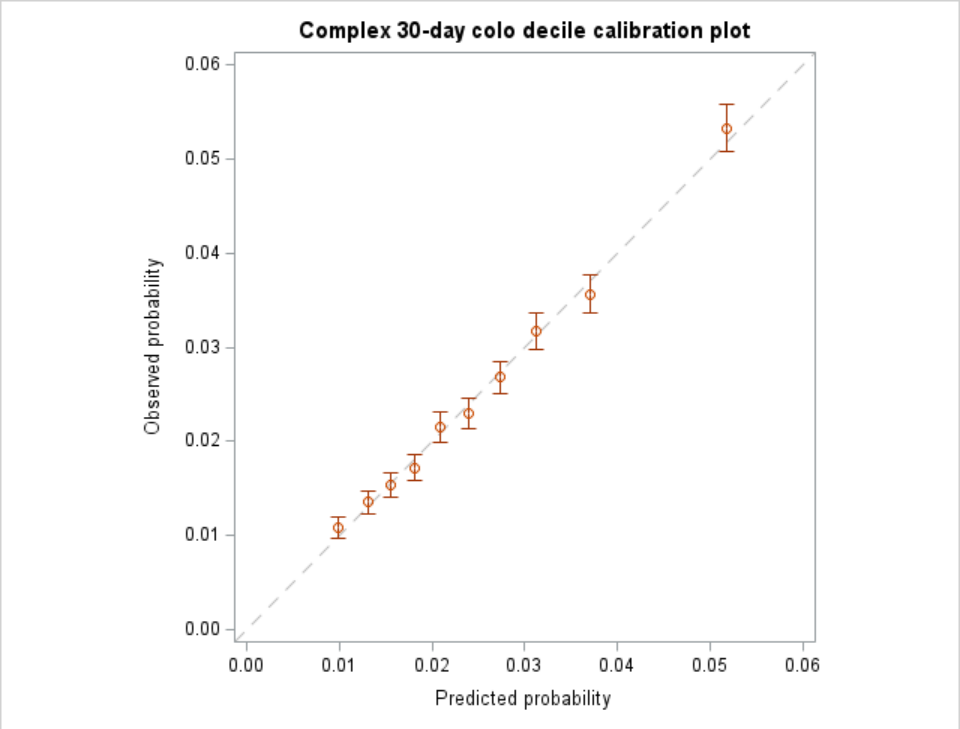


*Figure A1: COLO Decile Calibration Plot for CBE 0753*

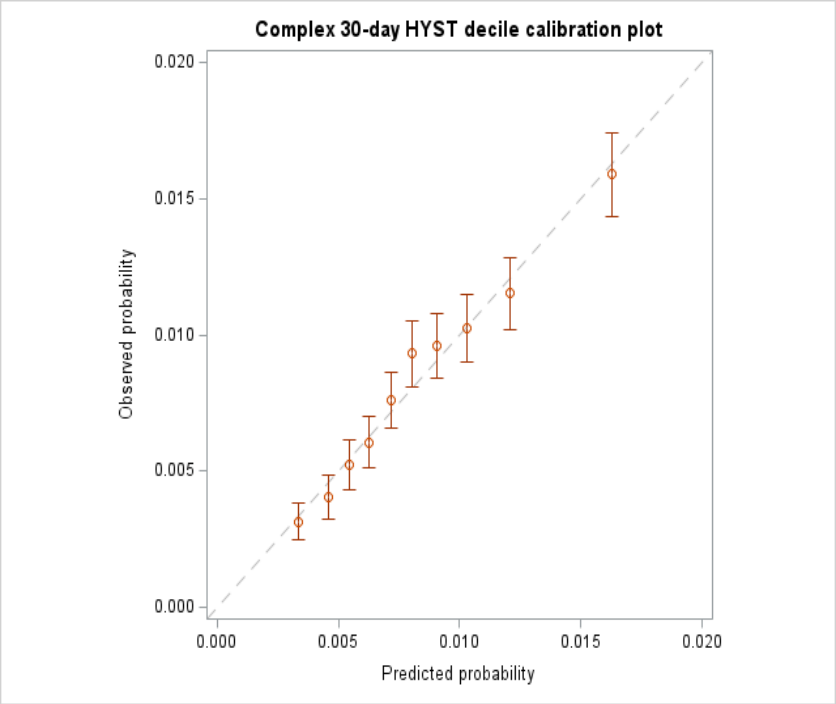


*Figure A2: HYST Decile Calibration Plot for CBE 0753*

Version 1.0 | June 2025 | The analyses upon which this publication (or document) is based were performed under Contract Number 75FCMC23C0010, entitled, “National Consensus Development and Strategic Planning for Health Care Quality Measurement,” sponsored by the Department of Health and Human Services, Centers for Medicare & Medicaid Services. *Restricted:* Use, duplication, or disclosure is subject to the restrictions as stated in Contract Number 75FCMC23C0010 between the Government and Battelle.

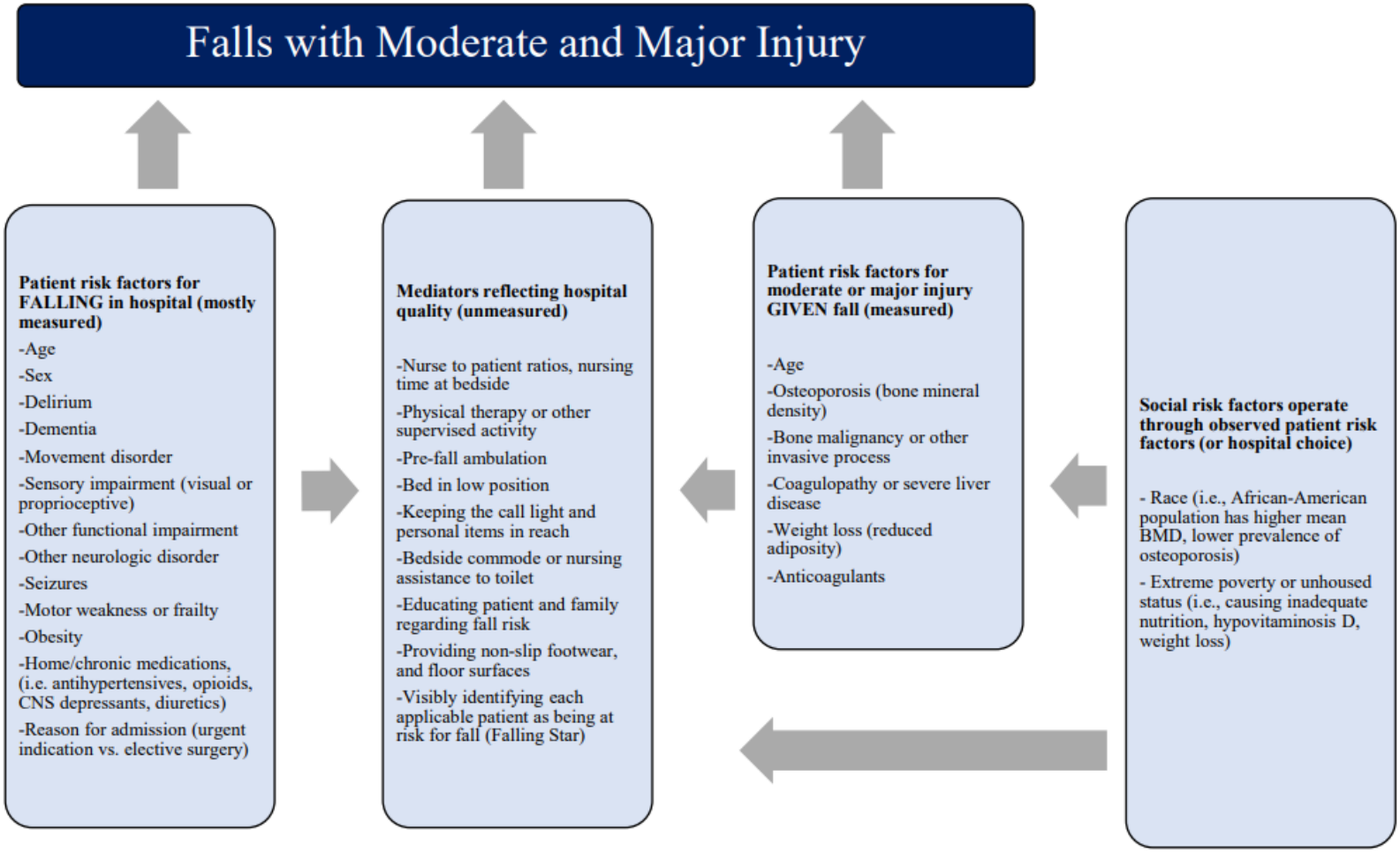


*Figure A3. Conceptual Model Example from Battelle's What Good Looks Like Guidance (Based on Submission from CMS and the American Institutes for Research)*

## CBE 0138: Catheter-Associated Urinary Tract Infection (CAUTI) Standardized Infection Ratio [CDC, National Healthcare Safety Network] – Full Responses Written by Developer

| Feedback/Questions | Full Developer Response |
|---|---|
| **Methods Concerns:** A committee member expressed concerns about:<br>• The use of facility-level variables potentially obscures the quality of care.<br>• Outdated feature-selection method. Specific to the feature-selection method, the committee member also asked for clarification on:<br>  ○ Which pseudo-R-squared calculation they did.<br>  ○ Why they used a logistic regression rather than a linear regression.<br>• Decile plots and an analytical pipeline not being provided. | • **Facility-level variables:** *The developer provided tables that outline the eligible risk variables they tested. Please see Tables A3, A4, A5, and A6.*<br>• **Decile plots:** Discrimination of risk models were assessed using the Dispersion-based pseudo R-squared, and calibration was visually investigated by dividing predicted number of events into deciles and plotting the observed number of events. Additionally, the Root Mean Square Error (RMSE) was calculated between observed and predicted events.<br>For the acute care hospital model, the dispersion-based pseudo r-square was 29.8%, for CAH 16.4%, for LTAC 16.7%, and IRF 40.9%. For each of the 4 CAUTI models, there was no obvious deviation from the y=x line in the decile calibration plot. The RMSE for each of the models was low: acute care hospital 1.09, CAH 0.52, LTAC 3.9, IRF 1.2.<br>See Figures A4, A5, A6, A7.<br>The conceptual model can be found here. On October 30, 2024, Battelle held a Measure Developer Workshop. One of the purposes of the webinar was for Battelle to describe their comprehensive strategy for measure endorsement, which included sharing best practices for measure submissions. Battelle also provided examples of "good" measure submissions for process and outcome measures. The What Good Looks Like (Outcome Measure) reference document provides the following conceptual model (Figure A3) under question 4.4.2a [If risk factors are addressed by any method (4.4.1)] Attach Conceptual Model. The CDC NHSN conceptual models are based off this conceptual model that Battelle references in their What Good Looks Like (Outcome Measure), which can be found on the E&M Resources page of the Battelle website. |
| **Public Comment on Spinal Cord Injury:** A committee member asked the developer to speak to a public comment from the American | CDC's NHSN introduced a new data field in January 2025 to identify catheter-associated urinary tract infection (CAUTI) events in patients |

| Feedback/Questions | Full Developer Response |
|---|---|
| Spinal Injury Association (ASIA), the Academy of Spinal Cord Injury Professionals (ASCIP), and the United Spinal Association on the exclusion of spinal cord injury patients. | with Spinal Cord Injury-associated Neurogenic Bladder (SCI-NB). This addition aims to enhance understanding of CAUTI occurrences in this vulnerable population. Previously, the CAUTI measure lacked a mechanism to identify these patients, quantify their infection burden, and establish metrics for evaluating improvements. The new field will collect SCI-NB data as "optional" for the 2025 reporting year and will become mandatory starting January 2026. We have submitted a request to the Office of Management and Budget (OMB) to revise the field name to "Neurogenic Bladder due to a Spinal Cord Injury," and OMB approval for this change is currently pending. All federal data collections require OMB approval.<br><br>While the new fields will not immediately exclude CAUTI events for SCI-NB patients, the ongoing use and reporting of SCI-NB data will provide essential analytics to support potential modifications to current UTI criteria and the Standardized Infection Ratio (SIR) for these patients. As we are still in the early phases of data collection for this population, we will present our findings and recommendations once sufficient data are available.<br><br>Patients with neurogenic bladder require careful monitoring for CAUTI due to their increased risk associated with prolonged indwelling catheterization. Ensuring high-quality, safe care that adheres to recommended CAUTI prevention strategies is essential and necessitates ongoing surveillance of this patient group. Multiple guidelines, including the Neurogenic Lower Urinary Tract Dysfunction: AUA/SUFU Guideline (2021)[1] and the Consortium for Spinal Cord Medicine's Bladder management for adults with spinal cord injury: a clinical practice guideline for health-care providers[2] recommend that the choice of catheterization method be based on various factors. These include the patient's condition (type of neurogenic bladder, bladder capacity, compliance), symptoms (urinary retention vs. incontinence), and other considerations (ability to self-catheterize, cognitive and physical limitations, patient preference), as well as the associated risks of different catheterization types. Both the Healthcare Infection Control Practices Advisory Committee (HICPAC) Catheter-Associated Urinary Tract Infections (CAUTI) Prevention Guideline[3] and the Consortium for Spinal Cord Medicine's Bladder management for adults with spinal cord injury: a clinical practice guideline for health- |

| Feedback/Questions | Full Developer Response |
|---|---|
| | care providers[2] advocates for providers to consider alternatives to chronic indwelling catheters, such as intermittent catheterization, in spinal cord injury patients tailored to individual patient factors. While it is advisable to explore alternatives to indwelling urethral catheterization as part of CAUTI prevention, decisions should be evidence-based and involve shared decision-making between clinicians and patients. The removal of a urinary catheter should never be motivated by a desire to avoid "penalties" related to CAUTI occurrences.<br><br>The Society for Healthcare Epidemiology of America (SHEA) Compendium of Strategies to Prevent Healthcare-Associated Infections in Acute Care Hospitals[4] outlines seven essential practices for managing indwelling catheters, based on a synthesis of evidence, current practices, expert consensus, and potential harms. Additionally, the Association for Professionals in Infection Control and Epidemiology (APIC) has released a NEW: Guide to Preventing Catheter-Associated Urinary Tract Infections (2025)[5] that includes best practices for prevention relevant to chronic indwelling catheters, such as maintaining a sterile, continuously closed drainage system and ensuring unobstructed urine flow that can be used to prevent CAUTIs in the SCI-NB patient population. Rather than prematurely removing catheters to avoid CAUTI events, facility leadership and clinical staff should implement these evidence-based practices to prevent CAUTI and make clinical decisions that prioritize patient welfare.<br><br>In summary, facility staff should prioritize safe bladder management and CAUTI prevention for those diagnosed with SCI-NB. If catheter management in this population is deemed unsafe, interventions should focus on improving clinical practices and infection prevention.<br><br>Efforts to prevent CAUTI in SCI-NB patients should be guided by data captured through quality measures, such as #0138 Catheter-Associated Urinary Tract Infection (CAUTI) Standardized Infection Ratio.<br><br>References<br><br>1. Ginsberg, D. A., Boone, T. B., Cameron, A. P., Gousse, A., Kaufman, M. R., Keays, E., ... & Kraus, S. R. (2021). The AUA/SUFU guideline on adult neurogenic lower urinary tract |

| Feedback/Questions | Full Developer Response |
|---|---|
| | dysfunction: diagnosis and evaluation. *The Journal of Urology*, *206*(5), 1097-1105.<br>2. Consortium for Spinal Cord Medicine. Bladder management for adults with spinal cord injury: a clinical practice guideline for health- care providers. J Spinal Cord Med. 2006;29(5):527-73. PMID: 17274492; PMCID: PMC1949036.<br>3. Gould, C. V., Umscheid, C. A., Agarwal, R. K., Kuntz, G., Pegues, D. A., & Healthcare Infection Control Practices Advisory Committee. (2010). Guideline for prevention of catheter-associated urinary tract infections 2009. *Infection Control & Hospital Epidemiology*, *31*(4), 319-326.<br>4. Yokoe, D. S., Anderson, D. J., Berenholtz, S. M., Calfee, D. P., Dubberke, E. R., Ellingson, K. D., ... & Maragakis, L. L. (2014). A compendium of strategies to prevent healthcare-associated infections in acute care hospitals: 2014 updates. *Infection Control & Hospital Epidemiology*, *35*(8), 967-977.<br>5. Association for Professionals in Infection Control and Epidemiology. (2025). *Guide to Preventing Catheter-Associated Urinary Tract Infections (2025)*. Retrieved from https://apic.org/wp-content/uploads/2025/05/2025_CAUTI_Implementation_Guide_May-Update.pdf |

**Table A3: Tested CAUTI-ACH Risk Variables for CBE 0138**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| factype | ☐ | Facility type | Analysis Dataset | Nominal | 9 levels present in 2022 CAUTI ACH data: HOSP-GEN, HOSP-VA, HOSP-CHLD, HOSP-SURG, HOSP-MIL, HOSP-ONC, HOSP-WOMCHILD, HOSP-ORTHO, HOSP-WOM | Non-significant in the presence of other variables |
| locationType | ☐ | Location type | Analysis | Nominal | 8 categories present in 2022 | Collinear with |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | Dataset | | CAUTI ACH data: WARD, CC, STEP, OTHER, WARD_ONC, SCA, CC_ONC, STEP_ONC | loccdc_grp |
| loccdc_grp | ☒ | CDC location | Derived Variable | Nominal | See Appendix for loccdc groupings | - |
| medAff | ☐ | Medical school affiliation | Analysis Dataset | Nominal | Y, N | This is the parent variable of medtype2_grp |
| medType2_grp | ☒ | Medical school affiliation type group | Derived Variable | Nominal | N, U, G: No affiliation, Undergraduate, or Graduate affiliation<br>M: Major affiliation | - |
| numBeds_grp | ☒ | Number of beds group | Derived Variable | Ordinal | 1. 1 <= numBeds < 68<br>2. 68 <= numBeds < 177<br>3. 177 <= numBeds < 421<br>4. 421 <= numBeds<br>Range: 4-1342 | - |
| numICUBeds | ☐ | Number of ICU beds | Analysis Dataset | Continuous | Considered as categorical, refer to code section<br>Range: 0 – 326 | Collinear with numBeds_grp; numerator for ICUBedsPropn_grp |
| avgLOS_grp | ☒ | Average length of stay, calculated as numPatDaysSurv / numAdmitsSurv, grouped | Derived Variable | Ordinal | 1. 1 <= avgLOS < 5.7<br>2. 5.7 <= avgLOS < 6.6<br>3. 6.6 <= avgLOS<br>Range: 1.9-108.9 | - |
| ICUBedsPropn_grp | ☒ | Proportion of total beds that are ICU group | Derived Variable | Ordinal | 1. 0 <= ICUBedsPropn < 0.141<br>2. 0.141 <= ICUBedsPropn | - |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | | | Range: 0-0.848 | |

**Table A4: Tested CAUTI-CAH Risk Variables for CBE 0138**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| medAff | ☐ | Medical school affiliation | Analysis Dataset | Nominal | Y, N | This is the parent variable of medtype2_grp |
| medType2_grp | ☐ | Medical school affiliation type group | Analysis Dataset | Nominal | M=Major<br>G=Graduate<br>U=Undergraduate<br>N=No affiliation | Non-significant |
| loccdc | ☐ | CDC location | Analysis Dataset | Nominal | 17 distinct locations present in 2022 CAUTI CAH data | Collinear with locationType; not significant |
| locationType | ☐ | Location type | Analysis Dataset | Nominal | 4 distinct location types present in 2022 CAUTI CAH data:<br>CC (ICU)<br>OTHER (mixed acuity)<br>STEP<br>WARD | Non-significant in the presence of other variables |
| numBeds | ☐ | Number of beds | Analysis Dataset | Continuous | Range: 4-44<br>Considered as categorical, refer to code section | Collinear with ICUbedPropn_grp and numICUBeds; non-significant in the presence of other variables |
| numICUBeds | ☐ | Number of ICU beds | Analysis | Continuous | Range: 0-11 | Collinear with numBeds and |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | Dataset | | Considered as categorical, refer to code section | ICUbedPropn_grp; non-significant in the presence of other variables |
| avgLOS_grp | ☒ | Average length of stay, calculated as numPatDaysSurv / numAdmitsSurv, grouped | Derived Variable | Ordinal | 1. 1 <= avgLOS < 6.5<br>2. avgLOS >= 6.5<br>Range: 1.4 – 101.6 | - |
| ICUBedsPropn_grp | ☒ | Proportion of total beds that are ICU group | Derived Variable | Ordinal | 1. ICUbedPropn < 0.16<br>2. ICUbedPropn >= 0.16<br>Range: 0 – 0.4 | - |

**Table A5: Tested CAUTI-IRF Risk Variables for CBE 0138**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| avgCensus | ☐ | Average daily census | Analysis Dataset | Continuous | Range: 0.19 - 212.8<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| factype_grp | ☒ | Facility type group | Derived Variables | Nominal | 1: CAH, CHLD, GEN, ORTHO, SURG<br>2: LTAC, REHAB<br>7 factype levels present in 2022 CAUTI IRF data: HOSP-CAH, HOSP-CHLD, HOSP-GEN, HOSP-LTAC, HOSP-ORTHO, HOSP-REHAB, HOSP-SURG | - |
| locationType | ☐ | Location type | Analysis Dataset | Nominal | 2 locationType levels present in 2022 CAUTI IRF data: IRF, WARD | Non-significant in the presence of other |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | | | | variables |
| loccdc | ☐ | CDC location | Analysis Dataset | Nominal | 4 loccdc levels present in 2022 CAUTI IRF data:<br>IN:ACUTE:IRF, IN:ACUTE:IRF:PED, IN:ACUTE:WARD:REHAB, IN:ACUTE:WARD:REHAB_PED | Collinear with locationType; not significant |
| numBeds | ☐ | Number of beds | Analysis Dataset | Continuous | Range: 4-262<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| rehabSetting | ☐ | Rehab setting | Analysis Dataset | Nominal | 2 rehabSetting levels present in 2022 CAUTI IRF data: FREE-STD, HFB<br>Note: This variable is only populated when factype = 'HOSP-REHAB'. | Non-significant in the presence of other variables |
| avgLOS | ☐ | Average length of stay | Derived Variable | Continuous | Range: 1-75.1<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| PropnVent | ☐ | Proportion of admissions on a ventilator | Derived Variable | Continuous | Range: 0-1<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| PropnPed | ☐ | Proportion of pediatric admissions | Derived Variable | Continuous | Range: 0-1<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| PropnTraSCDys | ☐ | Proportion of admissions with traumatic spinal cord dysfunction | Derived Variable | Continuous | Range: 0-0.253<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| PropnNonTraSCDys_grp | ☒ | Proportion of | Derived | Ordinal | 1. 0 <= PropnNonTraSCDys < 0.064 | - |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | admissions with non-traumatic spinal cord dysfunction group | Variable | | 2. 0.064 <= PropnNonTraSCDys<br>*Range: 0-0.312 | |
| PropnStroke_grp | ☒ | Proportion of admissions with stroke group | Derived Variable | Ordinal | 1. 0 <= PropnStroke < 0.250<br>2. 0.250 <= PropnStroke<br>*Range: 0-0.664 | - |
| PropnBrainDys_grp | ☒ | Proportion of admissions with brain dysfunction (non-traumatic or traumatic) group | Derived Variable | Ordinal | 1. 0 <= PropnBrainDys < 0.123<br>2. 0.123 <= PropnBrainDys<br>*Range: 0-0.521 | - |
| PropnOthNeuro_grp | ☒ | Proportion of admissions with other neurologic conditions group | Derived Variable | Ordinal | 1. 0 <= PropnOthNeuro < 0.150<br>2. 0.150 <= PropnOthNeuro<br><br>Range: 0-1 | - |
| PropnOrtho | ☐ | Proportion of admissions with orthopedic conditions | Derived Variable | Continuous | Range: 0-0.640<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| PropnStrkBDOthN | ☐ | Proportion of admissions with stroke, brain dysfunction (non-traumatic or traumatic), and other neurologic conditions | Derived Variable | Continuous | Range: 0-1<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| PropnBDOthN | ☐ | Proportion of admissions with brain dysfunction | Derived Variable | Continuous | Range: 0-1<br>Included as ordinal, refer to code | Non-significant in the presence of other |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | (non-traumatic or traumatic) and other neurologic conditions | | | section | variables |
| PropnOrthoOth | ☐ | Proportion of admissions with orthopedic conditions and other non-specific diagnostic categories | Derived Variable | Continuous | Range: 0-1<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |

**Table A6: Tested CAUTI-LTAC Risk Variables for CBE 0138**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| avgCensus | ☐ | Average daily census | Analysis Dataset | Continuous | Range: 3-397<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| acuteCareHospNear | ☐ | LTAC located near acute care hospital | Analysis Dataset | Nominal | 2 levels: Y, N<br>Note: This variable is only populated when ltacSetting = 'FREE=STD' | Non-significant |
| acuteCareHospNo | ☐ | LTAC located in building that does not provide acute care services | Analysis Dataset | Nominal | 2 levels: Y, N<br>Note: This variable is only populated when ltacSetting = 'FREE=STD' | Non-significant |
| locationType | ☐ | Location type | Analysis Dataset | Nominal | 2 locationType levels present in 2022 CAUTI LTAC data: CC_LTAC, WARD_LTAC | Non-significant |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| loccdc | ☐ | CDC location | Analysis Dataset | Continuous | 2 loccdc levels present in 2022 CAUTI LTAC data:<br>IN:ACUTE:CC:LTAC, IN:ACUTE:WARD:LTAC | Collinear with locationType |
| ltacSetting | ☐ | Setting | Analysis Dataset | Nominal | 2 ltacSetting levels present in 2022 CAUTI LTAC data:<br>FREE-STD, HOSPITAL | Non-significant |
| numBeds | ☐ | Number of beds | Analysis Dataset | Continuous | Range: 13-455<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| numHiObsBeds | ☐ | High observation/special care/high acuity beds (not ICU) | Analysis Dataset | Continuous | Range: 0-104<br>Included as ordinal, refer to code section | Non-significant |
| numICUBeds | ☐ | Number of ICU beds | Analysis Dataset | Continuous | Range: 0-36<br>Included as ordinal, refer to code section | Non-significant |
| shareFacNEUR | ☐ | Share housing - neuro-behavioral | Analysis Dataset | Nominal | 2 levels: Y, N<br>Note: This variable is only populated when ltacSetting = 'FREE=STD' | Non-significant |
| shareFacNo | ☐ | Share housing - none | Analysis Dataset | Nominal | 2 levels: Y, N<br>Note: This variable is only populated when ltacSetting = 'FREE=STD' | Non-significant |
| shareFacOth | ☐ | Share housing - other | Analysis Dataset | Nominal | 2 levels: Y, N<br>Note: This variable is only populated when ltacSetting = 'FREE=STD' | Non-significant |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| shareFacREHAB | ☐ | Share housing - rehabilitation | Analysis Dataset | Nominal | 2 levels: Y, N<br>Note: This variable is only populated when ltacSetting = 'FREE=STD' | Non-significant |
| shareFacRES | ☐ | Share housing - residential | Analysis Dataset | Nominal | 2 levels: Y, N<br>Note: This variable is only populated when ltacSetting = 'FREE=STD' | Non-significant |
| shareFacSNF | ☐ | Share housing - skilled nursing | Analysis Dataset | Nominal | 2 levels: Y, N<br>Note: This variable is only populated when ltacSetting = 'FREE=STD' | Non-significant in the presence of other variables |
| AvgLOS_grp | ☒ | Average length of stay group | Derived Variable | Ordinal | 1. 1 <= AvgLOS < 22.2<br>2. 22.2 <= AvgLOS < 27.8<br>3. 27.8 <= AvgLOS<br>*Range: 7.6-1035.4 | - |
| PropnVent | ☐ | Proportion of annual admissions on a ventilator | Derived Variable | Continuous | Range: 0-0.951<br>Included as ordinal, refer to code section | Non-significant in the presence of other variables |
| PropnHemo | ☐ | Proportion of annual admissions with hemodialysis | Derived Variable | Continuous | Range: 0-0.714<br>Included as ordinal, refer to code section | Non-significant |
| PropnICUBeds_grp | ☒ | Proportion of LTAC beds that are critical care group | Derived Variable | Ordinal | 1. PropnICUBeds < 0.103<br>2. 0.103 <= PropnICUBeds<br>*Range: 0-0.933 | - |
| PropnHiObsBeds | ☐ | Proportion of LTAC beds that are high observation | Derived Variable | Continuous | Range: 0-0.925<br>Included as ordinal, refer to code section | Non-significant |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| PropnSingOccRm | ☐ | Proportion of single occupancy rooms | Derived Variable | Continuous | Range: 0-1<br>Included as ordinal, refer to code section | Non-significant |

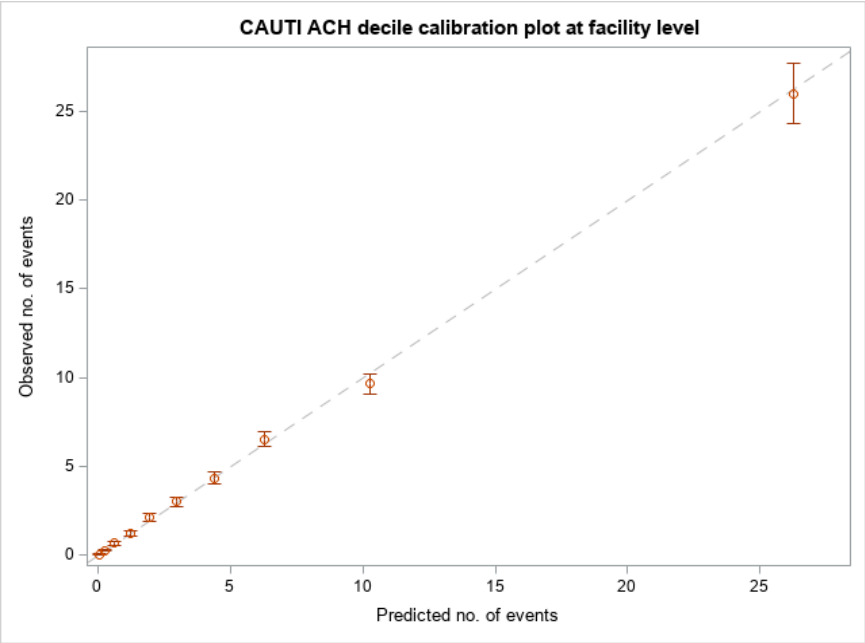


*Figure A4. CAUTI ACH Decile Calibration Plot for CBE 0138*

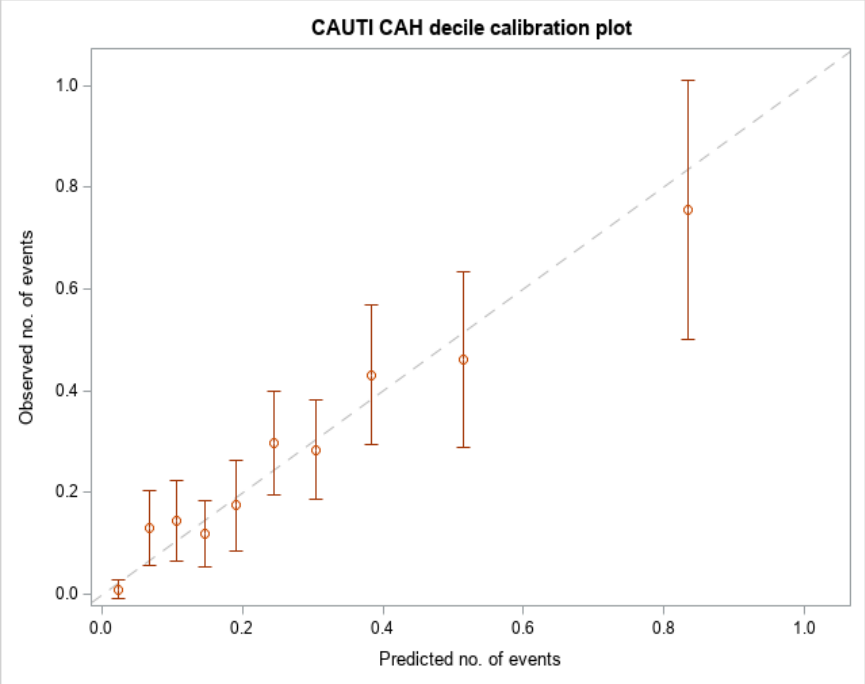


*Figure A5. CAUTI CAH Decile Calibration Plot for CBE 0138*

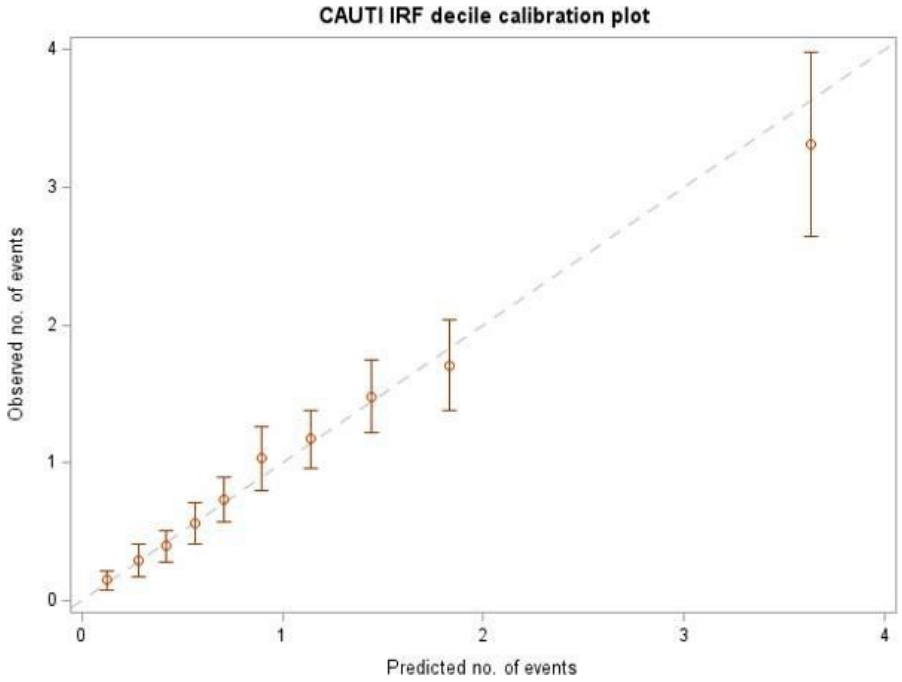


*Figure A6. CAUTI IRF Decile Calibration Plot for CBE 0138*

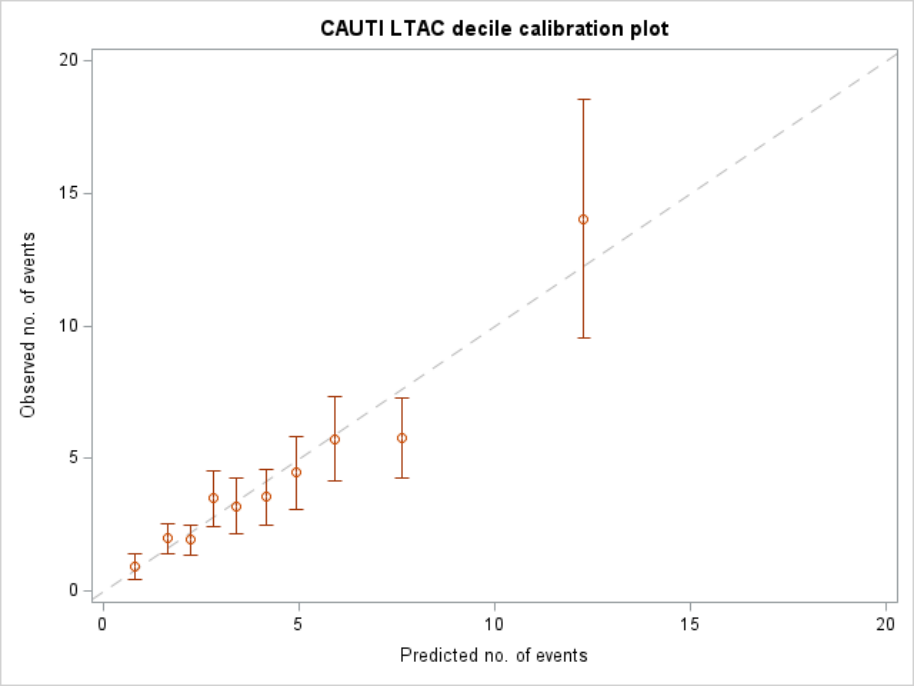


*Figure A7. CAUTI LTAC Decile Calibration Plot for CBE 0138*

## CBE 0139: Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratio [CDC, National Healthcare Safety Network] – Full Responses Written by Developer

| Feedback/Questions | Full Developer Response |
|---|---|
| **Methods Concerns:** In writing, a committee member expressed concerns about:<br>• The use of facility-level variables potentially obscures the quality of care.<br>• Outdated feature-selection method. Specific to the feature-selection method, the committee member also asked for clarification on:<br>  ○ Which pseudo-R-squared calculation they did.<br>  ○ Why they used a logistic regression rather than a linear regression.<br>• Decile plots and an analytical pipeline not being provided. | • **Facility-level variables:** *The developer provided tables that outline the eligible risk variables they tested. Please see Tables A7, A8, A9, A10, A11, and A12.*<br>• **Decile plots:** Discrimination of risk models was assessed using the Dispersion-based pseudo R-squared, and calibration was visually investigated by dividing predicted number of events into deciles and plotting the observed number of events. Additionally, the Root Mean Square Error (RMSE) was calculated between observed and predicted events.<br>For the acute care model, the Dispersion based pseudo r-square was 26.98% (NICU Specific: 43.5%, SCA Specific: 27.5%), for CAH 50.1%, for LTAC 34.78%. For each of the 3 CLABSI models there was no obvious deviation from the y=x line in the decile calibration plot. The RMSE for each of the models were low: Acute Care 1.13 (NICU Specific: 0.60, SCA Specific: 1.62) , CAH 0.85, LTAC 3.3.<br>See Figures A8, A9, A10, A11, A12, and A13.<br>The conceptual model can be found here. On October 30, 2024, Battelle held a Measure Developer Workshop. One of the purposes of the webinar was for Battelle to describe their comprehensive strategy for measure endorsement, which included sharing best practices for measure submissions. Battelle also provided examples of "good" measure submissions for process and outcome measures. The What Good Looks Like (Outcome Measure) reference document provides the following conceptual model (Figure A3) under question 4.4.2a [If risk factors are addressed by any method (4.4.1)] Attach Conceptual Model. The CDC NHSN conceptual models are based off this conceptual model that Battelle references in their What Good Looks Like (Outcome Measure), which can be found on the E&M Resources page of the Battelle website. |

**Table A7: Tested CLABSI-ACH-NICU Risk Variables for CBE 0139**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| Birthweightcode1 | ☒ | Birthweight categories; D & E categories are combined | Derived Variable | Ordinal | BIRTHWTCODE1=BIRTHWTCODE;<br>IF BIRTHWTCODE IN ('D' 'E') THEN BIRTHWTCODE1='D/E'; | - |
| ICUbeds_gp | ☒ | Number of ICU beds, divided into 2 groups based on median value | Derived Variable | Ordinal | IF ICUBEDS<56 THEN ICUBEDS_GP='<56 ';<br>IF ICUBEDS>=56 THEN ICUBEDS_GP='>=56';<br>Range of ICU beds:4-326 | - |
| LOS_gp | ☒ | Average length of stay calculated as numPatDaysSurv/numAdmitsSurv, grouped into 2 groups based on median value | Derived Variable | Ordinal | Los=numPatDaysSurv/numAdmitsSurv<br>IF 1<=LOS <4.9 THEN<br>LOS_GP='1<=LOS<4.9 days ';<br>IF LOS>=4.9 THEN LOS_GP='>=4.9 days';<br>Range of LOS: 1.2-55.4 | - |
| facType | ☐ | - | Analysis Dataset | Nominal | - | Non-significant |
| LOCCDC | ☐ | - | Analysis Dataset | Nominal | - | Non-significant |
| medType2 | ☐ | - | Analysis Dataset | Nominal | - | Non-significant |
| numBeds | ☐ | - | Analysis Dataset | Continuous | Range of beds: 35-1322<br>Included as categorical but Not sig. | Non-significant |
| pICU | ☐ | ICUBEDS/numBeds as pICU | Derived Variable | Continuous | Range of pICU: 0.038 – 0.728<br>Included as categorical but Not sig. | Collinearity with ICUbeds |

**Table A8: Tested CLABSI-ACH-SCA Risk Variables for CBE 0139**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| avgLOS_grp | ☒ | Average length of stay calculated as numPatDaysSurv/numAdmitsSurv, grouped | Derived Variable | Ordinal | Average length of stay deciles in 2 groups:<br>avgLOS_grp "1<=avgLOS<4.4": 1<=avgLOS<br><4.4<br>avgLOS_grp "avgLOS>=4.4": avgLOS>=4.4 | - |
| facType | ☐ | Facility type | Analysis Dataset | Nominal | facType: HOSP-CHLD, HOSP-GEN, HOSP- MIL, HOSP-ONC, HOSP-VA, HOSP- WOMCHILD | Non-significant |
| lineType | ☒ | Central line type | Derived Variable | Nominal | PERM: permanent central line TEMP: temporary central line<br>See SAS code section for creation of this variable | - |
| LOCCDC_grp | ☒ | CDC location, grouped | Derived Variable | Nominal | See appendix for list of location groupings | - |
| medType2_grp | ☒ | Medical affiliation type, grouped | Derived Variable | Nominal | medType2_grp "M": M<br>medType2_grp "OTHER": N, U, G | - |
| numBeds | ☐ | Number of beds | Analysis Dataset | Continuous | Range: 20-1342 | Non-significant |
| numICUbeds | ☒ | Number of ICU beds, grouped | Derived Variable | Ordinal | numICUbeds_grp "numICUbeds<35":<br>numBeds<35 | - |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| propICUbeds | ☐ | Proportion of total beds that are ICU beds, calculated as numICUbeds/numBeds | Analysis Dataset | Continuous | Range: 0 – 0.73 | Collinearity with ICUbeds |

**Table A9: Tested CLABSI-ACH-ALL OTHERS Risk Variables for CBE 0139**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| avgLOS_grp | ☒ | Average length of stay calculated as numPatDaysSurv/numAdmitsSurv, grouped | Derived Variable | Ordinal | Average length of stay deciles in 3 groups:<br>avgLOS_grp "1<= avgLOS<4.8": avgLOS < 4.8<br>avgLOS_grp "4.8<=avgLOS<5.7": 4.8 ≤ avgLOS < 5.7<br>avgLOS_grp "avgLOS>=5.7": avgLOS ≥ 5.7 | - |
| facType_grp | ☒ | Facility type, grouped | Derived Variable | Nominal | facType_grp "ORTHO/SURG/WOM": HOSP-ORTHO, HOSP-SURG, HOSP-WOM<br>facType_grp "OTHER": HOSP-CHLD, HOSP-GEN, HOSP- MIL, HOSP-VA, HOSP-WOMCHILD | Non-significant |
| LOCCDC_grp | ☒ | CDC location, grouped | Derived Variable | Nominal | See appendix for list of location groupings | - |
| medType2_grp | ☒ | Medical affiliation type, grouped | Derived Variable | Nominal | medType2_grp "U/N": U & N<br>medType2_grp "G/M": G & M | - |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| numBeds_grp | ☒ | Number of beds, grouped | Derived Variable | Ordinal | numBeds_grp "numBeds<138": numBeds < 138<br>numBeds_grp "138<=numBeds<425": 138 < numBeds < 425<br>numBeds_grp "numBeds>=425": numBeds > 425 | - |
| numICUbeds | ☐ | Number of ICU beds | Analysis Dataset | Continuous | Range: 0-326 | Collinearity with number of beds<br>and proportion of ICU beds |
| propICUbeds_grp | ☒ | Proportion of total beds that are ICU beds, grouped | Derived Variable | Ordinal | propICUbeds_grp "propICU<0.189": propICUbeds < 0.189<br>propICUbeds_grp "propICU >=0.189": propICUbeds > _ 0.189 | - |

**Table A10: Tested CLABSI-CAH OTHERS Risk Variables for CBE 0139**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| Location_LOS | ☒ | Loccdc (CC & OTHERS) + Average length of stay (numPatDaysSurv/numAdmitsSurv; split at 90th pctile) were combined to create 3 risk categories | Derived Variable | Nominal | Los=numPatDaysSurv/numAdmitsSurv<br><br>IF LOCATIONTYPE IN ('CC') THEN | - |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | | | LOCATION_LOS='CC';<br>IF LOCATIONTYPE in ('WARD' 'OTHER'<br>'STEP') THEN DO;<br>IF 1<=LOS<8.9 THEN<br>LOCATION_LOS='non-CC & 1<=LOS<8.9<br>DAYS';<br>IF LOS>=8.9 THEN<br>LOCATION_LOS='non-CC & LOS>=8.9<br>DAYS';<br>END;<br>Range of LOS: 1.5-101.6<br>Note: locCDCs were assessed and should be used for implementation. | |
| medType2 | ☐ | - | Analysis Dataset | Nominal | - | Non-significant |
| numBeds | ☐ | - | Analysis Dataset | Continuous | Range: 4-44<br>Included as categorical but Not sig. | Non-significant in the present of other variables |
| numICUbeds | ☐ | - | Analysis Dataset | Continuous | Range: 0-11<br>Included as categorical but Not sig. | Non-significant in the present of other variables |
| pICU | ☐ | ICUBEDS/numBeds as pICU | Derived Variable | Continuous | Range: 0-0.4 | Non-significant in |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | | | Included as categorical but Not sig. | the present of other variables |

**Table A11: Tested CLABSI-IRF Risk Variables for CBE 0139**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| avgCensus | ☐ | Average Daily Census | Analysis Dataset | Continuous | Calculated as numPatDaysSurv/numAdmitsSurv<br>Valid range: 0.19-132.9 | Non-significant |
| avgLOS | ☐ | Average Length of Stay | Analysis Dataset | Continuous | Valid range: 1.0-70.8 | Non-significant |
| factype | ☐ | Facility Type | Analysis Dataset | Nominal | HOSP-CAH, HOSP-CHLD, HOSP-GEN, HOSP-LTAC, HOSP-ORTHO, HOSP-REHAB, HOSP-SURG | Non-significant |
| Loccdc | ☐ | CDC Location | Analysis Dataset | Nominal | IN:ACUTE:IRF<br>IN:ACUTE:IRF:PED<br>IN:ACUTE:WARD:REHAB<br>IN:ACUTE:WARD:REHAB_PED | Non-significant |
| numBeds | ☐ | Number of beds | Analysis Dataset | Continuous | Valid range: 5-187 | Non-significant |
| pBrainDysAdm | ☐ | Proportion of admissions with brain dysfunction (non-traumatic or traumatic) | Derived Variable | Continuous | Calculated as numBrainDysAdm/numAdmitsSurv<br>Valid range: 0.000-0.521 | Non-significant in the present of other variables; collinearity with pOrthoAdm |
| pNonTraSCDysAdm | ☐ | Proportion of admissions with | Derived Variable | Continuous | Calculated as numNonTraSCDysAdm /numAdmitsSurv | Non-significant in the presence of other |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | non-traumatic spinal cord dysfunction | | | Valid range: 0.000-0.312 | variables |
| pOrthoAdm_grp | ☒ | Proportion of admissions with orthopedic conditions, grouped | Derived Variable | Ordinal | Calculated as numOrthoAdm /numAdmitsSurv<br>Group 0: propOrthoAdm < 0.070<br>Group 1: propOrthoAdm ≥ 0.070 | - |
| pOtherAdm | ☐ | Proportion of admissions with other non-specific diagnostic categories | Analysis Dataset | Continuous | Calculated as numOtherAdm/numAdmitsSurv<br>Valid range: 0.000-0.889 | Non-significant |
| pOthNeuroAdm | ☐ | Proportion of admissions with other neurologic conditions | Analysis Dataset | Continuous | Calculated as numOthNeuroAdm/numAdmitsSurv<br>Valid range: 0.000-0.649 | Non-significant |
| pPedAdm | ☐ | Proportion of pediatric admissions | Analysis Dataset | Continuous | Calculated as numPedAdm/numAdmitsSurv<br>Valid range: 0.000-1.000 | Non-significant |
| pStrokeAdm_grp | ☒ | Proportion of admissions with stroke, grouped | Derived Variable | Ordinal | Calculated as numStrokeAdm/numAdmitsSurv<br>Group 0: propStrokeAdm < 0.215<br>Group 1: 0.215 ≤ propStrokeAdm < 0.330<br>Group 2: propStrokeAdm ≥ 0.330 | - |
| pTraSCDysAdm | ☐ | Proportion of admissions with traumatic spinal cord dysfunction | Analysis Dataset | Continuous | Calculated as numTraSCDysAdm/numAdmitsSurv<br>Valid range: 0.000-0.250 | Non-significant in the present of other variables; collinearity with pNonTraSCDysAdm |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | | | | and pBrainDysAdm |
| pVentAdm_grp | ☒ | Proportion of admissions on a ventilator, grouped | Derived Variable | Ordinal | Calculated as numVentAdm/numAdmitsSurv Group 0: propVentAdm = 0<br>Group 1: propVentAdm > 0 | - |
| rehabSetting2 | ☐ | - | Derived Variable | Nominal | FREE-STD: Free-standing<br>HFB: Healthcare facility based<br>IRFunit: IRF unit within a facility | Non-significant |
| pOOAdm | ☐ | Proportion of orthopedic conditions and other non-specific diagnostic categories | Analysis Dataset | Continuous | Calculated as numOrthoAdm + numOtherAdm /numAdmitsSurv<br>Valid range: 0.083-0.966 | Non-significant in the present of other variables |
| pBNAdm_grp | ☐ | Proportion of admissions with brain dysfunction (non-traumatic or traumatic) and with other neurologic conditions | Analysis Dataset | Continuous | Calculated as numBrainDysAdm + numOthNeuroAdm/numAdmitsSurv<br>Valid range: 0.000-0.649 | Fit statistics larger than the final model which includes pStrokeAdm |
| pBNSAdm | ☐ | Proportion of admissions with brain dysfunction (non-traumatic or traumatic), other neurologic conditions, and with stroke | Analysis Dataset | Continuous | Calculated as numBrainDysAdm + numOthNeuroAdm + numStrokeAdm /numAdmitsSurv<br>Valid range: 0.034-0.824 | Fit statistics larger than the final model which includes pStrokeAdm |

**Table A12: Tested CLABSI-LTAC Risk Variables for CBE 0139**

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| avgCensus | ☐ | Average Daily Census | Analysis Dataset | Continuous | The average number of patients housed each day range: 3-318 | Non-significant |
| avgLOS | ☒ | Average Length of Stay | Analysis Dataset | Ordinal | Calculated as numPatDaysSurv/numAdmitsSurv<br>Categorized as follows:<br>if 1<=LOS<27.6 then LOS_DECILEGP='1-<27.6'; if 27.6<=LOS<31.7 then LOS_DECILEGP='27.6 - <31.7';<br>if LOS>=31.7 then LOS_DECILEGP='>=31.7';<br>range: 7.6-1035.4 days | - |
| Locationtype | ☒ | Location type | Analysis Dataset | Nominal | CC_LTAC; WARD_LTAC which comprised of 454 IN:ACUTE:WARD:LTAC + 1 IN:ACUTE:WARD:LTAC_PED<br>Note: locCDCs were assessed and should be used for implementation. | - |
| Loccdc | ☐ | CDC Location | Analysis Dataset | Nominal | - | Collinearity with locationtype |
| LTACSETTING1 | ☒ | Derived from the following variables ( ltacSetting shareFacNo shareFacSNF acuteCareHospNear acuteCareHospNo ) | Derived Variable | Nominal | IF LTACSETTING='HOSPITAL' AND acuteCareHospNear='N' AND acuteCareHospNo='N' THEN SHARESNF=1;<br>IF LTACSETTING='HOSPITAL' AND acuteCareHospNear='Y' AND acuteCareHospNo='Y' THEN SHARESNF=2;<br>IF LTACSETTING='HOSPITAL' AND acuteCareHospNear='Y' AND | - |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| | | | | | acuteCareHospNo='N' THEN SHARESNF=3;<br>IF LTACSETTING='HOSPITAL' AND<br>acuteCareHospNear='N' AND acuteCareHospNo='Y' THEN SHARESNF=4;<br>IF LTACSETTING='FREE-STD' AND<br>shareFacNo='N'AND shareFacSNF='N' THEN SHARESNF=5;<br>IF LTACSETTING='FREE-STD' AND<br>shareFacNo='N'AND shareFacSNF='Y' THEN SHARESNF=6;<br>IF LTACSETTING='FREE-STD' AND<br>shareFacNo='Y'<br>THEN<br>SHARESNF=7;<br>IF SHARESNF IN (3 5) THEN LTACSETTING1=0;*LOWEST RISK GROUP;<br>IF SHARESNF NOT IN (3 5) THEN LTACSETTING1=1;<br>LTACSETTING1=0 represents LTAC-within-hospital system which is located near acute care hospital and provides acute care services (or) Free-standing LTAC which shares with units other than skilled nursing facilities LTACSETTING1=1 represents other types of LTAC setting. | |
| shareFacNEUR<br>shareFacOth | ☐ | - | Analysis Dataset | Nominal | - | NA; Already incorporated into LTACSETTING1 |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| shareFacREHAB<br>shareFacRES | | | | | | above |
| Proportion of annual admission on a ventilator | ☒ | - | Analysis Dataset | Ordinal | PVENT=numAdmVent/numAdmitsSurv<br>if 0<=pVENT<0.145 then pVENT_QUARTILEGP='<0.145';<br>if pVENT>=0.145 then pVENT_QUARTILEGP='>=0.145';<br>Range: 0-0.95 | - |
| Proportion of annual admission with Hemodialysis | ☒ | - | Analysis Dataset | Ordinal | PHEMO=numAdmHemo/numAdmitsSurv<br>if 0<=pHEMO<0.078 then pHEMO_DECILEGP='<0.078';<br>if pHEMO>=0.078 then pHEMO_DECILEGP='>=0.078';<br>Range: 0-0.71 | - |
| numBeds | ☐ | Number of beds | Analysis Dataset | Continuous | Range: 13-370 | Non-significant in the present of other variables |
| numHiObsBeds | ☐ | - | Derived Variable | Ordinal | Range: 0-104 | Non-significant |
| numICUBeds | ☐ | - | Analysis Dataset | Continuous | Range: 0-36 | Non-significant in the present of other variables |
| numSingOccRm | ☐ | - | Derived Variable | Ordinal | Range: 0-233 | Non-significant in the present of other variables |
| Proportion of LTAC beds that are critical care | ☐ | - | Derived Variable | Nominal | Range: 0-0.93 | Non-significant in the present of other variables |
| Proportion of | ☐ | - | Analysis | Continuous | Range: 0-0.93 | Non-significant |

| Variable Name | Used in Final Model? | Variable Definition | Variable Source | Variable Type | Variable Details (Groups, Levels, Ranges) | Reason Not in Final Model |
|---|---|---|---|---|---|---|
| LTAC beds that are high observation | | | Dataset | | | |
| Proportion of single occupancy rooms | ☐ | - | Analysis Dataset | Continuous | Range: 0-1.0 | Non-significant in the present of other variables |

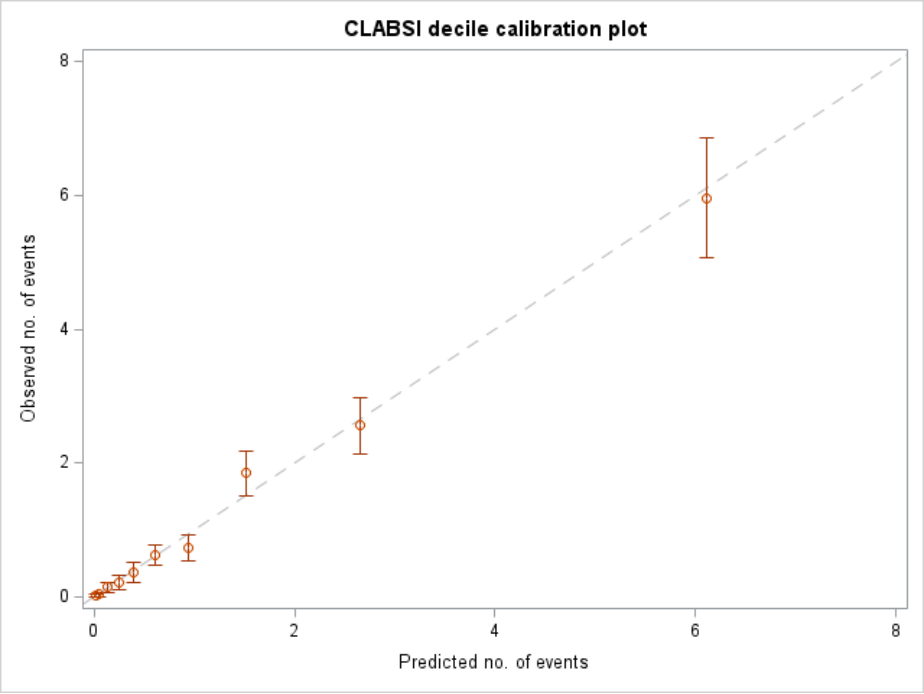


*Figure A8. CLABSI-ACH-NICU Decile Calibration Plot for CBE 0139*

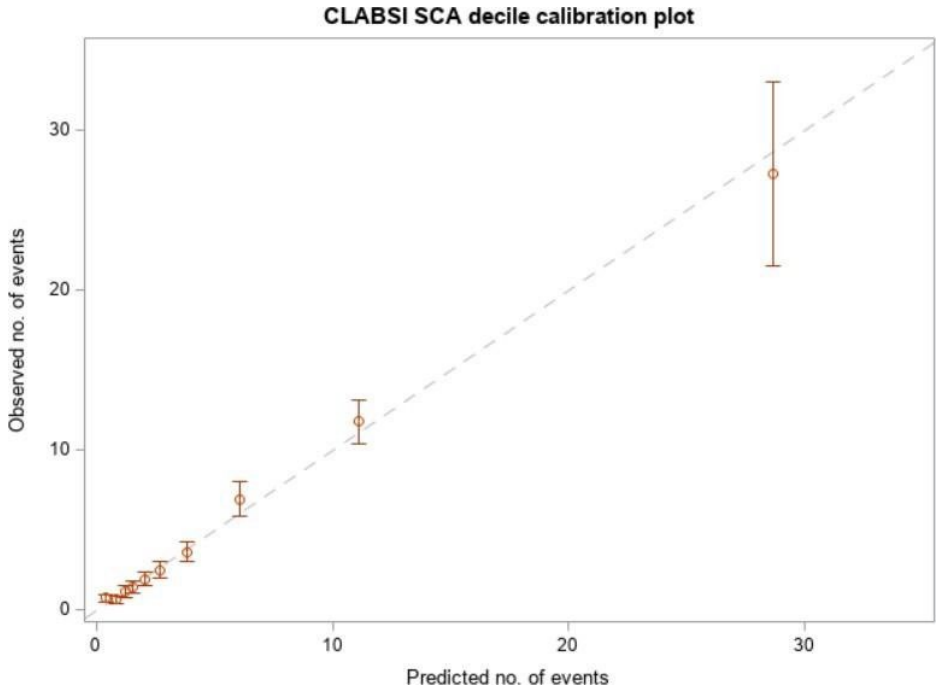


*Figure A9. CLABSI-ACH-SCA Decile Calibration Plot for CBE 0139*

Version 1.0 | June 2025 | The analyses upon which this publication (or document) is based were performed under Contract Number 75FCMC23C0010, entitled, “National Consensus Development and Strategic Planning for Health Care Quality Measurement,” sponsored by the Department of Health and Human Services, Centers for Medicare & Medicaid Services. *Restricted:* Use, duplication, or disclosure is subject to the restrictions as stated in Contract Number 75FCMC23C0010 between the Government and Battelle.

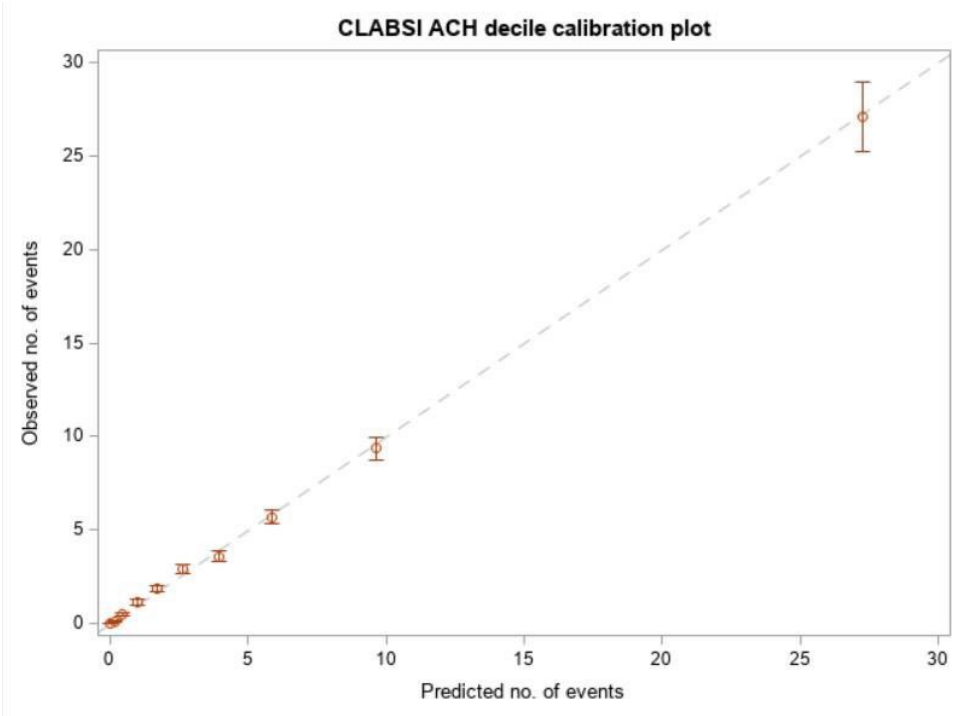


*Figure A10. CLABSI-ACH-Others Decile Calibration Plot for CBE 0139*

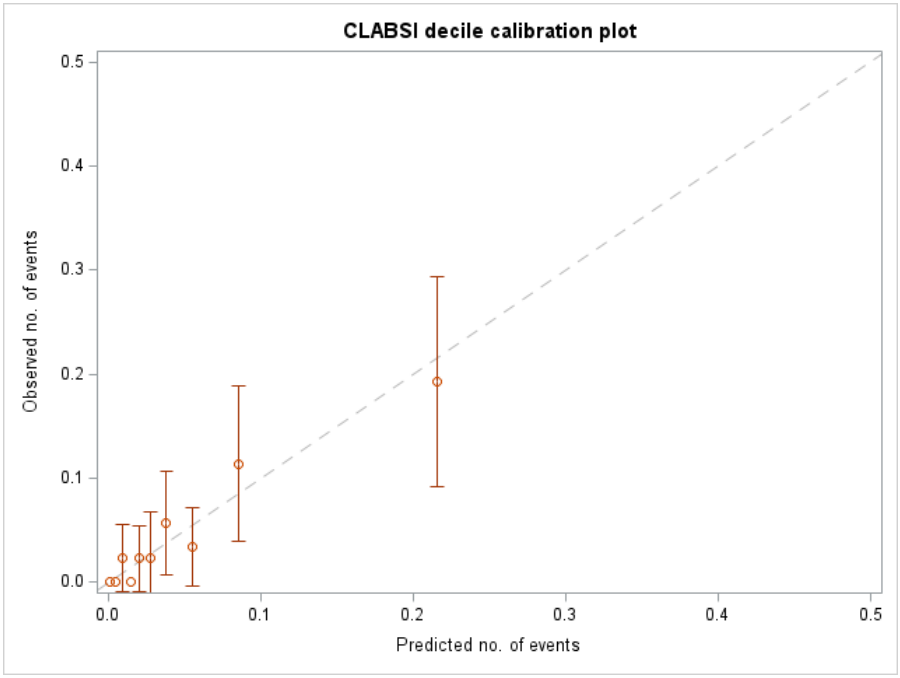


*Figure A11. CLABSI-CAH Decile Calibration Plot for CBE 0139*

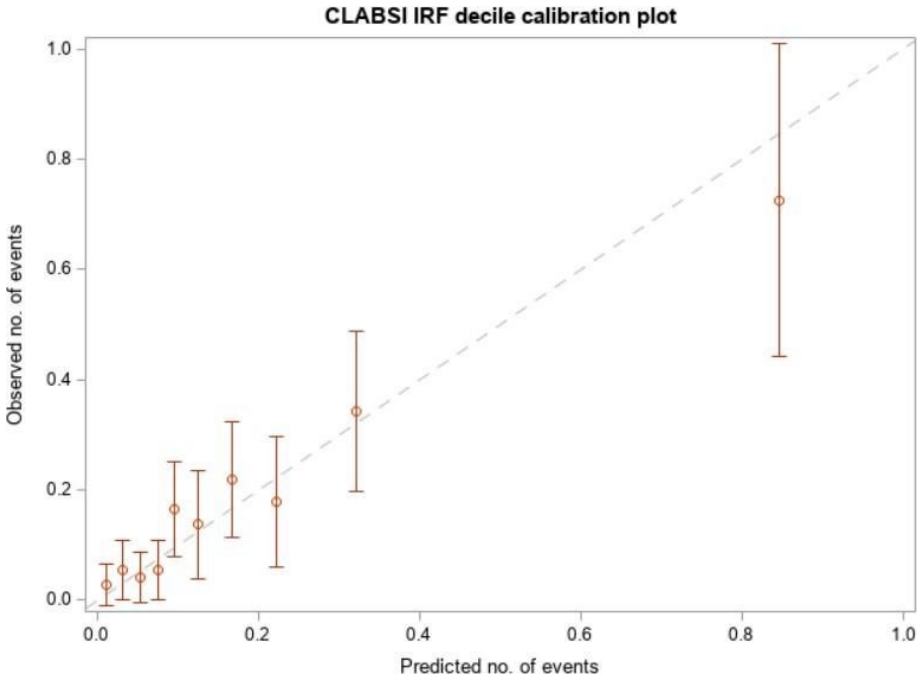


*Figure A12. CLABSI-IRF Decile Calibration Plot for CBE 0139*

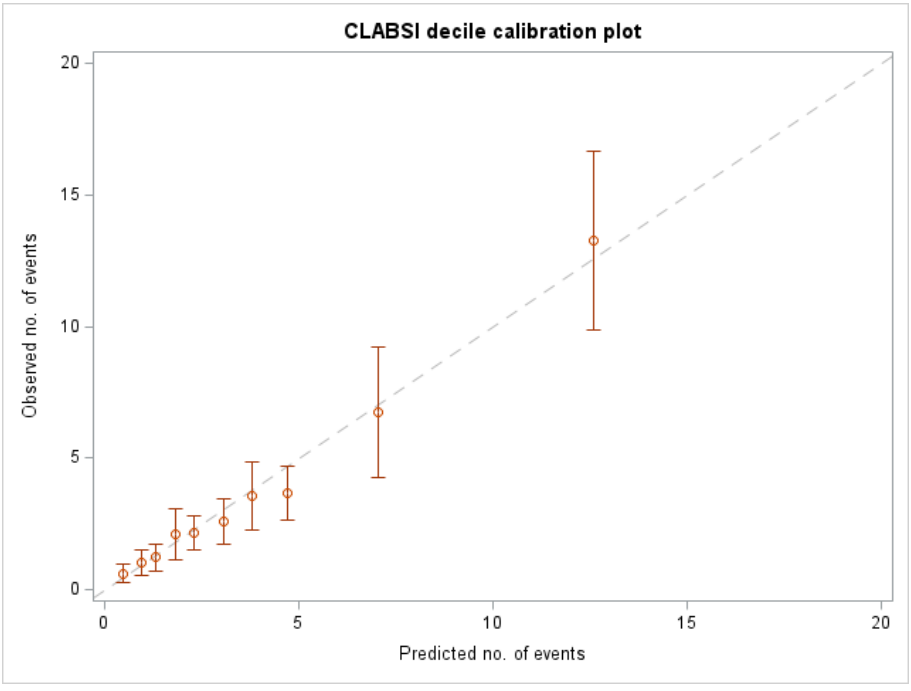


*Figure A13. CLABSI-LTAC Decile Calibration Plot for CBE 0139*


Version 1.0 | June 2025 | The analyses upon which this publication (or document) is based were performed under Contract Number 75FCMC23C0010, entitled, “National Consensus Development and Strategic Planning for Health Care Quality Measurement,” sponsored by the Department of Health and Human Services, Centers for Medicare & Medicaid Services. *Restricted:* Use, duplication, or disclosure is subject to the restrictions as stated in Contract Number 75FCMC23C0010 between the Government and Battelle.