# Measure Information and Justification Form

## Project Title: Emergency Care Capacity and Quality Electronic Clinical Quality Measure

**Date:** 8/15/2024

Information included is current on 8/15/2024.

**Project Overview:**

The Centers for Medicare & Medicaid Services (CMS) has contracted with Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE) to develop a measure of emergency care capacity and quality. This measure will be an electronic clinical quality measure (eCQM) determining emergency department (ED) care capacity and quality. The contract name is Measure & Instrument Development and Support (MIDS): Development, Reevaluation, and Implementation of Outpatient Outcome/Efficiency Measures, Option Period 4. The contract number is HHSM-75FCMC18D0042. As part of its measure development process, CORE requests interested parties to submit comments on the candidate or concept measures that may be suitable for this project. This project's main objective is to evaluate emergency care capacity and quality.

**Measure Name/Title:** Emergency Care Capacity and Quality

### Descriptive Information

#### 1.1 Measure Type

process

☐outcome

☐PRO-PM

☐cost /resource use

☐efficiency

☐structure

**intermediate outcome**

☐population health

☐composite

☐process

☐outcome

☐other

☐other

#### 1.2 Brief Description of Measure

The measure aims to reduce patient harm and improve outcomes for patients requiring emergency care in an ED. Emergency care capacity is inclusive of several concepts pertaining to boarding and crowding in an ED. This measure aligns with incentives to promote improved care both in EDs and the broader health system to help identify where patients experience failures in access to emergency care.

#### 1.3 If Paired or Grouped

Not applicable.

### Measure Specifications

#### 2.1 Measure-Specific Webpage

Not applicable.

#### 2.2 If this is an electronic clinical quality measure (eCQM)

This is an eCQM and the MAT output is attached.

#### 2.3 Data Dictionary, Code Table, or Value Sets*.*

Attached.

#### 2.4 For an instrument-based measure

Not applicable.

#### 2.5 Updates since last submission

Not applicable.

#### 2.6 Numerator Statement

The numerator is comprised of any ED visit in the denominator with any quality gap in access; if the patient experiences any of the following during a visit, the visit is included in the numerator:

1. The patient waited longer than **1 hour** to be placed in a treatment room or dedicated treatment area that allows for audiovisual privacy during history-taking and physical examination; or
2. The patient left the ED without being evaluated by a physician/advanced practice nurse/physician’s assistant, or
3. The patient boarded (time from Decision to Admit (order) to ED departure for admitted patients) in the ED for longer than **4 hours**, or
4. The patient had an ED length of stay (LOS) (time from ED arrival to ED physical departure as defined by the ED depart timestamp) of longer than **8 hours**.

#### 2.7 Numerator Details

No additional details.

#### 2.8 Denominator Statement

Includes all ED visits associated with patients of all ages, for all-payers, during the performance period. Patients can have multiple visits during a performance period; each visit is eligible to contribute to the outcome.

#### 2.9 Denominator Details

No additional details.

#### 2.10 Denominator Exclusions

This measure has no denominator exclusions.

#### 2.11 Denominator Exclusion Details

Not applicable.

#### 2.12 Type of Score

☐count

**rate/proportion**

☐ratio

☐categorical (e.g., yes or no)

☐continuous variable (CV) (e.g., an average)

☐composite/scale

☐other (specify) To be determined

#### 2.13 Interpretation of Score

A higher score means worse performance.

#### 2.14 Risk Adjustment Type

no risk adjustment or risk stratification

**stratification by risk category/subgroup**

☐statistical risk model

☐other

#### 2.15 Stratification Details/Variables

The measure will utilize volume standardization to address differences in patient population between hospitals. Volume-standardization is harmonized with other existing measures and accommodates a “like to like” comparison among hospitals. Large volume EDs will always be compared to large volume EDs, while smaller volume EDs will always be compared to EDs of similar size.

The measure will also be stratified by age and mental health visits.

The principal diagnosis will be used to define strata inclusion; a history of mental health diagnoses will not automatically exclude or include patients in either stratum. For this measure's purpose, mental health diagnoses do not include substance use disorders.

Stratification by age will be reported for patients less than 18 years of age and patients 18 years of age and older, for both mental health and non-mental health cohorts.

#### 2.16 Calculation Algorithm/Measure Logic

The score for public display will be an adjusted percentage of access failures. This score is first calculated at the individual ED level as the proportion of ED visits where any one of the four outcomes occurred. Scores will be standardized z-scores by ED case volume strata (defined in ED visit volume bands of 20,000 visits). For CCN’s with more than one ED, volume-adjusted z-scores are then combined as a weighted average for that CCN. This volume-adjusted z-score is then multiplied by the national average to display an adjusted percentage, consistent with other measures currently displayed on Care Compare. A higher score means worse performance, compared to like CCNs. Individual hospitals will receive additional score information.

#### 2.17 Sampling

Not applicable.

#### 2.18 Survey/Patient-Reported Data

Not applicable.

#### 2.19 Data Source

☐administrative data

☐claims data

☐paper patient medical records

**electronic patient medical records**

**electronic clinical data**

☐registries

☐standardized patient assessments

☐patient-reported data and surveys

☐non-medical data

☐other—describe in 2.20

#### 2.20 Data Source or Collection Instrument

Not applicable.

#### 2.21 Data Source or Collection Instrument (Reference)

Not applicable.

#### 2.22 Level of Analysis

☐individual clinician

☐group/practice

**hospital/facility/agency**

☐health plan

☐accountable care organization

☐geographic population

☐other (specify) Click or tap here to enter text.

#### 2.23 Care Setting

☐ambulatory surgery center

☐clinician office/clinic

☐outpatient rehabilitation

☐urgent care – ambulatory

☐behavioral health: inpatient

☐behavioral health: outpatient

☐dialysis facility

☐emergency medical services/ambulance

**emergency department**

☐home health

☐hospice

hospital

☐hospital: critical care

hospital: acute care facility

☐imaging facility

☐laboratory

☐pharmacy

☐nursing home/skilled nursing facility (SNF)

☐inpatient rehabilitation facility (IRF)

☐long-term acute care

☐birthing center

☐no applicable care setting

☐other (specify) Click or tap here to enter text.

#### 2.24 Composite Measure

Not applicable.

### Importance

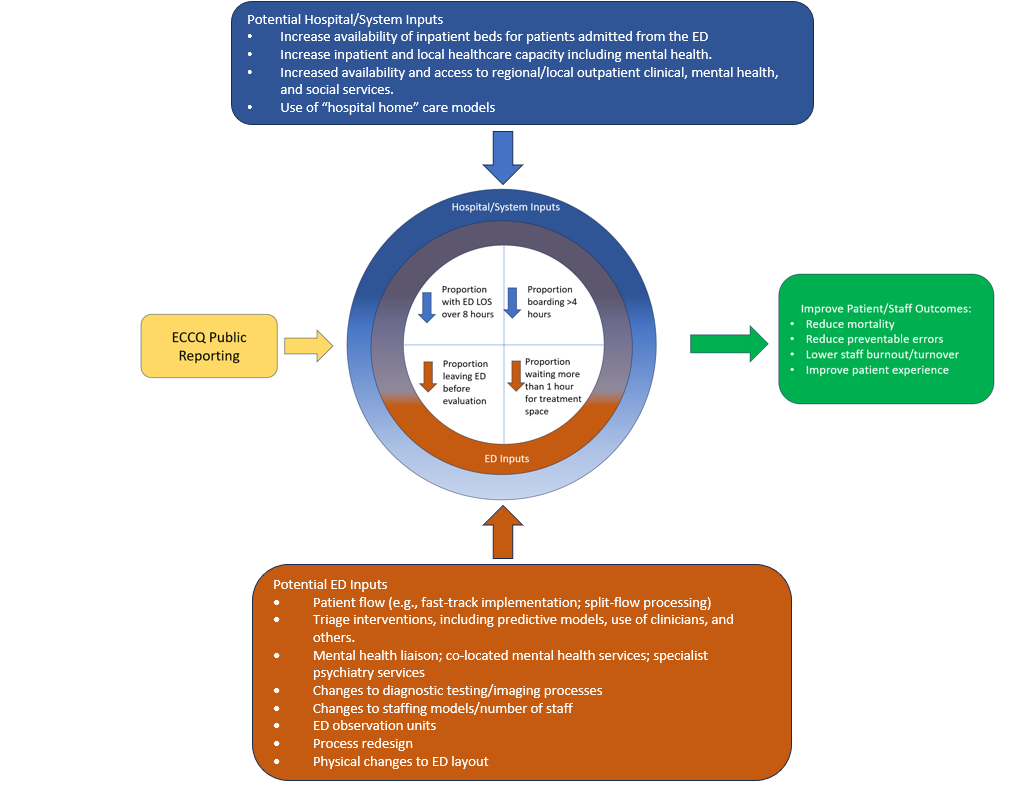
#### 3.1 Evidence to Support the Measure Focus (for reference only)

EDs in the United States (U.S.) play a crucial role in providing immediate medical care to individuals who require urgent attention for a wide range of injuries, illnesses, and medical emergencies. EDs also provide a safety-net for care in most communities, serving as an open door for a broad range of services, including trauma care, diagnostic services, procedures, coordination and referrals, public health and disaster response, and patient education and coordination of care. The ED is also a critical hub in the health system, connecting care and services between a broad array of non-hospital settings and other hospital settings, such as inpatient care. Because of this larger health system role, focusing on variation in ED care has impacts beyond the ED itself.

There are long-standing and worldwide concerns about parameters that impact the quality and timeliness of care in the ED, including interactions between patients admitted to the hospital from the ED, care quality in the ED, and hospital capacity at large. For example, when a patient is deemed to require inpatient care but there are no inpatient beds available, that patient may remain in the ED until a bed becomes available (this patient is now “boarding” in the ED).[[1]](#endnote-2) ED boarding and crowding have been shown to be associated with poor patient outcomes, including increased mortality (in ED and non-ED patients),[[2]](#endnote-3),[[3]](#endnote-4),[[4]](#endnote-5),[[5]](#endnote-6) delays in needed care (e.g., delivery of antibiotics),[[6]](#endnote-7) and negative patient[[7]](#endnote-8) and staff experiences (impacting staff burnout and turnover).[[8]](#endnote-9) Importantly, there are also disparities in boarding, with high acuity black patients and patients with behavioral health diagnoses experiencing longer boarding times compared with white patients.[[9]](#endnote-10) Although ED boarding is widely reported as a crisis in the lay press,[[10]](#endnote-11) by professional associations,[[11]](#endnote-12) and supported by data from benchmarking groups,[[12]](#endnote-13) there are currently no national measures available to assess boarding; stakeholders have even appealed to the President of the United States for national action to address the problem.[[13]](#endnote-14) At the same time, many locally devised interventions have been shown to be effective in addressing ED boarding and crowding.

##### 3.1.1 Logic Model

[Figure 1](#Fig1) depicts the logic model by which public reporting of the ECCQ eCQM could result in changes in inputs by EDs as well as hospital wide, resulting in improvements in the four components of the ECCQ measure. Hospital wide/system changes will likely play more of a role in improvements in the ED LOS and boarding components, while ED-level changes are more likely to result in improvement in the proportion of visits without a medical screening by a qualified professional and for time to be placed in a treatment space. However, there are opportunities for both EDs and the wider hospital system to contribute to improvement in all four components.

Figure 1: ECCQ Logic Model

##### 3.1.2 Value and Meaningfulness

Not applicable.

##### 3.1.3 Empirical Data (for outcome measures) – as applicable

Not applicable.

##### 3.1.4 Systematic Review of the Evidence (for intermediate outcome, process, or structure quality

☐Clinical Practice Guideline recommendation (with evidence review)

☐USPSTF recommendation

☐other systematic review and grading of the body of evidence (e.g., Cochrane Collaboration, [AHRQ Evidence-based Practice Centers](https://effectivehealthcare.ahrq.gov/about/epc)External link icon)

**other**

##### 3.1.5 Other Source of Evidence – as applicable

An environmental scan and literature review provided evidence from peer-reviewed literature and standards of practice from a range of sources.

###### 3.1.5.1 Briefly Synthesize the Evidence

**Capacity Metrics: Descriptions and Definitions**

There are extensive options for measuring ED crowding and boarding, and the differences in measurement highlight the challenges including definition and measured outcomes.10,[[14]](#endnote-15),[[15]](#endnote-16),[[16]](#endnote-17), ,[[17]](#endnote-18),[[18]](#endnote-19),[[19]](#endnote-20),[[20]](#endnote-21),[[21]](#endnote-22),[[22]](#endnote-23),[[23]](#endnote-24) Furthermore, the research included in this literature review was predominately retrospective and the ED is a dynamic, rapidly changing setting, even minute to minute in each ED, which further highlights these measurement challenges. ).

**Harm**

ED boarding and crowding are important public health issues that have been associated with various adverse events, most concerning patient outcomes, though some mixed evidence on mortality has been published. Adverse events and harms identified in this literature review include mortality (in-hospital, 10- and 30- day mortality), delay in antibiotic administration, delay in medication administration, higher complication rates, poor patient experience and satisfaction, and generally poorer quality of care.2,[[24]](#endnote-25),[[25]](#endnote-26) ,[[26]](#endnote-27),[[27]](#endnote-28),[[28]](#endnote-29),[[29]](#endnote-30)

**Health Equity: Special Populations**

Many of the barriers to providing high quality care for behavioral health patients are acutely exacerbated in crowded clinical settings. For example, limited space, limited time, and “difficulty differentiating between psychiatric illness and social disorganization” can all become more complicated to address during times of boarding.[[30]](#endnote-31)

Although numerous harms are particularly relevant to the care received by older patients in emergency departments, the impact of delirium is noteworthy among these harms, with “between 6% and 38% of older ED adults [having] incident delirium, defined as new development of delirium after arrival [in the ED]”, and has also been associated with a host of other serious harms, including increased length of hospitalization and decreased independence and cognitive function.[[31]](#endnote-32)

Additionally, disparities in care have been noted among patients who are assigned a lower triage acuity level during times of ED crowding and among Black patients who are boarded for a psychiatric admission.10,[[32]](#endnote-33)

**Interventions**

Various and extensive interventions are cited covering different processes, clinical care access points, and creative methods of tending to the ever-growing ED boarding problem; some examples of interventions that have been considered include care transitions, point-of-care testing, observation units, streaming, short-stay units, or administrative or organizational improvements.[[33]](#endnote-34),[[34]](#endnote-35),[[35]](#endnote-36) Other studies suggest specific direction including strengthening triage and ED teams, creating new care zones, or use of capacity protocols.[[36]](#endnote-37) Several studies also cite the benefit of adding ED staffing, such as an additional ED physician per shift, or adding nurse practitioner or primary care physician to staff to manage less emergent cases.38 Other studies cite different points of care to enact change; one study assessed telehealth to manage non-critical emergencies in rural settings to reduce unnecessary patient transfer and increasing capacity of ED staff to diagnose and manage patients locally; another study employed a nurse navigator to assist in decreased turnaround time for EMS.[[37]](#endnote-38),[[38]](#endnote-39)

###### 3.1.5.2 Process Used to Identify the Evidence

Not applicable.

###### 3.1.5.3 Citation(s) for the Evidence

Not applicable.

#### 3.2 Performance Gap – Opportunity for Improvement

##### 3.2.1 Rationale

The goal of this measure is to assess and improve the safety and quality of care for the 140 million ED visits that patients experience each year.[[39]](#endnote-40) Limitations in capacity and quality of emergency care have been shown to be associated with harm, such as increases in mortality, delays in care, preventable errors, poor patient experience and staff burnout. These capacity and quality limitations are also associated with increased costs of care.

Challenges related to emergency care access and capacity have been increasing and have prompted public calls for action. Prior efforts to measure components of this proposed measure (for example, ED boarding, through use of the ED-2 measure)[[40]](#endnote-41) were unsuccessful likely in part due to the construction of the measure score, which was based on median performance that obscured poor performance. Implementation of this proposed measure, which captures multiple components of quality and capacity, will minimize gaming, and help identify facilities where patients do not receive timely access to emergency care. This measure, therefore, could positively impact millions of patients who seek treatment in the ED and help address long-standing disparities in emergency care, including for patients with behavioral health diagnoses.

##### 3.2.2 Performance Scores

This measure is not yet implemented; 4.8.2 below includes the performance scores calculated with test data; this may be updated after data is collected when the measure is implemented and can be used to inform usability including improvement, unexpected findings and/or benefits.

##### 3.2.3 Summary of Data Indicating Opportunity

Below we summarize current performance of metrics in the proposed numerator, as well as harms associated with those metrics, based on CORE’s prior literature search related to ED boarding/crowding[[41]](#endnote-42) and additional empiric results for these metrics from other sources including the [Emergency Department Benchmarking Alliance (EDBA)](https://www.edbenchmarking.com/).

**Component 1: The patient waited for longer than 1 hour to be placed in a treatment space.**

*Current Performance*

Wait time metrics have been trending upward. For example, according to 2022 EDBA data48, the median “door to bed” (akin to door to ED treatment space) time increased by 6 minutes (from 8 minutes to 14 minutes) between 2021 and 2022, respectively. Likewise, median “door to doctor” times increased from 17 minutes in 2021 to 20 minutes in 2022.

*Association with Harms*

Studies have shown that wait times (which represent delays in timely care) are associated with patient harm. One retrospective study across multiple urban EDs in Canada examined the association between wait times and harm (72-hour ED re-visits) and found that, among other input metrics, mean ED waiting time (defined as ED arrival to physician assessment) had the strongest association with harm.33 In addition, a single-site study using data gathered prior to the pandemic showed that the odds of a patient safety event (adverse event, preventable adverse event, and near miss) increased with each additional increase in ED waiting time (time from arrival to being seen by a triage nurse).

**Component 2: The patient left the ED without being evaluated.**

*Current Performance*

The proportion of patients who leave the ED before they are seen or before their treatment was complete has been trending upward. According to EDBA data, in 2018, 2.2 percent of patients left the ED before completing treatment; but that proportion increased to 4.0 percent in 2021 and to almost 5 percent in 2022.

*Association with Harms*

Based on 2022 EDBA data, if 4.9 percent of patients left the ED before their treatment was complete, that means that about 7.6 million patients did not receive the care they needed in the ED. Single ED studies have shown that about half of patients who leave the ED without being seen have a subsequent encounter with the healthcare system; and, of those, more than half (about 68 percent) return to an ED or are admitted to the hospital.[[42]](#endnote-43) In addition, one study found that across all patients, 12.6 percent left the ED without being seen; the rate was 30 percent for higher-acuity patients.[[43]](#endnote-44)

**Component 3: The patient boarded (time from decision to admit order to patient departure from the ED for admitted patients) in the ED for longer than 4 hours.**

*Current Performance*

There are currently no national publicly reported measures that provide current performance of ED boarding-related metrics; ED-2, a publicly reported measure of boarding (median time from admission decision to ED departure) was retired from use in IQR 2021.48 Data from the EDBA shows that median boarding times between 2012 and 2017 did not change, despite the implementation of ED-2. Lack of improvement could be because ED-2 is specified based on median times, which can obscure poor performance.

More recent data from the EDBA shows a steep increase in median boarding times, from 119 minutes (about 2 hours) in 2020 to 190 minutes (about 3 hours) in 2022. One larger study that examined data (January 2020 through December 2021) from 1,769 hospitals using the EPIC EHR system found that, when hospitals were above 85% occupancy, patients remained boarded for more than 4 hours across most months (about 89% of hospital-months); median boarding times were about 6.6 hours during those hospital months.[[44]](#endnote-45)

Boarding times vary with hospital volume, with larger hospitals having longer median boarding times. For example, in 2017, hospitals with annual ED volumes between 100,000 and 120,000 had boarding times of almost 450 minutes (about 7 and a half hours), compared with less than 250 minutes (about 4 hours) for hospitals with annual ED volume of under 20,000.

Studies have examined a range of ED boarding times; the four-hour threshold is by far the most commonly studied in the literature; it was chosen in part based on prior recommendations from The Joint Commission[[45]](#endnote-46) and expert input.

*Association with Harms*

ED boarding has been shown to be associated with a wide range of harm, from delays in treatment to increases in mortality, including patients already admitted to the hospital.6 ED boarding also negatively impacts patient experience, as patients are often boarded by being held in hallways in a bed which lacks privacy and can contribute to staff burnout.

The evidence suggests there is an impact of boarding on outcomes in critically ill patients.For example, a 2020 review article summarized studies related to ED boarding and critically ill patients[[46]](#endnote-47) and identified more than ten studies showing worse outcomes for boarded patients, including increased duration of mechanical ventilation, worsening organ dysfunction, and lower probability of neurologic recovery in stroke patients.

**Component 4: The patient had an ED length of stay (LOS) (time from ED arrival to ED departure) of longer than 8 hours.**

*Current Performance*

ED length of stay is defined as arrival time to departure time from the ED. ED length of stay varies across EDs and is positively associated with ED volume, with larger hospitals having longer lengths of stay.33 According to 2022 data from the EDBA, between 2009 and 2022, median ED length of stay steadily increased from 167 minutes (about 3 hours) in 2009 to 211 minutes (about 3.5 hours) in 2022.

*Association with Harms*

A 2021 systematic review20 concluded that ED length of stay (and total ED occupancy) had the strongest evidence for association with worse timeliness of care (e.g., pain relief, medication administration); and, likewise, a 2023 systematic review identified two studies that found that ED length of stay was the strongest predictor of delays in treatment in the ED.[[47]](#endnote-48) A 2023 study that examined the impact of the UK 4-hour LOS standard[[48]](#endnote-49) found that this policy resulted in a 14 percent relative decrease in 30-day all-cause mortality.[[49]](#endnote-50)

A 2022 systematic review identified several studies that support an 8-hour threshold.2 Akhtar et al (2015) found that patients with acute stroke were more likely to experience complications and more likely to die in the hospital if they spent more than 8 hours in the ED.[[50]](#endnote-51) Berg et al., (2019) found that lower-acuity patients (triage acuity levels 3 to 5) with an ED length of stay of at least 8 hours who were discharged from the ED had higher odds of 10-day mortality compared with patients who had a stay of less than 2 hours.30 Dinh et al., (2020) found a significantly higher risk of all-cause 30-day mortality for patients with an ED length of stay greater than 4 hours.[[51]](#endnote-52)

##### 3.2.4 Equity/Disparities

In the future, this measure can improve disparities and health equity through stratification by social risk factors.

3.2.5 If no or limited equity/disparities data, provide summary of data.

Patients seen in the emergency department with a mental health principal diagnosis are more likely to experience boarding and, when boarding, to experience long boarding times. For example, one study showed that about 30 percent of psychiatric visits were associated with boarding, compared with about 7 percent of non-psychiatric visits. Pediatric psychiatric visits were somewhat more likely to be associated with boarding compared with adult visits (34 percent vs. 30 percent, respectively).

For patients seen in the emergency department for a behavioral health condition or complaint, ED length of stay has been shown to be longer compared with patients with non-behavioral health diagnoses among patients who were discharged, admitted, or externally transferred (10.7, 11.4, and 52.6 hours; compared with 8.3, 7.3 and 29.3 hours, respectively).[[52]](#endnote-53)

**Race and Ethnicity**

There are disparities in ED throughput metrics by race. For example, in one study, Black patients waited longer (arrival time to decision-to-admit time) than white patients even after adjusting for clinical, demographic, and socioeconomic variables.[[53]](#endnote-54) Another study found that, while across all patients there was no difference in mean boarding time between Black and white patients, among those with higher acuity (ESI level 1), Black patients boarded significantly longer than white patients; and, for psychiatric admissions, Black patients also boarded significantly longer than white patients.10 Among trauma patients, ED length of stay was found to be longer in Black and Hispanic patients, who remained in the ED for about 40 minutes longer compared with white patients.63 Finally, a more recent 2023 study found that Black and Hispanic patients (as well as patients covered by Medicaid), were more likely to leave without being seen, or to be placed in hallway locations for treatment, even when controlling for factors such as acuity.[[54]](#endnote-55)

**Older Patients**

Older patients have been shown to experience longer ED input and throughput, and worse outcomes. For example, one study found that older patients who were eventually admitted to the medicine service had significantly longer ED wait times compared with younger patients, and another study found a strong association between patient age (65 or older) and longer ED wait times (time from ED arrival to seeing a provider).31 Older patients are more likely to experience worse outcomes from the same type of adverse event (e.g., missed medications) when compared with younger patients. In one study, older patients who stayed overnight in the ED had higher in-hospital mortality and higher odds of adverse events compared with patients admitted to an inpatient bed before midnight.5

#### 3.3 Harmonization

A prior measure of ED boarding, ED-2, was removed from the Inpatient Quality Reporting (IQR) Program in 2021. There are currently two active related measures; ED Median Time from ED Arrival to ED Departure for all Adult Patients and ED Median Time from ED Arrival to ED Departure for all Pediatric Patients.

The retired measure did not demonstrate a clear association with outcome and the actives measures focus on one component of boarding.

This proposed measure describes an alternative approach to quality measurement that can maximize capture of the problem, minimize gaming, and be used to address ED boarding/crowding and related disparities in care. It includes multiple components of care related to boarding as opposed to one specific component.

##### 3.3.1 Related and Competing Measures

###### 3.3.1.1 Relation to Other Measures

Are there related measures or competing measures?

yes

no

1. Appropriate Treatment Time for ST-Segment Elevation Myocardial Infarction (STEMI) Patients in the Emergency Department (ED)
2. All-Cause Emergency Department Utilization Rate for Medicaid Beneficiaries in Need of Integrated Physical and Behavioral Health Care
3. Ambulatory Care: Emergency Department Visits
4. ED Median Time from ED Arrival to ED Departure for all Adult Patients
5. ED Median Time from ED Arrival to ED Departure for all Pediatric Patients
6. Door to Diagnostic Evaluation by a Provider Within 30 Minutes – Urgent Care Patients

###### 3.3.1.2 Competing Measures

This measure does not have either the same target population or the same measure focus as other measures. The other related measures do not address multiple facets of boarding and barriers to emergency care.

### Scientific Acceptability

#### 4.1 What is the Source of Data Used for Testing?

Measure tested with data from

☐abstracted from paper record

☐administrative/management

☐claims

☐instrument-based

☐assessment

☐clinical database/registry

**abstracted from electronic health records (EHRs)**

electronic clinical quality measure (eCQM) Health Quality Measure Format (HQMF) implemented in EHRs/health information technology

other (specify)

#### 4.2 Identify the Specific Dataset

Three datasets were used to test the ECCQ eCQM, derived from EHR data from multiple testing partners. There was an overall mix of geographic regions, hospital size, teaching status, trauma level, and EHR vendor. Dataset A was the primary dataset used for testing, with Dataset B used to replicate the measure scores and calculate reliability, and Dataset C used for data element validity.

**Dataset A** consisted of a diverse array of 20 EDs. Dataset A represented 11 health systems, Epic and Cerner EHR systems, four rural EDs, and a mix of geographic locations, bed size, teaching status, and trauma level. Four sites were rural, although not in the REHQR program: ED4, ED7, ED14, ED19. All but ED19 are a part of a larger health system. Dataset A used calendar years 2022 and 2023, both combined and as separate performance periods, for different types of analyses. This allowed us to look at the measure score for each site over two years, creating 40 data points, to test volume standardization (comparing hospital scores with similar number of encounters), and it allowed us to see measure score changes year over year.

Results are labeled by the dataset name and year as follows:

* **Dataset A 2-years** (2022-2023) was 20 EDs over two years, so using 40 ED data points; it represented 2,196,714 encounters;
* **Dataset A 2022** had 20 EDs, representing 1,077,773 encounters; and
* **Dataset A 2023** had the same 20 EDs, representing 1,118,941 encounters.

Dataset A included all required data elements to calculate measure scores, and patient characteristics such as date of birth, gender/sex, race, payer.

**Dataset B** consisted of 12 hospital-based EDs within one large health system, using Epic EHR system. EDs were in the South, ranging in bed size, teaching status, and trauma level. Two EDs were rural, although not in the REQHR program: ED1, ED3. Dataset B included one calendar year of data, 2023.

Dataset B was 12 EDs, representing 832,056 encounters.

Dataset B included all required data elements to calculate measure scores, and patient characteristics such as date of birth, gender/sex, and race but not payer.

**Dataset C** consisted of six hospital-based EDs within one health system, using Epic EHR system. EDs were in the Northeast, ranging in bed size, teaching status, with one trauma center. Dataset C includes 390,500 total encounters in calendar year 2023.

#### 4.3 Testing Data

##### 4.3.1 What Are the Dates of the Data Used in Testing?

Across the three datasets, data from calendar years 2022 and 2023 were used.

##### 4.3.2 What Levels of Analysis Did the Measure Developer Test?

Analyses were performed at the facility level.

Measure specified to measure performance of

☐individual clinician

☐group/practice

**hospital/facility/agency**

☐health plan

☐accountable care organization

☐geographic population

☐other (specify)

Measure tested at level of

☐individual clinician

☐group/practice

**hospital/facility/agency**

☐health plan

☐accountable care organization

☐geographic population

other (specify)

##### 4.3.3 How Many and Which Measured Entities Were Included in the Testing and Analysis?

Thirty-eight facilities were measured across the three datasets.

##### 4.3.4 How Many and Which Patients Were Included in the Testing and Analysis?

Because the measure can include multiple encounters for the same patient within a performance period, the number of encounters for each dataset were analyzed. Dataset A included 2,196,714 encounters; Dataset B included 832,056 encounters; and Dataset C included 390,500 encounters. The total number of encounters included in testing is 3,419,270.

##### 4.3.5 Sample Differences, if applicable

Not applicable.

##### 4.3.6 What Were the Social and Functional Risk Factors That Were Available and Analyzed?

One analysis was performed using Dataset A, combined years of data (2022-2023) to examine the relationship between payer and the measure outcome. [Table 1](#table1) shows there was no significant correlation found between the proportion of patients within any of the payer status categories and measure scores, however literature shows that higher income is associated with longer ED LOS and that more complex patients also have longer ED LOS. There were limitations in the ability to perform additional analyses due to missing race/ethnicity, and language data from Datasets A and B.

Table 1. Correlation between Payer and Measure Performance Score, Dataset A (2022-2023)

|  |  |  |
| --- | --- | --- |
| Population | Pearson's r correlation | p-value |
| Proportion of patients with Medicaid | -0.029 | 0.904 |
| Proportion of patients with Private/Other | 0.135 | 0.571 |
| Proportion of patients with Medicare | -0.139 | 0.559 |

#### 4.4 Reliability Testing (for reference only)

##### 4.4.1 Level of Reliability Testing

**patient/encounter level (data element level) (e.g., inter-abstractor reliability)**

**accountable entity level (measure score level) (e.g., signal-to-noise analysis)**

##### 4.4.2 Method of Reliability Testing

##### For measure score reliability, we calculated signal-to-noise reliability scores for EDs, using a beta binomial model.The signal is the proportion of the variability in measured performance that can be explained by real differences in performance.Scores can range from zero to one. 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. The CBE recommends a minimum 0.6 signal-to-noise reliability statistic for endorsement of a quality measure.

##### 4.4.3 Statistical Results from Reliability Testing

The mean signal to noise reliability for Dataset A 2023 and Dataset B 2023 combined (N=32 facilities) is 0.9999. The range was 0.9997 to 1.0000.

4.4.4 Interpretation

#### This signal to noise reliability is very high. The “noise” in the measure is very small, because this is a proportion measure capturing a census, not a sample, of encounters; the high reliability is both a function of the size of the measure (# of encounters) and the measure structure being a true score of the encounters in the numerator. The measure is not predicting the outcome, it’s accurately representing the outcome. Therefore, the wide range in measure scores are due to differences in provider quality.

#### 4.5 Validity Testing (for reference only)

##### 4.5.1 Level of Validity Testing

**patient/encounter level (data element level)**

**accountable entity level (measure score level)**

##### 4.5.2 Type of validity testing

**empirical validity testing**

**systematic assessment of face validity of quality measure score as an indicator of quality or resource use (i.e., is an accurate reflection of performance on quality or resource use and can distinguish good from poor performance)**

##### 4.5.3 Method of Validity Testing

**Face Validity:** We systematically assessed the face validity of the measure score as an indicator of quality by soliciting the experts and patients/caregivers’ agreement with the following statement: “The Emergency Care Capacity and Quality eCQM could differentiate good from poor quality of care among facilities.”

Results of the TEP rating of agreement with the validity statement were as follows: A total of 15 TEP members responded. The scale was as follows: *strongly agree, agree, disagree, strongly disagree.*

**Construct Validity:** CORE conducted an analysis of construct validity to demonstrate the measure’s validity to stakeholders. Construct validity is the extent to which the measure accurately assesses what it is intended to. ECCQ eCQM is a novel intermediate outcome measure, so no other relevant existing external quality measures were available for such construct validity testing. Therefore, CORE examined other quality measures that may be considered capturing a similar quality signal.

Hospital capacity, including several of the numerator components of the ECCQ eCQM, have been shown to be associated with hospital quality across a range of outcomes including mortality, patient experience, and cost. CORE tested the construct validity, as shown in [Table 2](#table2) of ECCQ eCQM by examining the association between measure score performance and broadly available and validated measures of hospital quality, including:

* Overall Hospital Quality Star Rating;
* Hospital Quality Summary Score;
* Domain-Level Quality Score in Mortality;
* Domain-Level Quality Score in Readmission; and
* Domain-Level Quality Score in Timely Care.

Dataset A 2023 and Dataset B overall measure scores were used to calculate the Spearman's rank correlation coefficients.

**Data Element Validity:** we assessed data element validity by the raw match rate of each required EHR data element to their chart abstracted data element, as shown in [Table 3](#table3new). We validated numerator events, denominator-only encounters (which should not qualify for the numerator), and those in the numerator exclusion being observation stays. We wanted to closely examine the timestamps with encounters associated with transfers and admitted patients.

Abstractors looked for and input the timestamp for each of the required data elements in the 254 encounters. This allowed us to validate the timestamp for each encounter in the numerator and identify whether the electronic data pull missed any encounters that should be in the numerator.

We considered each data element “matched” if the electronically extracted value (from EHR) exactly matched the manual abstraction value (from the patient medical record). For each data element, match month, day, year, hour, and minutes. To identify the numerator exclusion, the ED disposition was also documented.

##### 4.5.4 Statistical Results from Validity Testing

**Construct Validity:**

Table 2. Construct Validity: Correlation Between the ECCQ eCQM and Validated Existing Measures of Hospital Quality

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Dataset** | **Expected Relationship** | **Overall Hospital Quality Star Rating** | **Hospital Quality Summary Score** | **Domain-Level Quality Score: Readmission** | **Domain-Level Quality Score: Mortality** | **Domain-Level Quality Score: Timely Care** |
| **Dataset A, 2022** | Negative | -0.56 | -0.73 | -0.61 | -0.13 | -0.54 |
| **Dataset B, 2022** | Negative | -0.55 | -0.53 | -0.51 | -0.26 | -0.35 |

**Data Element Validity:**

Validation of ED encounters by disposition and data elements demonstrated high validity and high levels of agreement between electronic record review and manual chart review.

* 95% of admissions records were confirmed through manual chart review.
* 100% of transfer records, final ED dispositions, ED arrival time, and time placed in treatment room were confirmed through manual chart review.
* 37% of reviewed records (94 out of 254) had a documented admission time, indicating 94 patients were admitted to the hospital, and of those admitted, 100% of the records had an exact match of the inpatient admission timestamp.
* 96% of reviewed records had an exact match of ED departure timestamp (245 out of 254 records), for the 9 non-matching records:
  + 7 records had a discrepancy in time of less than 90 minutes.
  + 2 records were outliers, with a wide discrepancy in discharge time, and discrepancy caused by a readmission.

Further analyses explored the percent agreement of each timestamp used to calculate the data elements for each numerator component of the measure. The results show percentage agreement in [Table 3](#table3new).

Table 3. Percent agreement of numerator components between eCQM and manual chart review

|  |  |
| --- | --- |
| **Numerator Component** | **Percent Agreement** |
| Time to Placement in Waiting Room | 100% |
| Left without being seen | 100% |
| Boarding | 100% |
| ED Length of Stay | 100% |
| Any numerator | 99.6% |

##### 4.5.5 Interpretation

**Face Validity:** There were 8 votes for strongly agree (53.3%), 3 votes for agree (20.0%), 4 votes for disagree (26.7 %), and 0 votes for strongly disagree (0.0 %), for a total of 15 TEP members. At the time of the face validity vote, the measure specifications included a numerator exclusion removing transfers to another facility from calculation in component #4 ED LOS. CORE does not believe this greatly impacts the face validity; experts widely agreed upon the importance of transfers relative to the measure’s intent and importance.

73.3% of TEP members agreed that the ECCQ eCQM measure could differentiate good from poor quality of care. Members who voted in agreement noted that these metrics are correlated with patient outcomes, so it is a useful quality measure with good face validity and construct validity. The measure considers various components that are proxies for access to emergency care, noting that a key tenet of emergency care is that it is timely, and this measure that can capture the data necessary to drive hospitals to improve throughput

The 26.7 % of TEP members who voted disagree or strongly disagree noted the following reasons for disagreement:

* They disagreed that the measure could differentiate good from poor quality of care based on the boarding and ED length of stay threshold, as the factors driving those are not exclusively within the facilities’ control.
* They disagreed in the definition of how a private treatment space is being defined and recorded.
* They noted the measure is of time, organizational capacity, and efficiency but not quality of care.
* Another member disagreed because the measure does not adjust for trauma levels designated to hospitals.

**Construct Validity:** As anticipated, a negative correlation with each of the Star Ratings components was seen. ECCQ eCQM inversely correlated with multiple measures of hospital quality, as would be conceptually expected; hospitals that performed well on Star Ratings also performed well on ECCQ eCQM, lending validity to the novel ECCQ eCQM. Noting the analysis compared the non-volume adjusted rates.

**Data Element Validity:**

Data element validity requires high rates of data capture and low rates of missing data, and this analysis of validity supports that this ECCQ eCQM specification relies on available electronic time stamps that are routinely present in clinical notes and therefore the measure is best suited for electronic capture.

All available evidence indicates that data element reliability is high within one health system which supports the validity of this ECCQ eCQM; further testing may be required to demonstrate reliability and validity across more health systems.

#### 4.6 Exclusions Analysis (for reference only)

##### 4.6.1 Method of Testing Exclusions

Not applicable (the measure has no denominator exclusions).

##### 4.6.2 Statistical Results from Testing Exclusions

Not applicable (the measure has no denominator exclusions).

##### 4.6.3 Interpretation

Not applicable (the measure has no denominator exclusions).

#### 4.7 Risk Adjustment or Stratification for Outcome or Resource Use Measures (for reference only)

##### 4.7.1 Method of Controlling for Differences

The method of controlling for differences in case mix is

no risk adjustment or stratification

* ☐ statistical risk model with (specify number) risk factors
* **stratification by (2) risk categories**

☐other (specify) Click or tap here to enter text.

##### 4.7.2 Rationale for Why There Is No Need for Risk Adjustment

The approach to stratification by age and principal diagnosis of a mental health diagnosis, as well as volume standardizing the measure performance scores in annual ED visit volume bands of 20,000 visits is sufficient to account for differences between facilities without further need for risk adjustment.

##### 4.7.3 Conceptual, Clinical, and Statistical Methods/Model

Total score and four cohorts of the measure will be calculated, stratified by age and mental health visits. Additional stratification by social risk factors to address equity may be considered in the future.

A history of mental health diagnoses does not automatically exclude or include patients in the strata; the principal diagnosis defines inclusion in the appropriate strata. For this measure's purposes, mental health diagnoses do not include substance use disorders.

Stratification by age will be reported for patients less than 18 years of age and patients 18 years of age and older, for both mental health and non-mental health cohorts.

Total score and score for the following strata will be reported:

Stratification 1: all patients aged less than 18 years seen in the ED who do not have an ED encounter principal diagnosis consistent with psychiatric/mental health visits. Patients who have an ED encounter principal diagnosis consistent with substance use disorders will be included in this stratification.

Stratification 2: all patients aged 18 years and older seen in the ED who do not have an ED encounter principal diagnosis consistent with psychiatric/mental health visits. Patients who have an ED encounter principal diagnosis consistent with substance use disorders will be included in this stratification.

Stratification 3: all patients aged less than 18 years seen in the ED who have an ED encounter principal diagnosis consistent with a psychiatric/mental health visit.

Stratification 4: all patients aged 18 years and older seen in the ED who have an ED encounter principal diagnosis consistent with a psychiatric/mental health visit.

##### 4.7.4 Conceptual Model of Impact of Social and Functional Risks

☐published literature

☐internal data analysis

**other (specify) No risk adjustment**

##### 4.7.5 Statistical Results

Not applicable.

##### 4.7.6 Analyses and Interpretation in Selection of Social and Functional Risk Factors

Not applicable.

##### 4.7.7 Method Used to Develop the Statistical Model or Stratification Approach

Not applicable.

##### 4.7.8 Statistical Risk Model Discrimination Statistics (e.g., c-statistic, R2)

Not applicable.

##### 4.7.9 Statistical Risk Model Calibration Statistics (e.g., Hosmer-Lemeshow statistic)

Not applicable.

##### 4.7.10 Statistical Risk Model Calibration—Risk decile plots or calibration curves

Not applicable.

##### 4.7.11 Results of Risk Stratification Analysis

Not applicable.

##### 4.7.12 Interpretation

Not applicable.

##### 4.7.13 Optional Additional Testing for Risk Adjustment

Not applicable.

#### 4.8 Identification of Meaningful Differences in Performance (for reference only)

##### 4.8.1 Method

For ease of comparison, distributions of the measure score by dataset and strata are displayed in [Table 4](#table4new) below. The mean and IQR range are very similar for the first four rows in Dataset A: EDs overall, EDs in 2022, EDs in 2023, and adult non-mental health strata. This lends weight to the adult non-mental health strata being the primary driving force behind the combined and yearly measure scores.

##### 4.8.2 Statistical Results

Table 4 Distribution of measure scores in Dataset A and Dataset B

| **Measure Score** | **Mean (SD)** | **Median (IQR)** | **Range (min-max)** |
| --- | --- | --- | --- |
| Dataset A | | | |
| EDs Overall (N=40) | 26.60 (16.07) | 30.36 (10.36-39.96) | (2.91-55.91) |
| EDs Entire Cohort, 2022 (N=20) | 28.28 (16.63) | 34.28 (10.83-39.83) | (3.52-55.91) |
| EDs Entire Cohort, 2023 (N=20) | 24.92 (15.75) | 26.30 (10.36-40.19) | (2.91-52.13) |
| Adult Non-Mental Health Strata (N=20) | 28.02 (17.01) | 32.47 (10.84-40.59) | (3.68-59.53) |
| Adult Mental Health Strata (N=20) | 32.67 (19.85) | 29.60 (14.78-45.91) | (8.52-70.80) |
| Pediatric Non-Mental Health Strata (N=20) | 18.22 (12.50) | 15.28 (8.94-27.36) | (1.61-40.73) |
| Pediatric Mental Health Strata (N=20) | 22.90 (12.08) | 20.54 (13.74-32.06) | (2.75-50.00) |
| Dataset B | | | |
| EDs Entire Cohort (N=12) | 23.87 (5.36) | 24.07 (20.28-27.97) | (15.91-32.21) |
| Adult Non-Mental Health Strata (N=12) | 23.59 (4.82) | 23.54 (20.23-27.30) | (15.90-30.90) |
| Adult Mental Health Strata (N=12) | 49.93 (10.55) | 52.27 (41.35-57.57) | (34.57-66.48) |
| Pediatric Non-Mental Health Strata (N=12) | 16.67 (10.15) | 14.94 (10.04-24.37) | (2.98-34.07) |
| Pediatric Mental Health Strata (N=12) | 52.62 (10.89) | 52.19 (46.59-58.54) | (33.82-71.62) |

##### 4.8.3 Interpretation

Overall, there is a wide range in overall scores (2.9% - 55.9%), and across all strata, indicating variation in performance and implying room for quality improvement.

#### 4.9 Comparability of Multiple Data Sources/Methods (for reference only)

Not applicable.

##### 4.9.1 Method

Not applicable.

##### 4.9.2 Statistical Results

Not applicable.

##### 4.9.3 Interpretation

Not applicable.

#### 4.10 Missing Data Analysis and Minimizing Bias (for reference only)

##### 4.10.1 Method

We examined the amount of missing data from Dataset A and Dataset B to identify how much data is missing from critical data elements ([Table 5](#table5new)). If the data is not being captured, it lowers the validity of each data element.

##### 4.10.2 Missing Data Analysis

Table 5. Amount of missing data for all critical data elements in Datasets A and B

| **Data elements** | **% Missing, Dataset A, 2-years** | **% Missing, Dataset B** | **% Missing, Dataset C** |
| --- | --- | --- | --- |
| Patient-level data elements | | | | |
| PT Chart number | 0 | 0 | 0 |
| PT Medical Record Number | 0 | 0 | 0 |
| PT Date of Birth | 0 | 0 | 0 |
| Encounter-level data elements | | | | |
| EHR ED Disposition | 0 | 0 | 0 |
| Arrival Time | 0 | 0 | 0 |
| First ED Room Time | 3.17 | 0 | 0 |
| Documented Decision to admit time | 6.28 | 0 | 0 |
| Patient Left the ED Time | 0.25 | 0 | 0 |

##### 4.10.3 Interpretation

##### All data elements required for measure calculation have less than 7% missing, which is considered very good. Although the breakdown by site is not shown, rural hospitals were not systematically missing data compared to non-rural sites. Dataset A systematically did not have access to race, ethnicity, and language at many sites at time of data extraction, due to problem with HL7 interface during that time span; this issue has since been resolved and is able to be extracted on all patients with those data recorded.

### Feasibility

#### 5.1 Data Elements Generated as Byproduct of Care Processes

Data used in the measure are (check all that apply)

Select.

**generated** **or collected by and used by health care personnel during provision of care (e.g., blood pressure, laboratory value, diagnosis, depression score)**

**coded by someone other than the person obtaining original information (e.g., Diagnosis-Related Group, International Classification of Diseases, 10th Revision, Clinical Modification/Procedure Coding System codes on claims)**

☐abstracted from a record by someone other than the person obtaining original information (e.g., chart abstraction for quality measure or registry)

☐other (specify) Click or tap here to enter text.

#### 5.2 Electronic Sources

##### 5.2.1 Data Elements Electronic Availability

Select.

**All data elements are in defined fields in EHRs.**

☐All data elements are in defined fields in electronic claims.

☐All data elements are in defined fields in electronic clinical data such as clinical registry, nursing home MDS, and home health OASIS.

All data elements are in defined fields in a combination of electronic sources.

☐Some data elements are in defined fields in electronic sources.

☐No data elements are in defined fields in electronic sources.

☐Data are patient/family reported information; may be electronic or paper.

##### 5.2.2 Path to Electronic Capture

Not applicable.

##### 5.2.3 eCQM Feasibility

We assessed data element feasibility of the data elements in each of the datasets, with Dataset A representing both Epic and Cerner, for a total of four assessments: two Epic EHRs, one Cerner site, and one Cerner assessment from a vendor representative. The data elements were identified from the electronic specifications measure package, with each data element having a value set or direct reference code. Details are within the Feasibility Scorecard, attached to this deliverable.

Final data elements were found to be feasible.

A few data elements did not meet all four criteria for feasibility across all systems, which we examined more closely.

* Race and ethnicity were noted to only be accurate if completed by the patient.
* Several data elements were not being currently coded to standard terminology, but were available from structured fields:
  + Patient bed assigned, with timestamp
  + ED disposition: Patient left without being seen, admitted to inpatient; transferred to another facility
  + Decision to Admit to Hospital Inpatient, with timestamp
  + Emergency Department Evaluation
  + Triage/ED arrival time

For the data elements not being currently coded to standard terminology, the data is accurately captured in structured fields. Therefore, we recommend keeping data element in measure specification. Facilities can work with their EHR vendor to ensure data element is aligned to standardized terminology prior to measure implementation.

#### 5.3 Data Collection Strategy

##### 5.3.1 Data Collection Strategy Difficulties (optional)

Not applicable.

##### 5.3.2 Fees, Licensing, Other Requirements

Not applicable.

### Usability and Use

#### 6.1 Usability

##### 6.1.1 Improvement

Not applicable.

##### 6.1.2 Unexpected Findings

Not applicable.

##### 6.1.3 Unexpected Benefits

Not applicable.

#### 6.2 Use

##### 6.2.1 Current and Planned Use

**public reporting (planned)**

☐public health or disease surveillance

**payment program (planned)**

☐regulatory and accreditation programs

☐professional certification or recognition program

☐quality improvement with external benchmarking to multiple organizations

**quality improvement internal to a specific organization (planned)**

**not in use (current)**

☐use unknown

###### 6.2.1.1 Reasons for Not Publicly Reporting or Use in Other Accountability Application

The measure is currently under development, and final implementation decisions for reporting and/or use in other accountability programs have not yet been decided.

###### 6.2.1.2 Plan for Implementation

The measure is currently under development; no final implementation decisions have been made yet.

##### 6.2.2 Feedback on the Measure by Measured Entities or Others

###### 6.2.2.1 Technical Assistance Provided During Development or Implementation

The measure has not required technical assistance during development.

###### 6.2.2.2 Technical Assistance with Results

The measure has not required technical assistance during development.

###### 6.2.2.3 Feedback on Measure Performance and Implementation

Feedback on final measure performance has been reported above.

###### 6.2.2.4 Feedback from Measured Entities

The measure is under development; no testing has been completed yet.

###### 6.2.2.5 Feedback from Other Users

Feedback from stakeholders, including TEP and patient workgroup members, and robust response from public comment have supported measure development through the stages of development to date.

###### 6.2.2.6 Consideration of Feedback

All feedback has been considered in development of the measure.

## Additional Information

***Appendix***

***Other Additional Information***

Ad.1. Working Group/Expert Panel Involved in Measure Development

**Technical Expert Panel (TEP)** – [Table 6](#table6) below includes the names, titles, and organizations of TEP members who provided input in measure development.

Table 6. TEP Member Name, Affiliation and Location

| **Name** | **Organization (title); clinical specialty, if applicable** | **Location** |
| --- | --- | --- |
| JohnMarc Alban, MS, RN, CPHIMS | The Joint Commission (Associate Director, Quality Measurement & Informatics) | OakbrookTerrace, IL |
| David Andrews | Patient/Caregiver Representative | Aiken, SC |
| Kelly Bookman, MD | University of Colorado School of Medicine, UC Health (Professor and Vice Chair of Operations, Senior Medical Director of Informatics) | Denver, CO |
| Joey Braggs | Patient/Caregiver Representative | Detroit, MI |
| Howard Bregman, MD, MS, FAAP | Epic Systems Corporation (Director, Clinical Informatics) | Verona, WI |
| Teresa M. Breslin DeLellis, PharmD, BCPS, BCGP | American Geriatrics Society (Pharmacist) | Fort Wayne, IN |
| Isbelia Briceno, CSPO | Oracle Cerner (Senior Product Manager, EHR Vendor) | Kansas City, MO |
| Lynn Ferguson | Patient/Caregiver Representative | Nashville, TN |
| Mustafa Mark Hamed, MD, MBA, FAAFP, FAEMS | American Academy of Family Physicians (AAFP) (Board Certified Family Physician and Emergency Medical Services Physician) | Novi, MI |
| Jennifer Hoffmann, MD, MS | Northwestern University and Lurie Children's Hospital of Chicago (Assistant Professor of Pediatrics) | Chicago, IL |
| Charleen Hsuan, JD, PhD | Pennsylvania State University (Assistant Professor) | University Park, PA |
| David Levine, MD, FACEP | Vizient, Inc. (Group Senior Vice President, Advanced, Analytics and Data Science) | Chicago, IL |
| Kelly McGuire, MD, MPA | EmblemHealth (Medical Director, Behavioral Health) | Katonah, NY |
| Sofie Morgan | University of Arkansas for Medical Sciences (Patient Experience Professional, Emergency Physician) | Little Rock, AR |
| Deepti Pandita, MD, FACP, FAMIA | University of California, Irvine (Associate Professor of Medicine, Chief Medical Information Officer) | Laguna Niguel, CA |
| Anne-Marie Podgorski Dunn, MBA, BSN, RN | Independent (EHR Expert) | West Chester, PA |
| Rupinder K Sandhu, BSN, MBA, MSHSA | UC Davis Medical Center (Executive Director, Emergency Services) | Sacramento, CA |
| Nathaniel Schlicher, MD, JD, MBA, FACEP | Physician and Administrative Leader | Gig Harbor, WA |
| Jodi A. Schmidt, MBA | University of Kansas Health System (Executive Director, UKHS Care Collaborative Patient Safety Organization) | Westwood, KS |
| Jeremiah Schuur, MD, MHS | St. Elizabeths Medical Center, Chief of Emergency Medicine | Brighton, MA |
| David P Sklar | Arizona State University College of Health Solutions (Physician) | Phoenix AZ |
| Anne Sugrue | Patient/Caregiver Representative | Gaithersburg, MD |
| Benjamin Sun, MD, MPP, FACEP, FACHE | University of Pennsylvania (Perelman Professor and Chair, Department of Emergency Medicine) | Philadelphia, PA |

***Measure Developer/Steward Updates and Ongoing Maintenance***

Ad.2. First Year of Measure Release

Ad.3. Month and Year of Most Recent Revision

Ad.4. What is your frequency for review/update of this measure?

Ad.5. When is your next scheduled review/update for this measure?

Ad.6. Copyright Statement

Ad.7. Disclaimers

Ad.8. Additional Information/Comments

## References

1. ACEP. Definition of Boarded Patient. https://www.acep.org/patient-care/policy-statements/definition-of-boarded-patient (2018). [↑](#endnote-ref-2)
2. Burgess, L., Ray‐Barruel, G. & Kynoch, K. Association between emergency department length of stay and patient outcomes: A systematic review. Res. Nurs. Health 45, 59–93 (2022). [↑](#endnote-ref-3)
3. Reznek, M. A. et al. Mortality Associated With Emergency Department Boarding Exposure: Are There Differences Between Patients Admitted to ICU and Non-ICU Settings? Med. Care 56, 436–440 (2018). [↑](#endnote-ref-4)
4. Roussel, M. et al. Overnight Stay in the Emergency Department and Mortality in Older Patients. JAMA Intern. Med. 183, 1378 (2023). [↑](#endnote-ref-5)
5. Hsuan, C., Segel, J. E., Hsia, R. Y., Wang, Y. & Rogowski, J. Association of emergency department crowding with inpatient outcomes. Health Serv. Res. 58, 828–843 (2023). [↑](#endnote-ref-6)
6. Gaieski, D. F. et al. The impact of ED crowding on early interventions and mortality in patients with severe sepsis. Am. J. Emerg. Med. 35, 953–960 (2017). [↑](#endnote-ref-7)
7. Reznek, M. A., Larkin, C. M., Scheulen, J. J., Harbertson, C. A. & Michael, S. S. Operational factors associated with emergency department patient satisfaction: Analysis of the Academy of Administrators of Emergency Medicine/Association of Academic Chairs of Emergency Medicine national survey. Acad. Emerg. Med. 28, 753–760 (2021). [↑](#endnote-ref-8)
8. Loke, D. E., Green, K. A., Wessling, E. G., Stulpin, E. T. & Fant, A. L. Clinicians’ Insights on Emergency Department Boarding: An Explanatory Mixed Methods Study Evaluating Patient Care and Clinician Well-Being. Jt. Comm. J. Qual. Patient Saf. 49, 663–670 (2023). [↑](#endnote-ref-9)
9. Ruffo, R., Shufflebarger, E., Booth, J. & Walter, L. Race and Other Disparate Demographic Variables Identified Among Emergency Department Boarders. West. J. Emerg. Med. 23, 644–649 (2022). [↑](#endnote-ref-10)
10. Wan, William. An autistic teen needed mental health help. He spent weeks in an ER instead. The Washington Post (2022). [↑](#endnote-ref-11)
11. ACEP. Emergency Department Boarding and Crowding. https://www.acep.org/administration/crowding--boarding . [↑](#endnote-ref-12)
12. ACE. A First Look at Emergency Department Data for 2022. https://www.acepnow.com/article/a-first-look-at-emergency-department-data-for-2022/ (2023). [↑](#endnote-ref-13)
13. ACEP. Letter to POTUS. https://www.acep.org/globalassets/new-pdfs/advocacy/emergency-department-boarding-crisis-sign-on-letter-11.07.22.pdf (2022). [↑](#endnote-ref-14)
14. Andersson J, Nordgren L, Cheng I, Nilsson U, Kurland L. Long emergency department length of stay: A concept analysis. Int Emerg Nurs. 2020 Nov;53:100930. doi: 10.1016/j.ienj.2020.100930. Epub 2020 Oct 6. PMID: 33035877. [↑](#endnote-ref-15)
15. Sharma R, Prakash A, Chauhan R, Dhibar DP. Overcrowding an encumbrance for an emergency health-care system: A perspective of Health-care providers from tertiary care center in Northern India. J Educ Health Promot. 2021 Jan 28;10:5. doi: 10.4103/jehp.jehp\_289\_20. PMID: 33688514; PMCID: PMC7933695. [↑](#endnote-ref-16)
16. Van Heukelom P, Vakkalanka JP, Pedersen R, Nugent AS. Inpatient boarding definitions and mitigation strategies: A cross-sectional survey of academic emergency departments in the United States. Am J Emerg Med. 2023 May;67:37-40. doi: 10.1016/j.ajem.2023.01.056. Epub 2023 Feb 9. PMID: 36796239; PMCID: PMC10121851. [↑](#endnote-ref-17)
17. Jones PG, Mountain D, Forero R. Review article: Emergency department crowding measures associations with quality of care: A systematic review. Emerg Med Australas. 2021 Aug;33(4):592-600. doi: 10.1111/1742-6723.13743. Epub 2021 Mar 16. PMID: 33724707. [↑](#endnote-ref-18)
18. Javidan AP, Hansen K, Higginson I, Jones P, Lang E; IFEM Task Force on Emergency Department Crowding and Access Block. The International Federation for Emergency Medicine report on emergency department crowding and access block: A brief summary. Emerg Med Australas. 2021 Feb;33(1):161-163. doi: 10.1111/1742-6723.13660. Epub 2021 Jan 13. PMID: 33440078. [↑](#endnote-ref-19)
19. McRae AD, Rowe BH, Usman I, Lang ES, Innes GD, Schull MJ, Rosychuk R. A comparative evaluation of the strengths of association between different emergency department crowding metrics and repeat visits within 72 hours. CJEM. 2022 Jan;24(1):27-34. doi: 10.1007/s43678-021-00234-4. Epub 2021 Dec 18. PMID: 34921658. [↑](#endnote-ref-20)
20. Ahalt V, Argon NT, Ziya S, Strickler J, Mehrotra A. Comparison of emergency department crowding scores: a discrete-event simulation approach. Health Care Manag Sci. 2018 Mar;21(1):144-155. doi: 10.1007/s10729-016-9385-z. Epub 2016 Oct 4. PMID: 27704323. [↑](#endnote-ref-21)
21. Jobé J, Donneau AF, Scholtes B, Ghuysen A. Quantifying emergency department crowding: comparison between two scores. Acta Clin Belg. 2018 Jun;73(3):207-212. doi: 10.1080/17843286.2017.1410605. Epub 2017 Dec 5. PMID: 29207925. [↑](#endnote-ref-22)
22. Improta, G., Majolo, M., Raiola, E. et al. A case study to investigate the impact of overcrowding indices in emergency departments. BMC Emerg Med 22, 143 (2022). https://doi.org/10.1186/s12873-022-00703-8 [↑](#endnote-ref-23)
23. Boyle A, Atkinson P, Basaure Verdejo C, Chan E, Clouston R, Gilligan P, Grewal K, Higginson I, Liston P, Newcombe V, Norton V, Richter S, Stoica G, Wakai A. Validation of the short form of the International Crowding Measure in Emergency Departments: an international study. Eur J Emerg Med. 2019 Dec;26(6):405-411. doi: 10.1097/MEJ.0000000000000579. PMID: 30431450. [↑](#endnote-ref-24)
24. Boudi Z, Lauque D, Alsabri M, Östlundh L, Oneyji C, Khalemsky A, Lojo Rial C, W Liu S, A Camargo C Jr, Aburawi E, Moeckel M, Slagman A, Christ M, Singer A, Tazarourte K, Rathlev NK, A Grossman S, Bellou A. Association between boarding in the emergency department and in-hospital mortality: A systematic review. PLoS One. 2020 Apr 15;15(4):e0231253. doi: 10.1371/journal.pone.0231253. PMID: 32294111; PMCID: PMC7159217. [↑](#endnote-ref-25)
25. Alsabri M, Boudi Z, Zoubeidi T, Alfaki IA, Levy P, Oneyji C, Shan L, Camargo CA Jr, Michel P, Tazarourte K, Hachimi-Idrissi S, Grossman S, Bellou A. Analysis of Risk Factors for Patient Safety Events Occurring in the Emergency Department. J Patient Saf. 2022 Jan 1;18(1):e124-e135. doi: 10.1097/PTS.0000000000000715. PMID: 32853517. [↑](#endnote-ref-26)
26. Morley C, Unwin M, Peterson GM, Stankovich J, Kinsman L. Emergency department crowding: A systematic review of causes, consequences and solutions. PLoS One. 2018 Aug 30;13(8):e0203316. doi: 10.1371/journal.pone.0203316. PMID: 30161242; PMCID: PMC6117060. [↑](#endnote-ref-27)
27. Major, D., Rittenbach, K., MacMaster, F. et al. Exploring the experience of boarded psychiatric patients in adult emergency departments. BMC Psychiatry 21, 473 (2021). https://doi.org/10.1186/s12888-021-03446-1 [↑](#endnote-ref-28)
28. Janke AT, Melnick ER, Venkatesh AK. Hospital Occupancy and Emergency Department Boarding During the COVID-19 Pandemic. JAMA Netw Open. 2022 Sep 1;5(9):e2233964. doi: 10.1001/jamanetworkopen.2022.33964. PMID: 36178691; PMCID: PMC9526134. [↑](#endnote-ref-29)
29. Kim JS, Bae HJ, Sohn CH, Cho SE, Hwang J, Kim WY, Kim N, Seo DW. Maximum emergency department overcrowding is correlated with occurrence of unexpected cardiac arrest. Crit Care. 2020 Jun 6;24(1):305. doi: 10.1186/s13054-020-03019-w. Erratum in: Crit Care. 2020 Aug 3;24(1):480. PMID: 32505196; PMCID: PMC7276085. [↑](#endnote-ref-30)
30. Dombagoll M, Kant J, Lai F, Hendarto A, Taylor D. (2019). Barriers to providing optimal management of psychiatric patients in the emergency department (psychiatric patient management). *Australasian Emergency Care*, *22*(1), 8–12. <https://doi.org/10.1016/j.auec.2019.01.001> [↑](#endnote-ref-31)
31. Lee S, Chen H, Hibino S, Miller D, Healy H, Lee J, Arendts G, Han J, Kennedy M, & Carpenter C. (2022). Can we improve delirium prevention and treatment in the emergency department? A systematic review. *Journal of the American Geriatrics Society*, *70*(6), 1838–1849. <https://doi.org/10.1111/jgs.17740> [↑](#endnote-ref-32)
32. Berg LM, Ehrenberg A, Florin J, Östergren J, Discacciati A, Göransson KE. Associations Between Crowding and Ten-Day Mortality Among Patients Allocated Lower Triage Acuity Levels Without Need of Acute Hospital Care on Departure From the Emergency Department. Ann Emerg Med. 2019 Sep;74(3):345-356. doi: 10.1016/j.annemergmed.2019.04.012. Epub 2019 Jun 20. PMID: 31229391. [↑](#endnote-ref-33)
33. Austin EE, Blakely B, Tufanaru C. *et al.* Strategies to measure and improve emergency department performance: a scoping review. *Scand J Trauma Resusc Emerg Med* 28, 55 (2020). https://doi.org/10.1186/s13049-020-00749-2 [↑](#endnote-ref-34)
34. De Freitas L, Goodacre S, O'Hara R, Thokala P, Hariharan S. Interventions to improve patient flow in emergency departments: an umbrella review. Emerg Med J. 2018 Oct;35(10):626-637. doi: 10.1136/emermed-2017-207263. Epub 2018 Aug 9. PMID: 30093379. [↑](#endnote-ref-35)
35. Burns TA, Kaufman B, Stone RM. An EMS Transport Destination Officer is Associated with Reductions in Simultaneous Emergency Department Arrivals. Prehosp Emerg Care. 2022 Sep 2:1-5. doi: 10.1080/10903127.2022.2107126. Epub ahead of print. PMID: 35894867. [↑](#endnote-ref-36)
36. Bittencourt RJ, Stevanato AM, Bragança CTNM, Gottems LBD, O'Dwyer G. Interventions in overcrowding of emergency departments: an overview of systematic reviews. Rev Saude Publica. 2020;54:66. doi: 10.11606/s1518-8787.2020054002342. Epub 2020 Jul 3. PMID: 32638885; PMCID: PMC7319499. [↑](#endnote-ref-37)
37. du Toit M, Malau-Aduli B, Vangaveti V, Sabesan S, Ray RA. Use of telehealth in the management of non-critical emergencies in rural or remote emergency departments: A systematic review. J Telemed Telecare. 2019 Jan;25(1):3-16. doi: 10.1177/1357633X17734239. Epub 2017 Oct 5. PMID: 28980853. [↑](#endnote-ref-38)
38. Felice J, Coughlin RF, Burns K, Chmura C, Bogucki S, Cone DC, Joseph D, Parwani V, Li F, Saxa T, Ulrich A. Effects of Real-time EMS Direction on Optimizing EMS Turnaround and Load-balancing Between Neighboring Hospital Campuses. Prehosp Emerg Care. 2019 Nov-Dec;23(6):788-794. doi: 10.1080/10903127.2019.1587123. Epub 2019 Mar 27. PMID: 30798628 [↑](#endnote-ref-39)
39. Centers for Disease Control and Prevention. Emergency Department Visits. https://www.cdc.gov/nchs/fastats/emergency-department.htm (2021). [↑](#endnote-ref-40)
40. ECQI Resource Center. Median Admit Decision Time to ED Departure Time for Admitted Patients. [↑](#endnote-ref-41)
41. Yale New Haven Hospital Center for Outcomes Research & Evaluation. Information Gathering Report for Equity of Care Capacity and Quality, Chapter 3, Deliverable #3-1. (2023). [↑](#endnote-ref-42)
42. Emergency Department Benchmarking Alliance. Preliminary 2022 Emergency Department Performance Measures Report. (2023). [↑](#endnote-ref-43)
43. Roby, N. et al. Characteristics and retention of emergency department patients who left without being seen (LWBS). Intern. Emerg. Med. 17, 551–558 (2022). [↑](#endnote-ref-44)
44. Hodgins, M., Moore, N. & Little, J. Those who opt to leave: Comparison by triage acuity of emergency patients who leave prior to seeing a medical practitioner. Int. Emerg. Nurs. 70, 101349 (2023). [↑](#endnote-ref-45)
45. The Joint Commission. Patient Flow through the Emergency Department. https://www.jointcommission.org/-/media/tjc/documents/ standards/r3-reports/r3\_report\_issue\_4.pdf [↑](#endnote-ref-46)
46. Mohr, N. M. et al. Boarding of Critically Ill Patients in the Emergency Department. Crit. Care Med. 48, 1180–1187 (2020). [↑](#endnote-ref-47)
47. Darraj, A., Hudays, A., Hazazi, A., Hobani, A. & Alghamdi, A. The Association between Emergency Department Overcrowding and Delay in Treatment: A Systematic Review. Healthc. Basel Switz. 11, 385 (2023). [↑](#endnote-ref-48)
48. A&E Waiting Times. https://www.nuffieldtrust.org.uk/resource/a-e-waiting-times#:~:text=Background,or%20discharged%20within%20four%20hours. [↑](#endnote-ref-49)
49. Gruber, J., Hoe, T. P. & Stoye, G. Saving Lives by Tying Hands: The Unexpected Effects of Constraining Health Care Providers. Rev. Econ. Stat. 105, 1–19 (2023). [↑](#endnote-ref-50)
50. Akhtar, N. et al. Prolonged Stay of Stroke Patients in the Emergency Department May Lead to an Increased Risk of Complications, Poor Recovery, and Increased Mortality. J. Stroke Cerebrovasc. Dis. 25, 672–678 (2016). [↑](#endnote-ref-51)
51. Steren, B., Fleming, M., Zhou, H., Zhang, Y. & Pei, K. Y. Predictors of Delayed Emergency Department Throughput Among Blunt Trauma Patients. J. Surg. Res. 245, 81–88 (2020). [↑](#endnote-ref-52)
52. Baia Medeiros, D. T., Hahn-Goldberg, S., O’Connor, E. & Aleman, D. M. Analysis of emergency department length of stay for mental health visits: A case study of a Canadian academic hospital. CJEM 21, 374–383 (2019). [↑](#endnote-ref-53)
53. Aysola, J. et al. Understanding Contributors to Racial/Ethnic Disparities in Emergency Department Throughput Times: a Sequential Mixed Methods Analysis. J. Gen. Intern. Med. 37, 341–350 (2022). [↑](#endnote-ref-54)
54. Sangal, R. B. et al. Sociodemographic Disparities in Queue Jumping for Emergency Department Care. JAMA Netw. Open 6, e2326338 (2023). [↑](#endnote-ref-55)