## Evidence Statement

Below we summarize the evidence of a performance gap for each component of the Equity of Emergency Care Capacity and Quality (ECCQ) measure for the RuNral Emergency Hospital (REH) setting, as well as associated harms, based on CORE’s prior literature search including systematic reviews (see ECCQ Environmental Scan\_Literature Review with Search String attachment) related to emergency department (ED)and additional empiric results from other sources including the [Emergency Department Benchmarking Alliance (EDBA)](https://www.edbenchmarking.com/) and CORE preliminary analyses of Electronic Health Record (EHR) data from five EDs within a single health system. We note that currently there is insufficient literature and data available to assess this measure in REHs therefore we are using the literature that we identified that includes all EDs (regardless of rural or REH status). This measure differs from the Hospital Outpatient Quality Reporting (HOQR) Program in that the boarding component for the REH measure captures boarding of transferred patients, as REHs do not have inpatient capacity.

For results based on published literature, we note that most studies are based on single hospitals or single health systems in non-REH facilities, or systematic reviews of those studies which are limited in their ability to pool results due to study heterogeneity; there are few national or registry-based studies available. In addition, in the published literature the definition of ED throughput metrics can vary. Finally, studies using data during the COVID-19 pandemic may not be representative of future performance.

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

#### **Performance Gap**

There are multiple ways in which people may face quality gaps in emergency care that can be measured through waiting times. There are different definitions of “waiting time,” including the time between arrival and different ED destinations/services, such as triage (door-to-triage), treatment room (door-to-room or ED treatment space), and time between arrival and being seen by a provider (door-to-doctor). The ECCQ measure focuses on “door to room” time.

**Figure 1: Components of the ECCQ Measure (REH version) Across Five Emergency Departments – Single Health System, Non-Behavioral Health Patients (2022 data**)\*

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\*We note that we do not have results for component 3 of the REH version of this measure as it was added after this data was obtained and analyses had been completed.

Wait time metrics have been trending upward. For example, according to 2022 EDBA data1 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.

CORE’s preliminary analyses of EHR data across five EDs (labeled A through E) in a health system, shows wide variation (8 percent to 43 percent) in the proportion of visits for all (adult and pediatric) non-behavioral health patients with door to ED treatment space times that were over the proposed threshold of 1 hour for this component ([Figure 1,](#Fig1) blue bars).

#### **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 harm2 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).3

### Component 2: The patient left the ED without being evaluated by a licensed clinical professional

#### **Performance Gap**

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 ([Figure 2](#Fig2)).1 CORE’s own empiric analyses using EHR data from a single health system with multiple EDs shows that rates range between 2 percent and 5 percent across the five EDs ([Figure 1](#Fig1), dark green bars).

**Figure 2: Proportion of patients who left before completing treatment (2012-2022); Source: EDBA1**

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#### **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.4 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.5

### Component 3: The patient, if transferred, boarded for longer than 4 hours

#### **Performance Gap**

Transfers are particularly salient for the REH setting, as REHs have no inpatient capacity by definition, and transfer boarding proportionally affects smaller, rural EDs compared with larger ones. For example, according to the EDBA, the transfer rate for small EDs (volumes below 20,000 per year) is 4.5%, compared with 2.3% for EDs with volumes of 40,000-60,000, and 1.3% for EDs with volumes greater than 80,000.1 In addition, the number of transfers of both medical patients and psychiatric patients has increased in 2022 compared with the prior year.1 Evidence from non-REH EDs show variation in transfer metrics (typically door-in-door out, ED LOS) for transferred patients. For example, for patients with stroke, one study found that only one-third of patients were transferred within the recommended time, and there were disparities by age, gender, and race.6 In another study of trauma patients cared for in non-trauma hospitals, study authors found facility-level variation in rates of transfer, ED LOS, and mortality.7 In addition, qualitative studies have identified key processes that can differ across facilities or providers and that may impact timely transfer. For example, ED providers have cited that use of hospitals that have transfer centers are more efficient.8 Facilities will also differ in the availability of specialists, which can be a driver of transfers.8 However, there are also factors beyond the control of the transferring facility (the REH) such as capacity at receiving hospitals, and the availability of transportation for the transfer, which will impact scores for this measure.9,10 We note that transfers from an REH to another ED are conceptually different than transfers from an acute-care hospital ED to another ED, because REHs do not have the option of inpatient hospitalization.

**Association with Harms**

There are several potential harms, both direct, and indirect, of prolonged transfer boarding. These harms can impact the individual patient being transferred, but also other patients in the facility. For example, facilities with processes that result in prolonged transfer boarding times can divert clinical staff from caring for the patient to be transferred, as well as other patients in the ED.8 Concordant with diversion of resources, one study focused on transfer boarding found that the number of patients transferred, in particular for rural hospitals, impacted how long it took all patients to be evaluated by a provider, as well as other timeliness of care metrics, such as time to lab testing, and total ED length of stay.11 Harms associated with delays in transfer have been well characterized clinical areas such as trauma,12 as well as stroke, and acute myocardial infarction (AMI) for which there are guidelines for the timeliness of transfer.13,14

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

#### **Performance Gap**

ED length of stay (LOS) is defined as arrival time to departure time from the ED. ED LOS varies across EDs and is positively associated with ED volume, with larger hospitals having longer lengths of stay.1 According to 2022 data from the EDBA, between 2009 and 2022, median ED LOS steadily increased from 167 minutes (about 3 hours) in 2009 to 211 minutes (about 3.5 hours) in 2022 ([Figure 3](#Fig3)). CORE’s preliminary analyses of EHR data from a single system with multiple EDs show wide variation (8 percent to 29 percent) in the proportion of ED visits with a LOS over the threshold defined by this proposed measure (longer than 8 hours) ([Figure 1](#Fig1), purple bars).

**Figure 3: Median ED Length of Stay, EDBA-member hospitals, 2012-2022. Source: EDBA**1

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#### **Association with Harms**

The relationship between ED LOS and mortality is unclear. A 2022 systematic review identified 19 studies that examined the relationship between ED LOS and in-hospital mortality and found that 10 of the 19 studies did not find a significant relationship;4 five studies showed an increased risk of mortality with longer ED LOS (studies included a range of thresholds, including 4, 6, 8, 12, and 24 hours).

In terms of harms other than mortality, a 2021 systematic review15 concluded that ED LOS (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 LOS was the strongest predictor of delays in treatment in the ED.16 A 2023 study that examined the impact of the UK 4-hour LOS standard17 found that this policy resulted in a 14 percent relative decrease in 30-day all-cause mortality.18

A 2022 systematic review identified several studies that support an 8-hour threshold.4 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.19 Berg et al., (2019) found that lower-acuity patients (triage acuity levels 3 to 5) with an ED LOS 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.20 Dinh et al., (2020) found a significantly higher risk of all-cause 30-day mortality for patients with an ED LOS greater than 4 hours.21 Mitra et al., (2012) found higher odds of death for “general medical” patients with an ED LOS greater than 8 hours after adjusting for age, gender, and acuity.22

## Disparities and Special Populations

**Mental Health Visits**

For patients seen in the emergency department for a behavioral health condition or complaint, ED LOS 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).23 Data from the five EDs within a single health system show that, across all patients with a behavioral health condition or complaint, the proportion of visits with an ED LOS greater than 8 hours was much higher for behavioral health patients, ranging from 72 percent to 87 percent of visits, compared with non-behavioral health patients (5 percent to 19 percent).

### Race and Ethnicity

There are disparities in ED throughput metrics by race. For example, among trauma patients, ED LOS was found to be longer in Black and Hispanic patients, who remained in the ED for about 40 minutes longer compared with white patients.21 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.24

### Older Patients

Older patients have been shown to experience longer ED input and throughput, as well as 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).25,26 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.

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