Section 2.2 and Section 2.3 Evidence of Measure Importance and Anticipated Impact

Table S1 Changes in Care anticipated from implementing the "Emergency Care Access & Timeliness" measure. (Text in brown font indicates a change in care outside the ED.)

Metric	Examples of Changes in Care for Improvement	Changes in Intermediate Outcomes	Changes in Clinical or Patient-Reported Outcomes, and Costs
Component 1: **The patient waited longer than 1 hour to be placed in a treatment space in the ED.**	• Patient flow (e.g., fast-track implementation; split-flow processing) (Grant et al. 2020). • Triage interventions, including predictive models, use of clinicians, and others. • Increased availability and access to regional/local outpatient clinical, mental health, and social services. • See also changes for component #3.	• Decreased waiting room time, door to provider times. • Higher proportion of patients seen in 1 hour • Decrease in proportion of patients who leave without being seen	• Improved patient experience (Rowe and Knox 2022; Walker et al. 2021) • Decreased mortality (Valli et al. 2021) • Increased ED revenue
Component 2: **The patient left the ED without being evaluated**	• See changes for component #1 and #3 (van der Linden et al. 2019)	• Decrease in encounters ending without an MSE. • Higher proportion of patients receiving needed care.	• Decrease in morbidity/mortality for patients who would have left without being assessed. • Improved patient experience

(Continued)

Table S1 (Continued) Changes in Care anticipated from implementing the "Emergency Care Access & Timeliness" measure (Continued). (Text in brown font indicates a change in care outside the ED.)

Metric	Examples of Changes in Care for Improvement	Changes in Intermediate Outcomes	Changes in Clinical or Patient-Reported Outcomes, and Costs
Component 3a: **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**	• Increase inpatient and local healthcare capacity including mental health. • Mental health liaison; co-located mental health services; specialist psychiatry services (Austin et al. 2020). • Use of "hospital home" care models (Ouchi et al. 2021). • Collaboration and communication with inpatient floors. • Improvements in transfer processes and protocols (Mueller et al. 2023; Wright et al. 2023)	• Better management of psychiatric illnesses (Dombagolla et al. 2019) • Reduced time from admission to departure from the ED. • Less patient time spent in hallways.	• Decrease in morbidity (Carr et al. 2007; Pines et al. 2009) and mortality (Boudi et al. 2020; Boulain, Malet, and Maitre 2020; do Nascimento Rocha, da Costa Farre, and de Santana Filho 2021) • Decrease in drug-related adverse events (do Nascimento Rocha, da Costa Farre, and de Santana Filho 2021) • Reduction in delirium (do Nascimento Rocha, da Costa Farre, and de Santana Filho 2021) • Improved outcomes for patients with behavioral health diagnoses • Improved patient experience (Walker et al. 2021)

(Continued)

Table S0 (Continued) Changes in Care anticipated from implementing the "Emergency Care Access & Timeliness" measure (Continued). (Text in brown font indicates a change in care outside the ED.)

Metric	Examples of Changes in Care for Improvement	Changes in Intermediate Outcomes	Changes in Clinical or Patient-Reported Outcomes, and Costs
Component 3b: **The patient boarded (time from decision to transfer to patient departure from the ED for transferred patients) in the ED for longer than 4 hours**	• Increase local healthcare capacity including mental health. • Mental health liaison; co-located mental health services; specialist psychiatry services (Austin et al. 2020) • Increased investment in infrastructure related to transfers • Improvements in transfer processes and protocols (Mueller et al. 2023; Wright et al. 2023)	• Better management of psychiatric illnesses (Dombagolla et al. 2019) • Reduced time from admission to departure from the ED • Less patient time spent in hallways	• Decrease in morbidity (Carr et al. 2007; Pines et al. 2009) and mortality (Boudi et al. 2020; Boulain, Malet, and Maitre 2020; do Nascimento Rocha, da Costa Farre, and de Santana Filho 2021) • Decrease in drug-related adverse events (do Nascimento Rocha, da Costa Farre, and de Santana Filho 2021) • Reduction in delirium (do Nascimento Rocha, da Costa Farre, and de Santana Filho 2021) • Improved outcomes for patients with behavioral health diagnoses • Improved patient experience (Walker et al. 2021) • *[Note that much of the boarding research revolves around inpatient boarding however similar impacts would be expected through improving transfer boarding]*

(Continued)

Table S0 (Continued) Changes in Care anticipated from implementing the "Emergency Care Access & Timeliness" measure (Continued). (Text in brown font indicates a change in care outside the ED.)

Metric	Examples of Changes in Care for Improvement	Changes in Intermediate Outcomes	Changes in Clinical or Patient-Reported Outcomes, and Costs
Component 4: **The patient had an ED length of stay (LOS) (time from ED arrival to ED departure) of longer than 8 hours.**	• See changes for component #1 and #3 • Changes to diagnostic testing/imaging processes • Changes to staffing models/number of staff • ED observation units (Austin et al. 2020) • Process redesign (Austin et al. 2020) • Physical changes to ED layout	• Decrease turn-around time for diagnostic/imaging tests • Improved time to treatment (e.g., administration of antibiotics). (Lykins V et al. 2021) • Decrease in ambulance diversion	• Decrease in mortality (Berg et al. 2019; Verma et al. 2021) • Improved patient experience (Walker et al. 2021)

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Section 4 Risk Adjustment Tables and Figures

Section 4.1.3 Characteristics of Measured Entities

Table S2 Facility Characteristics of EDs in Dataset A

Test Site	Region	Geography (Urban, Rural)	Type of ED (freestanding, hospital)	# of Bed Range	Teaching Hospital	Trauma Level	EHR Software Vendor
BH1	Midwest	Urban	Hospital	150-200	Y	3	EPIC
BH2	Midwest	Urban	Hospital	400-450	Y	1	EPIC
BH3	Midwest	Rural	Hospital	Under 10	N	4	EPIC
CMC1	Northeast	Urban	Hospital	400-450	Y	N/A	Cerner
CMC2	Northeast	Urban	Hospital	300-350	N	N/A	Cerner
DH1	Midwest	Urban	Hospital	200-250	Y	1	Cerner
FH1	Midwest	Urban	Hospital	150-200	N	3	EPIC
NMC1	South	Urban	Hospital	950-1000	Y	1	EPIC
HH1	Midwest	Rural	Hospital	Under 40	N	N/A	EPIC
HH2	Midwest	Urban	Hospital	100-150	Y	3	Cerner
JMC1	Northeast	Urban	Hospital	300-350	Y	2	Cerner
NMC1	South	Rural	Hospital	Under 30	N	N/A	EPIC
RMC1	West	Urban	Hospital	150-200	Y	1	EPIC
MH1	Northeast	Urban	Hospital	150-200	N	N/A	EPIC
NH1	Northeast	Rural	Hospital	Under 20	N	N/A	EPIC
NMC1	Northeast	Urban	Hospital	450-500	Y	N/A	Cerner
PH1	South	Urban	Hospital	200-250	Y	3	EPIC
PH2	West	Urban	Hospital	250-300	Y	3	EPIC
CMC1	Northeast	Urban	Hospital	550-600	Y	N/A	Cerner
UH1	West	Urban	Hospital	350-400	Y	2	Cerner
ED-1R	South	Rural	Hospital	50-99	No	N/A	Epic
ED-2	South	Urban	Hospital	100-199	No	N/A	Epic
ED-3R	South	Rural	Hospital	0-50	No	N/A	Epic
ED-4	South	Urban	Hospital	200-299	Yes	N/A	Epic
ED-5	South	Urban	Hospital	100-199	No	N/A	Epic
ED-6	South	Urban	Hospital	500-599	Yes	1	Epic
ED-7	South	Urban	Hospital	100-199	No	3	Epic
ED-8	South	Urban	Hospital	200-299	Yes	N/A	Epic
ED-9	South	Urban	Hospital	100-199	Yes	N/A	Epic
ED-10	South	Urban	Hospital	200-299	No	N/A	Epic
ED-11	South	Urban	Hospital	200-299	Yes	3	Epic

Table S3. Facility Characteristics of EDs in Dataset B

Test Site	Region	Geography (Urban, Rural)	Type of ED (freestanding, hospital)	# of Bed Range	Teaching Hospital	Trauma Level	EHR Software Vendor
ED-1R	South	Rural	Hospital	50-99	No	N/A	Epic
ED-2	South	Urban	Hospital	100-199	No	N/A	Epic
ED-3R	South	Rural	Hospital	0-50	No	N/A	Epic
ED-4	South	Urban	Hospital	200-299	Yes	N/A	Epic
ED-5	South	Urban	Hospital	100-199	No	N/A	Epic
ED-6	South	Urban	Hospital	500-599	Yes	1	Epic
ED-7	South	Urban	Hospital	100-199	No	3	Epic
ED-8	South	Urban	Hospital	200-299	Yes	N/A	Epic
ED-9	South	Urban	Hospital	100-199	Yes	N/A	Epic
ED-10	South	Urban	Hospital	200-299	No	N/A	Epic
ED-11	South	Urban	Hospital	200-299	Yes	3	Epic
ED-12	South	Urban	Hospital	100-199	No	N/A	Epic

Table S4. Facility Characteristics of EDs in Dataset C

Test Site	Region	Geography (Urban, Rural)	Type of ED (freestanding, hospital)	# of Bed Range	Teaching Hospital	Trauma Level	EHR Software Vendor
ED-1	Northeast	Urban	Hospital	200-250	No	N/A	Epic
ED-2	Northeast	Urban	Hospital	500-550	Yes	N/A	Epic
ED-3	Northeast	Urban	Hospital	1,100-1,200	Yes	N/A	Epic
ED-4	Northeast	Urban	Hospital	450-500	Yes	2	Epic
ED-5	Northeast	Urban	Hospital	200-250	No	N/A	Epic
ED-6	Northeast	Urban	Hospital	500-550	Yes	N/A	Epic

Table S5. Volume of ED Visits at each site, broken by volume bands of 20,000 visits

Volume of Visits (in thousands)	Dataset A 2022, # Facilities	Dataset A 2023, # Facilities	Dataset A 2-years, Total # Facilities	Dataset B, 2023
0-20	4	4	8	0
20-40	3	3	6	2
40-60	4	4	8	2
60-80	5	5	10	3
80+	4	4	8	5
Total # Facilities	**20**	**20**	**40**	**12**

Section 4.1.4 Characteristics of Units of the Eligible Population

Table S6. Patient Characteristics for all ED encounters, Dataset A 2022, Dataset A 2023, Dataset B, Dataset C

Patient Characteristic	Dataset A 2022	Dataset A 2023	Dataset B	Dataset C
Total Encounters	**1,077,773**	**1,118,941**	**832,056**	**390,500**
Gender	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Gender: Female	574,126 (53.27)	600,967 (53.71)	477,261 (57.4)	200,507 (51.3)
Gender: Male	503,508 (46.72)	517,614 (46.26)	354,702 (42.6)	189,959 (48.6)
Gender: Other	139 (0.01)	360 (0.03)	93 (0.0)	16 (0.0)
Gender: Missing	N/A	N/A	N/A	23 (0.0)
Age	-	-	-	-
Age: 18+	898,794 (83.39)	930,430 (83.15)	739,746 (88.9)	343,297 (87.9)
Age: <18	178,979 (16.61)	188,511 (16.85)	92,306 (11.1)	47,208 (12.1)
Race	-	-	-	-
Race: Unknown	533,773 (49.53)	481,852 (43.06)	2,251 (0.3)	12,751 (3.3)
Race: White	245,743 (22.80)	366,341 (32.74)	442,493 (53.2)	92,495 (23.7)
Race: Black	173,464 (16.09)	151,118 (13.51)	357,540 (43.0)	123,963 (31.7)
Race: Other	109,327 (10.14)	107,571 (9.61)	3665 (0.4)	145,850 (37.3)
Race: Asian	11,282 (1.05)	8,659 (0.77)	17,734 (2.1)	19,601 (5.0)
Race: Hispanic	2,401 (0.22)	743 (0.07)	N/A	N/A
Race: North American Native	1,783 (0.17)	2,657 (0.24)	2,938 (0.4)	744 (0.2)
Race: Native Hawaiian or Other Pacific Islander	N/A	N/A	4,312 (0.5)	577 (0.1)
Payer	-	-	-	-
Payer: Private/Other	827,283 (76.76)	680,849 (60.85)	N/A	136,341 (34.9)
Payer: Missing	96,037 (8.91)	190,442 (17.02)	N/A	61 (0.0)
Payer: Medicare	100,928 (9.36)	141,413 (12.64)	N/A	90,008 (23.0)
Payer: Medicaid	53,525 (4.97)	106,237 (9.49)	N/A	164,095 (42.0)

Section 4.4.3 Risk Factor Characteristics Across Measured Entities

Table S7 Distribution of Stratification Variables Across Measured Entities (Percent of Total Encounters)

Characteristic	Mean	Standard Deviation	Min	25th Percentile	50th Percentile	75th Percentile	Max
Adult (18+)	84.0	6.6	66.3	81.4	84.5	87.5	99.2
Adult (18+) Mental Health Diagnosis	2.9	1.6	0.7	1.8	2.6	3.5	8.6
Pediatric (<18)	16.0	6.6	0.8	12.5	15.5	18.6	33.7
Pediatric (<18) Mental Health Diagnosis	0.5	0.2	0.0	0.3	0.5	0.7	0.9

Section 4.4.4 Risk Adjustment Modeling and/or Stratification Results

Figure S1 ECAT Numerator Components by Strata: Dataset A, 2 Years

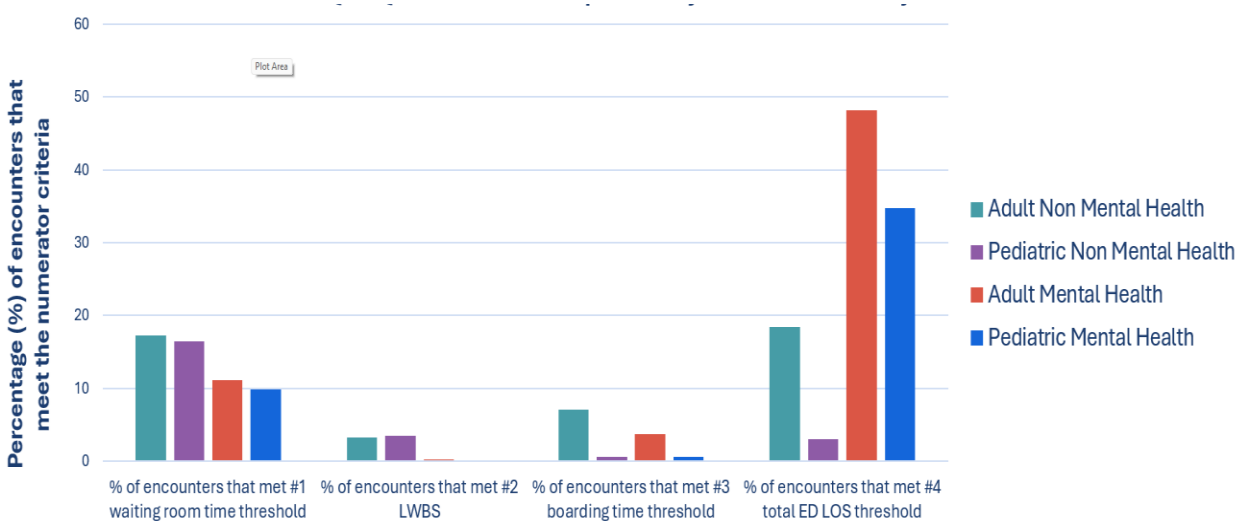

Figure S2 Stratified ECAT Measure Score Distribution