

CriticalWindow-24 (CW-24) Benchmark eICU

Subset Variable Specification

1 Overview

This document provides a comprehensive specification of variables included in the **eICU 24-hour benchmark dataset**. All variables have been **carefully curated** to ensure **strict temporal constraints** and **prevent data leakage**.

1.1 Key Design Principles

- **Temporal Integrity:** All predictive variables are recorded within a **24-hour window** from ICU admission
- **No Data Leakage:** Variables are strictly limited to information available **before or during** the prediction window
- **Clinical Relevance:** Selected variables represent **clinically meaningful** predictors of patient outcomes
- **Standardized Recording:** All temporal windows are **consistently defined** across the dataset

2 Dataset Baseline Characteristics

The following table presents the baseline characteristics of the **eICU 24-hour benchmark dataset**, stratified by **hospital mortality outcome**:

Table 1: **Baseline Characteristics by Hospital Mortality Outcome**

Characteristic	Survived (N=142,628)	Died (N=13,838)	Overall (N=157,883)
Demographics & Anthropometrics			
Age (Mean \pm SD)	62.43 \pm 17.25	69.76 \pm 15.06	63.10 \pm 17.20
Height (Mean \pm SD)	169.35 \pm 13.74	168.42 \pm 14.47	169.25 \pm 13.87
Weight (Mean \pm SD)	84.19 \pm 26.84	80.90 \pm 28.18	83.89 \pm 26.97
Clinical Severity Scores			
APACHE IV (Mean \pm SD)	51.02 \pm 22.63	87.23 \pm 33.34	54.21 \pm 25.89
SAPS II (Mean \pm SD)	28.90 \pm 13.05	49.58 \pm 17.89	30.74 \pm 14.76
OASIS (Mean \pm SD)	24.65 \pm 8.91	35.76 \pm 11.34	25.63 \pm 9.68
Dynamic Clinical Assessments - Glasgow Coma Scale			

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Table 1: **Baseline Characteristics by Hospital Mortality Outcome (continued)**

Characteristic	Survived (N=142,628)	Died (N=13,838)	Overall (N=157,883)
GCS Maximum (Mean \pm SD)	14.28 \pm 1.88	11.03 \pm 4.38	13.99 \pm 2.39
GCS Minimum (Mean \pm SD)	12.72 \pm 3.55	8.47 \pm 4.73	12.35 \pm 3.86
GCS First (Mean \pm SD)	13.28 \pm 3.20	10.19 \pm 4.75	13.01 \pm 3.47
GCS Last (Mean \pm SD)	13.93 \pm 2.33	9.40 \pm 4.64	13.53 \pm 2.90
GCS Average (Mean \pm SD)	13.63 \pm 2.39	9.76 \pm 4.35	13.29 \pm 2.84
GCS Std Dev (Mean \pm SD)	0.72 \pm 1.24	1.27 \pm 1.57	0.77 \pm 1.28
Dynamic Clinical Assessments - SOFA Score			
SOFA Maximum (Mean \pm SD)	4.58 \pm 3.01	7.83 \pm 3.95	4.86 \pm 3.24
SOFA Minimum (Mean \pm SD)	1.84 \pm 2.13	3.42 \pm 2.91	1.98 \pm 2.25
SOFA First (Mean \pm SD)	2.00 \pm 2.25	3.56 \pm 2.99	2.14 \pm 2.37
SOFA Last (Mean \pm SD)	4.30 \pm 2.95	7.55 \pm 3.98	4.58 \pm 3.19
SOFA Average (Mean \pm SD)	3.92 \pm 2.74	6.67 \pm 3.49	4.16 \pm 2.92
SOFA Std Dev (Mean \pm SD)	0.86 \pm 0.70	1.39 \pm 1.03	0.90 \pm 0.75
Categorical Variables			
Region (n (%))			
Midwest	49,371 (34.62%)	4,127 (29.82%)	54,232 (34.35%)
Northeast	10,104 (7.08%)	1,315 (9.50%)	11,459 (7.26%)
South	44,411 (31.14%)	4,741 (34.26%)	49,403 (31.29%)
West	29,530 (20.70%)	2,841 (20.53%)	32,676 (20.70%)
Unknown	9,212 (6.46%)	814 (5.88%)	10,113 (6.41%)
Ethnicity (n (%))			
African American	15,966 (11.19%)	1,423 (10.28%)	17,536 (11.11%)
Asian	2,389 (1.67%)	251 (1.81%)	2,677 (1.70%)
Caucasian	109,236 (76.59%)	10,724 (77.50%)	121,023 (76.65%)
Hispanic	5,452 (3.82%)	549 (3.97%)	6,031 (3.82%)
Native American	1,050 (0.74%)	94 (0.68%)	1,150 (0.73%)
Other/Unknown	6,776 (4.75%)	626 (4.52%)	7,504 (4.75%)
Unknown	1,759 (1.23%)	171 (1.24%)	1,962 (1.24%)
Unit Type (n (%))			
CCU-CTICU	12,099 (8.48%)	1,077 (7.78%)	13,218 (8.37%)
CSICU	5,264 (3.69%)	331 (2.39%)	5,633 (3.57%)

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Table 1: **Baseline Characteristics by Hospital Mortality Outcome (continued)**

Characteristic	Survived (N=142,628)	Died (N=13,838)	Overall (N=157,883)
CTICU	4,754 (3.33%)	294 (2.12%)	5,087 (3.22%)
Cardiac ICU	9,932 (6.96%)	1,131 (8.17%)	11,176 (7.08%)
MICU	11,648 (8.17%)	1,607 (11.61%)	13,365 (8.47%)
Med-Surg ICU	79,199 (55.53%)	7,629 (55.13%)	87,717 (55.56%)
Neuro ICU	10,775 (7.55%)	956 (6.91%)	11,863 (7.51%)
SICU	8,957 (6.28%)	813 (5.88%)	9,824 (6.22%)
Gender (n (%))			
Female	65,530 (45.94%)	6,446 (46.58%)	72,670 (46.03%)
Male	77,052 (54.02%)	7,376 (53.30%)	85,131 (53.92%)
Unknown	46 (0.03%)	16 (0.12%)	82 (0.05%)
Smoker (n (%))			
No	12,022 (8.43%)	1,136 (8.21%)	13,386 (8.48%)
Yes	14,331 (10.05%)	1,263 (9.13%)	15,889 (10.06%)
Unknown	116,275 (81.52%)	11,439 (82.66%)	128,608 (81.46%)
Alcohol Abuse (n (%))			
No	139,649 (97.91%)	13,612 (98.37%)	154,643 (97.95%)
Yes	2,979 (2.09%)	226 (1.63%)	3,240 (2.05%)
Drug Abuse (n (%))			
No	142,453 (99.88%)	13,833 (99.96%)	157,701 (99.88%)
Yes	175 (0.12%)	5 (0.04%)	182 (0.12%)
Obesity (n (%))			
No	141,141 (98.96%)	13,664 (98.74%)	156,203 (98.94%)
Yes	1,487 (1.04%)	174 (1.26%)	1,680 (1.06%)

3 Variable Specifications

The following table details all variables included in the benchmark dataset, with their descriptions and **precise recording windows**:

Table 2: **eICU 24-Hour Benchmark Variables**

Variable	Description	Record Window
Baseline Demographics & Admission Characteristics		
region	Geographic region of the hospital (Northeast, Midwest, South, West)	ICU admission (baseline)
ethnicity	Recorded patient ethnicity	ICU admission (baseline)
unittype	Type of ICU (medical, surgical, car- diac, etc.)	ICU admission (baseline)

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Table 2: **eICU 24-Hour Benchmark Variables (continued)**

Variable	Description	Record Window
gender	Biological sex of the patient (male/female)	ICU admission (baseline)
age	Age of the patient at ICU admission (years)	ICU admission (baseline)
height	Patient height (centimetres)	ICU admission (baseline)
weight	Patient weight (kilograms)	ICU admission (baseline)
smoker	Documented current or past smoking status	ICU admission (baseline)
alcohol_abuse	Documented history of alcohol abuse	ICU admission (baseline)
drug_abuse	Documented history of illicit drug abuse	ICU admission (baseline)
obesity	Obesity status (BMI 30)	ICU admission (baseline)
Outcome Variable		
hosp_mort	Indicator of in-hospital mortality (1 = died, 0 = survived)	Entire hospitalization (outcome label)
Clinical Severity Scores		
apacheIV	APACHE IV severity score	6h to +24h of ICU admission
sapsii	Simplified Acute Physiology Score II	6h to +24h of ICU admission
oasis	Oxford Acute Severity of Illness Score	6h to +24h of ICU admission
Dynamic Clinical Assessments		
gcs_dynamic_max	Maximum Glasgow Coma Scale observed in window	6h to +24h
sofa_dynamic_max	Maximum Sequential Organ Failure Assessment observed in window	6h to +24h
gcs_dynamic_min	Minimum Glasgow Coma Scale observed in window	6h to +24h
sofa_dynamic_min	Minimum SOFA observed in window	6h to +24h
gcs_dynamic_first	First Glasgow Coma Scale recorded within window	6h to +24h
sofa_dynamic_first	First SOFA recorded within window	6h to +24h
gcs_dynamic_last	Last Glasgow Coma Scale recorded within window	6h to +24h
sofa_dynamic_last	Last SOFA recorded within window	6h to +24h
gcs_dynamic_avg	Mean Glasgow Coma Scale across window	6h to +24h
sofa_dynamic_avg	Mean SOFA across window	6h to +24h
gcs_dynamic_stddev	Standard deviation of Glasgow Coma Scale within window	6h to +24h

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Table 2: **eICU 24-Hour Benchmark Variables (continued)**

Variable	Description	Record Window
sofa_dynamic_stddev	Standard deviation of SOFA within window	6h to +24h

4 Data Integrity Guarantees

4.1 Temporal Constraints

- **Baseline variables:** Recorded at or before ICU admission
- **Clinical scores:** Limited to **6 hours to +24 hours** from ICU admission
- **Dynamic assessments:** Aggregated within the **24-hour prediction window**
- **Outcome variable:** Hospital mortality status (no temporal restrictions)

4.2 Data Leakage Prevention

- **No future information:** All predictive variables precede or occur within the defined prediction window
- **Strict cutoffs:** No data beyond the 24-hour mark is included in any predictive variable
- **Validated extraction:** Automated checks ensure temporal consistency across all records

4.3 Dataset Summary

- **Total patients:** 157,883 ICU admissions
- **Hospital mortality rate:** 8.77% (13,838 deaths)
- **Multi-center data:** Represents diverse geographic regions and ICU types across the United States