



KAMALESWARAN LAB
CLINICAL INFORMATICS

REAL-TIME SEPSIS ML MODEL

07/20 UPDATES



Dataset Description & Filtering Criteria

FOR EMORY DATASET YEAR 2021

** FIXED ERROR IN FILTERING ALGORITHM **

2021 encounter from
EUH, EUHM, ESJH, or EJCH

212,263 CSN
3898 sepsis
(1.83%)



1

First encounter
since 2020

111,365 CSN
1736 sepsis
(1.56 %)



2

<= 48 hour since
admission exists

109,742 CSN
1554 sepsis
(1.42 %)



3

10:1 ratio

15,540 non-sepsis CSN
1554 sepsis CSN

List of Features (total of 174)

LOINC codes describing the same clinical parameter were condensed into a single variable.
e.g., serum hemoglobin and arterial hemoglobin became hemoglobin

DEMOGRAPHICS (2)	VITALS (9)	LABS (25)		
Age	HR	BaseExcess	Alkalinephos	Sodium
Gender	O2Sat	HCO3	Calcium	Potassium
	Temp	FiO2	Chloride	Bilirubin_total
	Resp	pH	Creatinine	Hct
	SBP	PaCO2	Glucose	Hgb
	MAP	SaO2	Lactate	PTT
	DBP	AST	Magnesium	WBC
	EtCO2	BUN	Phosphate	Platelets
	GCS_total_score		PaO2	

Derived features #1

Statistical Features (30)

_mean, _median, _min,
_max, _std, _dstd
18-hr sliding window
based statistical features

Derived features #2

Scoring Quantified Features (9)

- **SBP score** and **RR score** (based on qSOFA score)
- **Platelets score**, **Bilirubin score**, **MAP score**, and **Creatinine score** (based on SOFA score)
- **HR score** and **Temp score** (based on NEWS score)
- **SIRS >=2 indicator**

Derived features #3

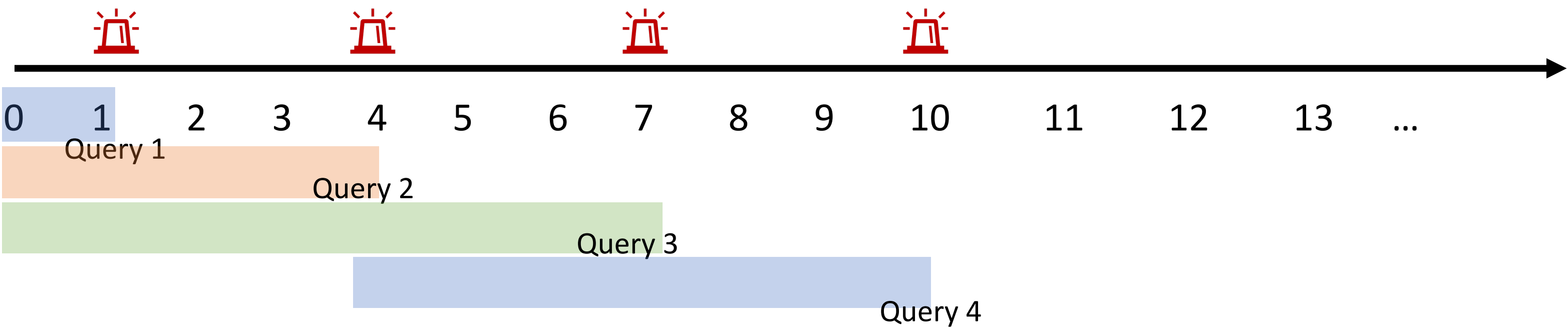
Missing Value Features & Differential Features (99)

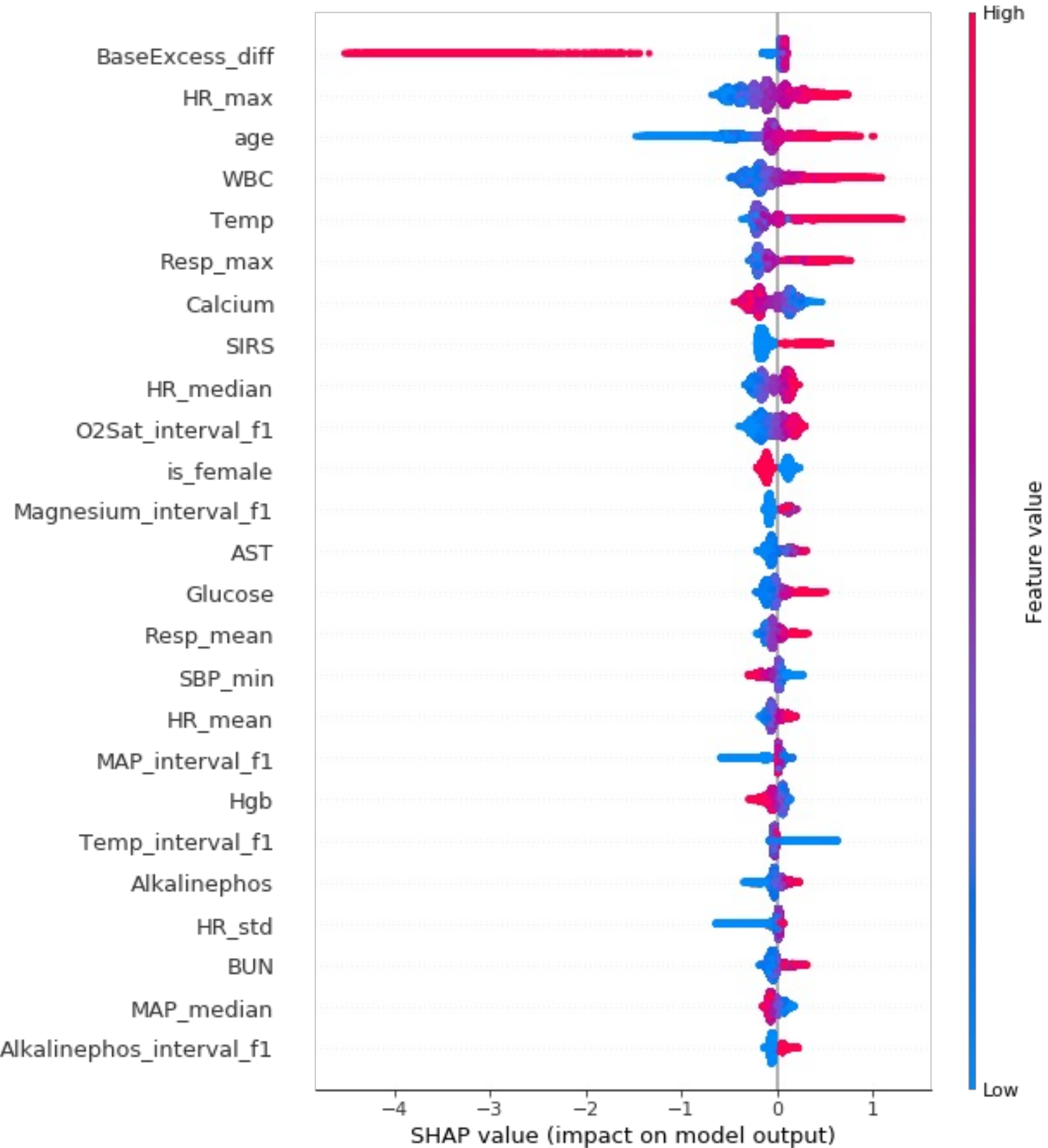
- Measurement frequency sequence (**_interval_f1**): Record the number of variable measurements before the current time
- Measurement time interval sequence (**_interval_f2**): Record the time interval from the last measurement between the current time.
- Differential features (**_diff**): current value – previous last known value

48-hour Model

- Takes first 48-hour data for training.
- Patient status evaluated every 3 hours from 6-hour sliding window.

Time of admission

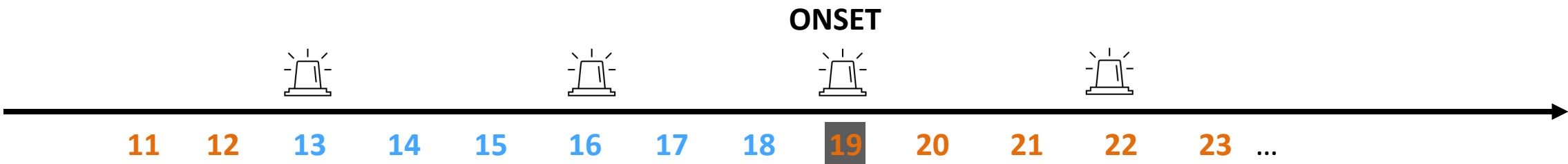




Feature Importance

- SHapley Additive exPlanations (SHAP) values show feature importance

	RED dots	BLUE dots
+ SHAP value	Higher value leads to	Lower value leads to
- SHAP value	Higher value leads to	Lower value leads to



0 = NO SEPSIS, 1 = SEPSIS

Time	True Label	Predicted Label	Standard	METRICS #1
7	0	0	TN	TN
10	0	1	FP	FP
13	0	1	FP	TP
16	0	1	FP	TP
19	1	1	TP	TP
22	1	0	FN	FP
25	1	1	TP	TP

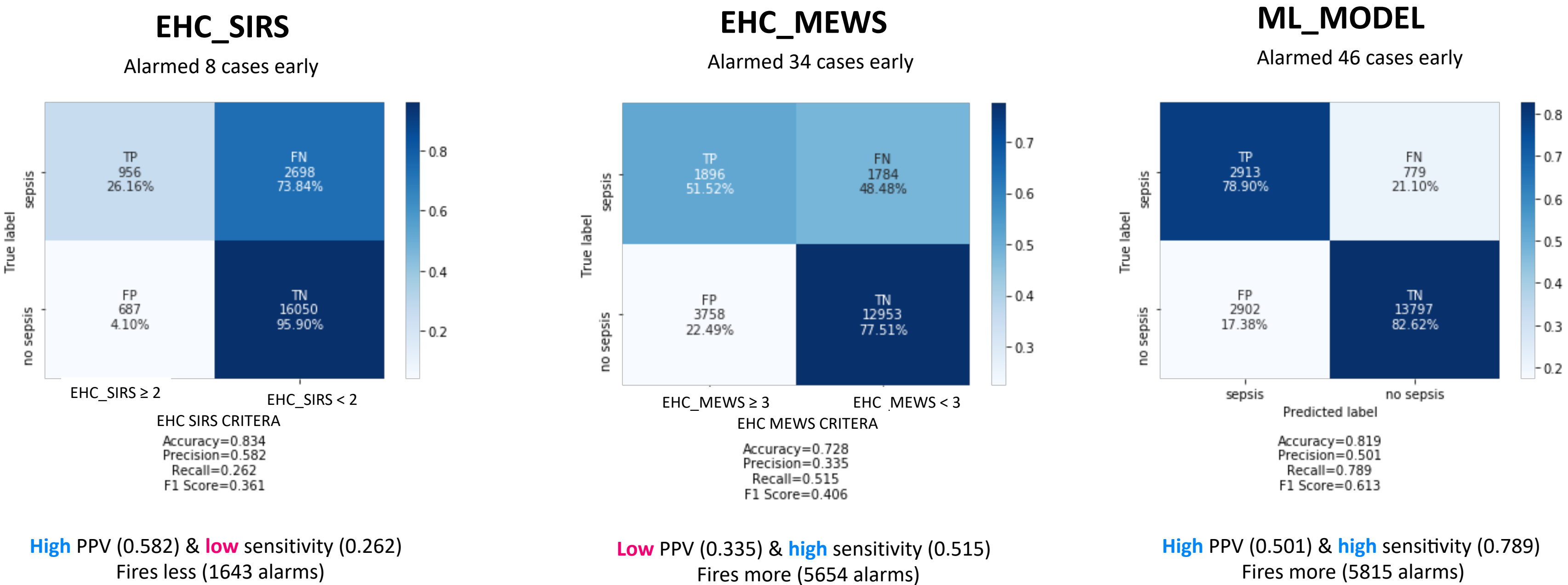
TP = True Positive, TN = True Negative, FP = False Positive, FN = False Negative

Evaluation Metrics #1

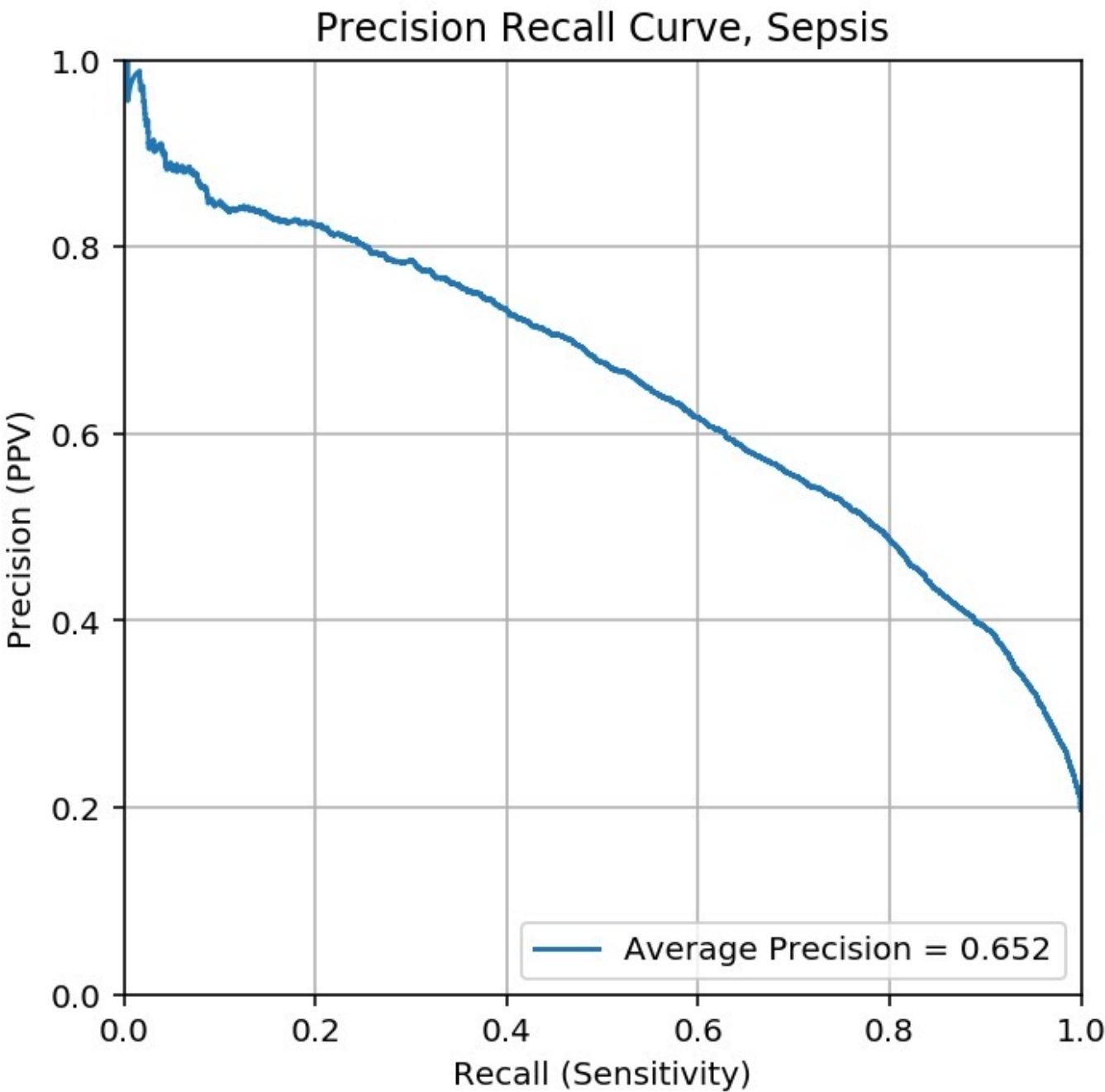
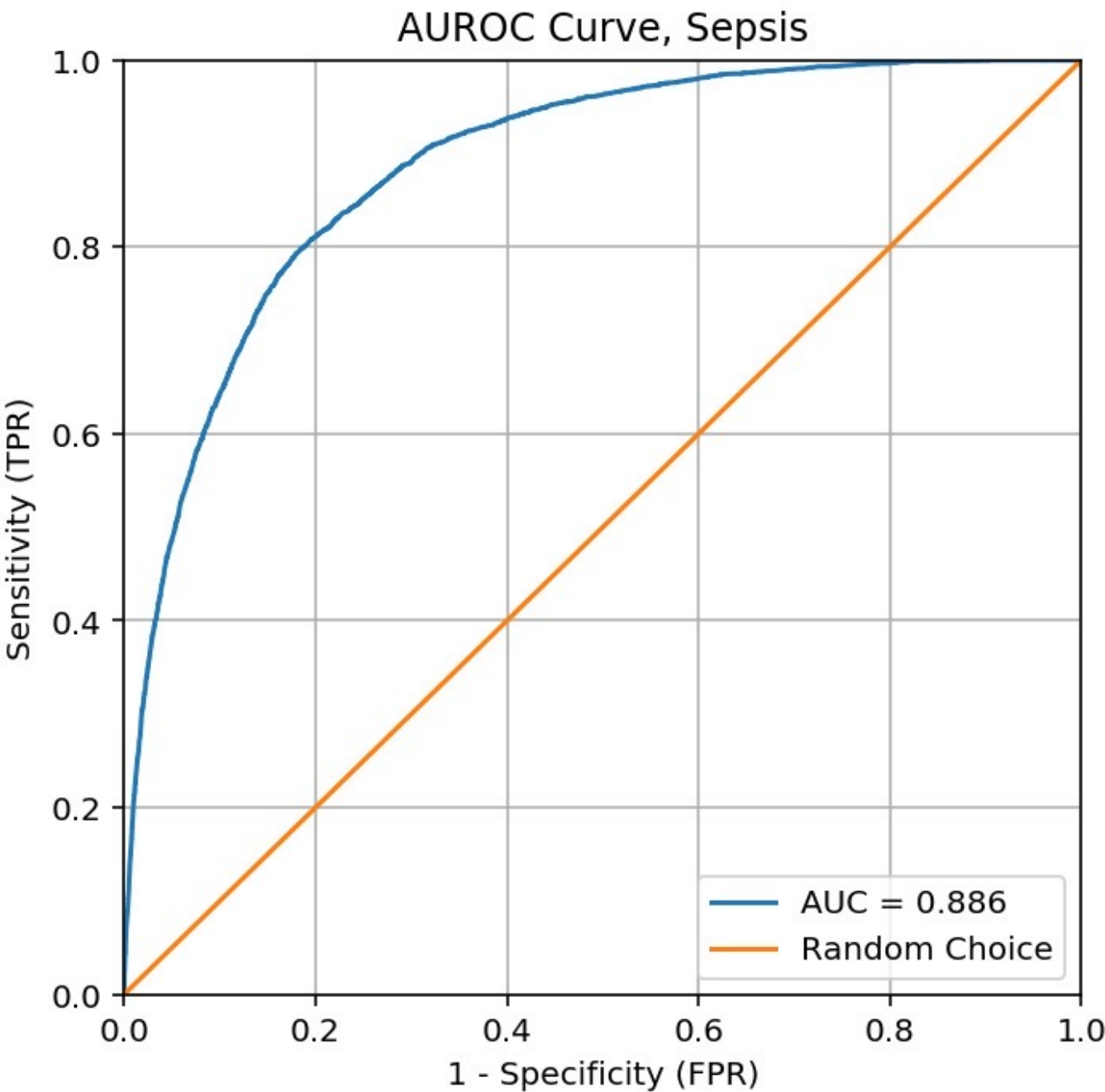
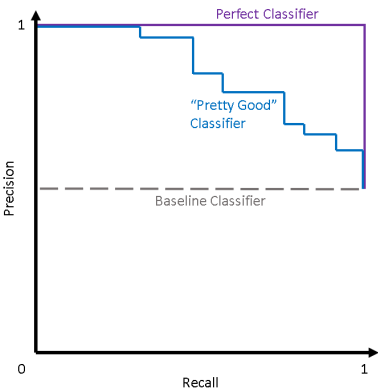
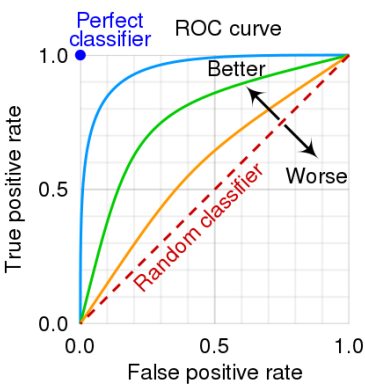
- If model predicts sepsis within 6 hour prior to true onset, will count as **True Positive**

Comparison w/ Metrics #1

- If model predicts sepsis within **6 hour prior** to true onset, will count as **True Positive**



Overall Performance



EHC_SIRSS ≥ 2

EHC_MEWS ≥ 3

