

Pre-Hospital qSOFA Score as a Predictor of Sepsis and Mortality

William Frye, MS2 Virginia Commonwealth University School of Medicine
PI-Crystal Ives-Tallman, MD UCSF Fresno


DISCLOSURES

- Authors
 - Eileen Shu MD¹, Crystal Ives-Tallman MD¹, Megann Young MD¹, William Frye², Leyla Farshidpour¹, Danielle Campagne MD¹
 - 1. UCSF Fresno
 - 2. Virginia Commonwealth University School of Medicine
 - No disclosures
- Presenter
 - William Frye


BACKGROUND

- Early recognition and treatment of sepsis is key to lowering mortality
- New guidelines and diagnosis criteria (SEPSIS-3)
 - Suspected infection, +2 SOFA score (complex, involves lab values, etc.)


What is qSOFA?



**ALTERED
MENTAL STATUS**



**FAST RESPIRATORY
RATE**



**LOW BLOOD
PRESSURE**

The qSOFA score (also known as quickSOFA) is a bedside prompt that may identify patients with suspected infection who are at greater risk for a poor outcome outside the intensive care unit (ICU). It uses three criteria, assigning one point for low blood pressure (SBP \leq 100 mmHg), high respiratory rate (\geq 22 breaths per min), or altered mentation (Glasgow coma scale \leq 15). qsofa.org

STUDY AIM(S) / HYPOTHESES

- Primary outcome: Evaluate sensitivity and specificity of prehospital qSOFA score on sepsis, in-hospital mortality, and ED diagnosis of infection
- Secondary outcomes:
 - Association with transport priority, **initial triage zone**, **up-triage**, admission location, hospital and ICU length of stay

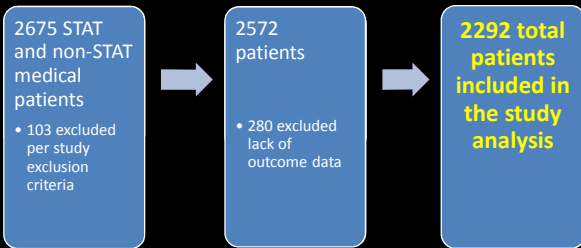
METHODS

- Single site retrospective cross sectional study
 - All medical patients transported by EMS to CRMC level 1 trauma center (Fresno CA) in September 2016
- Calculated pre-hospital qSOFA using EMS vital signs
- EMR chart review following the ED and hospital course of these patients

METHODS

- Independent variable
 - Prehospital qSOFA score (0, 1, 2, 3)
- Primary outcome variables
 - Discharge diagnosis of sepsis
 - In-hospital mortality
 - ED diagnosis of infection
- Analysis
 - Chi-squared tests, Fisher Exact tests, ANOVA
 - Logistical, Multinomial, and Linear Regression

Study Population



Characteristics of Study Population

	All patients (N = 2292)	Admitted patients (N = 960)
	N(%), median	N(%), median
Diagnosed with Sepsis on Hospital Discharge	119 (5.2%)	119 (12.4%)
In-Hospital Mortality	32 (1.4%)	32 (3.3%)
Diagnosed with Suspected Infection in the ED	428 (18.7%)	297 (30.9%)

RESULTS

- Diagnosis of sepsis
 - Specificity: 93.1%
 - Sensitivity: 38.7%
 - PPV 23.4%
 - NPV 96.5%
- In-hospital mortality
 - Specificity: 91.9%
 - Sensitivity: 40.6%
 - PPV 6.60%
 - NPV 99.1%

PRIMARY OUTCOMES: Association with qSOFA

Factor N(%)	qSOFA score				OR [95% CI]	p-value
	0	1	2	3		
TOTAL	1386 (60.5%)	709 (30.9%)	167 (7.3%)	30 (1.3%)		
ED Diagnosis of Infection	242 (17.4%)	123 (17.3%)	45 (26.9%)	18 (80.0%)	1.4 [1.2, 1.6]	<0.001
Discharge Diagnosis of Sepsis	31 (2.2%)	42 (5.9%)	30 (18.0%)	16 (53.3%)	3.4 [2.7, 4.2]	<0.001
In-Hospital Mortality	3 (0.2%)	16 (2.3%)	12 (7.2%)	1 (3.3%)	3.3 [2.3, 4.8]	<0.001

SECONDARY OUTCOMES

- Associated with initial triage to high acuity zone (OR=6.9)
- Associated with ICU admission vs floor/stepdown (OR=4.5)
- qSOFA+ not significantly associated with up-triage (p=.107)

DISCUSSION

- Prehospital +qSOFA is specific, but poorly sensitive for sepsis and mortality
- +qSOFA has high odds ratio for sepsis, mortality, triage to high acuity zone, ICU admission

Impact on EMS operations

- +qSOFA score should carry weight in communication with base hospital
 - ¼ are truly septic, irrespective of known infection
- May be helpful for triage
 - ED specific
- Potential for use in early intervention protocol
 - More specific but less sensitive than SIRS
 - Could be helpful in system with long transport times

LIMITATIONS

- EMR and EMS data by hand
 - Systematic and random error
 - Data reviewed by two authors
 - Missing data due to elopements
- Single site study

Questions?

Thank you!

Table 1. Characteristics of Study Population	All patients (N = 2292)	Admitted patients (N = 960)
	N(%), median [IQR], mean \pm SD ^a	N(%), median [IQR], mean \pm SD ^a
Males	1250 (54.5%)	519 (54.1%)
Age (years)	52 [37, 63]	59.5 [48, 71]
SOFA score		
0	1386 (60.5%)	475 (49.5%)
1	709 (30.9%)	352 (36.7%)
2	167 (7.3%)	104 (10.8%)
3	30 (1.3%)	29 (3.0%)
STAT Transport Priority	163 (7.1%)	142 (14.8%)
Initial Triage Zone		
Low Acuity	1570 (68.5%)	429 (44.7%)
Mid Acuity	381 (16.6%)	255 (26.6%)
High Acuity	341 (14.9%)	276 (28.8%)
Final Triage Zone		
Low Acuity	1453 (63.4%)	338 (35.2%)
Mid Acuity	434 (18.9%)	289 (30.1%)
High Acuity	405 (17.7%)	333 (34.7%)
Up-Triage to Higher Acuity Zone while in ED	147 (6.4%)	119 (12.4%)
Disposition/Admission Location		
Not Admitted	1332 (58.1%)	Not applicable
Floor	831 (36.4%)	811 (84.5%)
Stepdown Unit	59 (2.6%)	59 (6.1%)
Intensive Care Unit/OR/Cath Lab	90 (3.9%)	90 (9.4%)
Diagnosed with Suspected Infection in the ED	428 (18.7%)	297 (30.9%)
Diagnosed with Sepsis on Hospital Discharge	139 (6.0%)	119 (12.4%)
In-Hospital Mortality	32 (1.4%)	32 (3.3%)
Hospital Length of Stay (HLOS)	0 [0, 3]	4 [2, 6]
	2.63 \pm 8.68	6.24 \pm 12.5
Intensive Care Unit Length of Stay (ICU LOS)	0 [0, 0]	0 [0, 0]
	0.18 \pm 1.50	0.43 \pm 2.30

Factor	SOFA Score				OR ^b [95% CI]	p-value
	0	1	2	3		
N (%) mean \pm SD						
TOTAL	1386 (60.5%)	709 (30.9%)	167 (7.3%)	30 (1.3%)		
Male Sex	761 (54.9%)	382 (53.9%)	90 (53.9%)	17 (56.7%)	1.018 [0.904, 1.147]	0.963
Age^c	49.6 \pm 17.3	54.3 \pm 18.3	54.7 \pm 19.1	64.4 \pm 18.25	1.015 [1.007, 1.024] ^d	<0.001
STAT Transport Priority	25 (1.8%)	77 (10.9%)	40 (24.0%)	21 (70.0%)	4.286 [3.486, 5.265]	<0.001
Initial Triage Zone						
Low Acuity	1121 (80.9%)	395 (55.7%)	53 (31.7%)	1 (3.3%)	€	<0.001
Mid Acuity	178 (12.9%)	153 (21.6%)	49 (29.3%)	6 (20.0%)		
High Acuity	92 (6.6%)	161 (22.7%)	65 (38.9%)	23 (76.7%)		
Final Triage Zone						
Low Acuity	1044 (75.3%)	364 (51.3%)	44 (26.3%)	1 (3.3%)	€	<0.001
Mid Acuity	220 (15.9%)	169 (23.9%)	46 (27.5%)	5 (16.7%)		
High Acuity	122 (8.8%)	182 (25.7%)	77 (46.1%)	24 (80.0%)		
Up-Triage to Higher Acuity Zone	85 (6.1%)	43 (6.1%)	18 (10.8%)	1 (3.3%)	1.146 [0.910, 1.443]	0.107
Disposition/Admission Location						
Not Admitted	911 (65.7%)	357 (50.4%)	63 (37.7%)	1 (3.3%)	€	<0.001
Floor	444 (32.0%)	336 (47.3%)	68 (40.7%)	13 (43.3%)		
Stepdown Unit	17 (1.2%)	23 (3.2%)	9 (5.4%)	10 (33.3%)		
Intensive Care Unit/OR/Cath Lab	14 (1.0%)	43 (6.1%)	27 (16.2%)	6 (20.0%)		
Diagnosed with Suspected Infection in the ED	242 (17.4%)	123 (17.3%)	45 (26.9%)	18 (60.0%)	1.366 [1.184, 1.575]	<0.001
Diagnosed with Sepsis on Hospital Discharge	31 (2.2%)	42 (5.9%)	30 (18.0%)	16 (53.3%)	3.405 [2.736, 4.235]	<0.001
In-Hospital Mortality^e	3 (0.2%)	16 (2.3%)	12 (7.2%)	1 (3.3%)	3.301 [2.283, 4.777]	<0.001
Hospital Length of Stay (HLOS)	2.0 \pm 9.2	3.2 \pm 7.7	3.95 \pm 6.0	9.5 \pm 13.6	x	<0.001
Intensive Care Unit Length of Stay (ICU LOS)	0.08 \pm 1.2	0.27 \pm 1.8	0.47 \pm 1.9	1.27 \pm 3.6	x	<0.001

		OR (95% CI) of qSOFA Score as Predictor ^a		
		1	2	3
Initial Triage Zone ^a	Yellow	2.51 [1.96, 3.21]	5.99 [3.94, 9.12]	38.88 [4.65, 324.89]
	Red	4.97 [3.75, 6.58]	14.94 [9.81, 22.75]	280.25 [37.42, 2098.66]
Final Triage Zone ^a	Yellow	2.13 [1.68, 2.69]	4.96 [3.20, 7.69]	23.73 [2.76, 204.09]
	Red	4.28 [3.30, 5.54]	14.98 [9.89, 22.68]	205.38 [27.54, 1531.49]
Admission Location ^a	Floor	1.64 [1.36, 1.99]	2.22 [1.54, 3.18]	26.67 [3.48, 204.54]
	Stepdown	3.45 [1.82, 6.54]	7.66 [3.28, 17.86]	535.88 [64.91, 4423.95]
	ICU/OR/ Cath	7.84 [4.24, 14.50]	27.89 [13.91, 55.83]	390.43 [44.06, 3460.12]
