

## PROGNOSTIC ACCURACY OF THE SOFA SCORE, SIRS CRITERIA AND qSOFA SCORE FOR IN HOSPITAL MORTALITY AMONG ADULTS WITH SUSPECTED INFECTION ADMITTED TO THE INTENSIVE CARE UNIT

Chirag J Patel\*, Divyesh kumar kalariya, Zil Bardolia\*, Revant Agarwal, Parth Raval  
Arunjith G

\*Associate Professor and head of the department \*\*senior resident \*\* Second year resident, \*\* second year resident\*\*first year resident\*\*first year resident\*\*Department of Emergency Medicine department, B J Medical college and Civil Hospital, Ahmedabad-380016, Gujarat, India.

**Abstracts: Objective:** Externally validate and assess the discriminatory capacities of an increase in SOFA score by 2 or more points, 2 or more SIRS criteria, or a qSOFA score of 2 or more points for outcomes among patients who are critically ill with suspected infection in ICU. **Materials and methods:** A prospective cohort study was performed using young and older adult (aged  $\geq 18$ ) admissions with suspected infection in ICU of civil hospital Ahmedabad. Data were extracted regarding patient's bio data, clinical history, general and systemic examination. SOFA score, qSOFA score, SIRS score were calculated by using respective tables on patient ICU admission and After 24 hours of admission. **Results:** Among 100 patients, Mean age was 43.46, CV stroke was listed most common diagnosis followed by Bacterial pneumonia. There were 31 patients who died in the hospital. The secondary outcome of in hospital mortality or length of stay in the ICU of 3 days or more occurred in 88 patients. Of the study cohort, 11 patients (73.33%) had an increase of SOFA score from baseline of 2 or more, 3 patients (66%) manifested 2 or more SIRS criteria, and 1 patient (20%) had a qSOFA score of 2 or more. **Conclusion:** Among adults with suspected infection admitted to an ICU, an increase in SOFA score of 2 or more had greater prognostic accuracy for in hospital mortality than SIRS criteria or the qSOFA score.

**Key Words:** qSOFA score (Quick Sequential organ failure Assessment score), SIRS (Systemic inflammatory response syndrome), SOFA Score (Sequential organ failure Assessment score)

**Author for correspondence:** Dr Divyesh Kumar Kalariya, Department of Emergency Medicine, B.J Medical College, Ahmedabad – 380016 .e- mail: kalariya.dev420@gmail.com

### Introduction:

Sepsis is a life threatening condition resulting from a dysregulated host response to infection caused by bacterial, viral, fungal or parasitic pathogen. Sepsis remains difficult to define but represent a significant burden of disease. <sup>(1-4)</sup> A recent meta-analysis estimated its annual global incidence at 31.5 million cases, with 19.4 million cases of severe sepsis, resulting in 5.3 million deaths<sup>(5)</sup>. It has been recognized that survival following sepsis is associated with long term physical, cognitive, and psychosocial morbidity<sup>(6)</sup> and increased mortality rate up to 2 years after an event<sup>(7)</sup>

Accurate diagnostic criteria and consensus definitions have an important role in adult intensive care medicine, providing tools for research, benchmarking, performance monitoring, and accreditation. Seymour and colleagues published data concerning the validity of a 2 or more – point change in the sequential (sepsis-

related) organ failure assessment (SOFA) score as a means of identifying sepsis among patients who are critically ill with suspected infection, assuming a SOFA of 0 for patient not known to have preexisting organ dysfunction. In addition, the concept of the quick SOFA (qSOFA) score was introduced as a possible predictive tool among encounters with suspected infection outside the intensive care unit (ICU). These data were drawn from cohort study

The primary aims of this study were to

1. Assess the effect of an increase in SOFA score of 2 or more point, 2 or more systemic inflammatory response syndrome (SIRS) criteria, and a qSOFA score of 2 or more points measured within the first 24 hours of admission in discriminating in hospital mortality or prolonged length of stay among patient with suspected infection admitted to ICUs
2. To validate the use of qSOFA in this setting

**Material and Methods:****Study design and population**

A prospective cohort study was performed using young and older adult (aged  $\geq 18$ ) admissions with suspected infection in ICU of civil hospital Ahmadabad from October 2021 to December 2021. Data were extracted: information regarding chief complain was obtained, along with that personal history, past history, family history also noted, general examination including temperature, pulse, blood pressure, spo<sub>2</sub>, RBS, respiratory rate recorded, systemic examination done and positive findings were noted, level of consciousness noted by using Glassglow coma score(GCS).relevant lab findings and investigations noted, disposition of patients noted. All these data noted in standard case record form. All the patients were reassess after 24 hours of ICU admission

**Calculation of SOFA score: SOFA score was calculated by using following table on admission and after 24 hours of admission(Table-1)**

**Calculation of qSOFA score-**

- Low BP (SBP $\leq$ 100 mmHg) 1
- High respiratory rate( $\geq$ 22/min) 1
- Altered mental status (GCS $\leq$ 14) 1

**Calculation of SIRS score-**

- Temperature( $>38^{\circ}\text{C}$  or  $36^{\circ}\text{C}$ ) 1
- Heart rate $>90/\text{min}$  1
- Respiratory rate $>20/\text{min}$  or PaCO<sub>2</sub> $<4.3$  kPa 1
- WCC $>12000$  celle/mm<sup>3</sup> or  $<4000$  cells/mm<sup>3</sup> or  $>10\%$  immature(band) forms 1

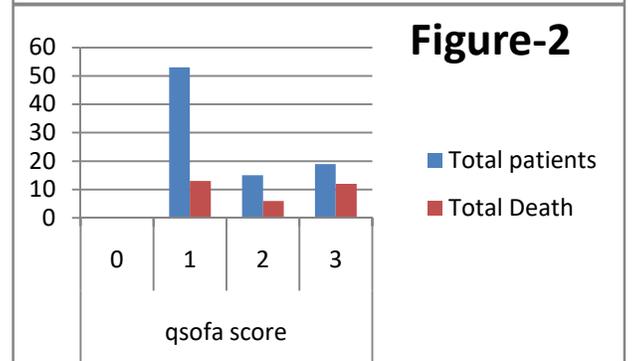
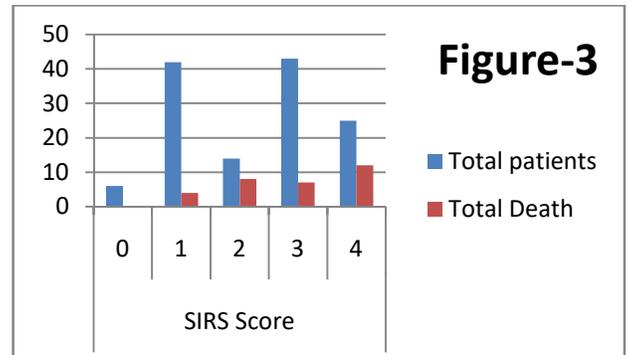
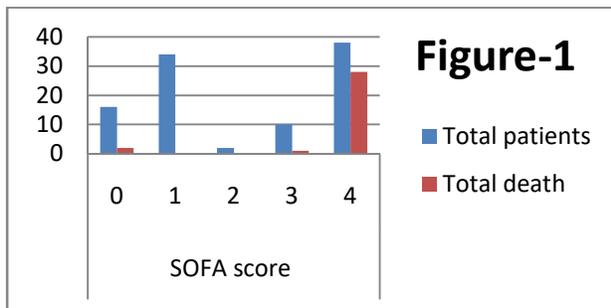
| Variables   | SOFA Score(Table-1)    |                        |   |   |  |
|---|------------------------|------------------------|---|---|--|
|   | 0                      | 1                      | 2   | 3   | 4  |
| Respiratory<br>(Pao <sub>2</sub> /fio <sub>2</sub> or<br>Spo <sub>2</sub> /Fio <sub>2</sub> ) | $>400$ or<br>$>302$    | $<400$ or<br>$<302$    | $<300$ or $<221$                          | $<200$ or $<142$  | $<100$ or $<67$  |
| Cardiovascular<br>(dose in mcg/kg/min)  | MAP $\geq$ 70<br>mm hg | MAP $\geq$ 70<br>mm hg | Dopamine $\leq$ 5<br>or any<br>dobutamine | Dopamine $>5$<br>Norepinephrine $\leq$ 0.1<br>phrnylepherine $\leq$ 0.8 | Dopamine $>15$<br>Norepinephrine $>0.1$<br>Phrnylepherine $>0.8$ |
| Liver<br>(Bilirubin,mg/dl)  | $<1.2$                 | 1.2-1.9                | 2.0-5.9                                   | 6.0-11.9  | $>12$  |
| Renal<br>(Creatinine,mg/dl)   | $<1.2$                 | 1.2-1.9                | 2.0-3.4                                   | 3.5-4.9   | $>5.0$   |
| Coagulation<br>(platelets*1000/mm <sup>3</sup> )  | $\geq 150$             | $<150$                 | $<100$                                    | $<50$   | $<20$  |
| Neurological<br>(GCS Score)   | 15                     | 13-14                  | 10-12                                     | 6-9   | $<6$   |

| (Table-2)                               | Not Survived | Survived  | All  |
|---|--------------|-----------|------|
| <b>Average Age(Years)</b>               | 45.548387    | 42.521739 | 43.4 |
|   | 1            | 13        | 6    |
|   |              |           |      |
| <b>Severity of illness</b>              |              |           |      |
| SOFA $\geq$ 2                           | 11           | 4         | 15   |
| qSOFA $\geq$ 2                          | 1            | 4         | 5    |
| SIRS $\geq$ 2                           | 2            | 1         | 3    |
|   |              |           |      |
| <b>Outcome</b>                          |              |           |      |
|   |              |           |      |
| Hospital mortality                      | 31           | 0         | 31   |
| Hospital mortality or ICU $\geq$ 3 days | 32           | 56        | 88   |
| DAMA                                    | 1            | 11        | 12   |
| Discharge                               | 31           | 31        | 62   |
|   |              |           |      |
|   |              |           |      |
| <b>Deaths</b>                           |              |           |      |
|   |              |           |      |
| Total                                   | 31           | 0         | 31   |
|   |              |           |      |
| <b>Diagnosis</b>                        |              |           |      |
|   |              |           |      |
| Acute exaceberation of Asthma           |              | 2         | 2    |
| Acute exaceberation of COPD             |              | 2         | 2    |
| AMAN varient of GBS                     |              | 1         | 1    |
| aspiration pneumonia                    |              | 1         | 1    |
| Bacterial Meningitis                    | 2            |           | 2    |
| bacterial Pneumonia                     | 5            | 2         | 7    |
| Baterial Pneumonia                      | 1            |           | 1    |
| Brain Abscess                           | 2            | 1         | 3    |
| Brain tumor                             | 2            |           | 2    |
| Broncho                                 | 1            |           | 1    |

|   |   |    |    |
|---|---|----|----|
| Pneumonia                               |   |    |    |
| Cellulitis with septic shock            |   | 2  | 2  |
| Chronic Pancreatitis                    |   | 2  | 2  |
| CV Stroke                               | 5 | 10 | 15 |
| Diabetic Ketoacidois                    | 1 | 1  | 2  |
| Diffuse axonal injury                   | 1 |    | 1  |
| Fracture shaft of Left Femur            |   | 1  | 1  |
| Gangrane with septicemia                |   | 1  | 1  |
| GBS                                     |   | 4  | 4  |
| Glioblastoma with aspiration pneumonia  | 1 |    | 1  |
| GTCS                                    | 1 |    | 1  |
| GTCS with aspiration pnumonia           |   | 2  | 2  |
| Head injury                             |   | 8  | 8  |
| Hepatic encephalopath y                 | 1 |    | 1  |
| Hepatorenal Syndrome                    | 1 |    | 1  |
| Herpes simplex encephalitits            |   | 2  | 2  |
| Incisional Hernia with Septicemia       |   | 1  | 1  |
| Intestinal perforation                  |   | 2  | 2  |
| Intestinal TB                           |   | 2  | 2  |
| Irreducible hernia with LPD and ascites |   | 1  | 1  |
| Laryngeal Carcinoma with Pneumonia      | 1 |    | 1  |
| lung abscess                            |   | 1  | 1  |
| Perforation paritonitis                 | 2 | 1  | 3  |
| septic shock                            | 4 |    | 4  |
| septicemia                              |   | 2  | 2  |
| Stab Injury over Chest, Abdomen, Neck   |   | 2  | 2  |
| supracondylar fracture of humerus       |   | 1  | 1  |
| surgical site infection                 |   | 1  | 1  |
| TB Meningitis                           |   | 3  | 3  |

|                         |    |    |     |   |
|-------------------------|----|----|-----|---|
| Urinary Tract Infection |    |    | 4   | 4 |
| Viral Encephalitis      |    |    | 3   | 3 |
| Viral meningitis        |    |    | 1   | 1 |
| viral Pneumonia         |    |    | 2   | 2 |
| Grand Total             | 31 | 69 | 100 |   |

**Result:**Data pertaining 100 adult admissions were recorded for the period OCT 2021 to DEC 2021 ,drawn from ICUs of civil hospital,ahemedabad.As shown in Table-2,Mean age was 43.46,CV stroke was listed most common diagnosis followed by Head injury,Bacterial pneumonia. Maximum mortality is seen in septic shock and Bacterial pneumonia.There were 31 patients who died in the hospital.the secondary outcome of in hospital mortality or length of stay in the ICU of 3 days or more occurred in 88 patients.



| (Table-3) | Total patients | Total Death |
|-----------|----------------|-------------|
| SOFA<2    | 85             | 20          |
| SOFA≥2    | 15             | 11          |
|           | 100            | 31          |
| qSOFA<2   | 95             | 30          |
| qSOFA≥2   | 5              | 1           |
|           | 100            | 31          |
| SIRS<2    | 97             | 29          |
| SIRS≥2    | 3              | 2           |
|           | 100            | 31          |

A relevant statistical test was applied to compare the effect SOFA score,SIRS Score and qSOFA score on Hospital mortality among adults with suspected Infection in ICU,It revealed that was significant difference in between these scores and hospital mortality,so proven that increase in SOFA score 2 or more have greater prognostic accuracy in hospital mortality than qSOFA and SIRS score.

**SOFA,qSOFA,SIRS and study outcome**

Of the study cohort,11 patients (73.33%) had an increase of SOFA score from baseline of 2 or more,3 patient(66%) manifested 2 or more SIRS criteria,and 1 patient (20%) had a qSOFA score of 2 or more.The distributions of each score and their

relationship with in hospital mortality are presented in above tables.

#### Discussion:

| (Table-4)                               | Eamon p. Raith              | Christian Koch              | Present study               |
|---|-----------------------------|-----------------------------|-----------------------------|
| <b>Type of study</b>                    | <b>Retrospective cohort</b> | <b>Retrospective cohort</b> | <b>Retrospective cohort</b> |
| Study population                        | 1,84,875                    | 13,780                      | 100                         |
| Age(Mean)                               | 62.9                        | 64                          | 43.46%                      |
| <b>Severity of Illness</b>              |                             |                             |                             |
| SOFA $\geq$ 2                           | 90.1%                       | 32.7%                       | 73.33%                      |
| qSOFA $\geq$ 2                          | 54.4%                       | 81.4%                       | 20%                         |
| SIRS $\geq$ 2                           | 86.7%                       | 93.5%                       | 66%                         |
| Outcomes                                |                             |                             |                             |
| Hospital mortality                      | 18.7%                       | 35.5%                       | 31%                         |
| Hospital mortality or ICU $\geq$ 3 days | 55.7%                       | 62.0%                       | 88%                         |
| Diagnoses                               | Bacterial pneumonia         |                             | CV stroke                   |

A cohort study confirmed that an increase in SOFA score of 2 or more points within 24 hours of ICU admission had superior prognostic accuracy for mortality or ICU length of stay of 3 days more compared with SIRS criteria or qSOFA, the qSOFA score had little predictive value over the SIRS criteria among patients admitted to the ICU with suspected infection. SOFA, SIRS criteria, and qSOFA could only be studied for the first 24 hours in ICU. Biochemical and physiological values could

have come from any time within first 24 hours of ICU admission, and as a result, could not be more accurately linked to the timing of the diagnosis of infection. The incidence of nosocomial infections was unknown.

#### Conclusion:

Among adults with suspected infection admitted to an ICU, an increase in SOFA score of 2 more points had greater prognostic accuracy for in-hospital mortality than SIRS criteria or qSOFA. These findings suggest that SIRS and qSOFA may have limited use for predicting mortality in the ICU settings.

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**Conflict of Interest :** None