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A COMPARATIVE STUDY OF q SOFA(Quick SOFA) SCORE AGAINST SIRS CRITERION AS A PROGNOSTIC TOOL IN INFECTED PATIENTS REQUIRING EMERGENCY ADMISSION.

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ABSTRACT

INTRODUCTION: Sepsis, a syndrome of physiological, pathological, and biochemical abnormalities induced by infection and is defined as life-threatening organ dysfunction that is caused by a dysregulated host response to infection (11).It is a common cause of admission to the ICU and can lead to multiple organ dysfunction syndrome and death (12). It is essential to differentiate sepsis from uncomplicated infection because sepsis is associated with poor outcomes (13). Early recognition of sepsis can improve outcome of these patients through corresponding interventions (13). However because sepsis is a complex,heterogeneous,disease it is often difficult for clinician to promptly identify patient with sepsis.

The qSOFA has merit according to its proponents. It is simple (consisting of three clinical elements ,namely hypotension , tachypnoea , and altered consciousness), it can be easily and repeatedly assessed , it was generated through a data driven approach ,and in a large retrospective study, it was more accurate than SIRS for predicting death and ICU transfer of patient with suspected sepsis outside the ICU. (16, 17, 18).

MATERIAL AND METHODS: This study was a single centre observational prospective study conducted in Surgery emergency (department of surgery) Nehru hospital, BRD Medical College, Gorakhpur for a period of 12 months.

CONCLUSION: Identification of ED patients with infection who ultimately survive but are in the need for early critical care intervention may be helpful in minimising in hospital mortality. qSOFA and SIRS scores can be useful clinical tools in decision making in emergency department.

KEYWORDS

Sepsis, qSOFA score.

INTRODUCTION

Sepsis remains difficult to define (1-4) but represent a significant burden of disease. 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(5).

It is a common cause of critical illness and mortality worldwide (6 ,7) , accounting for 10% of intensive care unit cases , and it has an in –hospital mortality rate of 10-20 %(8,9,10).

Sepsis, a syndrome of physiological, pathological, and biochemical abnormalities induced by infection and is defined as life-threatening organ dysfunction that is caused by a dysregulated host response to infection (11).It is a common cause of admission to the ICU and can lead to multiple organ dysfunction syndrome and death (12). It is essential to differentiate sepsis from uncomplicated infection because sepsis is associated with poor outcomes (13). Early recognition of sepsis can improve outcome of these patients through corresponding interventions (13). However because sepsis is a complex, heterogeneous, disease it is often difficult for clinician to promptly identify patient with sepsis.

There are no gold standard tests or diagnostic criteria to detect patients with sepsis. For more than two decades ,the systemic inflammatory response syndrome(SIRS) criteria have been used in the diagnosis of sepsis(14,15), researcher in several studies have reported controversies regarding the applicability of SIRS , and the SIRS criteria have also been criticized as a sepsis screening tool because of inadequate specificity and sensitivity (14,15).

In 2016 the society of critical care medicine and(SCCM)/ European society of intensive care medicine (ESICM) task force released the third international consensus definition for sepsis and septic shock (sepsis-3) as a new definition for sepsis(11). The consensus definition replaced the SIRS criteria with the sequential (sepsis related) organ failure assessment (SOFA) score (11). In addition the quick sofa score was introduced as a bedside criterion to facilitate the identification of patients with suspected infection who are likely to have poor outcome (11). Data published shortly after the establishment of sepsis -3 demonstrate that the predictive validity of qSOFA for in-hospital mortality was statistically greater than either the original SOFA or SIRS criteria in encounters with suspected infection outside the ICU.

The qSOFA has merit according to its proponents. It is simple (consisting of three clinical elements ,namely hypotension , tachypnoea , and altered consciousness), it can be easily and repeatedly assessed , it was generated through a data driven approach ,and in a large retrospective study it was more accurate than SIRS for predicting death and ICU transfer of patient with suspected sepsis outside the ICU(16,17,18). However thoughtful criticism have also been articulated . It has been stressed that the increased specificity of qSOFA over SIRS score for predicting poor prognosis may come at the expense of lower sensitivity which may leads to delay in initiation of treatment(19). Other pointed that it was not endorsed by key scientific societies or they were skeptical about its misapplication as clinical decision tool (20,21).

AIMS AND OBJECTIVES

To study the qSOFA score & comparing it with SIRS criteria's in terms of

- Patient outcome-survive/death
- Duration of hospital stay.
- Duration of ICU stay(if applicable)
- Complications in operated patients like

-leak (of primary closure of bowel perforation / anastomotic leak)
-wound complications- dehiscence/seroma formation/pus discharge

MATERIAL AND METHODS

This study was a single centre observational prospective studyconducted at Surgery emergency (department of surgery) Nehru hospital, BRD Medical College, Gorakhpur. Patients with suspected infection requiring admission and management (conservative/ operative) in surgery emergency of Nehru hospital BRD Medical College Gorakhpur. Total number of patients included in the study were 166.

INCLUSION CRITERIA:-

Patients presenting with

- Acute infective abdominal conditions -acute appendicitis/ perforation peritonitis/acute pancreatitis/acute cholecystitis/ ruptured liver abscess
- Multiple pyemic abscess
- Complicated skin and soft tissue infections(SSTI)- cellulitis/ necrotizing fasciitis/ Fournier gangrene

EXCLUSION CRITERIA:-

- Patients who were not giving consent
- Pediatric patients (age <12 years)

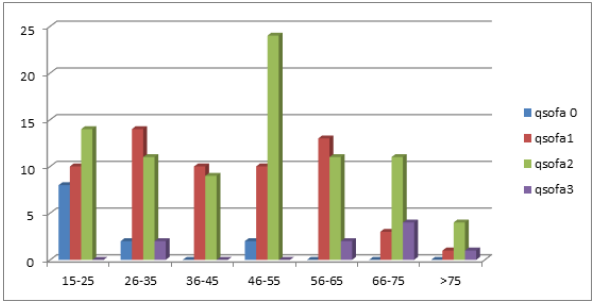
OBSERVATIONS

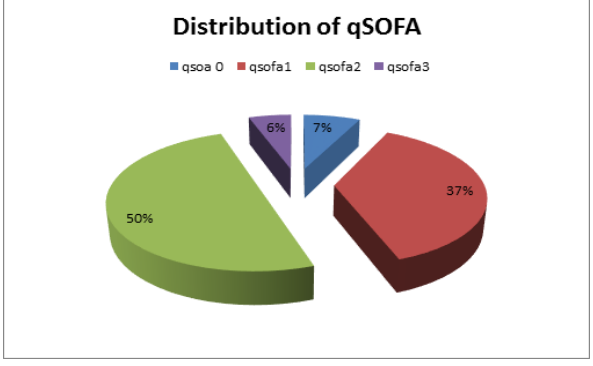
DISTRIBUTION OF qSOFA AND SIRS

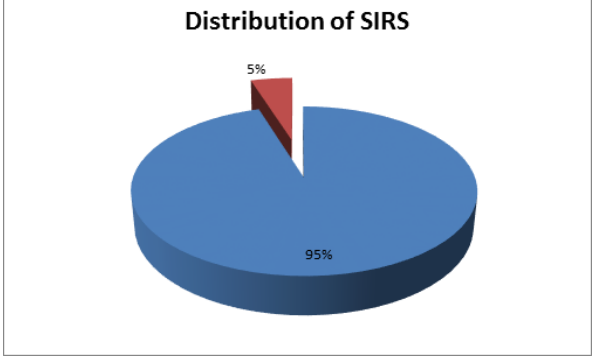
Age	qSOFA				SIRS		
	0	1	2	3	POSITIVE	NEGATIVE	TOTAL
15-25	8	10	14	00	27	1	28
26-35	2	14	11	2	29	1	30
36-45	0	10	9	00	19	2	21
46-55	2	10	24	00	35	2	37
56-65	0	13	11	2	26	2	28
66-75	0	3	11	4	18	00	18
>75	0	1	4	1	05	00	05
TOTAL	12 (7.2%)	62(37. 34%)	83 (50%)	9 (5.4%)	158 (95.18%)	8 (4.81%)	166

Of all the studied patients had qSOFA score 0 in 7.2 % , 1 in 37.34 %, 2 in 50 % & 3 in 5.4 % of patients

AGE DISTRIBUTION OF qSOFA

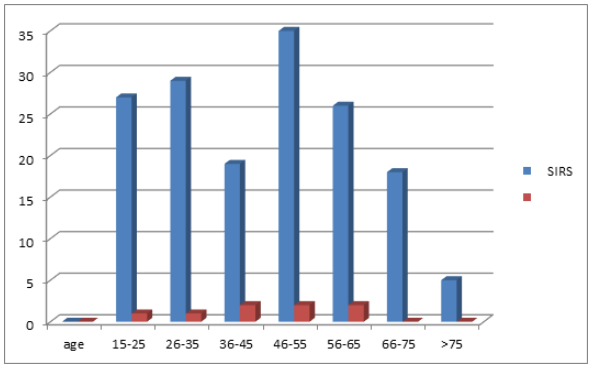






SIRS score was found to be positive in 95.18 % and negative in 4.81 % of patients.

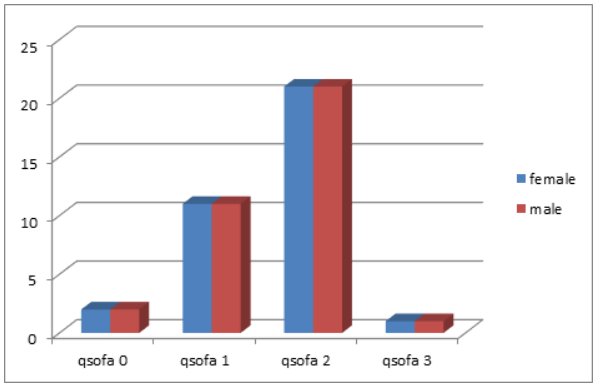
AGE DISTRIBUTION OF SIRS



SEX DISTRIBUTION OF qSOFA

Sex	qSOFA				
	0	1	2	3	Total
Male	10(7.6%)	51(38.93%)	62(47.32%)	8(6.1%)	131(78.91%)
Female	2(5.7%)	11(31.42%)	21(60%)	1(2.8%)	35(21.08%)
Total	12	62	83	9	166

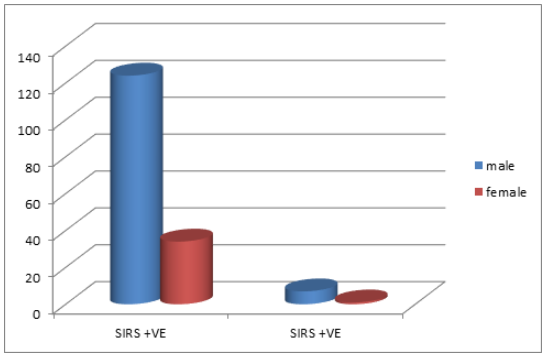
Of all the studied patients 21.08 % were females while 78.91 % were males. Of all the studied males had qSOFA score 0 in 7.6% ,1 in 38.93 %, 2 in 47.32 % & 3 in 6.1 %. Of all the studied females had qSOFA score 0 in 5.7% , 1 in 31.42 %, 2 in 60 % & 3 in 2.8 %.



SEX DISTRIBUTION OF SIRS-

Sex	SIRS		
	Positive	Negative	Total
Male	124(94%)	7(6 %)	131
Female	34(97.1%)	1(2.9%)	35
Total	158(95.18%)	8(4.8%)	166

SIRS score was found to be positive in 94% and negative in 6% of all studied males. SIRS score was found to be positive in 97% and negative in 2.9 % of all studied females.



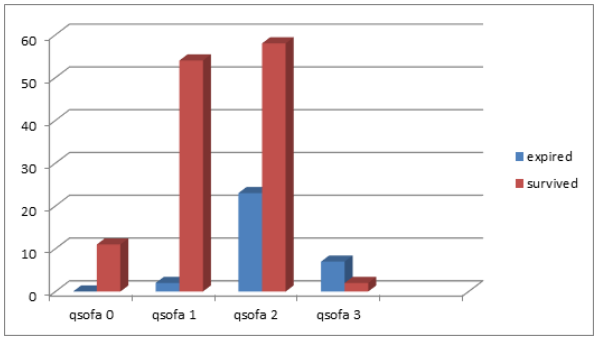
MORTALITY IN qSOFA

qSOFA	Expired	Survived	Total
0	00	11	11
1	2(3.5%)	54	56
2	23(28.39%)	58	81
3	8(89 %)	1	9
Total	33 (21.01%)	124 (78.98%)	157

Mortality in patients was 0% having qSOFA score 0 ,3.5 % having qSOFA score 1 , 28.39% having score 2 and 89 % having score 3.

qSOFA	Expired	Survived	Total
+ve(>/=2)	31(34.44%)	59	90
-ve(<2)	2(2.99%)	65	67
Total	33	124	

Sensitivity=93.9%, Specificity=52.4%, PPV=34.4% , p value=0.00

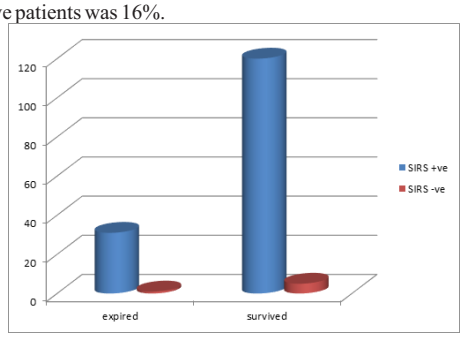


SIRS MORTALITY

SIRS	Expired	Survived	Total
+ve	32(21.19%)	119	151
-ve	1(16 %)	5	6
Total	33	124	157

Sensitivity=96.97%, specificity=4.03%, PPV =21.19% , p value=0.79

21% of patients who were SIRS positive expired while expiry in SIRS negative patients was 16%.



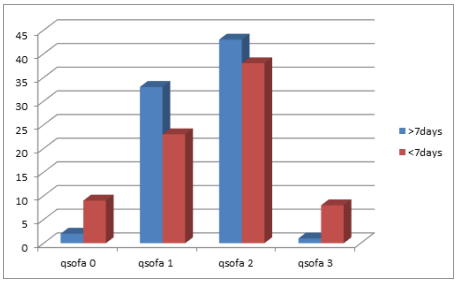
DURATION OF HOSPITAL STAY IN qSOFA

qSOFA	>1 week	<1week	Total
0	2(18.18%)	9(81.8%)	11
1	33(58.92%)	23(41.07%)	56
2	43(53.08%)	38(46.91%)	81
3	1(11.11%)	8(88.88%)	9
Total	79	78	157

Patient having hospital stay of >1 week had qSOFA score 0 in 18% , 1 in 58 %, 2 in 53 % & 3 in 11 %, conversely < 1 week of hospital stay was found in patients having qSOFA 0 in 81% , 1 in 41 % , 2 in 46 % & 3 in 88 %.

qSOFA	>1 week	<1 week	Total
+ve	44(50%)	46	90
-ve	35(52.2%)	32	67
Total	79	78	157

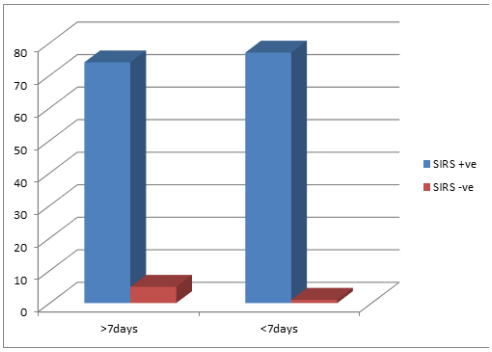
Sensitivity= 56.96 % , specificity= 41.02 %, PPV=48.88 % , p value=0.678



HOSPITAL STAY OF SIRS

SIRS	>1 week	<1week	Total
+VE	74(49%)	77	151
-VE	5(83.33%)	1	6
Total	79	78	157

SIRS score was positive in 49 % patients having > 1 week of hospital stay and 75% of SIRS negative patients need hospital stay of > 1 week Sensitivity = 93.68 % , specificity= 1.28 % , PPV =49% , pvalue =0.099



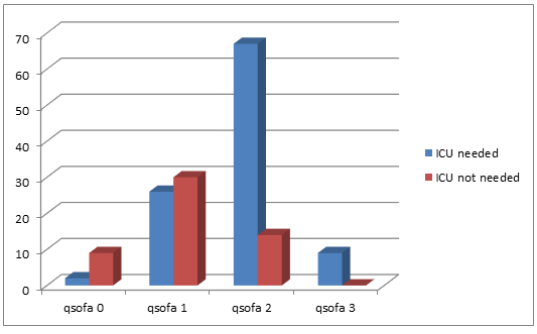
ICU REQUIREMENT IN qSOFA

qSOFA	Needed	Not needed	Total
0	2(18.18%)	9	11
1	26 (46.42%)	30	56
2	67 (82.71%)	14	81
3	9(100%)	0	9
Total	104 (65%)	53	157

Requirement of ICU stay was found in18% patients having qSOFA score 0, 46 % having qSOFA 1 , 82 % having score 2 and in 100 % of patients having score 3.

qSOFA	Needed	Not needed	Total
+ve	76(85.56%)	14	90
-ve	28(41.79%)	39	67
Total	104	53	

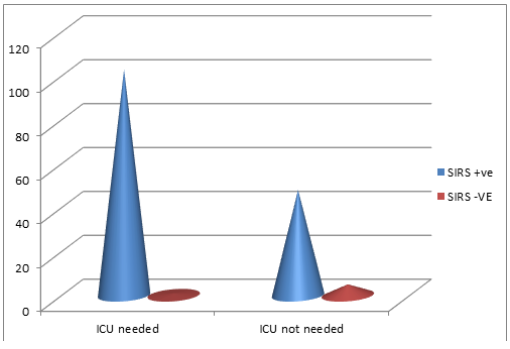
Sensitivity= 73.07% , specificity = 73.58% , PPV= 84.44 % , p value=0.00



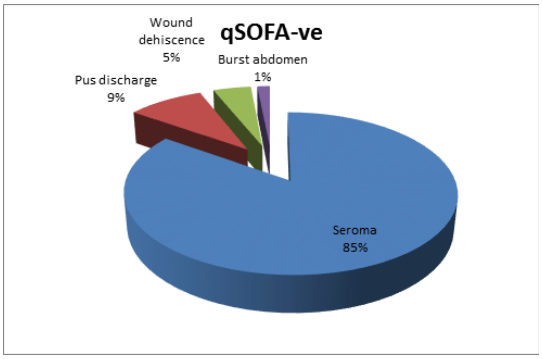
ICU REQUIREMENT IN SIRS

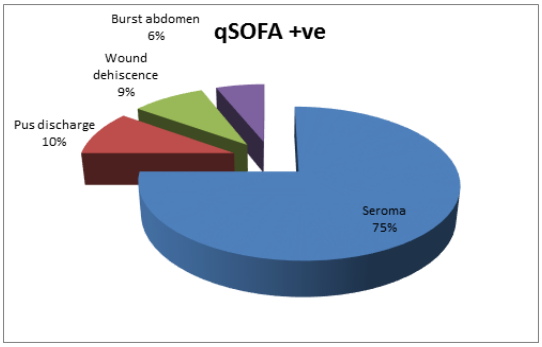
68% of patients with positive SIRS needed ICU stay while 16 % of SIRS negative need ICU care.

Sensitivity= 99.03 %, specificity= 9.44 % , PPV = 68.21 %, p value =0.009

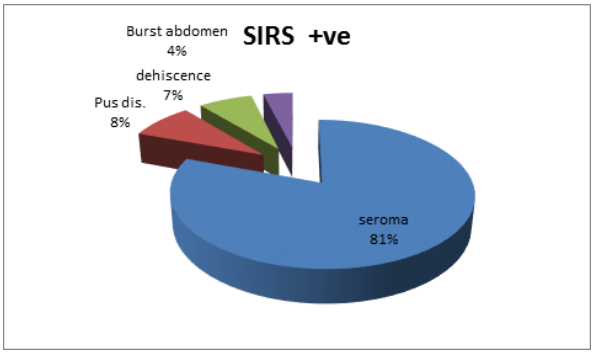


COMPLICATIONS





Complications in SIRS



DISCUSSION

In the present study of 166 patients with suspected infection admitted to B.R.D. Medical College Emergency department of which 157 patients were followed up, quick sequential organ failure assessment (qSOFA) score and systemic inflammatory response syndrome (SIRS) were applied. qSOFA score was combined into qSOFA positive (qSOFA≥ 2) and qSOFA negative (qSOFA< 2) for interpretation to be made, based on the observations , contingency tables were made and Chi square test was applied to study any significant association between the various studied parameters.

Sensitivity(sn) and specificity(sp) for the scores were calculated for both the scores .

	Event		
Test	***occured***	***Not occured***	***Total***
Positive	*A(true positive)*	*B(false positive)*	*A+B*
Negative	*C(false negative)*	*D(true negative)*	*C+D*
Total	*A+C*	*B+D*	*A+B+C+D*

Following assumptions were made in deciding the true positive cases for calculating the sensitivity and specificity of the respective test

a) Patients having hospital stay >1 week and test positive have been considered true positive
b) With regard to ICU stay patients who were test positive and actually needed ICU stay considered true positive
c) In context with mortality patients who were test positive and expired considered true positive

1. Distribution of total numbers Of patients according to qSOFA and SIRS-

Distribution of qSOFA score was studied among the subject and was found that maximum no of patients had qSOFA score 2 (50%) with 55.4 % have qSOFA of ≥ 2 , SIRS score was found to be positive (2 or more) in 95 % of patients in our study. This is in affirmation with a study by ***Eamon et al*** (22), in which qSOFA was found to be 2 or more in 54.4% patients and SIRS score was 2or more than 2 in 86.7 % of patients.

2) Gender distribution-

qSOFA score was found to be ≥ 2 in 53% of male and 62 % of females while SIRS was positive in 94% males and 97 % of females.

3) Mortality-

qSOFA	***Expired***	***Survived***	***Total***
+ve(>/=2)	*31(34.44%)*	*59*	*90*
-ve(<2)	*2(2.99%)*	*65*	*67*
Total	*33*	*124*	*157*

SIRS	***Expired***	***Survived***	***Total***
+ve	*32(21.19%)*	*119*	*151*
-ve	*1(16.67%)*	*5*	*6*
Total	*33*	*124*	*157*

qSOFA is more specific than SIRS (specificity 52.4 % vs. 4.03%) while less sensitive than SIRS (Sensitivity 93.9% vs. 96.97 %) in predicting mortality in sepsis patients.

Comparison of different studies shown below in table suggesting higher sensitivity for SIRS while higher specicificity of qSOFA in predicting mortality in sepsis patients.

Study	**Sensitivity % (qSOFA v/s SIRS)**	**Specificity % (qSOFA v/s SIRS)**
Jiang et al. 2018(23)	*42/81*	*88/41*
Goulden R et al. 2018(24)	*37/80*	*79/21*
Song et al. 2018(25)	*51/86*	*83/29*
Finkelsztein et al 2017(26)	*90/93*	*42/12*
This study	*93/96*	*52/4*

Higher qSOFA scores (≥ 2) and SIRS positive patients show higher mortality which is in accordance to the study by **eamon p et al(22) .**

Mortality in patients with positive QSOFA is significantly higher than SIRS positive patients .(p value 0.000 vs. 0.79)

4) Requirement of ICU-

qSOFA	***Needed***	***Not needed***	***Total***
+ve	*76(85.56%)*	*14*	*90*
-ve	*28(41.79%)*	*39*	*67*
Total	*104*	*53*	*157*

SIRS	***Needed***	***Not needed***	***Total***
+ve	*103(68.21%)*	*48*	*151*
-ve	*1(16.67%)*	*5*	*6*
Total	*104*	*53*	*157*

qSOFA is more specific but less sensitive (sp-73.58% ,sn-73.07%) than SIRS(sp-9.44% , sn-99.03%) in identifying those patients who require ICU admission .

Different studies show high specificity/low sensitivity for qSOFA while low specificity /high sensitivity for SIRS in predicting ICU requirement

Study	***Sensitivity % (qSOFA v/s SIRS)***	***Specificity % (qSOFA v/s SIRS)***
Song et al 2018(27)	*53/91*	*75/14*
Goulden R, et al. 2018(28)	*36/85*	*77/21*
This study	*73/99*	*73/9*

ICU requirement is significantly higher in patients having positive qSOFA as compared with SIRS positive patients (p value 0.000vs 0.009).

5) Duration of hospital stay-

qSOFA	**>1 week**	**<1 week**	**Total**
+ve	44(48.89%)	46	90
-ve	35(52.2%)	32	67
Total	79	78	157

SIRS	>1 week	<1 week	Total
+ve	74(50.33%)	77	151
-ve	5(83.33%)	1	6
Total	79	78	157

SIRS is more sensitive in identification of patients requiring hospital stay of > 1 week (sn- 93.67%) as compared to qSOFA score (sn-56.96%) , while qSOFA is more specific (sp- 41.02%) than SIRS (sp-1.28%).

Our study shows increase duration of hospital stay when qSOFA score increases from 0 to 2 (> 1 week) but a decrease in duration of hospital stay in patient with qSOFA 3 (<1 week), which is because of higher mortality (89%) in patients having qSOFA 3 which occur within 1 week.

CONCLUSION

Identification of ED patients with infection who ultimately survive but are in the need for early critical care intervention may be helpful in minimising in hospital mortality .qSOFA and SIRS scores can be useful clinical tools in decision making in emergency department. Study was conducted on 166 patients of which 157 were followed and following inferences were made:

- We found that positive qSOFA score had high specificity (52 vs 4) and near sensitivity (93 vs 96) to SIRS in predicting in hospital mortality.
- Study found high specificity of qSOFA (73 vs 9) and low sensitivity (73 vs 99) than SIRS in predicting need for intensive care with a significant p value for both mortality and need for ICU(p value 0.000)
- Positive qSOFA is also found to be highly specific than SIRS (41 vs 1.28) but less sensitive (56 vs 93) in determining hospital stay of > 1week but this difference was not found to be significant (p value 0.678)

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