Quick Sequential Organ Failure Assessment Score in Recognizing Infected Patients with Organ Dysfunction & Prediction of Mortality: Cohort Study

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Abstract

Objectives: To calculate the q-SOFA for postpartum patients admitted with infection and to correlate this with critical care unit admission & patient outcome.

Methods: An observational, prospective cohort hospital-based study. It was conducted in Omdurman Maternity Hospital from October 2018-to March 2019. The study included 59 postpartum patients who were diagnosed with postpartum infection; their q-SOFA score was calculated on admission and then on daily basis, to detect their in-hospital mortality and morbidity. The data was analyzed using SPSS, using Pearson Chi-square which was significant at P value of 0.05.

Results: Fifty-nine participants were involved, mean age was 28years.Those who delivered by cesarean section was 54.3%, 33(55.9%) developed surgical site infection. Five patients (8.5%) died and 54 (91.5%) discharged. 17(28.8%) were admitted to critical care unit. q-SOFA score was calculated & correlated to critical care unit admission & fate of the patient using Pearson Chi-square which was found to be significant 0.01 and 0.001, respectively (P value of 0.05).

Conclusion: q-SOFA is a useful tool in detecting infected patients at risk of poor outcome and death. If the score≥2 patients need to be, admitted to critical care units and to have further assessment.

Keywords: (q-SOFA) Score, Maternal infection, ICU admission, Maternal morbidity & mortality, Synopsis: q-SOFA is a clinical tool that help identifying infected patients at risk of bad outcome.

1. Introduction

Maternal Sepsis is "a life-threatening condition defined as organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion, or postpartum period [1]. Sepsis kills and causes significant morbidity millions more than stroke and cancers of the lung and breast [2]. Caesarean section is a common operation in obstetric practice. Post- caesarean wound infection is a bacterial infection in the surgical incision. It occurs in about 2-7% of women who have a cesarean delivery [3]. The most common postpartum infections include endometritis (puerperal sepsis), urinary tract infections, surgical site infections, blood stream infection and wound infections [4]. In a retrospective study from Mbarara Uganda, puerperal sepsis accounted for 31% of maternal deaths, making

it the most common cause of maternal mortality at that facility [5]. Infections during pregnancy are relatively prevalent, and the majority of cases are managed well in the community. The treatment of sepsis is time critical and requires early recognition, aggressive resuscitation, antibiotic administration and source control [6]. Early involvement of other specialties and allied health-care professionals to provide a multidisciplinary approach to patient care is important. Continuous monitoring of maternal vital signs and provision of supportive care for multiple organ dysfunction are best done within the intensive care unit. In Sudan: study was done in a maternity hospital that showed 1.16 % of pregnancy complication admission was due to severe sepsis and septic shock. Hyperthermia, Tachycardia and hypotension are the main presenting clini-

cal findings and uterine infection is the main focus of sepsis. The mean average Intensive Care Unit (ICU) stay was 6.3-day. Organs dysfunctions are the main morbidity and mortality is reported in five cases [7].

The q-SOFA score is a bedside clinical tool 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: blood pressure (SBP≤100 mmHg), high respiratory rate (≥22 breaths per min) and altered mentation (Glasgow coma scale<15). The score ranges from 0 to 3 points, one point for each. The presence of 2 or more q-SOFA points near the onset of infection was associated with a greater risk of death or prolonged intensive care unit stay. Seymour and colleagues tested the construct and criterion validity of q-SOFA compared to other criteria like the q-SOFA SOFA score, change in q-SOFA score, logistic organ dysfunction score (LODS), and systemic inflammatory response syndrome (SIRS) criteria near the onset of infection. They found that mortality increased among patients with suspected infection with each point [1]. There are many physiological changes that happen during pregnancy so, several modifications are suggested to the q-SOFA criteria when applied to pregnancy: such as putting the systolic blood pressure cutoff 90mmhg instead of 100 in general population and respiratory cut off is 25 rather than 22 [8].

This is the first study done in Sudan to assess the q-sofa tool which is a clinical tool by its three parameters to recognize infected patient who can develop sepsis and its ability to predict maternal mortality in low resources income country like Sudan.

2. Materials and Methods
2.1. Population and Study Procedures
An observational, prospective cohort hospital-based study. The study was conducted at Omdurman Maternity Hospital, Khartoum, Sudan from October 2018-to March 2019. Targeted 59 postpartum patients who were diagnosed with postpartum infection. Systemic randomisation of all post-partum patients admitted to maternity hospital with infection during the study period. Odd numbers of patients on admission Number 1, then 3, then 5 were recruited. Every patient was counseled and gave a written informed consent prior to participation in the study. The study had been approved by the Research Ethics Committee of the Sudan Medical Specializa-

tion Board. Full history was taken, concerning age, parity, mode of delivery, duration from delivery to infection diagnosis, medical diseases, Intervention, site of care whether the ward, high dependency unit (HDU) or intensive care unit (ICU).

The q-SOFA score by its three parameters was calculated and recorded on admission and then on daily basis, in addition to pulse, oxygen saturation and temperature. The place of care was registered till the patient either discharged, transferred to another hospital or died, so as to detect their in-hospital mortality and morbidity. The data was analyzed using statistical Package for the Social Science (SPSS) and summarized using the percentage &Mean as well as Pearson Chi-square which was significant at P value of (0.05). The q-SOFA score was correlated to critical care unit admission & fate of the patient using Pearson Chi-square.

Ethical approval has been taken from the ethical committee at Sudan Medical Specialization Board on Khartoum Sudan at October 15th 2018.

3. Result
A Total of 59 patients had been randomized in this study. Fifty-three (89.8%) between age of 21-40 years, (mean age 28years), 3(5.1 %) above 41 and 3 below 20yrs. Forty-two (71.2 %), of the patients coming from Khartoum state while 18(28.8%) were coming from other states of Sudan. Thirty (50.8 %) of the patients were primipara,15(26%) patients were multipara & the remainder were grand multipara as shown in Figure No 1. Concerning the mode of delivery, 26(44.1 %) delivered by emergency caesarean section, 25(42%) delivered vaginally, 6(10.2%) by Elective caesarean section which was the least common route as shown in Figure No 2. Forty-four (74.6%) of the patients presented within their first week of delivery as shown in table No 1. and Table No 2 showed that 33(55.9%) of study participants were having infection at the wound site, followed by 17(28.8%) in the genital tract, 2(3.4%) in the gastrointestinal, and 2 (3.4%) in the respiratory tract, while other areas such as malaria and fasciitis constitute 5(8.5%). The components of q-SOFA score were found on admission as follows: Respiratory rate was≥22 in 44(74.6 %), Systolic blood pressure was above 100 mmhg in 33(55.9%) and 54(91.5%) of the population was alert.

Duration from delivery to (days)	Frequency	Percentage % infection
<7	44	74.6
8-14	8	13.6
15-21	4	6.8
22-28	1	1.7
29-36	1	1.7
37-42	1	1.7
Total	59	100

Table 1: Duration between delivery and infection presentation

Source of infection	No of participants	Percentage
Surgical site infection	33	55.9%
Genitourinary	17	28.8%
Others	5	8.5%
Gastrointestinal	2	3.4%
Respiratory	2	3.4%

Table 2: Source of infection

q-SOFA score has been calculated for study participants and it was found to be 3 in 1(1.7%), and 2 in 25(42.4%) of the patients, in figure No 3. Figure 4 showed that 17(28.8%) of study participants were admitted to critical care unit; 6(10.2 %) to ICU while 11 (18.6%) were admitted to HDU. Five (83.4%) of patients admitted to ICU scored ≥2, and 63 % of patients admitted HDU scored ≥2, (64.4%) of study participants stayed at hospital for 1 week or less, and 5.1 % between 2-3 weeks as shown in table 3. Participants who were discharged home constituted 91.5% of the study population, while 8.5% died.

Duration of hospital stay	Frequency	Percentage %
< 1 week	38	64.4
1-2 weeks	18	30.5
2-3 weeks	3	5.1
Total	59	100

Table 3: Hospital stay of study participants

Of those died 80% scored 2 and 20 % scored 3. The source of infection and mode of delivery were correlated using Pearson Chi-square& was found to be 0.001which was significant at (P value of 0.05). The q-SOFA score was correlated by using Pearson Chi- square with place of admission and maternal outcome & was found to be significant 0.01&0.001 respectively (P value of 0.05).

4. Discussion

This is an observational prospective cohort study, conducted at Omdurman maternity hospital, it is a tertiary hospital in which the majority of patients in this study are coming from Khartoum State (71.2%). While few are coming from other states rural areas such as Gazira, Dongola, Kusti and White Nile. the study participants were found to be mainly (89.8%) between age of 21-40 years, with mean age of 28years. Puerperal sepsis in increasing in rural regions such as Gadarif [9]. In addition to that, 50.8% of study participants found to be primigravida , which may reflect their lack of experience in seeking medical advice following drainage of liquor or being at risk of prolonged labour which are known risk factor for puerperal infections in addition to that 63.3% of them delivered by caesarian section .Similar study done(Mohamed Issa Ahmed, Mohamed Alkhatim Alsammani, and Rabie Ali babiker) showed that (66.3%) of patient with puerperal sepsis were having lower parity.

Clearly, the major source of infection is found to be the incision site (55.9%) following emergency and elective cs, episiotomy following vaginal deliveries and 3.4% underwent laparotomies due to rupture uterus. It was found that cs is single most important factor that increase risk of puerperal infection 5-20-fold [10]. Incidence of SSI following CS was found to be 7 % in Ugandan study,

same study showed that endometritis was the most common cause of post-partum infection while in our study Endometritis was the second cause and it was source of infection 28.8% of participants [5]. Moreover, 2 patients experienced pneumonia and 2 were having gastrointestinal tract infection and remaining 4 was malaria. One case of fasciitis after emergency CS due to failure of progress in the second stage, has been referred form Kosti to Omdurman teaching hospital then refereed to maternity hospital who stayed for 3 weeks and finally discharged in good condition.

The source of infection and mode of delivery were found to be related to each other evidenced by P value of 0.001. It was found that asthma is one of the co morbidities that increases the risk of having SSI since 3.4% of the patients were asthmatic. Other diseases found in this cohort were hypertensive disorders 11.9%, anemia 6.8%, which is low compared to an Indian study in which anemia was found in 42% of patients of puerperal sepsis and diabetes 5.1% [11]. A study showed that increased insulin resistance in midtrimester is less likely to be associated with puerperal infection when compared with prolonged rupture of membranes and caesarean delivery as strongest risk factors [12]. Majority of patients (66.1%) studied were found to have no significant past medical history same as what was found in US study which showed that severe sepsis still occurs without identifiable risk factor, but few reported pancytopenia, chicken pox and antiphospholipid [13]. Some of the Study participants who presented within 1 week of time of delivery have developed infection since 1st or second day in hospital (74.6%,), others have been refereed from other hospitals, and some presented after discharge. The percentage is more than study in New Delhi that showed 45% of patients presented between day 1 to day 6 [11,14].

q-SOFA score has been calculated for all patients on admission. Our study supports that q-SOFA on admission strongly correlates with critical care admission (P value of 0.01), and 83.4% of patients admitted to ICU scored ≥2, and 63 % of patients admitted to HDU scored ≥2. This is similar to the findings of Sepsis 3 Taskforce [1]. Fifty-four (91.5 %) of study participants discharged home and 5(8.5%) died. Of those who have died 4 (80%)

scored 2 and one patient (20 %) scored 3; so, the score strongly relates to maternal death P=0.001. Our study showed that q-SOFA is sensitive in detecting patients who are at risk of critical care unit admission and risk of death, a similar finding of the Australian study [8].

5. Conclusion
Caesarean delivery is a risk factor for postpartum infection especially SSI, the majority were primigravida this is why antibiotic prophylaxis and standard sterile techniques for the procedure have to be followed to reduce the incidence of post-partum infection. The majority of patients admitted to ICU scored ≥2, (83.4%) and 63 % of patients admitted to HDU ward, scored ≥2. q-SOFA is a simple and a useful tool in detecting infected patients at risk of poor outcome and death. If the score ≥ 2 patients need to be admitted to critical care units and more organ function investigation needs to be done because patients most likely will be having sepsis or septic shock. Further studies could be done in a large population, but we feel it could be utilized as a preliminary test especially with the shortage of ICU facilities in Sudan.

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