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Original paper

Frequency and significance of qSOFA criteria during adult rapid response team reviews: A prospective cohort study☆

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ABSTRACT

Aim: A new definition of sepsis released by an international task-force has introduced the concept of quick Sequential (Sepsis-Related) Organ Failure Assessment (qSOFA). This study aimed to measure the proportion of patients who fulfilled qSOFA criteria during a Rapid Response Team (RRT) review and to assess their associated outcomes.
Methods: We conducted a prospective study of adult RRT reviews over a one month period between 6th June and 10th July 2016 in a large tertiary hospital in Melbourne Australia
Results: Over a one-month period, there were 282 RRT reviews, 258 of which were included. One hundred out of 258 (38.8%) RRT review patients fulfilled qSOFA criteria. qSOFA positive patients were more likely to be admitted to the intensive care unit (29% vs 18%, P = 0.04), to have repeat RRT reviews (27% vs 13%; p = 0.007) and die in hospital (31% vs 10%, P < 0.001). qSOFA positive patients with suspected infection were more likely to be admitted to the intensive care unit compared to patients with infection alone (37% vs 15%, P = 0.002). Eleven of 42 patients (26%) who had infection and qSOFA died whilst in hospital, compared to 8/55 (15%) of patients with infection alone (P = 0.2).
Conclusion: Adult patients who are qSOFA positive at the time of their RRT review are at increased risk of in-hospital mortality. The assessment of qSOFA may be a useful triage tool during a RRT review.
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Introduction

Sepsis remains an important cause of morbidity and mortality in hospitalised patients [1–3]. One of the most challenging aspects of recognising and responding to patients with sepsis is a lack of consensus criteria for its diagnosis [4].

Initial definitions of sepsis focussed on the role of inflammation and were based on the presence of criteria termed the systemic inflammatory response syndrome (SIRS) [5,6]. However, SIRS criteria are not specific and may become positive in conditions other than infection [7–10]. In addition, SIRS criteria require the inclusion of blood tests, which might not be available when a clinician is assessing an unwell patient. Moreover, the model may be misleading in implying a continuum from severe sepsis to shock [5,6].

Recently, the criteria for diagnosis sepsis were changed to "a life-threatening organ dysfunction cause by dysregulated host response to infection" [5]. Moroever, large data sets suggested that in patients who were receiving therapeutic antibiotics or had cultures taken, the presence of two or more of the following: Altered mentation (as measured by a GCS <15); Respiratory Rate ≥22/min; SBP ≤100 mmHg [5]—termed qSOFA (quick Sequential [Sepsis-Related] Organ Failure Assessment) was associated with increased risk of death and prolonged intensive care unit (ICU) length of stay.

Rapid Response Teams (RRTs) have been widely introduced into hospital systems to identify acutely deteriorating ward patients with the aim of reducing in-hospital mortality and serious adverse events [11,12]. Previous studies have suggested that approximately 25% of RRT reviews may occur in patients with sepsis [13,14]. However, these studies examined sepsis diagnosis in the era of SIRS-based diagnostic criteria for sepsis.

The purpose of this prospective observational study was to examine the frequency and consequences of qSOFA criteria in adult patients receiving a RRT review. Specifically, we assessed how commonly RRT patients fulfilled qSOFA criteria, and differences in the

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baseline characteristics of patients who were qSOFA positive compared with those who were not. In addition, we evaluated how often the RRT suspected infection, and how often therapeutic antibiotics were changed. Finally, we assessed whether the presence of suspected infection and qSOFA criteria were associated with differences in critical care therapies, and in-hospital outcomes.

Methods

Hospital setting

The Austin Hospital is a major tertiary acute hospital with 400 beds and approximately 80,000 admissions per year. It provides all major medical and surgical services and is the referral centre for liver transplantation, spinal cord injury and long-term ventilation weaning for the state of Victoria. The ICU contains 22 beds and admits over 2200 patients per year.

Details of the RRT

The RRT has been in operation within the hospital since 2000. It consists of an intensive care registrar (fellow) and intensive care nurse, as well as an internal medical registrar (fellow) [15]. The RRT operates twenty-four hours a day and can be activated by any member of staff according to pre—set criteria (Table 1). Importantly, the respiratory rate and blood pressure criteria for RRT activation are more extreme than those of qSOFA criteria (25/min versus 22/min, respectively). An electronic record of the RRT is completed by the staff at the end of the review, which is captured in an electronic database separate from the remainder of the electronic health record. There are approximately 3000 RRT reviews per year.

Table 1
Description of adult Rapid Reponses Team criteria.

Body system	RRT criteria
Airway	Obstructed airway
	Noisy breathing or stridor
	Problem with tracheostomy tube
Breathing	Any difficulty breathing
	RR <8/min
	RR >25/min
	SpO_2 <90% despite oxygen
Circulation	HR <40/min
	HR >120/min
	SBP <90 mmHg
	UO <50 ml over 4 h
	HR >90/min
Conscious state	Sudden change in conscious state
	Patient cannot be roused
Other	Worried
	Repeated or prolonged seizure
	Severe bleeding

RRT = rapid response team, RR = respiratory rate, SpO_2 = oxygen saturation, HR = heart rate, SBP = systolic blood pressure, UO = urine output

Study design and data collection

We conducted a prospective observational audit of consecutive RRT reviews occurring between, and including, the 6th of June 2016 and the 10th of July 2016 in adult (>18 yo) patients. Clinical staff collected data using a paper case report form on each RRT review at the time of the review which included the date, time and location of the RRT review. The following vital signs were recorded for the period six hours before and including the RRT review: 1) highest respiratory rate, 2) lowest systolic and diastolic blood pressures, 3) highest heart rate, 4) highest temperature, 5) Glasgow coma score [as either normal or less than fifteen], and 6) lowest SpO_2. Immediately following the RRT review the attending ICU clinician was asked if they thought the patient had an infection and if so, the suspected source. We recorded whether the patient had been on therapeutic antibiotics prior to the RRT review and whether antibiotics were commenced or changed after the review.

Data collected from the electronic RRT database and scanned medical record included the time, date and location of the RRT review as well as patient age, gender, treating unit and reason for admission to hospital. Each patient's pathology tests were examined for the period 6 h before and 6 h after the RRT review for the measurement of a lactate level and whether cultures were taken in relation to the RRT call. To assess whether the patient had a possible infection, we also assessed for positive micro-biology and radiology for the period 72 h before and 24 h after the RRT review.

The data collected at the time of the RRT review and from the electronic RRT database and the scanned medical record were matched based on the time, date and ward location of the RRT

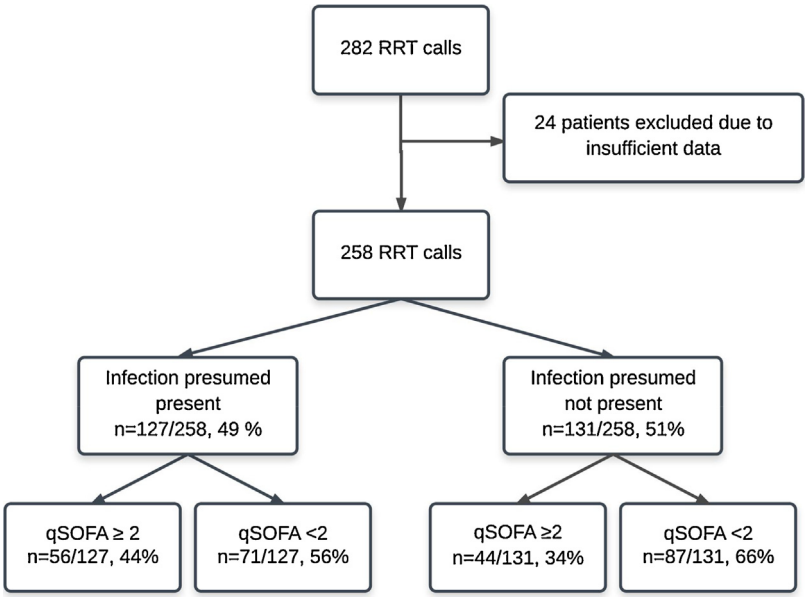

Fig. 1. Interaction between qSOFA and suspected infection during RRT calls.

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