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Block 8
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Reference article: Liao, Michael, MD et al. "Sensitivity of systemic inflammatory response syndrome for critical illness among ED patients." *American Journal of Emergency Medicine*. 32 (2014) 1319-1325.

Question:

What is the prevalence of SIRS criteria in ED patients admitted to the hospital and how sensitive is SIRS in ED patients admitted to the hospital for critical illness as measured by ICU stay or in-hospital death?

Background:

Systemic inflammatory response syndrome (SIRS) is widely used as an objective indicator of systemic inflammation and for initiation of advanced therapies such as early goal directed therapy. Although SIRS criteria are often used as an early marker of Sepsis, prior literature has shown it has poor sensitivity in this regard. Noninfectious SIRS occurs nearly twice as often as infectious SIRS, but both seem to share the same pattern of mortality possibly indicating SIRS should be thought of more as a sign of severe or critical illness regardless of whether it has an infectious or noninfectious etiology.

Methods:

This was a retrospective cohort study of adult patients admitted from the ED to the Medicine service of an Academic hospital in Denver Colorado between Apr 1, 2008 and Mar 31, 2009. Patients who died in the ED, were transferred from another hospital, or who were primary Surgical or Psychiatric patients were excluded. A random sample of 1,152 patients was selected and a retrospective medical record review including demographic data, VS (from triage), and labs were recorded. Patients were stratified into presumed infection or no presumed infection based on whether they received antibiotics ordered by the admitting doctor within 48 hours of admission. Critical illness was defined as an ICU stay of 24 or more hours or in-hospital death. A small percentage (5%) of patients were missing some or all of the vital signs from the ED encounter. In these cases it was assumed that SIRS criterion of interest was not met and the SIRS criteria was calculated using available information.

Results:

Of the 1152 patients, 298 (26%) had no SIRS criteria, 408 (35%) had one, 291 (25%) had two, 120 (10%) had three, and 35 (3%) had all four. A total of 446 patients (39%) met SIRS criteria by having two or more criteria present. Heart rate was the most common SIRS criteria. 39% of the patients with SIRS required ICU admission during their stay and 30% spent at least 24 hours in the ICU. 22% of the patients without SIRS required ICU admission and 17% spent at least 24 hours in the ICU. Percentage of in-hospital mortality was the same (2% in both groups). Patients with presumed infection were found to have a higher proportion of critical illness. Of those with presumed infection and SIRS 39% required ICU stays. Of those without presumed infection and SIRS 25% required ICU stays.

Discussion:

Based on the results of this study, SIRS criteria during ED triage has a poor sensitivity for detecting critical illness as almost as many patients without SIRS required ICU admission as those with it. This is true whether presumed infection is present or absent. Results obtained in this study suggest that hospitals using SIRS criteria to identify patients who would benefit from EGDT or other interventions may miss 54% of all critically ill patients and 44% of critically ill patients with presumed infection. SIRS criteria in its current form is limited as an ED screening tool and requires modification or should be abandoned in favor of a novel early ED screening tool that can be used to identify critically ill patients. Unlike prior studies which have shown that non-infectious SIRS may have the same mortality as infectious SIRS, but in this study, those with infectious SIRS had a higher mortality.

Limitations:

There were many. This study was retrospective and when data was not available, they simply assumed the patient's value would not meet SIRS criteria which could certainly affect the data. The definition of "presumed infection" was arbitrary. They did not take into account whether they received antibiotics in the ER and there was no mention of how this may or may not have affected the patient's outcome. The only vital signs used were triage vital signs with no attempt to correct for incorrect or missing vital signs (tympanic temperatures, no one actually counting a respiratory rate, that 400 lb woman for whom walking to the triage desk is the most exercise she's had in the last 5 years and her initial

heart rate is then 105). Inaccurate or missing vital signs could certainly be a major reason why more patients who met SIRS criteria did not require ICU admission. Only patients admitted were included and no attempt was made to compare them to patients discharged home who may also have met one or more SIRS criteria with or without a presumed infection.

Bottom Line:

SIRS like any other clinical tool is just that, one tool. Although the authors of this study hope that another better tool can be developed to allow patients to be accurately placed into a “sick” or “not sick” category with 100% sensitivity all from outside the room without ever looking at the patient, I doubt this is right around the bend. Intuitively abnormal VS and an elevated WBC count are markers of more significant illness, but do not replace clinical gestalt and additional studies to determine if there are more sensitive and specific criteria are needed.
