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Evaluating patients in sepsis using compensatory reserve measurement: A prospective clinical trial

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Background: Sepsis, one of the major health system concerns worldwide, is characterized by changes in organ function, morphology, cell biology, biochemistry, immunology and circulation that can lead to low blood perfusion, multi-organ failure, and death. It is a leading cause of morbidity and mortality, accounting a third of hospital deaths. Sepsis has several levels of severity ranging from self-limited disease to severe sepsis and septic shock. The evaluation of a patient's condition is routinely performed by a number of objective criteria including vital signs as well as laboratory tests. The compensatory reserve measurement (CRM) represents a new paradigm that measures the total of all physiological compensatory mechanisms, using noninvasive photoplethysmography to read changes in arterial waveforms. This study aim was evaluating the applicability and the predicting value of the CRM during sepsis.

Methods: Study patients included prospectively enrolled patients with proven laboratory and / or imaging diagnosis of infectious disease hospitalized in department of Surgery. All of them were evaluated with CRM, hemodynamic and laboratory measurements. Waveform data were postprocessed by an algorithm to calculate the CRM, measured on a scale of 1 to 0, with 1 indicating fully compensated and 0 indicating no reserve, or decompensation. Those values were measured throughout hospitalization.

Results: During the study period, data were prospectively collected from 100 patients. Subjects were hospitalized from October 1, 2016 to December 30, 2016. Of the 100 patients enrolled, 84 patients were not septic. The remaining 16 patients were in sepsis (SOFA score > 2), six of which were in septic shock. Groups had similar in age and gender, and statistical differences were wound in disease distribution when septic patients had higher incidence of mesenteric events and peri-appendiceal abscess ($p=0.02$). When Non-septic patients were compared to control patients, statistical differences were found only in CRP ($P<0.0005$), SOFA score ($p<0.0005$) and CRM ($p<0.0001$). When septic patients were compared with those in septic shock, differences were found in HR ($p=0.03$), SOFA score ($p=0.01$) and CRM ($p=0.03$). The remaining measurements did not show any significance among groups.

Conclusions: A novel computational algorithm that recognizes subtle changes in PPG waveforms can quickly and non-invasively discern which patients are in sepsis or in septic shock with high sensitivity and specificity in acutely sick patients.

Biography

Avi Benov has been working as a Physician in Meir Medical Center. He is also part of Tel-Aviv University, Israel. He is also part of Israel Defence forces.

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Notes:

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