

New Biomarker Improves Early Sepsis Detection in the ED



Sepsis most often presents to the emergency department (ED), and delayed detection is harmful. The white blood count (WBC) is often used to detect sepsis in the ED. New research shows that volume increases of circulating immune cells, or monocytes, adds value to the WBC for early sepsis detection in the ED.

"This study shows that the monocyte distribution width (MDW), a measure of a change in the size distribution of circulating monocytes, provides significant added value to WBC for the detection of sepsis in the ED population," the authors write. "From a practical perspective, when validated by a larger prospective study, incorporation of MDW and WBC parameters during initial CBC [complete blood count] analysis could be readily used in the ED to provide a timely and convenient sepsis diagnostic tool and lead to early initiation of antimicrobial therapy."

In this study, which will appear in the journal CHEST, neutrophil and monocyte volume parameters were measured in conjunction with routine CBC testing at the time of ED admission and were evaluated for the detection of sepsis. A total of 1,320 ED subjects were consecutively enrolled and categorised as controls (n=879), systemic inflammatory response syndrome (SIRS) (n=203), infection (n=140), or sepsis (n=98). Compared to other parameters, MDW best discriminated sepsis from all other conditions [AUC 0.79 (95% CI: 0.73-0.84)]; sensitivity 0.77, specificity 0.73; MDW threshold of 20.50, sepsis from SIRS [AUC 0.74 (95% CI: 0.67-0.84)] and severe sepsis from non-infected ED patients [AUC 0.88 (95% CI: 0.75-0.99); NPV 99%].

Moreover, the added value of MDW to WBC was statistically significant (AUC 0.89 for MDW + WBC vs. 0.81 for WBC alone; $p < 0.01$); and a decision curve analysis also showed improved performance compared to WBC alone.

Although this study was not designed to compare monocyte and neutrophil volumetric parameters to all other available sepsis biomarkers, MDW is shown to provide added value to the WBC, the biomarker most commonly used to screen for sepsis in the ED. The authors note that three different approaches demonstrated added value of MDW for the detection of sepsis in comparison to WBC alone:

- Area under the ROC (receiver operating characteristic) curves are often criticised because they provide an overall measure of diagnostic ability and are limited in terms of the detection of positive and negative patients, and the test statistics and variances used for comparison of different AUC (area under the curve) may be biased. Nonetheless, an increase in AUC indicates improved diagnostic ability.
- Cochran-Mantel-Haenszel (CMH) approach: CMH odds ratio is also indicative of an overall added value of the diagnostic test and is valid even if data from the other tests used in the model are sparse.
- Decision curves are considered to ultimately quantify the clinical relevance of the new test in comparison to the existing ones over a wide range of clinical situations wherein the risk of sepsis is variable.

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