RES-160

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Early Sepsis Screening in Patients with Suspected Sepsis in Emergency Settings: a Sequential Strategy of Monocyte Distribution Width and Presepsin

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INTRODUCTION

Early sepsis screening is critical in emergency departments (ED) for improving patient outcomes. We evaluated the utility of a sequential measurement strategy using two monocyte-related biomarkers for the early sepsis screening: **monocyte distribution width (MDW)**, a U.S. FDA-cleared early sepsis indicator followed by **presepsin**, a soluble CD14-subtype.

AIM

- To evaluate both individual and sequential measurement strategies of MDW and presepsin for early sepsis screening in ED settings
- To determine the appropriate cut-off value of MDW to optimise the clinical utility of these measurements

METHOD

We enrolled 281 ED patients with suspected sepsis and collected EDTA-K3 whole blood samples (**Fig. 1**). MDW was measured using the Beckman Coulter DxH 900 analyzer and presepsin level was measured using the Sysmex HISCL system, with cut-offs of 21.5 and 500 pg/mL, respectively. One-hundred twenty-eight patients (45.6%) were diagnosed as having sepsis based on Sepsis-3 criteria. Receiver operating characteristic (ROC) curve analyses, diagnostic tests, and a Chi-squared test were performed between individual and sequential strategies.

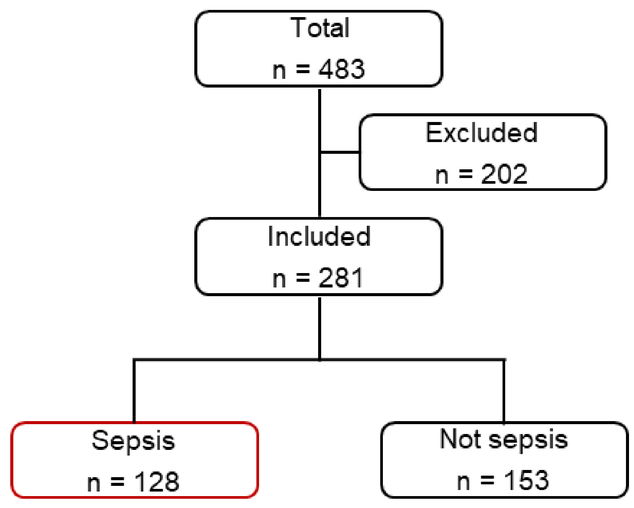


Fig. 1 Flowchart of patient enrollment and exclusion.

RESULTS

When MDW and presepsin were divided into quartiles, the first quartile (Q1) values were 22.76 and 493.5, respectively, both closely matching the manufacturer-recommended cut-offs (**Fig. 2**). The median MDW levels showed a statistically significant difference between non-sepsis and sepsis groups (**Fig. 2-A**). Similarly, median presepsin levels showed a statistically significant difference between non-sepsis and sepsis groups (**Fig. 2-B**).

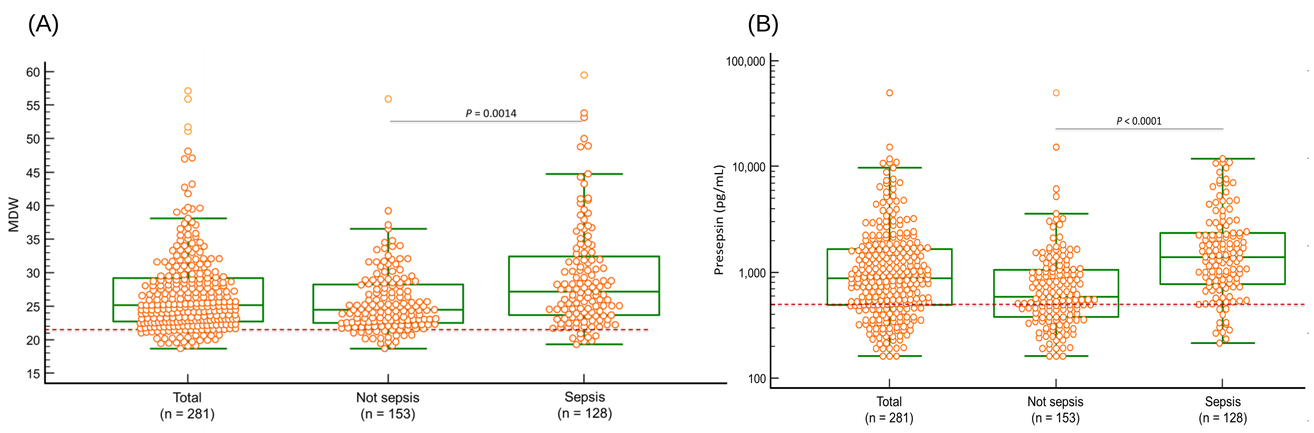


Fig. 2. Distribution of monocyte distribution width (MDW) and presepsin with comparison based on the presence of sepsis. The red dashed lines indicate the manufacturer-recommended cut-offs for MDW and presepsin. The presepsin levels are represented as logarithmic transformation.

In the quadrant where both MDW and presepsin values are below the cut-offs only 2 of 128 patients (1.6%) were diagnosed with sepsis, indicating a high effectiveness of the sequential strategy in minimizing false negatives (**Fig.3**).

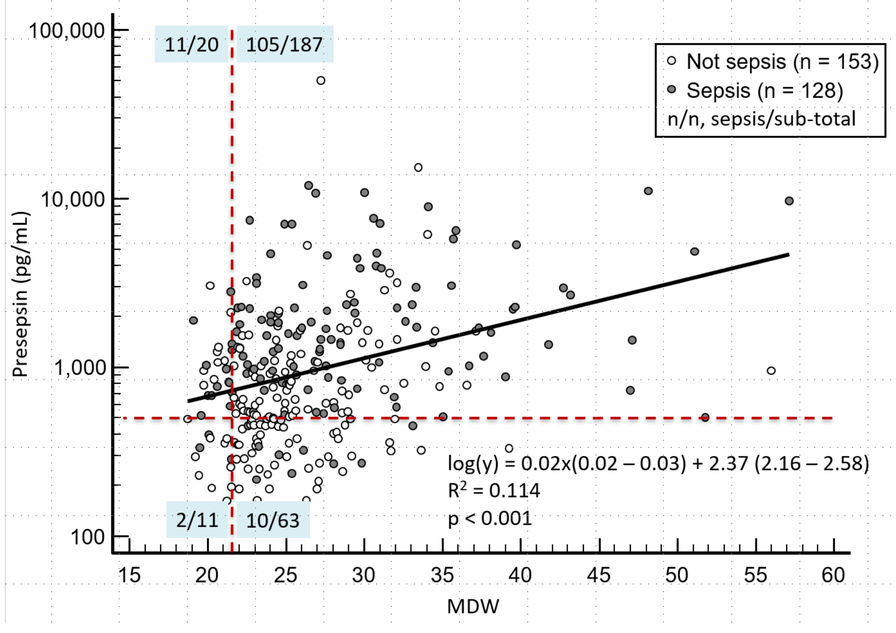
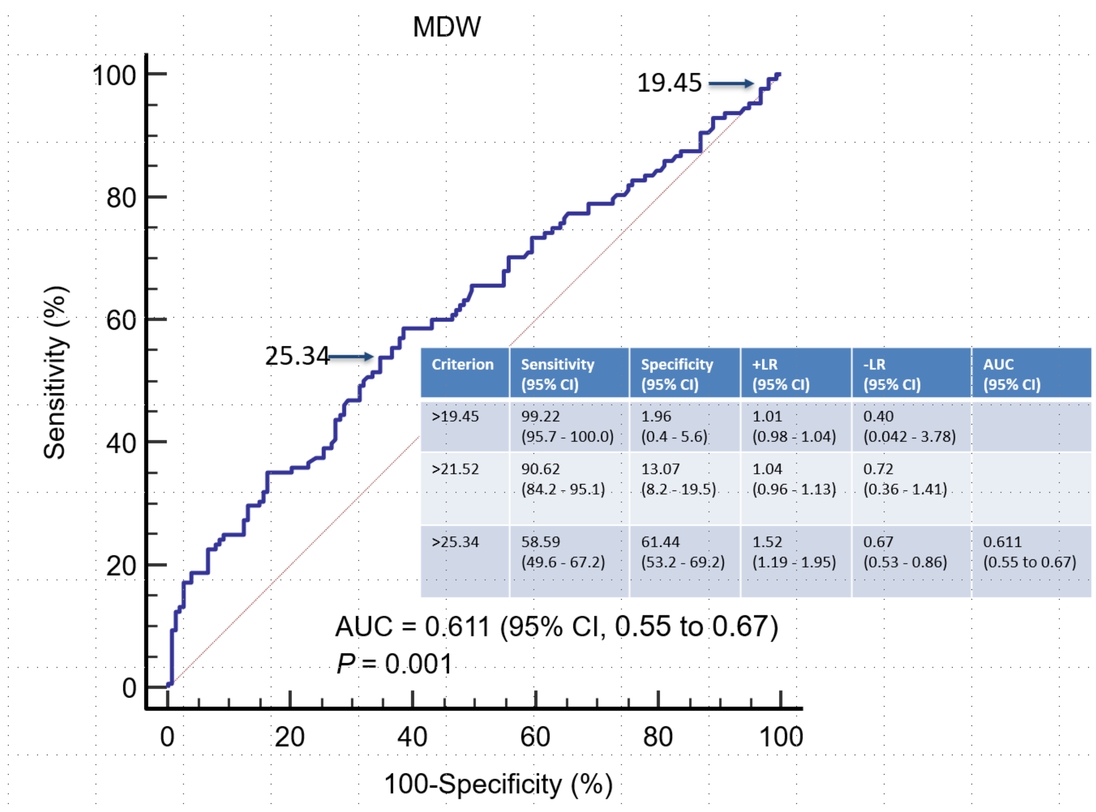


Fig.3. Scatter plot of monocyte distribution width (MDW) and presepsin levels in patients with sepsis (n = 128, black circles) and non-sepsis (n = 153, white circles). The presepsin axis is shown on a logarithmic scale. The plot is partitioned into quadrants using the cut-offs of MDW and presepsin.

MDW and presepsin showed sensitivities of 90.6% and 89.8%, respectively. The sequential strategy increased sensitivity to 98.4% . The AUCs of MDW, presepsin, and sequential strategy for sepsis diagnosis were comparable (0.52 vs. 0.65 vs. 0.52). **Fig. 4** presents the ROC curve analysis for MDW, evaluating its diagnostic accuracy in sepsis detection.



Criterion	Sensitivity (95% CI)	Specificity (95% CI)	+LR (95% CI)	-LR (95% CI)	AUC (95% CI)
>19.45	99.22 (95.7 - 100.0)	1.96 (0.4 - 5.6)	1.01 (0.98 - 1.04)	0.40 (0.042 - 3.78)	
>21.52	90.62 (84.2 - 95.1)	13.07 (8.2 - 19.5)	1.04 (0.96 - 1.13)	0.72 (0.36 - 1.41)	
>25.34	58.59 (49.6 - 67.2)	61.44 (53.2 - 69.2)	1.52 (1.19 - 1.95)	0.67 (0.53 - 0.86)	0.611 (0.55 to 0.67)

Fig. 4. Receiver operating characteristic (ROC) curve analysis and diagnostic test performance based on MDW cut-off for sepsis diagnosis.

When applying the MDW cut-off of 21.5, 250 of 281 (88.9%) patients tested positive. Among 128 patients diagnosed with sepsis, 12 (9.4%) showed MDW values below the cut-off. When applying the presepsin cut-off of 500 pg/mL, 207 patients (73.7%) tested positive. Among 128 patients diagnosed with sepsis, 13 (10.2%) showed presepsin values below the cut-off. After applying the sequential strategy of first testing with MDW followed by presepsin in the MDW-negative group, only two of 128 patients (1.6%) were diagnosed with sepsis.

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CONCLUSIONS

- Integrating MDW and presepsin testing in a sequential manner significantly enhances sepsis detection, reducing the likelihood of missed diagnoses and potentially improving patient outcomes.
- Combining MDW and presepsin measurements enhances sepsis detection accuracy compared to using either biomarker alone.