An analysis of the prognostic ability of the white blood cell count, neutrophil:lymphocyte ratio and C reactive protein in patients with septic shock

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Introduction:
This study analyses the prognostic ability of white blood cell count (WBC), neutrophil:lymphocyte ratio (NLR) and C-reactive protein (CRP). Hypo- and hyperimmune responses have been associated with increased mortality from septic shock [1].

Methods:
Patients with septic shock (Sepsis 3.0) admitted to Queen Elizabeth Hospital Birmingham, between December 2017 and July 2019 were included. The primary outcome was 90-day mortality. Data was tested for normality and presented as median (IQR) and analysed using a Mann Whitney U test. Categorical data was presented as % and analysed using a chi-squared test. A p value of < 0.05 was used to determine significance. A multivariate binary logistic regression analysis was conducted using age, APACHE II, charlson comorbidity index, performance status, and initial lactate as covariates. A Hosmer Lemeshow test of >0.05 indicated good fit.

Results:
474 patients were admitted with septic shock. The majority (61%) were male, with a median age of 64 (55-75) and a 90-day mortality of 37%. On day 1, WBC was lower in patients who died compared to patients who survived (9 [7-15] vs. 13 [9-21]; p = 0.005). NLR (8 [3-16] vs. 16 [5-33]; p = 0.001) and CRP (99 [31-177] vs. 170 [91-266]; p <0.0001) were also lower in patients who died compared to survivors. A low WBC on day 1 (<4) was associated with an increased mortality compared to WBC ≥ 4 (45% vs. 35%; p = 0.01). Multivariate logistic regression analysis identified that day 1 WBC (OR 0.965 [0.925-1.07]; p = 0.1), NLR (OR 0.99 [0.97-1.01]; p = 0.69) and CRP (OR 0.97 [0.95-1.02]; p = 0.93) were not independently associated with mortality.

Conclusion:
Patients who died of septic shock had a lower WBC, NLR and CRP response early on compared to survivors. This may represent early immunoparesis that allows infection to propagate unchecked. However, this was not independently associated with mortality when confounding factors were accounted for.

References: