

SOFA-based Prognostication in PICU: A Cardiovascular Critique!

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Dear Editor,

In the recent issue of the *Indian Journal of Critical Care Medicine*, Lois and Save serially evaluate the sequential organ failure assessment (SOFA) score for the prediction of mortality across the stages of pediatric intensive care unit (PICU) admission.¹ Meanwhile, the index prospective observational study outlines the value of the initial, 72 hour and delta SOFA scores in the matter, a corresponding cardiovascular prognostic standpoint would be worth discussing here keeping abreast with the evolving developments in the subject.¹

Sequential organ failure assessment score, albeit commonly used for assessing the severity of organ dysfunction, has been found to inadequately characterize cardiovascular failure in the modern-day ICU.^{2,3} Emanating from a *post hoc* analysis of two existing databases, Bachmann et al. delineate surprising results from a cohort of 1,031 adult patients admitted to the ICU.² They suggest exercising caution in substituting the cardiovascular component of the SOFA score (cvSOFA) as numerical variables in the regression models. Their analysis reveals a peculiarly skewed distribution of cvSOFA scores, to raise concerns in expecting a linear association of the same with mortality.² The research group simultaneously opines that the cvSOFA score may serve as a poor severity metric of the prevailing cardiovascular dysfunction owing to its' insufficient representation of the current ICU practices pertaining to the administration of vasoactive agents.^{2,3}

Specific to PICU, however, literature characteristically demonstrates poor outcomes in the backdrop of high hemodynamic support.^{4,5} Employing described formulas like vasoactive-inotropic score (VIS) for reporting cardiovascular support, Musick et al. highlight an escalating relative risk of mortality alongside an increasing VIS in PICU.⁴ Adding to the debate and propounding an update of the cvSOFA, Pölkki et al. recently discover an improved mortality predictive accuracy of the SOFA score on replacing the cvSOFA with maximum VIS or the VIS_{max} in a setting involving 8,079 ICU patients with a 30-day mortality rate of 13%.³ Ahead of the original SOFA score exhibiting a decent 30-day mortality-risk discrimination (area under the receiver operating characteristic curve or the AU-ROC of 0.813; 95% CI: 0.800–0.825), the predictive accuracy of the VIS_{max}-based SOFA score was found to be accentuated (AU-ROC for SOFA-VIS_{max} of 0.822; 95% CI: 0.809–0.834; difference when compared to the original SOFA score being 0.009; $p < 0.001$).³

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Moreover, accounting for the dynamic nature of the disease course in critical care, it only appears appropriate for Lois and Save to have sought an incremental prognostic value of the delta SOFA in their prospective research endeavor.¹ To that end, a retrospective cohort study by Shah et al. outlines the merit of estimating the aggregate VIS, computed using the hourly VIS area under the curve calculation premised on the trapezoidal rule.⁵ Amidst an elevated aggregate VIS being associated with in-hospital mortality and the need for continuous renal replacement therapy (CRRT) and extracorporeal membrane oxygenation (ECMO) ($p < 0.0001$, for all the parameters), classification and regression tree (CART) analysis revealed aggregate VIS >16 and >20 as respective independent predictors of ECMO use and in-hospital mortality ($p < 0.0001$).⁵ Indeed, the role of catering to outcomes like ECMO or CRRT in a prospective observational PICU-based study like the one by Lois and Save, can also not be overemphasized.^{1,5}

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