Evento	Salão UFRGS 2021: SIC - XXXIII SALÃO DE INICIAÇÃO CIENTÍFICA DA UFRGS
Ano	2021
Local	Virtual
Título	Pneumonia-Optimized Ratio for Community-acquired pneumonia: An inexpensive and accurate prognostic biomarker
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Pneumonia-Optimized Ratio for Community-acquired pneumonia: An inexpensive and accurate prognostic biomarker

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Introduction: Community-acquired pneumonia (CAP) is a major public health problem. Prognostic scores at admission in tertiary services may improve early identification of severity and better allocation of resources, ultimately improving survival. Herein, we aimed to evaluate prognostic biomarkers of CAP and a Pneumonia-Optimized Ratio was created to improve prognostic performance. **Methods:** In this retrospective study, patients with suspected CAP aged 18 or older admitted to a public hospital from January 2019 to February 2020 were included. Blood testing and clinical information at admission were collected, and the primary outcome was overall mortality. CURB-65 scores and prognostic biomarkers were measured, namely Neutrophil-to-lymphocyte Cell Ratio (NLCR), Platelet-to-lymphocyte ratio (PLR), Monocyte-to-lymphocyte Ratio (MLR). A Pneumonia-Optimized Ratio (POR) score was created by selecting the biomarker with larger accuracy (NLCR) and multiplying it by the patients' CURB-65 score. Multivariate regression model was performed and ROC curves were created for each biomarker. **Results:** Our sample consisted of 646 individuals (median 66 years, 53.9% females). Patients scored 0–1 (323, 50%), 2 (187, 28.9%), or 3 or above (122, 18.9%) in the CURB-65, and 65 (10%) patients died. POR exhibited the highest Area Under Curve (AUC) in the ROC analysis (AUC = 0.753), when compared with NLCR (AUC = 0.706), PLR (AUC = 0.630) and MLR (AUC = 0.627). POR and NLCR presented increased crude mortality rate in the fourth quartile in comparison with the first, and the fourth quartile of NLCR had more days of hospitalization than the first (11.06±15.96 vs. 7.02±8.39, p = 0.012). **Conclusion:** POR in patients with CAP showed good prognostic performance of mortality at the admission of a tertiary service. The NLCR may also be used as an estimation of days of hospitalization. Prognostic biomarkers may provide important guidance to resource allocation in resource-limited settings.