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Red cell Distribution Width as a Prognostic Predictor in Ventilator Associated Pneumonia

Thesis

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List of Abbreviations

Abb.	Full term
ABGs	Arterial blood gases
AMI	Acute myocardial infarction
APACHE II	Acute physiology and chronic health evaluation II
APOE	Apolipoprotein E
ATS	American Thoracic Society
BAL	Bronchoalveolar lavage
BUN	Blood urea nitrogen
CAD	Coronary artery disease
CAP	Community acquired pneumonia
CBC	Complete blood cell count
CDC	Center for disease control
COPD	Chronic obstructive pulmonary disease
CPB	Cardiopulmonary bypass
CPIS	Clinical pulmonary infection score

Abb.	Full term
CRP	C-reactive protein
CV	Cardiovascular
DM	Diabetes mellitus
ESRD	End-stage renal disease
ETT	Endotracheal tube
GNB	Gram-negative bacilli
HF	Heart failure
hs-CRP	High-sensitivity C-reactive protein
HTN	Hypertension
ICU	Intensive Care Unit
IL	Interleukin
LOS	Length of stay
MCH	Mean corpuscular he-moglobin
MCHC	Mean corpuscular hemoglobin concentration
MCV	Mean corpuscular volume
MCV	Mean corpascular volume

🕮 List of Abbreviations

Abb.	Full term
MRSA	Methicillin-resistant staphylococcus aureus
MSSA	Methicillin sensitive staphylococcus aureus
MV	Mechanical ventilation
NASH	Cirrhosis, nonalcoholic steatohepatitis
PCT	Procalcitonin
PSB	Phosphate solubilizing bacteria
PSI	Pneumonia severity index
RBCs	Red blood cells
RBCs	Red blood cells
RDW	Red blood cell distribution width
ROC	Receiver operating characteristic
SAPS	Simplified acute physiology score
SOFA	Sequential organ failure assessment
SPSS	Statistical Package for the Social Sciences
sTREM-1	Soluble triggering receptor expressed on myeloid cells
TNF	Tumor necrosis factor

Abb.	Full term
VAE	Ventilator associated event
VAP	Ventilator-associated pneumonia
VFDs	Ventilator free days
WBCs	White blood cells

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Introduction

Pneumonia is the second most common nosocomial infection in critically ill patients, affecting 27% of all critically ill patients. Eighty-six percent of nosocomial pneumonias are associated with mechanical ventilation and are termed ventilator-associated pneumonia (VAP). Between 250,000 and 300,000 cases per year occur in the United States alone, which is an incidence rate of 5 to 10 cases per 1,000 hospital admissions. The mortality attributable to VAP has been reported to range between 0 and 50% **(Koenig and Truwit, 2006).**

There is growing evidence showing that red blood cell distribution width (RDW) are associated with mortality in adult populations. Few studies, however, have evaluated such risk factors for in-hospital mortality in critically ill who have undergone mechanical ventilation **(Aali-rezaie et al., 2018).**

So, in the adult ICU population, RDW might be used as an independent predictor of mortality, and improve the current prognostic scores such as the SAPS and APACHE-II scores **(Schepens et al., 2017).**

The ideal biological marker for VAP would allow for a rapid diagnosis, have a prognostic value, and facilitate

therapeutic decision-making. So far, only C-reactive protein (CRP) and procalcitonin (PCT) were found to fulfill some of these properties. CRP, however, lacks specificity and often rises when VAP is already ongoing. While use of PCT was shown to reduce of duration and to prevent unnecessary start of antibiotic therapy, alike CRP, it has no value in the early recognition of VAP **(Martin-Loeches et al., 2015).**

Aim of the Work

The aim of this study is to evaluate if red cell distribution width has a prognostic value in ventilator associated pneumonia.

Red Blood Cell Distribution Width (RDW)

Definition:

Red blood cell distribution width (RDW) is a parameter of complete blood count that quantitatively describe the variability in the size of circulating erythrocytes and plays a role in the differential diagnosis of anemia. It has been recently found a strong predictor in many pathological states, for example coronary deaths, nonfatal myocardial infarction, stroke, heart failure, peripheral artery disease, cancer, hemodialysis, infection and diabetes mellitus **(Grap et al., 2012).**

Each RBC is shaped as a biconcave disk with a depressed center, its volume ranging from 80 to 100 femtoliters (fL; 1 fL ¼ 10-15L) in adults (represented by the MCV in the CBC count). The RBC membrane is extremely flexible and, in certain conditions, is able to change shape (eg, in hereditary spherocytosis or sickle cell disease) and to decrease or increase in size (eg, microcytosis in the thalassemias, macrocytosis in folate deficiency) without significant cell injury or loss in function. Differences in cell volume among the RBCs, or