


Research Article

IBM WATSON Trauma Pathway Explorer[®] as a Predictor for Sepsis after Polytrauma - Is Procalcitonin Useful for Identifying Septic Polytrauma Patients?

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Abstract

IBM and the University Hospital Zurich have developed an online tool for predicting outcomes of a patient with polytrauma, the *IBM WATSON Trauma Pathway Explorer[®]*. The three predicted outcomes are Systemic Inflammatory Response Syndrome (SIRS) and sepsis within 21 days as well as early death within 72 hours since the admission of the patient. The validated *Trauma Pathway Explorer[®]* offers insights into the most common laboratory parameters, such as procalcitonin (PCT). Sepsis is one of the most important complications after polytrauma, which is why it is crucial to detect it early. This study aimed to examine the time-dependent relationship between PCT values and sepsis, based on the WATSON technology. A total of 3653 patients were included, and ongoing admissions are incorporated continuously. Patients were split into two groups (sepsis and non-sepsis), and the PCT value was assessed for 21 days (1, 2, 3, 4, 6, 8, 12, 24, 48 hours, and 3, 4, 5, 7, 10, 14 and 21 days). The Mann-Whitney U-Test was used to evaluate the difference between the two groups. Binary logistic regression was utilized to examine the dependency of prediction. The Closest Top-left Threshold Method provided time-specific thresholds at which the PCT level is predictive for sepsis. At $p < 0.05$, the data were declared significant. R was used to conduct all statistical analyses. The Mann-Whitney U-test showed a significant difference in PCT values in sepsis and non-sepsis patients between 12 and 24 hours, including post-hoc analysis ($p < 0.05$). Likewise, the p-value started to be significant between 12 and 24 hours in the binary logistic regression ($p < 0.05$). The threshold value of PCT to predict sepsis at 24 hours is $0.7\mu\text{g/l}$, and at 48 hours $0.5\mu\text{g/l}$. The presented time course of PCT levels in polytrauma patients shows the PCT as a separate predictor for sepsis relatively early. Even later, during the 21-day observation period, time-dependent PCT values may be utilized as a benchmark for the early and preemptive detection of sepsis, which may reduce death from septic shock and other deadly infectious episodes.

Keywords: Systemic Inflammatory Response Syndrome (SIRS); Polytrauma; Sepsis

Introduction

In polytrauma patients, septic complications are the most common cause of death (>1 week) [1] Klicken oder tippen Sie hier, um Text einzugeben. Immunological exhaustion defines the Compensatory Anti-Inflammatory Response Syndrome (CARS), polytrauma patients are more likely to suffer infective sequelae such as sepsis [2,3]. Treating sepsis immediately, correctly,

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