

PREDICTIVE ANALYTICS WITH MACHINE LEARNING

Predicting Sepsis Risk

Data Source :

Machine Learning Repository

Data Type :

Hospital Patient Records

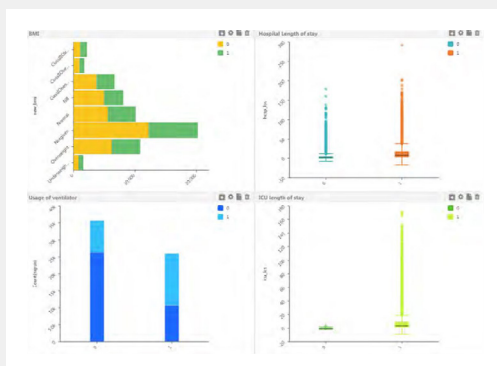
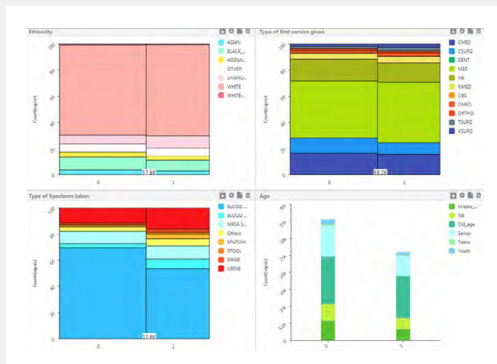
Application :

Analance



PROOF OF CONCEPT – POWERED BY ANALANCE

Sepsis accounts for 1 in 5 deaths globally. It's also the most common cause of in-hospital deaths in the US, costing as much as \$24 billion a year.¹ Effective sepsis management continues to be a challenge, increasing the need for proactive treatment and consistent risk visibility.



LEVERAGING ML TO FACILITATE EARLY INTERVENTION

Analance used a hospital's patient data set to predict the likelihood of a patient being diagnosed with sepsis— with summaries and findings easy to explore through dashboards and reports.

By leveraging Analance machine learning (ML), patients can be classified into risk categories based on their likelihood of having the disease and future outcomes can be predicted with accuracy as high as 95%. With built-in automations, alerts can be scheduled to notify healthcare professionals when patients are at risk of sepsis. This allows providers to implement proactive measures and improve outcomes.



EXPLORATORY DATA AND MODELING PROCESS

With visibility into a patient's risk of sepsis, providers can proactively improve outcomes, reduce readmissions, and decrease length of stay and costs.

A total of 61,532 patients were observed and different predictor variables were considered such as gender, ethnicity, type of first service, comorbidity index, SOFA (Sequential Organ Failure Assessment) score, and more.

All variables available were studied to understand distributions. Data was cleaned by the means of handling outlying values, missing values, and looking for interrelationships between predictors before looking to see if any data had a significant relationship with the outcome. A Bivariate Analysis (Chi-Squared) was done for all predictoroutcome combinations, which helped in restricting the analysis to only those predictors that majorly influence sepsis risk.



DATA MODELING AND FINDINGS

A total of 50 different models were built but the Two-Class Random Forest Classification model was chosen as the winning model based on the model accuracy. From the analysis performed, the highest risk of sepsis was found for:

- Patients with first services like Osteopathic medicine (55.65%) and neonatal service (newborn babies)
- Patients who used ventilators (33%)
- Patients with age > 65 (47.09%)



DATA ANALYSIS AND INSIGHTS

It's no surprise that neonatal services are associated with sepsis risk. Research has shown that infections leading to sepsis account for about 1/5 of the world's annual 2.7 million neonatal deaths.² The link with ventilators also makes sense, as sepsis is the main cause of about 70% of Acute Respiratory Distress Syndromes (ARDS) cases.³ These cases usually result in mechanical ventilation recommendations. Additionally, advanced age increases risk of the disease. There is a higher rate of incidence and mortality among the elderly when it comes to sepsis, compared to the younger population.



NEXT STEPS

Hospitals and clinics can develop sepsis detection protocols for the emergency department, optimize treatment during the critical early intervention period, pay close attention to at-risk cases, and optimize discharge workflows to reduce risk of readmission due to sepsis.

SOURCES:

1. CNN Health, "[1 in 5 Deaths Globally are Due to Sepsis](#)"
2. Dovepress, "[Neonatal Sepsis and Associated Factors among Newborns](#)"
3. NCBI, "[Sepsis in Old Age: Review of Human and Animal Studies](#)"

ABOUT DUCEN

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