# Determining the Probability of Intensive Care Unit Admission Based on Patient Characteristics Using Machine Learning

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Infectious diseases have affected people for years. As the population and demand for resources grow, hospitals or clinics may reach their maximum capacity and must arbitrarily decide who deserves these limited resources. This study focuses on determining the patient's probability of being admitted to an intensive care unit (ICU) using machine learning algorithms to prevent severe outcomes due to an infection. This research used the COVID-19 Restricted Access Database provided by the CDC. The exploratory analysis showed that the ICU admission variable was significantly unbalanced. This was considered for future stages. The database was divided into training (70%) and test (30%) datasets. The algorithms for decision trees, XGBoost, and neural networks were evaluated using the test dataset with the AUC metric. All models surpassed a random classifier, and the Artificial Neural Network (ANN) obtained the best performance:82.7%. The ANN was used to create probabilities for each possible combination of the variables studied. According to the algorithm, using the range from January 2020 to November 2020, those over the age of 70 were the most likely to be admitted to an ICU, while those under 29 were the least. The results provide evidence to support the hypothesis that the machine learning program outperforms a random classifier. Thus, an efficient tool that can easily recalculate probabilities as data is collected was created.

**Awards Won:**