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Predicting adherence to continuous positive airway pressure in patients with obstructive sleep apnea syndrome through machine learning

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Abstract

Many patients with Obstructive Sleep Apnea Syndrome (OSAS) require Continuous Positive Airway Pressure (CPAP) therapy.

Despite its high efficacy, both in the short and long term, treatment through CPAP has low adherence rates, even with the technological advances in recent years.

In this study, using machine learning algorithms, we tried to predict which patients would be successful in adhering to CPAP treatment (mean ≥4h per night), three months after the beginning of the treatment, through the data obtain from a multicentre public database (n=175).

After comparing six algorithms, Neural Networks (NN) was the one that showed the best results, with an f1-score of 0.71 and an AUC of 0.75, followed by Linear Regression, kNN, SVM, Naive Bayes and Random Forests.

Ten relevant characteristics were also identified for predicting adherence success: severity of OSAS, time til treatment, waist perimeter, score of FOSQ global, Apnea-Hypopnea Index, seizure diagnostic, type of sleep study (home vs. full night in laboratory vs split night in laboratory), liver disease diagnostic and score FOSQ vigilance.

It is possible to conclude that ML algorithms, properly trained in Big Data systems, may have a reasonable predictive capacity for the success of patients' adherence to CPAP, thus allowing a personalized therapy with an improvement in their quality of life.

Treatments Apnoea / Hypopnea Personalised medicine

Footnotes

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