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## What changes the quality of life in a hemodialysis patient: A machine learning approach

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**Statement of the Problem:** Lifestyle of hemodialysis patients has a significant impact on their quality of life (QOL). Physical, psychological, social, environmental, and financial factors play an important role in determining the QOL. Several studies identify the most significant correlates with a better QOL in these patients. Because, there has been no study specifically aiming at predicting a change in QOL using modern machine learning techniques, therefore, the purpose of this study is to produce a classification model for the most important positive and negative predictors for the QOL in hemodialysis patients.

**Methodology & Theoretical Orientation:** This is a prospective cohort study of patients on at least 3 months of hemodialysis. By the first interim analysis, a total of 78 patients were administered a proforma containing questions about demographics and the validated Urdu version of WHO BREF questionnaire for the QOL assessment by a MBBS qualified doctor on day 0 and 30. Statistical analysis was performed using SPSS version 24, while machine learning algorithms including the classification tree were generated using Orange.

**Findings:** A total of 78 patients were enrolled and analyzed for the first interim analysis (42 males, 36 females). The domain means of WHO BREF questionnaire for QOL were: Physical =12.9 (SD=3.7), Psychological =15.0 (SD=3.4), Social =15.2 (SD=2.75), Environmental =16 (SD=2.9) respectively. Linear regression model ( $p<0.000$ ,  $R^2=0.418$ ), showed monthly income ( $p<0.000$ ) and serum albumin ( $p<0.000$ ) to be positively and significantly associated with better QOL. Among machine learning algorithms (classification tree and Naïve Bayes models), classification tree was the most accurate (AUC=83.3%).

**Conclusion & Significance:** Machine learning algorithms can be used to classify patients into those with higher probabilities of having a given change in QOL in future. This can in turn be used to risk stratify patients and for better utilization of health resources.

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