Factors Influencing Repeated Prescription and Overdose in Hypertension Treatment: A Data Mining Study

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Abstract

This study aimed to investigate repeated hypertension prescriptions and overdose in hypertension treatment. Data from the NHI Research Database were organized using computer-assisted audit techniques, and a model of doctor prescription behavior was established through data mining. Data from the medication classification files of the open platform of Taiwan's Ministry of Health and Welfare as well as that from the World Health Organization (WHO) on a medication's defined daily dose were used. The audit, combination, and screening of data were also conducted using computer-assisted audit techniques. Finally, a data mining decision tree model was established to examine the correlations between repeated prescriptions by doctors and actual medical expense points. Subsequently, overdose for hypertension medication was defined according to the defined daily dose stipulated by the WHO Collaborating Center. The factors influencing overdose were analyzed using an artificial neural network backpropagation algorithm. The study results indicated that doctors have written repeated prescriptions, where most have been filled by doctors themselves. Furthermore, among the self-filled and non-self-filled prescriptions, prescriptions of film-coated tablets accounted for most instances of high medical expense points. Finally, an artificial neural network was used to examine the factors influencing hypertension overdose. The classification accuracy was up to 98.44%, and the predictive validity probability of the ROC curve was 99.2%. These indicate the very high performance of the identified factors in predicting hypertension overdose. These factors included the main ingredient of the drug, drug content, drug dosage, usage frequency, standard daily dosage, and daily maintenance dose.

Keywords: data mining, repeated prescription, overdose, decision tree, artificial neural network