

Clustering for Detection of the Population at Risk of Anticholinergic Medication

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Abstract : Anticholinergic medication has been associated with events such as falls, delirium, and cognitive impairment in older patients. To further assess this, anticholinergic burden scores have been developed to quantify risk. A risk model based on clustering was deployed in a healthcare management system to cluster patients into multiple risk groups according to anticholinergic burden scores of multiple medicines prescribed to patients to facilitate clinical decision-making. To do so, anticholinergic burden scores of drugs were extracted from the literature, which categorizes the risk on a scale of 1 to 3. Given the patients' prescription data on the healthcare database, a weighted anticholinergic risk score was derived per patient based on the prescription of multiple anticholinergic drugs. This study was conducted on over 300,000 records of patients currently registered with a major regional UK-based healthcare provider. The weighted risk scores were used as inputs to an unsupervised learning algorithm (mean-shift clustering) that groups patients into clusters that represent different levels of anticholinergic risk. To further evaluate the performance of the model, any association between the average risk score within each group and other factors such as socioeconomic status (i.e., Index of Multiple Deprivation) and an index of health and disability were investigated. The clustering identifies a group of 15 patients at the highest risk from multiple anticholinergic medication. Our findings also show that this group of patients is located within more deprived areas of London compared to the population of other risk groups. Furthermore, the prescription of anticholinergic medicines is more skewed to female than male patients, indicating that females are more at risk from this kind of multiple medications. The risk may be monitored and controlled in well artificial intelligence-equipped healthcare management systems.

Keywords : anticholinergic medicines, clustering, deprivation, socioeconomic status

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