ORAL PRESENTATIONS

[ID-O#0[54] Impact of Machine-Learning Assistance on Sympathomimetic Poisoning Diagnosis in Emergency Care

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Objective: Identifying sympathomimetic exposure in emergency departments (ED) is often challenged by heavy clinical workloads, lack of experience, insufficient history taking, and the unavailability of confirmatory testing. Although machine-learning algorithms have emerged as new tools assisting physicians in various aspects, evidence of their application in the toxicologic field remains scarce. This study aims to develop a machine-learning algorithm to evaluate its effectiveness in assisting physicians in predicting sympathomimetic exposure among patients suspected of illicit drug intoxication.

Methods: Data was sourced from the Taiwan Emergency Department Drug Abuse Surveillance network, a nationwide program monitoring recreational drug use among ED patients, using Liquid Chromatograph/Mass Spectrometer as a confirmatory tool for urine samples. Patients were prospectively enrolled, and data on demographics, medical histories, physical examinations, and laboratory results were retrospectively collected at a medical center from 2019 to 2022. Detected substances meeting the definition for sympathomimetics were classified into an exposure group. We trained a machine-learning model using data from 2019-2021. The 2022 data served to test the algorithm's performance. Additionally, 50 exposure and 50 non-exposure cases were randomly selected from the testing dataset to examine physicians' performance, which was subsequently compared with the assistance provided by the algorithm.

Results: A total of 1,349 patients met the inclusion criteria from the year 2019 to 2022, with 23.0% (n=310) showing sympathomimetic exposure. The decision tree-based algorithm, such as the Gradient Boosting Machine, demonstrated an accuracy of
0.80 in predicting sympathomimetic exposure. Ten physicians tested the data, including two toxicologists, four ED physicians, and four ED residents, achieving accuracies of 0.75, 0.68, and 0.63, respectively. With the algorithm's assistance, accuracy improved to over 0.80 across all physician groups.

Conclusion: Machine-learning algorithms can serve as an effective tool in assisting physicians to identify sympathomimetic exposure among ED patients suspected of illicit drug intoxication.