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Critical Care

Acute kidney injury associated with smoking synthetic cannabinoid

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Abstract

*Context and objectives.* Synthetic cannabinoids are illegal drugs of abuse known to cause adverse neurologic and sympathomimetic effects. They are an emerging health risk: 11% of high school seniors reported smoking them during the previous 12 months. We describe the epidemiology of a toxicologic syndrome of acute kidney injury associated with synthetic cannabinoids, review the toxicologic and public health investigation of the cluster, and describe clinical implications of the cluster investigation. *Materials and methods.* Case series of nine patients affected by the toxicologic syndrome in Oregon and southwestern Washington during May–October 2012. Cases were defined as acute kidney injury (creatinine > 1.3 mg/dL) among persons aged 13–40 years without known renal disease who reported smoking synthetic cannabinoids. Toxicology laboratories used liquid chromatography and time-of-flight mass spectrometry to test clinical and product specimens for synthetic cannabinoids, their metabolites, and known nephrotoxins. Public health alerts informed clinicians, law enforcement, and the community about the cluster and the need to be alert for toxidromes associated with emerging drugs of abuse. *Results.* Patients were males aged 15–27 years (median, 18 years), with intense nausea and flank or abdominal pain, and included two sets of siblings. Peak creatinine levels were 2.6–17.7 mg/dL (median, 6.6 mg/dL). All patients were hospitalized; one required dialysis; none died. No alternate causes of acute kidney injury or

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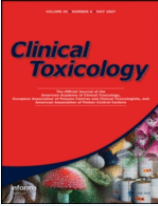
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nephrotoxins were identified. Patients reported easily purchasing synthetic cannabinoids at convenience, tobacco, and adult bookstores. One clinical and 2 product samples contained evidence of a novel synthetic cannabinoid, XLR-11 ([1 -(5-fluoropentyl)-1H-indol-3-yl](2,2,3,3-tetramethylcyclopropyl)methanone). *Discussion and conclusion.* Whether caused by direct toxicity, genetic predisposition, or an as-yet unidentified nephrotoxin, this association between synthetic cannabinoid exposure and acute kidney injury reinforces the need for vigilance to detect new toxicologic syndromes associated with emerging drugs of abuse. Liquid chromatography and time-of-flight mass spectrometry are useful tools in determining the active ingredients in these evolving products and evaluating them for toxic contaminants.

## Keywords

Epidemiology, Electrospray ionization, Mass, Public health, Substance-related disorders, Spectrometry

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