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Correspondence

Nicotine Poisoning in an Infant

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To the Editor:

Reports to U.S. poison control centers of possible nicotine toxicity tripled from 2012 to 2013.^{1,2} Although nicotine toxicity is not a new phenomenon, the emergence of electronic cigarettes (“e-cigarettes”) has spawned a market for highly concentrated liquid nicotine. This phenomenon has resulted in unprecedented access to potentially toxic doses of nicotine and other harmful compounds in the home. We report a case of a child who was poisoned by e-cigarette refill liquid (“e-liquid”).

Vomiting, tachycardia, grunting respirations, and truncal ataxia developed in a 10-month-old boy after he ingested a “small” amount of e-liquid nicotine. The vaping (or “vape”) shop that compounded the product reported that it contained a nicotine concentration of 1.8% (18 mg per milliliter) and unknown concentrations of oil of wintergreen (methyl salicylate), glycerin, and propylene glycol.

Multiple toxidromes that could have been associated with ingestion of this type of product include cholinergic crisis and salicylism. Low doses of nicotine frequently have stimulant effects (e.g., tachycardia). Vomiting is common with enteral exposures. Signs of central nervous system toxicity include ataxia and seizures. As doses increase, loss of nicotinic receptor specificity may occur and result in signs of muscarinic cholinergic toxicity, including extreme secretions and gastrointestinal disturbance. The highest levels of poisoning can result in neuromuscular blockade, respiratory failure, and death. Small ingestions could be deadly. With an estimated median lethal dose between 1 and 13 mg per kilogram of body weight, 1 teaspoon (5 ml) of a 1.8% nicotine solution could be lethal to a 90-kg person.^{3,4}

Fortunately, our patient's levels of consciousness, hemoglobin oxygen, and serum salicylate, as well as findings on chest radiography and his basic metabolic profile, were all normal. The boy did not require antidote therapy (usually atropine or scopolamine to combat cholinergic activity) and recovered baseline health 6 hours after ingesting the poison.

The Food and Drug Administration does not currently regulate nontherapeutic nicotine; this raises concern that in the ballooning unregulated liquid nicotine market there may be variability in nicotine dosing and introduction of unintended toxic ingredients. Lack of regulatory oversight has resulted in inconsistent labeling, insufficient or nonexistent child protective packaging, and product design and flavoring that may encourage children to



explore and ingest these products. [Figure 1](#) shows labeling that contains suggestions of edible ingredients (“lemonade”), visually appealing cartoons, and handwritten labels of uncertain reliability.

With the growing use of e-cigarettes, physicians need to be alert for nicotine poisoning. They also need to educate patients and parents about this danger and advocate for measures that will help prevent potentially fatal liquid nicotine poisoning of infants and young children.

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[Disclosure forms](#) provided by the authors are available with the full text of this letter at NEJM.org.

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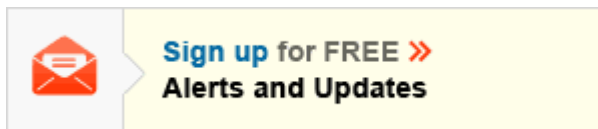
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