

Ethanol Intoxication From Hand Sanitizer Ingestion

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A 29-year-old man presented for evaluation after intentionally ingesting a large quantity of liquid hand sanitizer.

Case

A 29-year-old man presented to the ED several hours after ingesting what he described as a “hefty” bottle of hand sanitizer. The patient stated that he ingested such a considerable quantity of liquid hand sanitizer because he was unable to obtain beer or liquor. He further admitted to drinking two 40-ounce beers daily for the past several years, noting that he last consumed drinking alcohol the preceding day.

The patient denied any other coingestants. He also denied nausea, vomiting, abdominal pain, or other somatic complaints. The patient’s medical history was significant for hypertension and hepatitis C, and his social history was significant for daily alcohol consumption, tobacco abuse, and former benzodiazepine, marijuana, and intravenous heroin abuse. His psychiatric history was significant for borderline personality disorder, major depression, and bulimia. The patient’s home medications included a daily multivitamin, folate, thiamine, sertraline, mirtazapine, and prazosin.

Initial vital signs at presentation were: blood pressure, 124/77 mm Hg; heart rate, 86 beats/min; respiratory rate, 15 breaths/min; and temperature, 98.0°F. On physical



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examination, he was noted to have slurred speech and nystagmus. His pupils were equal and reactive, without scleral icterus. The abdomen was nontender and nondistended, with regular bowel sounds, and without ascites or varicosities visualized. The rest of the examination was unremarkable. The patient did express thoughts of suicidality, but denied any homicidal ideation.

Laboratory studies revealed a serum ethanol concentration of 446 mg/dL. The patient's basic metabolic panel was unremarkable, and liver function test results showed mildly elevated enzymes. The coagulation panel was within normal limits.

Is alcohol-based hand sanitizer consumption an emerging public health concern?

Excessive alcohol consumption is a recognized public health problem in the United States and is associated with an average of 88,000 deaths per year.¹ In a select population of patients, an untoward effect has developed from another public health target—that of hand hygiene.

Alcohol-based liquid hand sanitizers have become ubiquitous as a weapon in the antimicrobial arsenal with recommendations for its use as an alternative to soap and water in certain clinical settings. Liquid hand sanitizers are ideal for hospital or community use as they are faster, more effective, and less irritating to the skin than traditional hand-washing techniques.²

The downside to the widespread availability of hand sanitizers is that they offer easy access to individuals in search of clandestine sources of alcohol. Prior case reports have discussed the practice of consuming alcohol-based hand sanitizers for the purpose of intoxication in institutionalized persons, such as prisoners or patients in psychiatric facilities who are restricted to conventional sources of alcohol.

Children and confused elderly patients are also at risk for unintentional ingestions.^{3,4} An article reviewed exposures

reported to the American Association of Poison Control Center's National Poison Data System over a 5-year period from 2005 to 2009.³ Of the 68,712 reported cases in this cohort, 80.5% were in children younger than 6 years of age. The investigators also noted an increased incidence of exposure over this period with an average of 1,894 additional cases per year.³ There were 17,154 children aged 12 years and younger reported in 2017 to poison centers with exposures to hand sanitizers. Young children may be enticed by the bright colorful packaging and similarity to food and candy smells.⁵

What are the clinical manifestations of alcohol-based hand sanitizer ingestion?

Significant hazards exist from ingesting liquid hand sanitizer, including the high alcohol content, which varies from 40% to 85%.² Because isopropanol is commonly one of the components (if not the sole component) of many hand-sanitizer preparations, isopropanol toxicity may occur when ingested. The effects of isopropanol are similar to those of ethanol, with clinical effects reported after ingestion of as little as 100 mL of 70% isopropanol solution.⁴

Hand sanitizer formulations vary by manufacturer and contain different concentrations of ethanol and/or isopropanol, as well as additional potential inactive ingredients such as acetone, 1-propanol, 2-propanol, benzyl alcohol, hydrogen peroxide, glycerin, water, and different perfumes.^{3,4}

Persons who consume hand sanitizers recreationally are often unaware of the large alcohol content by volume that they are consuming. Recreational ingestion of hand sanitizer is believed to be the cause of at least one case of lethal ethanol intoxication. An article reported a case of a male patient who suffered respiratory arrest after consuming an ethanol-based hand sanitizer.⁶ This patient was noted to have a serum ethanol of 536 mg/dL after

consuming an unknown quantity of a 354 mL container of a 62% ethanol by volume hand sanitizer.⁶

Institutionalized individuals seeking alcohol through this source have discovered novel ways to yield a stronger product. Through the use of table salt and a cotton sock, it is possible to extract a liquid from a gel hand sanitizer preparation, yielding an alcohol content 30% higher by volume than the parent mixture.⁷

Alcohol intoxication poses a host of health effects. In nonhabituated individuals, a lethal load of alcohol can be achieved by consuming a volume of as little as 400 mL of an 80% alcohol-based solution.⁴ Symptoms from ingestion of an alcohol-based liquid hand sanitizer typically appear 1 to 2 hours after ingestion and mirror that of the alcohol toxidrome. Most commonly, this includes nausea, vomiting, epigastric pain, and varying degrees of central nervous system (CNS) depression.⁴ The life-threatening clinical manifestation of alcohol intoxication includes severe CNS and respiratory depression resulting in respiratory arrest, hypothermia, cardiac dysrhythmias with possible cardiac arrest, hypoglycemia, ketoacidosis, and hypotension.³

How is alcohol-based hand sanitizer ingestion managed?

The management of patients with alcohol-based hand sanitizer ingestion is the same as the management of alcohol ingestion from more socially acceptable sources and is mainly supportive.^{3,4} These measures are directed at managing the patient's airway with intubation and mechanical ventilation when appropriate, as well as supportive measures to address any underlying

metabolic derangement or hypotension.² While hemodialysis has been used in some patients who had severe organ dysfunction and did not respond to supportive measures, it is usually not necessary.^{1,3}

Case Conclusion

The patient in this case was subsequently admitted to an intermediate level of care. He did not require intubation or further hemodynamic support during his initial acute intoxication. Later in the patient's hospital course, he was noted to be in alcohol withdrawal, and proper management was initiated. He also required therapeutic one-to-one supervision after members of the nursing staff observed the patient consuming the hand sanitizer gel present in patient-care areas. He was later seen by psychiatry services. The psychiatrist recommended transfer to an inpatient psychiatric facility upon medical clearance for treatment of his psychiatric illness as well as alcohol dependence.

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