

Acknowledgements

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Drone-related injuries treated at emergency departments



A personal or consumer drone is a remotely-controlled unmanned aircraft system (UAS) or unmanned aerial vehicle (UAV) designed for the mass market. Such devices have become

increasingly popular. By early 2018, the total number of drones, including consumer drones, registered with the United States (US) Federal Aviation Administration (FAA) had exceeded one million [1].

Because drones can move quickly and have rapidly-rotating blades (rotors, propellers), injuries to the pilot and bystanders may occur. These injuries may be to the head (bloody nose, black eye, cuts to the face, bruises, concussion) and fingers or arms (cuts, fractures, amputation) [2,3]. Some reported injuries have been serious [4]. Published information on consumer drone-related injuries is limited.

The National Electronic Injury Surveillance System (NEISS) operated by the US Consumer Product Safety Commission (CPSC) collects data on consumer product-related injuries in the US from the emergency departments (EDs) of approximately 100 hospitals as a probabilistic sample of the more than 5000 hospitals with EDs in the nation [5]. Drone-related injuries in NEISS during 2001–2017 were identified by searching the Narrative_1 and Narrative_2 text fields for any mention of the terms “drone” or “unmanned.” The resulting records were then reviewed to determine whether the product involved in the injury appeared to be a drone.

Forty-seven drone-related injuries were identified in the NEISS database during 2001–2017, for a national weighted estimate of 1911 injuries. (An additional 9 injuries occurred when the person was trying to retrieve or control the drone and were not directly related to the drone.) No injuries were reported during 2001–2014, 10 (21.3%) in 2015, 19 (40.4%) in 2016, and 18 (38.3%) in 2017. Twenty-two (46.8%) of the injuries occurred when the person was struck by the drone, 17 (36.2%) when the person was handling the drone, and 8 (17.0%) under unclear circumstances. Twenty-three (48.9%) of the injuries occurred during Saturday or Sunday. Nine (19.1%) of the patients were age 0–19 years, 28 (59.6%) 20–39 years, and 10 (21.3%) 40–79 years. Thirty-eight (80.9%) of the patients were male and 9 (19.1%) were female. Twenty-two (46.8%) of the injuries occurred at home, 2 (4.3%) in a public place, 2 (4.3%) in a sports facility, 1 (2.1%) on the street, and 20 (42.6%) at an unknown location. The reported injuries were laceration to the finger or hand (n = 23, 48.9%), laceration of the face (n = 7, 14.9%), laceration to other parts of the body (n = 10, 21.3%), contusions or abrasions (n = 4, 8.5%), internal injury (n = 2, 4.3%), and dermatitis or conjunctivitis (n = 1, 2.1%). Forty-six (97.9%) of the patients were treated or evaluated at the ED and released and 1 (2.1%) was hospitalized (patient was hit in the eye by a drone and there was concern of a corneal laceration).

In summary, drone-related injuries reported to the NEISS first appeared in 2015. Although relatively few such injuries have been reported, this may change if drone use increases in popularity. The injured patients most often were age 20–39 years and male. The injuries tended to occur on the weekends and at home. The most common injuries were laceration, particularly of the fingers or hand and the face. Almost all of the patients were treated and released from the ED. Various precautions have been suggested to avoid drone-related injuries, including taking care where the drone is flown, not flying a drone over a crowd, keeping fingers away from the blades, not launching or landing the drone from the hand, and using propeller guards [2,3].

Declaration of Competing Interest

None.

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Severe toxicity following inhalational exposure to N, N-diethyl-meta-toluamide (DEET)



Dear Editor:

We appreciate the response in regard to our article “Bug Off! Severe Toxicity Following Inhalation Exposure to N, N-diethyl-meta-toluamide (DEET)” [1]. We reported a patient with severe toxicity following inhalational exposure to an insect repellent containing 98% DEET. After discussion with Dr. Nikiforov, it was confirmed that the source of DEET was not a home insect fogger but rather a continuous spray repellent. Although designed for application to the skin and clothing, the patient used the spray indoors in a small enclosed mobile home. The patient was last seen normal by family members 24 h prior to presentation, and was in good general health. Given the uncertainties associated with many confusing ED presentations in older patients we do not know how much of the repellent was used or how it was applied. Based on the data presented in Fig. 1, it is likely that the route of exposure was by toxic inhalation [1]. There have been no previous reports of severe DEET toxicity following inhalational exposure.

Although case reports of toxicity or clinical symptomatology stemming from DEET exposure are rare considering the number of applications, it has been shown to have various sublethal effects after topical exposure, including effects on skin, action on the cardiovascular system, and neuropathologies [2]. Encephalopathies observed from either chronic or acute exposures to DEET include tremors, hypertonia, seizures and coma [3]. Lethal cases of DEET poisoning are few, and usually due to deliberate or other overdoses that ignore product instructions [2]. It is apparent that our patient did not follow label directions.

As any clinician in Emergency Medicine can attest, people forget, or decline, or flat out refuse, to read the directions. Examples include owner's manuals for snowblowers, prescription medicine directions, hospital discharge instructions or product labels. This information may be critical to using a product safely, yet people

would rather not do something that takes time and effort, like follow instructions [4]. The future challenge for manufacturers will be to provide information in a way that is more likely to be read or viewed and understood and followed. On discharge from the hospital, the patient featured in our case report expressed concern that the public was not more aware of the dangers of accidental DEET toxicity.

Toxic exposure is not always the user's fault. Brad Riley, a medical toxicologist in our institution, reported on a case of DEET toxicity occurring in a 69-year-old man who lived as a nudist in a cabin in the woods [5]. He would spray his entire body liberally with 30% DEET daily. On the day of incident he used a new bottle, but due to a faulty nozzle, the entire bottle discharged in a single spray onto his chest and back. He quickly became ill with nausea, vomiting, and diarrhea. On arrival to the ED he was confused, dyspneic, and generally weak. Fluid rehydration was begun, but due to increasing weakness he was subsequently intubated and mechanically ventilated. He required hemodialysis for worsening renal insufficiency and lactic acidosis. A drug screen was positive only for DEET, and a subsequent blood DEET level of 130 ppb was obtained. He recovered after a prolonged hospital stay, without other cause for illness identified.

In summary, efficacy (and safety) of insect repellents are markedly affected by several factors. These include ambient temperature, amount of exposed skin, age of user, concentration and form of repellent, clothing worn, and other factors [3]. This has prompted a number of consumer groups and professional organizations to publish safety and prevention guidelines which are readily available to the public, but they have to be read and followed.

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