

Chemical Attacks – Addressing the Threat

**By: Joel Hewett, M.S.,
Jamie Glover, MPH, M.S.,
& Joseph Swanner**

The use of acid or other corrosive liquids in criminal attacks has more than doubled in the United Kingdom since 2012, and Ireland has also experienced chemical attacks [1,2]. Although these attacks account for only a small percentage of the U.K. and Ireland's total crime rate, their increased occurrence is cause for concern. Due to restrictions in both countries on the purchase and carry of guns and knives, those seeking to do harm have turned to corrosive liquids as a matter of convenience [3]. Their ease of purchase at hardware stores has made them a "weapon of first choice" for gang members in the U.K. in particular [1]. The chemicals used in these attacks include hydrochloric and sulfuric acid [4], and liquid ammonia, which is a highly corrosive alkaline ionizing solvent [5]. While to date these attacks have typically taken place outside of the United States [6], domestic attacks are possible. In May of this year, a robber threatened a woman with a bottle of what appeared to be a yellow acid while she withdrew cash from an ATM in New York City [7]. Most recently, an unidentified chemical "mist" drifted from the English Channel onto the shore near Beachy Head in the U.K., sending 150 people to the hospital with sore throats and burning eyes [8]. The source of the chemical mist remains unknown, but its effects demonstrate just how harmful a potential attack could be.

We sat down with HDIAC Chemical, Biological, Radiological, and Nuclear Defense Subject Matter Experts Robert Walk and Stephen Malone to discuss the threat posed by chemical attacks.

Q: What are the effects of exposure to the substances used in these chemical attacks?

Both hydrochloric and sulfuric acids burn a person's skin and mucus membranes. They can



Image 1: Members of the Kentucky National Guard Chemical, Biological, Radiological, Nuclear and High Yield Explosive Enhanced Response Force head toward a simulated hot zone to conduct search-and-extraction operations during Operation Starke Thunder at Camp Blanding in Starke, Fla., Jan. 13, 2015. The four-day exercise certified the joint Kentucky Army and Air Guard emergency-response group as mission-ready. (U.S. Air National Guard photo by Staff Sgt. Vicky Spesard)

cause blindness and physical trauma by destroying tissue through a process known as coagulation necrosis that only stops when the acid is removed. Such attacks can also result in chronic pain for the victim. Depending on the severity of the victim's injuries, some scarring may always be present. The psychological effects of being attacked require treatment as well [4]. Ammonia causes liquefaction and can burn deeper into the skin than other corrosive liquids. Strong solutions can burn the skin and cause blindness [9]. The use of liquid ammonia can be especially harmful, since it easily vaporizes and can be inhaled, burning the respiratory tract from within [10].

Q: Can these substances be obtained by someone in the United States?

These substances are so problematic because they are so useful: hydrochloric acid is used in

cleaning, while sulfuric acid is a component of many batteries and is used as a powerful drain cleaner. Ammonia is also used in cleaning. The difficulty is that anyone with a valid street address and credit card can access these products with little to no oversight. Those seeking to do harm can order these substances over the internet in relatively ample quantities—enough for multiple attacks—without raising a red flag for a vendor.

Q: Are there protocols and procedures in place for first responders who must address these types of incidents?

There are many protocols and procedures in place, which are outlined in the 400-page 2016 edition of the Emergency Response Guidebook, published by the U.S. Pipeline and Hazardous Materials Safety Administration. This guidebook is considered the authoritative

source for responding to all types of hazardous materials releases [11].

This guidebook can assist first responders in identifying isolation distances and downwind hazards. If responding to a chemical attack made on an individual, however, responders should follow local protocols and common sense, turning to the Emergency Response Guidebook for guidance on performing first aid. Responders must protect themselves first to avoid contamination. At a minimum, gloves and eye protection must be worn, and a face mask is recommended in particular scenarios. Responders should remove the victim from the contaminated area and generously flush the wound to dilute the chemical. Responders should also remove contaminated pieces of clothing, as they can hold a chemical against the skin, causing continued damage [11,12].

Q: What mitigation strategies does the U.S. have for this kind of attack? Is there reason to suspect that chemical attacks might be carried out against military personnel serving in the British Isles?

Chemical attacks like these are particularly difficult to defend against or prepare for. Most acid or ammonia attacks, for example, tend to be personal in nature. Simple awareness of the rising threat of liquid chemical attacks, by both the public and especially first responders, will somewhat mitigate the severity of the threat. As for DoD personnel serving in the British Isles, the attacks to date do not appear to be terrorism related but are rather more run-of-the-mill criminal behaviors [13]. However, there are always concerns about DoD military and civilian personnel being targeted while traveling abroad. When DoD personnel travel or serve overseas, they are

required to receive threat-related briefings on the hazards associated with their destination(s). Regarding travel, the DoD Foreign Clearance Guide outlines all requirements that must be completed before departure. The requirements vary by combatant command, and country, and they continually change to meet dynamic threats.

DoD personnel are also encouraged to review anti-terrorism documents, such as DoD Instructions 2000.16 [14]. All DoD personnel (military, civilians, and contractors) are required to complete Level 1 training, which can be found at the Joint Knowledge Online website [15]. The purpose of this training is to increase awareness of terrorism and to improve one's ability to apply personal protective measures. Continued vigilance is the most powerful deterrent and mitigation strategy available. ■

REFERENCES

- Mann, G. (2017, July 14). Acid attacks: What has led to the rise and how can they be stopped? BBC News. Retrieved from <http://www.bbc.com/news/uk-40559973>
- Foy, K., Murphy, C. (2013, February 5). Acid attack father had no enemies, says shocked wife. *The Evening Herald*. Retrieved from <http://www.herald.ie/news/acid-attack-father-had-no-enemies-says-shocked-wife-29050376.html>
- Erickson, A. (2017, July 14). The London acid attack is part of a depressing, 'barbaric' trend. *The Washington Post*. Retrieved from https://www.washingtonpost.com/news/worldviews/wp/2017/07/14/why-acid-attacks-have-become-depressingly-common-in-london/?utm_term=.d325a988bce3
- Emanuel, D. (2017, August 2). What to know about acid burns. CNN. Retrieved from <http://www.cnn.com/2017/07/18/health/acid-burn-attacks-what-to-know/index.html>
- Christodoulou, H. (2017, July 14). A SCAR ON SOCIETY Horrific life-long injuries, lax laws and why acid attacks are burning a hole through Britain. *The Sun*. Retrieved from <https://www.thesun.co.uk/news/4016355/horrific-life-long-injuries-lax-laws-and-why-acid-attacks-are-burning-a-hole-through-britain/>
- Acid Survivors Trust International. (2017). A worldwide problem. Retrieved from <http://www.asti.org.uk/a-worldwide-problem.html>
- Annese, J. (2017, May 29). Woman threatened with acid attack, robbed at Upper East Side cash machine. *New York Daily News*. Retrieved from <http://www.nydailynews.com/new-york/manhattan/woman-threatened-acid-attack-robbed-manhattan-article-1.3204971>
- Farmer, B. (2017, August 28). Beachy Head chemical haze mystery deepens as police say gas not from France. *The Telegraph*. Retrieved from <http://www.telegraph.co.uk/news/ukcrime/2017/08/28/beachy-head-chemical-haze-mystery-deepens-as-police-say-gas-not-from-france/>
- Grassby, J. (2017, January 26). Man jailed over ammonia attack in takeaway that left teen with sight loss in one eye. *Daily Echo*. Retrieved from http://www.bournemouthecho.co.uk/news/15049264.Man_jailed_over_ammonia_attack_in_takeaway_that_left_teen_with_sight_loss_in_one_eye/
- Agency for Toxic Substances and Disease Registry. (n.d.). *Medical management guidelines for ammonia (NH3)* (Rep.). Atlanta, GA: Agency for Toxic Substances and Disease Registry. Retrieved from <https://www.atsdr.cdc.gov/MMG/MMG.asp?id=7&tid=2>
- U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration. (2016). 2016 Emergency response guidebook. Retrieved from <https://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Hazmat/ERG2016.pdf>
- Kearns, R. D. (2014, March 28). Chemical burn care: A review of best practices. Retrieved from <http://www.emsworld.com/article/11362795/chemical-burn-care-review-best-practices>
- U.S. Department of Defense. (2006). DoD Instructions 2000.16, DoD Anti-terrorism Standards.
- Joint Knowledge Online. (n.d.). JS-US007 Level I antiterrorism awareness training. Retrieved from <http://jko.jten.mil/courses/at1/launch.html>
- Lusher, A. (2017, July 3). What is the truth behind claims Muslims are being targeted by right-wing acid attackers in London? *The Independent*. Retrieved from <http://www.independent.co.uk/news/uk/crime/east-london-acid-attacks-muslim-resham-khan-jameel-muhktar-south-asian-residents-race-hate-crimes-a7821701.html>

ABOUT THIS PUBLICATION:

All information regarding non-federal, third party entities posted on the HDIAC website shall be considered informational, aimed to advance the Department of Defense (DoD) Information Analysis Center (IAC) objective of providing knowledge to the Government, academia, and private industry. Through these postings, HDIAC's goal is to provide awareness of opportunities to interact and collaborate. The presence of non-federal, third party information does not constitute an endorsement by the United States DoD or HDIAC of any non-federal entity or event sponsored by a non-federal entity. The appearance of external hyperlinks in this publication and reference herein to any specific commercial products, processes, or services by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or HDIAC. HDIAC is a DoD sponsored IAC, with policy oversight provided by the Assistant Secretary of Defense for Research and Engineering (ASD (R&E)), and administratively managed by the Defense Technical Information Center (DTIC). For permission and restrictions on reprinting, please contact publications@hdiac.org. Any views or opinions expressed on this website do not represent those of HDIAC, DTIC, or the DoD.