



## Electronic Cigarette Explosions and Fires: The 2015 Experience

Electronic cigarettes (e-cigarettes) are battery-operated devices that deliver nicotine in a vapor form by heating a solution commonly comprised of propylene glycol, nicotine, and flavoring ingredients. Since entering the U.S. market in 2007, e-cigarettes have attracted a growing supply of consumers, with sales increasing from \$20 million in 2008 to approximately \$1.5 billion in 2014.<sup>1</sup> The U.S. Centers for Disease Control and Prevention found that 12.6 percent of U.S. adults reported ever trying an e-cigarette in 2014.<sup>2</sup> E-cigarette sales are projected to further increase in the years ahead.

Health concerns prompted by this still new product have largely centered on the potential adverse effects of their ingredients on users or the prospect that e-cigarettes will act as a gateway to conventional cigarettes for previous non-smokers. More recently, however, an additional set of health and safety concerns has been raised by incidents involving e-cigarette fires and explosions.

In 2014, the U.S. Fire Administration (USFA) published an alert that identified 25 separate e-cigarette fires and explosions dating to 2009 that were reported in the media.<sup>3</sup> This report offered the first comprehensive indication of the physical safety hazards associated with e-cigarette use. Incidents documented in the report did not always result in injury, but a number of moderate, major, and severe injuries were identified, as well as fires that spread beyond the e-cigarette and caused additional damage.

Through a newspaper clipping service, the Fire Analysis and Research Division of the National Fire Protection Association (NFPA) maintains a database of fires reported in U.S. media outlets. The incidents in the database include fires and explosions caused by e-cigarettes, and these records indicate that the number of e-cigarette fires and explosions reported in the media has increased since publication of the USFA report, with 15 separate e-cigarette fires and explosions recorded in 2015. It is important to acknowledge that the incidents identified through media accounts are unlikely to capture the complete e-cigarette fire and explosion experience. However, there do not currently appear to exist alternative reporting systems that systematically capture e-cigarette events.

### **Lack of Regulation and Safety Standards**

E-cigarettes are currently not regulated by the federal government, although the U.S. Food and Drug Administration released a draft rule in April, 2014 declaring its authority over e-cigarettes and component fluids. In addition to lacking government oversight, the manufacture of e-cigarettes is not subject to enforceable industry-wide product standards that would ensure their safety for consumers. The import of e-cigarettes from countries with poor safety standards raises additional cause for concern.<sup>17</sup>

## Overview of E-cigarette Incidents

Of the 15 e-cigarette incidents reported to media in 2015, 13 were described as explosions and two as ignitions. Five incidents resulted in fires, three of which occurred while users were in the act of smoking and two while batteries were being charged. Twelve incidents resulted in injuries requiring medical treatment.

The table below provides summary information on the 2015 e-cigarette incidents resulting in injury. As the table indicates, all victims were male, and six of the eight victims for whom age information was available were aged 20 to 29, with one of the remaining victims in his teens and the other 35 years of age. Eight of the injuries occurred in events that were described as e-cigarette explosions in or near the face, and two other events were other explosions or ignitions.

E-cigarette Incidents Resulting in Injury, 2015				
Publication Date	Event Description	Injuries	Victim	Damage
February 9, 2015 <sup>4</sup>	E-cigarette exploded in or near face.	Burns and cuts on face, critical condition.	Male No age given.	Shattered a glass display in store.
February 10, 2015 <sup>5</sup>	E-cigarette exploded.	Hand badly burned.	Male, 17 yrs.	Unknown
March 9, 2015 <sup>6</sup>	E-cigarette exploded while smoking in bed.	Minor burns to face and hands, cut to hand.	Male No age given.	Set fire to clothing on bed.
September 8, 2015 <sup>7</sup>	E-cigarette exploded in face.	Severe. First degree burns to face and chest, finger burns, damage to teeth and mouth, neck fracture.	Male, 23 yrs.	Unknown
October 26, 2015 <sup>8</sup>	E-cigarette exploded in face.	Severe burns and lung damage, critical condition.	Male, 21 yrs.	Unknown
November 10, 2015 <sup>9</sup>	E-cigarette exploded in face.	Burns to mouth, throat, and hands, severed lips. Required stitches.	Male, No age given.	Unknown
November 19, 2015 <sup>10</sup>	E-cigarette exploded in pocket.	Second-degree burns to leg, requiring skin grafts.	Male, No age given.	Unknown
November 19, 2015 <sup>10</sup>	E-cigarette exploded near face.	Severe. Burns in mouth and hand. Surgery on tongue and amputation of finger.	Male, 23 yrs.	Unknown
November 19, 2015 <sup>10</sup>	E-cigarette exploded near face.	Second-degree burns on neck, ear and face, facial fractures and concussion.	Male, 35 yrs.	Unknown.
November 22, 2015 <sup>11</sup>	E-cigarette exploded in face.	Severe. Shattered vertebrae, multiple fractures, broken neck, knocked out teeth.	Male, 29 yrs.	Unknown
December 8, 2015 <sup>12</sup>	E-cigarette battery ignited in pocket.	Second- and third-degree burns on leg.	Male, 25 yrs.	Unknown
December 8, 2015 <sup>13</sup>	E-cigarette exploded in face.	Cut to forehead. Eight stitches to close.	Male, 22 yrs.	Unknown

Many of the injuries were quite serious, including neck fractures, severe burns, broken or damaged teeth, and injuries requiring stitches and even amputation. Only one injury was described as minor, and most of the incidents inflicted more than one injury to the victim.

In addition to the e-cigarette explosions resulting in injury, three of the 15 incidents resulted in the ignition of some other object, but did not produce a reported injury, as indicated below.

E-cigarette Incidents Resulting in Fire Without Injury, 2015					
Publication Date	Location	Injuries	Event	Damage	Fire Department Response
February 18, 2015 <sup>14</sup>	Yuba City, CA	None reported.	E-cigarette exploded, apparently while charging. Set fire to carpet.	Set carpets on fire.	Not reported.
November 25, 2015 <sup>15</sup>	Hollywood, FL	None reported.	E-cigarette caught fire while charging.	Set fire to bed.	Yes
December 25, 2015 <sup>16</sup>	Ogden, UT	None reported.	House fire. E-cigarette exploded while resident was smoking, igniting materials in room.	House fire.	Yes

Two of these incidents occurred while the e-cigarette was charging and one while the user was smoking in bed. There was a fire department response in two of the incidents, while there was no indication that the fire department was summoned in the third incident.

## Conclusion

E-cigarette fires and explosions are rare events. It is not clear how completely the e-cigarette incidents reported in the media convey the true e-cigarette fire and explosion experience during 2015, since some unknown number of incidents are likely not to have received media coverage. Still, the severity of many of the injuries and the comparatively young ages of many of the injury victims that are captured in media accounts provide additional evidence for arguments calling for greater regulatory oversight of this still new technology, particularly in light of the projected increase in sales of the product into the future. With a rise in e-cigarette use, it can be reasonably anticipated that the incidence of fires and explosions will also increase.

<sup>1</sup> Trefis Team, June 2015. *Who Stands to Gain From the E-Cigarette Phenomenon?* Available at: <http://www.forbes.com/sites/greatspeculations/2015/06/23/who-stands-to-gain-from-the-e-cigarette-phenomenon/#7f5f99ff4876>. Accessed March 1, 2016.

<sup>2</sup> Schoenborn CA, Gindi RM., October 2015. *Electronic Cigarette Use among Adults: United States, 2014*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.

<sup>3</sup> U.S. Fire Administration, FEMA, U.S. Department of Homeland Security, October 2014. *Electronic Cigarette Fires and Explosions*. Available at: [https://www.usfa.fema.gov/downloads/pdf/publications/electronic\\_cigarettes.pdf](https://www.usfa.fema.gov/downloads/pdf/publications/electronic_cigarettes.pdf). Accessed March 8, 2016.

<sup>4</sup> <http://fox8.com/2015/02/10/e-cigarette-explodes-in-california-mans-face/>. Accessed March 23, 2016.

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- <sup>5</sup> <http://www.nbclosangeles.com/news/local/Anaheim-Hills-Teen-Injured-Exploding-E-Cig-291489711.html>. Accessed March 23, 2016
- <sup>6</sup> <http://www.latimes.com/local/lanow/la-me-ln-man-ecigarette-explodes-santa-ana-20150309-story.html>. Accessed March 23, 2016
- <sup>7</sup> <http://www.aol.com/article/2015/09/08/man-severely-injured-after-e-cigarette-explodes-in-his-mouth/21233058/>. Accessed March 23, 2016
- <sup>8</sup> <http://www.nydailynews.com/news/national/florida-man-coma-e-cig-explodes-face-family-article-1.2413702>. Accessed March 23, 2016
- <sup>9</sup> <http://www.arkansasmatters.com/news/local-news/e-cigarette-explodes-in-bentonville-mans-face>
- <sup>10</sup> <http://www.dailynews.com/general-news/20151119/3-men-severely-burned-when-e-cigarette-batteries-explode-file-lawsuit>. Accessed March 23, 2016
- <sup>11</sup> <http://www.wmcactionnews5.com/story/30580857/man-seriously-injured-when-e-cig-explodes-in-his-face>. Accessed March 23, 2016
- <sup>12</sup> <http://fox17online.com/2015/12/08/id-rather-have-lung-cancer-e-cigarette-explodes-in-mans-pocket/>. Accessed March 23, 2016
- <sup>13</sup> <http://kfor.com/2015/12/08/blood-just-pouring-down-e-cig-explodes-in-oklahoma-mans-face/>
- <sup>14</sup> <http://fox40.com/2015/02/18/e-cigarette-almost-claims-mans-life/>. Accessed March 23, 2016.
- <sup>15</sup> <http://www.local10.com/news/tina-kruzyck-says-e-cigarette-exploded-while-she-slept-caught-bed-on-fire>. Accessed March 23, 2016.
- <sup>16</sup> <http://www.standard.net/Police-Fire/2015/12/28/E-cigarette-caused-Christmas-house-fire-in-Ogden-officials-say>. Accessed March 23, 2016.
- <sup>17</sup> Barboza, D. "China's E-Cigarette Boom Lacks Oversight for Safety," The New York Times, December 13, 2014. [http://www.nytimes.com/2014/12/14/business/international/chinas-e-cigarette-boom-lacks-oversight-for-safety-.html?\\_r=0](http://www.nytimes.com/2014/12/14/business/international/chinas-e-cigarette-boom-lacks-oversight-for-safety-.html?_r=0). Accessed April 4, 2016.