

Acute Occupational Respiratory Injuries and Fatalities, United States, 2016-2020

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Rationale: Our study analyzed workplace exposures, incidents, injuries, and fatalities associated with acute respiratory illness in the United States using the Occupational Safety and Health Administration (OSHA) Occupational Safety and Health Information System (OIS) database, with inspection records from both federal and state OSHA. Currently, there is limited knowledge on how workers are exposed to acute respiratory-associated events over time, across industries and occupations. **Methods:** Cases were identified by searching the narrative for respiratory-associated keywords and developing a selection criterion. They were then manually validated and categorized by source (primary and secondary), similar to Occupational Injury and Illness Classification System (OIICS) developed by the US Bureau of Labor Statistics (BLS). Primary sources were cases with respiratory-related event or exposure that was responsible for the incident (e.g., chemicals and gases; oxygen deficiency; smoke and explosions; infectious agents). Secondary sources were cases when objects or substances contributed to the event or exposure (e.g., struck, caught, or crushed; drowning) followed by respiratory-related condition such as asphyxia or pneumothorax. Injury (fatal and non-fatal) and fatality rates were calculated using total employed worker statistics reported by BLS and for the 20 industries categorized by North American Industry Classification System (NAICS 2017). **Results:** A total of 37,289 incidents were reported in the OSHA OIS dataset from January 2016 to February 2020. Of these, 1279 (3.4%) met the case definition, accounting for 2495 workers involved in a respiratory-related event or exposure. Most incidents had only one worker involved (77.8%; n=995) and 60% reported at least one fatality (n=762). The injury and fatality rates were highest for the construction industry at 77.3 and 31.8 per 10 million workers, respectively. Incidents may have involved one or more exposure or event. Among primary source incidents, carbon monoxide exposure was the leading cause (30.1%, n=119; Table 1), followed by chlorine exposure (13.6%, n=54; Table 1). The major causes for secondary source incidents were workers being struck, caught, or crushed in collapsing structures and equipment (56.4%, n=463; Table 1), which was predominantly associated with positional asphyxiation.

Table 1: Exposures and events stratified by primary and secondary sources for acute occupational respiratory incidents (n=1279) reported in the Occupational Safety and Health Administration (OSHA) Occupational Safety and Health Information System (OIS), Jan 2016 to Feb 2020.

Source, n	Exposure or Event (OIICS) ¹	n, % ²
<i>Primary sources, 618</i>		
	Inhalation of harmful substance (Chemicals and gases) (552)	396, 64.1%
	Carbon monoxide	119, 30.1%
	Chlorine	54, 13.6%
	Sulfur	41, 10.4%
	Ammonia	39, 9.8%
	Chemical allergens (including asthma exacerbation and anaphylaxis)	28, 7.1%
	Nitrogen gas	11, 2.8%
	Carbon dioxide	7, 1.8%
	Fluorine	7, 1.8%
	Pesticides and fertilizers	7, 1.8%
	Other ³	83, 21%
	Fires (31) and explosions (32)	98, 15.9%
	Exposure to oxygen deficiency (56)	88, 14.2%
	Infectious diseases (55)	36, 5.8%
	Fungi	24, 66.7%
	Bacteria	10, 27.8%
	Viruses	2, 5.6%
<i>Secondary sources, 821</i>		
	Struck, caught, or crushed in collapsing structure, equipment, or material (65)	463, 56.4%
	Drowning (43 and 561)	169, 20.6%
	Engulfment in trenches (651) and bins (656)	104, 12.7%
	Falls, slips, and trips (40)	65, 7.9%
	Bites and stings (131)	10, 1.2%
	Other ⁴	10, 1.2%

Note:

¹ Exposure or event was captured using keywords. The code in parenthesis refers to Occupational Injury and Illness Classification System (OIICS) section 2.4 Event or Exposure. Variations in chemical form of the specified chemicals were allowed.

² Workers were often exposed to one or more of the specified substances. An incident can involve more than one exposure, therefore, the percentages in this column may not sum to 100% of the incidents.

³ Among primary sources, other category represented chemicals and gases with less than 1% occurrence, and remaining incidents searched by using nonspecific index words such as chemicals, fumes, vapor, and those reported unknown.

⁴ Among secondary sources, other category represented incidents with less than 1% occurrence such as burns from chemicals and explosions, food allergies, workplace violence, and heat stress.

Conclusions: Our findings illustrate the burden of acute respiratory injuries and fatalities across industries and exposures. Since 60% of incidents resulted in fatalities, this data likely undercounts acute non-fatal incidents and injuries. These findings can inform safety recommendations and preventative measures where occupational respiratory hazards are present.

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