

Toxic Substance-Related Illness

Agent: Multiple agents, including heavy metals (e.g., lead, cadmium, mercury, arsenic), occupational dusts or fibers (e.g., coal, silica, asbestos), gases (e.g., carbon monoxide, methane), pesticides, or radioactive materials.

Mode of Transmission: Varies depending on agent; can include absorption through skin, ingestion, or inhalation.

Signs/Symptoms: Varies depending on agent, route, dose and duration of exposure. Chronic occupational dust or fiber exposure may increase the risk of lung cancer, mesothelioma and nonmalignant lung disorders. Heavy metals, gases and pesticides may damage nervous, hepatic (liver), digestive, or reproductive systems.

Prevention: Eating, drinking, or smoking should not occur in contaminated work areas. Hands and face should be washed with soap and water after contact with toxic materials. After working with potential toxic substances, showering and changing clothes should occur at the worksite, if possible. Preventive measures include strict adherence to safety guidelines and requirements.

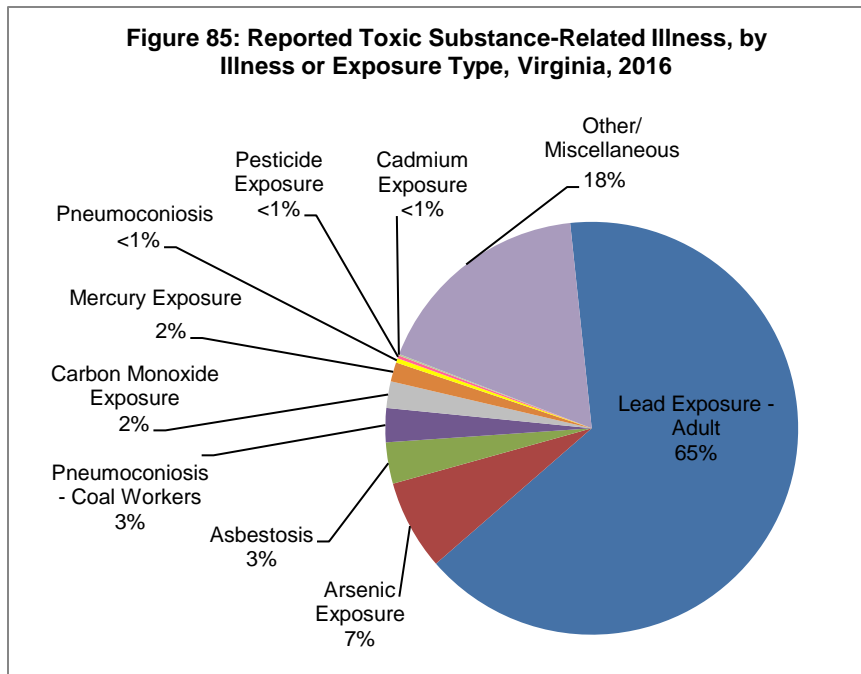
Other Important Information: Beginning in 2016, physicians and laboratories were required to report to the Virginia Department of Health any person, age 16 years and older, with a blood lead level of 5 µg/dL or higher. For prior years, reporting was required only for blood lead levels greater than or equal to 25 µg/dL.

Toxic Substance-related Illness: 2016 Data Summary	
Number of Cases:	864
5-Year Average Number of Cases:	326.4
% Change from 5-Year Average:	165%
Incidence Rate per 100,000:	10.3

In 2016, 864 cases of toxic substance-related illness were reported in Virginia. This is a 127% increase from the 381 cases reported in 2015, and a 165% increase from the five-year average of 326.4 cases per year. This increase is attributed to the change in blood lead levels used for surveillance purposes, as described above. Of these newly reported cases in 2016, 89% represent blood lead levels ranging from 5-24 µg/dL, which were not captured in previous years.

A determination of illness is based upon a physician's diagnosis, a laboratory finding outside an occupational standard, or when no standard exists, outside expected normal values. Toxic substance exposures are identified by public health professionals from electronic laboratory reports, death certificates, morbidity reports, and through claims by exposed persons to the Virginia Workers' Compensation Commission (WCC). The two most frequently reported toxic substance-related conditions in 2016 were adult lead exposure and arsenic exposure. These were followed by asbestosis, coal worker's pneumoconiosis, carbon monoxide exposure, mercury exposure, pneumoconiosis, pesticide exposure, and cadmium exposure (Figure 85). Illnesses from exposure to rarely reported substances are also reported and are captured under the general heading of other/miscellaneous reports.

While the occurrence of most types of toxic substance exposure or illness has remained relatively similar in recent years, more adult lead exposures were captured in 2016 when compared to previous years. As a result of the change in reportable levels, this increase in reports of adult lead exposures was expected. In 2016, 564 cases of elevated blood lead levels in adults were reported compared to the 28 cases in 2015 and 181 cases from a decade earlier in



2006. Of the 564 reported cases in 2016, 88% occurred in males and over half (52%) were reported from the eastern and central regions. The majority of reported cases with elevated lead exposure did not include information on occupation or industry. Among those with workplace information, lead removal, construction, shipping, steel working, and manufacturing were the most common industries listed. Greater enforcement of workplace lead safety and awareness of the dangers of lead exposure has contributed to the decrease in reported exposures in previous years. However, an increase in screening criteria and awareness of the dangers of lead may have also contributed to an increase in the number of individuals tested. Lead exposures among children aged 15 years or younger are discussed in the “Lead - Elevated Blood Levels in Children” section of this report.

Arsenic exposure has continued to be one of the most frequently reported toxic substance exposures in Virginia, due in part to the presence of arsenic in various foods, particularly fish and shellfish. Since the 2012 spike of 92 cases, arsenic trends have been declining and are showing proof of stabilization including the 66 exposures reported in 2013, 57 exposures in 2014, 59 exposures in 2015, and the 61 exposures in 2016. The 2012 spike was due to a more thorough and comprehensive reporting approach through utilization of electronic laboratory reporting. For 2016, individuals reported with arsenic exposure ranged in age from 21 to 88 years, and 61% of the cases were reported from the northern and eastern regions. Of the 61 arsenic exposures in 2016, 14 cases were confirmed and 47 were probable. Confirmed cases are characterized by clinical symptoms, which include headache, nausea, vomiting, diarrhea, abdominal pain, hypotension, fever, rupture of blood cells, seizures, and mental status changes, among other more severe complications. These symptoms are characteristic of inorganic arsenic poisoning. Exposure to inorganic arsenic poisoning can occur through contaminated drinking water and occupational exposures (primarily smelting of zinc and copper ores). For the 47 probable cases, exposure to the non-toxic organic form of arsenic or the toxic inorganic form of arsenic cannot be determined.

The number of reported asbestos exposures has remained relatively stable over the past decade, with a slight decrease for the current year. In 2016, 28 persons were reported with asbestos exposure in Virginia, compared to the 35 reported in 2015. The age of reported individuals ranged from 38-105 years, with a mean of 77 years. The majority of cases (82%) were 70 years or older, which reflects current illness from exposures that occurred before regulatory standards and guidelines went into effect. Of those reporting exposure, 93% were male and 75% were white. Of the 28 cases reported in 2016, 61% were reported from the eastern region. This area of the state is home to the shipbuilding industry, which has historically been the major source of exposure. Exposures were mostly reported through death certificates (82%) as asbestosis, the asbestos condition that results from previous exposure to asbestos fibers. The remaining cases were reported through the Worker's Compensation Commission as exposures in occupational settings.

Coal workers' pneumoconiosis, also referred to as black lung disease, is an industrial disease that is the result of breathing in dust from coal, graphite, or manufactured carbon over a period of years. The dust particles reside in the lungs following inhalation and build up over time. This creates chronic exposure due to the lungs not being able to excrete the dust. This continued exposure causes inflammation, fibrosis, and necrosis. Although rates of pneumoconiosis have declined since the Federal Coal Mine Health and Safety Act of 1969, new cases appear each year in Virginia. In 2016, 23 cases of coal workers' pneumoconiosis were reported. Nearly all were associated with working in the coal mining industry, and were mostly identified through surveillance of death certificates. Among the individuals reported with coal workers' pneumoconiosis, all were male, ranging in age from 52 to 91 years, and 87% were reported from the white population. Twenty-one cases (91%) occurred in the southwest region, which is home to the coal mining industry in Virginia. The 51% decrease in cases from the 47 cases reported in 2015 is likely due to the delayed reporting of death certificate data. Some death certificates of persons who died in 2014 as a result of coal workers' pneumoconiosis were not received until 2015. As a result, these deaths were counted as 2015 cases. This may have artificially increased the number for 2015, and continued delayed reporting may have reduced the case count for 2016.

In 2016, 18 carbon monoxide exposures were reported in Virginia compared to 27 reported exposures in 2015. The 18 individuals ranged in age from 13 to 85 years, with 67% being male. The cases reported in 2016 involved individuals who worked in various industries including automobile, construction, and law enforcement. Twelve exposures were reported through death certificates, and six cases were reported through the WCC. The majority of exposures were occupational, while most deaths were a result of accidental poisonings due to smoke inhalation from house fires.

A declining trend has been seen in the reporting of mercury and cadmium exposures over the last several years. Only 13 exposures to mercury were reported in 2016, as compared to the 48 cases reported in 2010. Mercury accounted for 2% of all reported toxic substance exposures in 2016. The two reported cases of cadmium in 2016 also dropped from the eight cases reported in 2010, and cadmium now accounts for less than 1% of all reported toxic substance-related exposures. Additionally, pneumoconiosis and pesticide exposure each accounted for less than 1% of exposures.

An additional 151 cases of toxic substance exposures were reported, with 72% received from the WCC and 28% reported through death certificates. These reports included unintentional workplace exposures to aerosol cleaners, solvents, exhaust fumes, and methane, or other illness or injury sustained during a toxic substance or chemical release. Inhalation was the most common route of exposure, followed by dermal contact and ingestion.

The overall incidence rate for toxic substance-related illness in Virginia in 2016 was 10.3 per 100,000. By age group, the incidence rate was highest in the 30-39 year age group (15.4 per 100,000), followed by the 40-49 year age group (15.2 per 100,000). The lowest incidence rate occurred among those 1-9 years of age (0.4 per 100,000). No infants were reported with a toxic substance-related illness. Adults in age groups from 20-59 years represented 77% of all reported cases. Race information was not reported for 56% of toxic substance-related cases. As such, no statement can be made about the distribution of toxic substance exposures by race. Males accounted for 80% of all cases. The incidence rate among males was more than four times the rate of females (16.6 and 4.1 per 100,000, respectively). The central region had the highest incidence rate at 15.2 per 100,000. Rates in other regions ranged from 7.5 to 15.1 per 100,000.