

Overdose

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Alcohol

1.

According to the US National Library of Medicine's MedlinePlus:

"Ethanol poisoning is caused by drinking too much alcohol," and can be found with respect to "Alcohol beverages, including: beer, gin, vodka, wine, whiskey."

"Symptoms include:

- * Abdominal pain
- * Coma
- * Intestinal bleeding
- * Moving from side to side
- * Slowed breathing
- * Slurred speech
- * Stupor
- * Unable to walk normally
- * Vomiting

"Home care: If you can wake an adult who has drunk too much alcohol, move the person to a comfortable place to sleep off the effects. Make sure the person won't fall or get hurt.

"Place the person on their side in case they throw up (vomit). DO NOT make the person throw up unless told to do so by a health care professional or Poison Control.

"Check the person frequently to make sure their condition does not get worse.

"If the person is not alert (unconscious) or only somewhat alert (semi-conscious), emergency assistance may be needed. When in doubt, call for medical help."

The NLM notes that "Survival over 24 hours past the drinking binge usually means the person will recover."

Source:

Source: "Ethanol Poising," MEDLINEplus Medical Encyclopedia, US National Library of Medicine (Bethesda, MD:American Accreditation HealthCare Commission, Feb. 3, 2009).

<http://www.nlm.nih.gov/medlineplus/ency/article/002644.htm>

2.

"In 2003, a total of 20,687 persons died of alcohol-induced causes in the United States (Tables 23 and 24). The category 'alcohol-induced causes' includes not only deaths from dependent and nondependent use of alcohol, but also accidental poisoning by alcohol. It excludes unintentional injuries, homicides, and other causes indirectly related to alcohol use as well as deaths due to fetal alcohol syndrome."

Source:

Hoyert, Donna L., PhD, Heron, Melonie P., PhD, Murphy, Sherry L., BS, Kung, Hsiang-Ching, PhD; Division of Vital Statistics, "Deaths: Final Data for 2003," National Vital Statistics Reports, Vol. 54, No. 13 (Hyattsville, MD: National Center for Health Statistics, April 19, 2006), p. 10.

Cannabis

1.

"Tetrahydrocannabinol is a very safe drug. Laboratory animals (rats, mice, dogs, monkeys) can tolerate doses of up to 1,000 mg/kg (milligrams per kilogram). This would be equivalent to a 70 kg person swallowing 70 grams of the drug—about 5,000 times more than is required to produce a high. Despite the widespread illicit use of cannabis there are very few if any instances of people dying from an overdose. In Britain, official government statistics listed five deaths from cannabis in the period

1993-1995 but on closer examination these proved to have been deaths due to inhalation of vomit that could not be directly attributed to cannabis (House of Lords Report, 1998). By comparison with other commonly used recreational drugs these statistics are impressive."

Source:

Iversen, Leslie L., PhD, FRS, "The Science of Marijuana" (London, England: Oxford University Press, 2000), p. 178, citing House of Lords, Select Committee on Science and Technology, "Cannabis — The Scientific and Medical Evidence" (London, England: The Stationery Office, Parliament, 1998).

2.

An exhaustive search of the literature finds no deaths induced by marijuana. The US Drug Abuse Warning Network (DAWN) records instances of drug mentions in medical examiners' reports, and though marijuana is mentioned, it is usually in combination with alcohol or other drugs. Marijuana alone has not been shown to cause an overdose death.

Source:

Source: Drug Abuse Warning Network (DAWN), available on the web at <http://www.samhsa.gov/> ; also see Janet E. Joy, Stanley J. Watson, Jr., and John A. Benson, Jr., "Marijuana and Medicine: Assessing the Science Base," Division of Neuroscience and Behavioral Research, Institute of Medicine (Washington, DC: National Academy Press, 1999), available on the web at <http://www.nap.edu/html/marimed/>; and US Department of Justice, Drug Enforcement Administration, "In the Matter of Marijuana Rescheduling Petition" (Docket #86-22), September 6, 1988, p. 57.

Cocaine

1.

"An overdose may cause severe anxiety, panic, agitation, aggression, sleeplessness, hallucinations, paranoid delusions, impaired judgment, tremors, seizures, and delirium. Mydriasis and diaphoresis are apparent, and heart rate and BP are increased. Death may result from MI or arrhythmias.

Severe overdose causes a syndrome of acute psychosis (eg, schizophrenic-like symptoms), hypertension, hyperthermia, rhabdomyolysis, coagulopathy, renal failure, and seizures. Patients with extreme clinical toxicity may, on a genetic basis, have decreased (atypical) serum cholinesterase, an enzyme needed for clearance of cocaine.

The concurrent use of cocaine and alcohol produces a condensation product, cocaethylene, which has stimulant properties and may contribute to toxicity."

Source:

"Cocaine," The Merck Manual, Section 15. Psychiatric Disorders, Chapter 198. Drug Use and Dependence, Merck & Co. Inc. (July 2008).

<http://www.merck.com/mmpe/sec15/ch198/ch198j.html>

Heroin

1.

"The main toxic effect is decreased respiratory rate and depth, which can progress to apnea. Other complications (eg, pulmonary edema, which usually develops within minutes to a few hours after opioid overdose) and death result primarily from hypoxia. Pupils are miotic. Delirium, hypotension, bradycardia, decreased body temperature, and urinary retention may also occur.

Normeperidine, a metabolite of meperidine accumulates with repeated use (including therapeutic); it stimulates the CNS and may cause seizure activity."

Source:

"Opioids," The Merck Manual, Section 15. Psychiatric Disorders, Chapter 198. Drug Use and Dependence, Merck & Co. Inc. (July 2008).

<http://www.merck.com/mmpe/sec15/ch198/ch198f.html>

2.

Fear of official involvement may contribute to the problem of overdose deaths. According to research in Australia, "Our findings that an ambulance was called while the subject was still alive in only 10% of cases, and that a substantial minority of heroin users died alone, strongly suggest that education campaigns should also emphasise that it is safer to inject heroin in the company of others, and important to call for an ambulance early in the event of an overdose. Consideration should also be given to trialling the distribution of the opioid antagonist naloxone to users to reduce mortality from heroin use."

Source:

Zador, Deborah, Sunjic, Sandra, and Darke, Shane, "Heroin-related deaths in New South Wales, 1992: toxicological findings and circumstances," The Medical Journal of Australia.

<http://www.mja.com.au/public/issues/feb19/zador/zador.html>

3.

"In addition to the effects of the drug itself, street heroin often contains toxic contaminants or additives that can clog the blood vessels leading to the lungs, liver, kidneys, or brain, causing permanent damage to vital organs."

Source:

Source: National Institute on Drug Abuse, Infobox on Heroin No. 13548 (Rockville, MD: US Department of Health and Human Services, September 2009).

<http://www.drugabuse.gov/infobox/heroin.html>

4.

"A striking finding from the toxicological data was the relatively small number of subjects in whom morphine only was detected. Most died with more drugs than heroin alone [on board], with alcohol detected in 45% of subjects and benzodiazepines in just over a quarter. Both of these drugs act as central nervous system depressants and can enhance and prolong the depressant effects of heroin."

Source:

Zador, Deborah, Sunjic, Sandra, and Darke, Shane, "Heroin-related deaths in New South Wales, 1992: toxicological findings and circumstances," The Medical Journal of Australia.

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5.

"A first priority for prevention must be to reduce the frequency of drug overdoses. We should inform heroin users about the risks of combining heroin with alcohol and other depressant drugs. Not all users will act on such information, but if there are similar behavioral changes to those that occurred with needle-sharing overdose deaths could be substantially reduced. Heroin users should also be discouraged from injecting alone and thereby denying themselves assistance in the event of an overdose."

Source:

Dr. W.D. Hall, "How can we reduce heroin 'overdose' deaths?" The Medical Journal of Australia (MJA 1996; 164:197).

<http://www.mja.com.au/public/issues/feb19/hall/hall.html>

6.

"If it is not pure drugs that kill, but impure drugs and the mixture of drugs, then the myth of the heroin overdose can be dangerous. If users had a guaranteed pure supply of heroin which they relied on, there would be little more likelihood of toxic doses than occur with narcotics administered in a hospital."

Source:

Peele, Stanton, MD, "The Persistent, Dangerous Myth of Heroin Overdose."

<http://www.peele.net/lib/heroinoverdose.html>

7.

"The disadvantage of continuing to describe heroin-related fatalities as "overdoses" is that it attributes the cause of death solely to heroin and detracts attention from the contribution of other drugs to the cause of death. Heroin users need to be educated about the potentially dangerous practice of concurrent polydrug and heroin use."

Source:

Zador, Deborah, Sunjic, Sandra, and Darke, Shane, "Heroin-related deaths in New South Wales, 1992: toxicological findings and circumstances," The Medical Journal of Australia.

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8.

"Our findings that an ambulance was called while the subject was still alive in only 10% of cases, and that a substantial minority of heroin users died alone, strongly suggest that education campaigns should also emphasise that it is safer to inject heroin in the company of others, and important to call for an ambulance early in the event of an overdose. Consideration should also be given to trialling the distribution of the opioid antagonist naloxone to users to reduce mortality from heroin use."

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<http://www.mja.com.au/public/issues/feb19/zador/zador.html>

9.

"This pilot trial is the first in North America to prospectively evaluate a program of naloxone distribution to IDUs to prevent heroin overdose death. After an 8-hour training, our study participants' knowledge of heroin overdose prevention and management increased, and they reported successful resuscitations during 20 heroin overdose events. All victims were reported to have been unresponsive, cyanotic, or not breathing, but all survived. These findings suggest that IDUs can be trained to respond to heroin overdose by using CPR and naloxone, as others have reported. Moreover, we found no evidence of increases in drug use or heroin overdose in study participants. These data corroborate the findings of several feasibility studies recommending the prescription and distribution of naloxone to drug users to prevent fatal heroin overdose."

Source:

Seal, Karen H., Robert Thawley, Lauren Gee, Joshua Bamberger, Alex H. Kral, Dan Ciccarone, Moher Downing, and Brian R. Edlin, "Naloxone Distribution and Cardiopulmonary Resuscitation Training for Injection Drug Users to Prevent Heroin Overdose Death: A Pilot Intervention Study," Journal of Urban Medicine (New York, NY: New York Academy of Medicine, 2005), Vol. 82, No. 2, p. 308.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2570543/pdf/nihms67318.pdf>

10.

"The disadvantage of continuing to describe heroin-related fatalities as 'overdoses' is that it attributes the cause of death solely to heroin and detracts attention from the contribution of other drugs to the cause of death. Heroin users need to be educated about the potentially dangerous practice of concurrent polydrug and heroin use."

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11.

"A striking finding from the toxicological data was the relatively small number of subjects in whom morphine only was detected. Most died with more drugs than heroin alone 'on board', with alcohol detected in 45% of subjects and

benzodiazepines in just over a quarter. Both of these drugs act as central nervous system depressants and can enhance and prolong the depressant effects of heroin."

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<http://www.mja.com.au/public/issues/feb19/zador/zador.html>

Methadone

1.

"Still, methadone is a potent drug; fatal overdoses have been reported over the years (Baden, 1970; Gardner, 1970; Clark, et al., 1995; Drummer, et al., 1992). As with most other opioids, the primary toxic effect of excessive methadone is respiratory depression and hypoxia, sometimes accompanied by pulmonary edema and/or aspiration pneumonia (White and Irvine, 1999; Harding-Pink, 1993). Among patients in addiction treatment, the largest proportion of methadone-associated deaths have occurred during the drug's induction phase, usually when (1) treatment personnel overestimate a patient's degree of tolerance to opioids, or (2) a patient uses opioids or other central nervous system (CNS) depressant drugs in addition to the prescribed methadone (Karch and Stephens, 2000; Caplehorn, 1998; Harding-Pink, 1991; Davoli, et al., 1993). In fact, when deaths occur during later stages of treatment, other drugs usually are detected at postmortem examination (Appel, et al., 2000). In particular, researchers have called attention to the "poison cocktail" resulting from the intake of multiple psychotropic drugs (Borron, et al., 2001; Haberman, et al., 1995) such as alcohol, benzodiazepines, and other opioids. When used alone, many of these substances are relatively moderate respiratory depressants; however, when combined with methadone, their additive or synergistic effects can be lethal (Kramer, 2003; Payte and Zweben, 1998).

"It is important to note that postmortem blood concentrations of methadone do not appear to reliably distinguish between individuals who have died from methadone toxicity and those in whom the presence of methadone is purely coincidental (Drummer, 1997; Caplan, et al., 1983)."

Source:

Center for Substance Abuse Treatment, *Methadone-Associated Mortality: Report of a National Assessment*, May 8-9, 2003, CSAT Publication No. 28-03 (Rockville, MD: Center for Substance Abuse Treatment, Substance Abuse and Mental Health Services Administration, 2004), p. 11.

2.

"Three primary scenarios characterize current reports of methadone-associated mortality:

1. In the context of legitimate patient care, methadone accumulates to harmful serum levels during the first few days of treatment for addiction or pain (that is, the induction period before methadone steady state is achieved or tolerance develops).
2. Illicitly obtained methadone is used by some individuals who have diminished or no tolerance to opioids and who may use excessive and/or repetitive doses in an attempt to achieve euphoric effects.
3. Methadone - either licitly administered or illicitly obtained - is used in combination with other CNS depressant agents (such as benzodiazepines, alcohol, or other opioids)."

Source:

- 1.

Center for Substance Abuse Treatment, Methadone-Associated Mortality: Report of a National Assessment, May 8-9, 2003, CSAT Publication No. 28-03 (Rockville, MD: Center for Substance Abuse Treatment, Substance Abuse and Mental Health Services Administration, 2004), p. 24.

Methamphetamine

- 1.

"Toxicity or overdose: Tachycardia, arrhythmias, chest pain, hypertension, dizziness, nausea, vomiting, and diarrhea can occur. CNS effects include acute delirium and toxic psychosis. Overdose can also cause stroke (usually hemorrhagic), seizures, muscle rigidity, and hyperthermia (> 40° C); all of these effects may precipitate rhabdomyolysis, which can lead to renal failure."

Source:

Source: "Amphetamines," The Merck Manual, Section 15. Psychiatric Disorders, Chapter 198. Drug Use and Dependence, Merck & Co. Inc. (July 2008).

<http://www.merck.com/mmpe/sec15/ch198/ch198k.html>

2.

"When significant oral toxicity is recent (eg, < 1 to 2 h), activated charcoal may be given to limit absorption, although this intervention has not been shown to reduce morbidity or mortality. Urinary acidification hastens amphetamine excretion, but it may worsen myoglobin precipitation in the renal tubules and thus is not recommended.

Benzodiazepines are the preferred initial treatment for CNS excitation, seizures, tachycardia, and hypertension. Lorazepam 2 to 3 mg IV q 5 min titrated to effect may be used. High doses or a continuous infusion may be required. Propofol, with mechanical ventilation, may be required for severe agitation. Hypertension that does not respond to benzodiazepines is treated with nitrates (occasionally nitroprusside or other antihypertensives as needed, depending on the severity of the hypertension. β -Blockers (eg, metoprolol 2 to 5 mg IV) may be used for severe ventricular arrhythmias or tachycardia.

Hyperthermia can be life threatening and should be managed aggressively with sedation plus evaporative cooling, ice packs, and maintenance of intravascular volume and urine flow with IV normal saline solution.

Source:

Source: "Amphetamines," The Merck Manual, Section 15. Psychiatric Disorders, Chapter 198. Drug Use and Dependence, Merck & Co. Inc. (July 2008).

<http://www.merck.com/mmpe/sec15/ch198/ch198k.html>

3.

"A paranoid psychosis may result from long-term use; rarely, the psychosis is precipitated by a single high dose or by repeated moderate doses. Typical features include delusions of persecution, ideas of reference (notions that everyday occurrences have special meaning or significance personally meant for or directed to the patient), and feelings of omnipotence. Some users experience a prolonged depression, during which suicide is possible. Recovery from even prolonged amphetamine psychosis is usual but is slow. The more florid symptoms fade within a few days or weeks, but some confusion, memory loss, and delusional ideas commonly persist for months."

Source:

"Amphetamines," The Merck Manual, Section 15. Psychiatric Disorders, Chapter 198. Drug Use and Dependence, Merck & Co. (July 2008).

<http://www.merck.com/mmpe/sec15/ch198/ch198k.html>

The Bottom Line

1.

2006! : "In 2006, a total of 38,396 persons died of drug-induced causes in the United States (Tables 21 and 22). This category includes not only deaths from dependent and nondependent use of legal or illegal drugs, but also poisoning from medically prescribed and other drugs. It excludes unintentional injuries, homicides, and other causes indirectly related to drug use, as well as newborn deaths due to the mother's drug use."

Source:

Heron MP, Hoyert DL, Murphy SL, Xu JQ, Kochanek KD, Tejada-Vera B. Deaths: Final data for 2006. National vital statistics reports; vol 57 no 14. Hyattsville, MD: National Center for Health Statistics. 2009, p. 11.

http://www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_14.pdf

2.

"According to the Centers for Disease Control and Prevention (CDC) National Center for Health Statistics, unintentional overdose deaths involving prescription opioids increased 114 percent from 2001 (3,994) to 2005 (8,541), the most recent nationwide data available. Further, the number of treatment admissions for prescription opioids as the primary drug of abuse increased 74 percent from 46,115 in 2002 to 80,131 in 2006, the most recent data available, according to the SAMHSA Treatment Episode Data Set (TEDS)."

Source:

National Drug Intelligence Center, Drug Enforcement Administration, "National Prescription Drug Threat Assessment," (Washington DC, April 2009), p. III.

<http://www.justice.gov/ndic/pubs33/33775/33775p.pdf>

3.

According to the federal Drug Abuse Warning Network, most drug-induced deaths involve multiple drugs. "DAWN accepts reports of illicit drugs, alcohol, prescription and over-the-counter pharmaceuticals, dietary supplements, and non-pharmaceutical inhalants. Multiple substances (as many as 6) can be reported for a single case. In 2003, the typical DAWN case involved between 2 and 3 drugs. Multiple drugs were as common in drug misuse deaths as in drug-related suicide cases; each averaged 2.7 drugs per case.

"When multiple drugs are involved in a single case, the cause of death often cannot be attributed to any one substance.

Instead, the cause may be attributed to 'combined effects' of multiple drugs. To illustrate this important concept, the area profiles in this publication differentiate the number of deaths that involved only one drug (termed 'single-drug' deaths) from all deaths. On average, participating metropolitan areas reported only 24% of drug misuse deaths (range 2% to 50%) and 19% of drug-related suicides (range 0% to 50%) with a single drug. Similarly, in the 6 States 24% of misuse deaths (range 7% to 35%) and 27% of drug-related suicides (range 10% to 57%) involved a single drug."

"Across the metropolitan areas, the most common single-drug deaths involved opiates/opioids alone, followed by cocaine and stimulants. The most frequent multiple-drug deaths involved various combinations of opiates/opioids, cocaine, and alcohol. In new DAWN, alcohol is reported in combination with other drugs and, for individuals under age 21, alcohol is reported even when no other drugs are present. Across the 32 metropolitan areas, the most common unique combinations were: Cocaine with opiates/opioids, Alcohol with opiates/opioids, Alcohol with cocaine and opiates/opioids, and Alcohol with cocaine."

Source:

Source: Substance Abuse and Mental Health Services Administration, Office of Applied Studies "Drug Abuse Warning Network, 2003: Area Profiles of Drug-Related Mortality," DAWN Series D-27, DHHS Publication No. (SMA) 05-4023. Rockville, MD, 2005, p. 17.

Related Chapters:

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