Toluene ($C_6H_5CH_3$)
CAS 108-88-3; UN 1294

Synonyms include methyl benzene, methyl benzol, phenyl methane, and toluol.

Persons exposed only to toluene vapor do not pose substantial risks of secondary contamination. Persons whose clothing or skin is contaminated with liquid toluene can cause secondary contamination by direct contact or through off-gassing vapor.

Toluene is a colorless liquid with a sweet, pungent, benzene-like odor which provides an adequate warning of hazardous concentrations. Toluene is volatile, readily producing flammable and toxic concentrations at room temperature. Its vapor is heavier than air and may accumulate in low-lying areas.

Toluene is absorbed rapidly after inhalation and ingestion. It is absorbed slowly through intact skin; however, percutaneous absorption may contribute to total body burden. Exposure by ingestion or inhalation can cause systemic effects. No information was found to suggest that the pharmacokinetics of toluene in children is different than in adults. Toluene crosses the placenta and is excreted in breast milk.

Description

Toluene is a clear, colorless, volatile liquid with a sweet, pungent, benzene-like odor. It is flammable at temperatures greater than 40 °F (4.4 °C); therefore, it is a significant fire hazard at room temperature. Toluene mixes readily with many organic solvents, but is poorly soluble in water. Toluene is less dense than water and will float on the surface of water. Toluene should be stored indoors in a standard flammable liquids room or cabinet that is separate from oxidizing materials.

Routes of Exposure

Inhalation

Toluene is readily absorbed from the lungs, and most exposures to toluene occur by inhalation. Toluene's odor is discernable at a concentration of 8 ppm, which is 25 times less than the OSHA PEL (200 ppm); therefore, odor generally provides adequate warning of acutely hazardous concentrations. Its vapor is heavier than air and may cause asphyxiation in enclosed, poorly ventilated, or low-lying areas.

Children exposed to the same levels of toluene vapor as adults may receive a larger dose because they have greater lung surface area:body weight ratios and increased minute volumes:weight ratios. In addition, they may be exposed to higher levels than adults in the same location because of their short stature and the higher levels of toluene vapor found nearer to the ground.

Skin/Eye Contact

Toluene vapor is only mildly irritating to mucous membranes; however, liquid toluene splashed in the eyes can result in corneal injury. Repeated or prolonged skin contact with liquid toluene can defat the skin, causing it to crack and peel. Percutaneous absorption is slow through intact skin; however, toluene absorbed through the skin may contribute to total body burden.

Children are more vulnerable to toxicants absorbed through the skin because of their relatively larger surface area:body weight ratio.

Ingestion

Acute systemic toxicity can result from ingestion of toluene.

Sources/Uses

Toluene is among the most abundantly produced chemicals in the United States. It is obtained primarily by distillation from crude petroleum. Toluene is an excellent solvent for paints, lacquers, thinners, and adhesives. It is used extensively in the rubber, chemical, paint, dye, glue, printing, and pharmaceutical industries.

Standards and Guidelines

OSHA PEL (permissible exposure limit) = 200 ppm (averaged over an 8-hour workshift)

OSHA ceiling = 300 ppm

OSHA STEL (short-term exposure limit) = 500 ppm (10-minute exposure)

NIOSH IDLH (immediately dangerous to life or health) = 500 ppm

ACGIH TLV (threshold limit value) = 50 ppm (averaged over an 8-hour workshift)

AIHA ERPG-2 (emergency response planning guideline) (maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action) = 300 ppm

Physical Properties

Description: Clear, colorless liquid

Warning properties: Adequate; sweet, aromatic odor at 8 ppm

Molecular weight: 92.1 daltons

Boiling point (760 mm Hg): 232 °F (110.6 °C)

Freezing point: -139 °F (-9 °C)

Specific gravity: 0.87 (water = 1)

Vapor pressure: 21 mm Hg at 68 °F (20 °C)

Gas density: 3.2 (air = 1)

Water solubility: Slightly water soluble (0.07% at 74 °F) (23 °C)

Flammability: 40 °F (4.4 °C); vapors may travel to a source of ignition and flash back.

Flammable range: 1.2% to 7.1% (concentration in air)

Incompatibilities

Toluene reacts with strong oxidizers.

Health Effects

Toluene is irritating to the skin, eyes, and respiratory tract. It can cause systemic toxicity by ingestion or inhalation and is slowly absorbed through the skin. The most common route of exposure is via inhalation. Symptoms of toluene poisoning include CNS effects (headache, dizziness, ataxia, drowsiness, euphoria, hallucinations, tremors, seizures, and coma), ventricular arrythmias, chemical pneumonitis, respiratory depression, nausea, vomiting, and electrolyte imbalances.

The mechanism by which toluene produces systemic toxicity is not known. No information was found to suggest that the health effects of toluene in children are different than in adults. Toluene crosses the placenta and is excreted in breast milk.

Acute Exposure

The mechanism by which toluene produces systemic toxicity is not known. CNS toxicity may be due to the liposolubility of toluene in the neuronal membrane. It has been suggested that toluene interferes with the normal function of neuronal proteins. It has also been suggested that the toxicity of toluene may be due to some of its metabolic intermediates. CNS toxicity is generally discernable within a short time of exposure, but pulmonary effects may not appear for up to 6 hours after exposure. No information was found to suggest that the health effects of toluene in children are different than in adults.

Children do not always respond to chemicals in the same way that adults do. Different protocols for managing their care may be needed.

CNS

Generally, symptoms of CNS toxicity are apparent immediately after inhalation of high toluene concentrations and 30 to 60 minutes after ingestion. Mild CNS effects include headache, lightheadedness, dizziness, confusion, nausea, impaired judgment, impaired gait, and blurred vision. More severe effects include loss of consciousness, coma, and death. Coma may be prolonged, although most victims regain consciousness rapidly after they are removed from exposure.

Respiratory

Acute exposure to toluene vapor can irritate the mucous membranes of the respiratory tract. With massive exposure, accumulation of fluid in the lungs and respiratory arrest may ensue. Pulmonary aspiration of toxic vomitus or ingested liquid toluene may cause chemical pneumonitis.

Exposure to certain chemicals can lead to Reactive Airway Dysfunction Syndrome (RADS), a chemically- or irritant-induced type of asthma.

Children may be more vulnerable because of relatively increased minute ventilation per kg and failure to evacuate an area promptly when exposed.

Hydrocarbon pneumonitis may be a problem in children.

Cardiovascular Massive doses of toluene can cause cardiac abnormalities. Toluene may lower the threshold of the heart to the effects of epinephrine, potentially disrupting the heart rhythm. Irregular heart rhythm leading to cardiac arrest has been described in solvent abusers, often immediately after intense physical activity.

Renal Blood and protein in the urine can occur after massive inhalation. These effects are usually reversible if exposure is terminated.

Metabolic After high-level exposure, toluene may cause an acid-base imbalance. In solvent abusers, electrolyte and acid-base disturbances have resulted in renal tubular acidosis, deficiency of potassium, and deficiency of phosphate. Ethanol or aspirin may prolong the half-life of toluene in the body.

Because of their relatively higher metabolic rates, children may be more vulnerable to toxicants interfering with basic metabolism.

Dermal Liquid toluene can cause irritation and defatting after prolonged or repeated contact with the skin. Redness and blisters may occur.

Because of their relatively larger surface area:body weight ratio, children are more vulnerable to toxicants absorbed through the skin.

Hepatic Liver damage has been reported in solvent abusers.

Ocular Eye irritation from toluene vapor begins at concentrations of about 300 ppm. Inflammation is generally slight. When splashed in the eyes, toluene may cause burning pain, blepharospasm, conjuctivitis, and keratinitis.

Gastrointestinal If swallowed, toluene can irritate the stomach, causing nausea, vomiting, and diarrhea.

Potential Sequelae During recovery, exposed persons may continue to experience ataxia, depressed level of consciousness, dilated and poorly responsive pupils, and decreased or absent deep tendon reflexes.

Anxiety, fatigue, and insomnia may last several days. No long-term effects due to acute toluene exposure have been reported.

Chronic Exposure

Chronic toluene exposures at less than 200 ppm have been associated with headache, fatigue, and nausea. Workers repeatedly exposed at 200 to 500 ppm have reported loss of coordination, memory loss, and loss of appetite. Some workers have developed reversible disorders of the optic nerves after chronic exposure in the workplace.

Chronic exposure due to solvent abuse can result in permanent neuropsychiatric effects. Disorders of the muscles, cardiovascular effects, renal tubular damage, and sudden death have occurred in chronic abusers of toluene.

Chronic exposure may be more serious for children because of their potential longer latency period.

Carcinogenicity

The International Agency for Research on Cancer has determined that toluene is not classifiable as to its carcinogenicity to humans. The EPA has determined that toluene is not classifiable as to its human carcinogenicity.

Developmental and Reproductive Effects

Toluene has not been confirmed as a human reproductive hazard. However, toluene is known to cross the placenta and is excreted in breast milk. In animal studies toluene has been shown to be fetotoxic, but not teratogenic. *Shepards Catalog of Teratogenic Agents* reports five cases of children whose mothers regularly used toluene recreationally while pregnant. These children were born with small heads (microcephaly); CNS dysfunction; and minor head, face, and limb anomalies. Several of the mothers had also abused alcohol during pregnancy. Toluene is included in *Reproductive and Developmental Toxicants,* a 1991 report published by the U.S. General Accounting Office (GAO) that lists 30 chemicals of concern because of widely acknowledged reproductive and developmental consequences.

Prehospital Management

Victims exposed only to toluene vapor do not pose substantial risks of secondary contamination to rescuers outside the Hot Zone. Victims whose clothing or skin is contaminated with liquid toluene can secondarily contaminate response personnel by direct contact or through off-gassing vapor. Toluene vapor may also off-gas from the toxic vomitus of victims who have ingested toluene.

Toluene is irritating to the skin, eyes, and respiratory tract. It can cause systemic toxicity by ingestion or inhalation. The most common route of exposure is via inhalation. Symptoms of toluene poisoning include CNS effects (headache, dizziness, ataxia, drowsiness, euphoria, hallucinations, tremor, seizures, and coma), ventricular arrythmias, chemical pneumonitis, respiratory depression, nausea, vomiting, and electrolyte imbalances.

There is no antidote for toluene. Treatment consists of support of respiratory and cardiovascular functions.

Hot Zone

Rescuers should be trained and appropriately attired before entering the Hot Zone. If the proper equipment is not available, or if rescuers have not been trained in its use, assistance should be obtained from a local or regional HAZMAT team or other properly equipped response organization.

Rescuer Protection

Toluene vapor is absorbed well by inhalation and is a mild respiratory-tract irritant. The liquid is a mild skin and eye irritant with slow skin absorption.

Respiratory Protection: Positive-pressure, self-contained breathing apparatus (SCBA) is recommended in response situations that involve exposure to potentially unsafe levels of toluene vapor.

Skin Protection: Chemical-protective clothing is not generally required when only vapor exposure is expected because toluene vapor is neither irritating nor absorbed well through the skin.

Chemical-protective clothing should be worn when repeated or prolonged contact with the liquid is anticipated because skin irritation and dermal absorption may occur.

ABC Reminders

Quickly access for a patent airway, ensure adequate respiration and pulse. If trauma is suspected, maintain cervical immobilization manually and apply a cervical collar and a backboard when feasible.

Victim Removal

If victims can walk, lead them out of the Hot Zone to the Decontamination Zone. Victims who are unable to walk may be removed on backboards or gurneys; if these are not available, carefully carry or drag victims to safety.

Consider appropriate management of chemically contaminated children, such as measures to reduce separation anxiety if a child is separated from a parent or other adult.

Decontamination Zone

Patients exposed only to toluene vapor who have no skin or eye irritation may be transferred immediately to the Support Zone. Other patients will require decontamination (as described below).

Rescuer Protection

If exposure levels are determined to be safe, decontamination may be conducted by personnel wearing a lower level of protection than that worn in the Hot Zone (described above).

ABC Reminders

Quickly access for a patent airway, ensure adequate respiration and pulse. Stabilize the cervical spine with a collar and a backboard if trauma is suspected. Administer supplemental oxygen as required. Assist ventilation with a bag-valve-mask device if necessary.

Basic Decontamination

Victims who are able may assist with their own decontamination. Quickly remove and double-bag contaminated clothing and personal belongings.

Flush liquid-exposed skin and hair with plain water for 2 to 3 minutes, then wash with mild soap. Rinse thoroughly with water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

Flush exposed or irritated eyes with plain water or saline for at least 15 minutes or until pain resolves. Remove contact lenses if easily removable without additional trauma to the eye. If a corrosive material is suspected or if pain or injury is evident, continue irrigation while transferring the victim to the Support Zone.

In cases of ingestion, **do not induce emesis**. The use of activated charcoal for hydrocarbon absorption is limited, but it may have some effect, especially in cases of mixed overdose. If the victim is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g). A soda can and a straw may be of assistance when offering charcoal to a child.

Consider appropriate management of chemically contaminated children at the exposure site. Provide reassurance to the child during decontamination, especially if separation from a parent occurs.

Transfer to the Support Zone

As soon as basic decontamination is complete, move the victim to the Support Zone.

Support Zone

Be certain that victims have been decontaminated properly (see *Decontamination Zone* above). Victims who have undergone decontamination or who have been exposed only to vapor generally pose no serious risks of secondary contamination. In such cases, Support Zone personnel require no specialized protective gear.

ABC Reminders

Quickly access for a patent airway. If trauma is suspected, maintain cervical immobilization manually and apply a cervical collar and a backboard when feasible. Ensure adequate respiration and pulse. Administer supplemental oxygen as required and establish intravenous access if necessary. Place on a cardiac monitor. Observe for cardiac arrhythmias.

Additional Decontamination

Continue irrigating exposed skin and eyes, as appropriate.

In cases of ingestion, **do not induce emesis**. The use of activated charcoal for hydrocarbon absorption is limited, but it may have some effect, especially in cases of mixed overdose. If activated charcoal has not been given previously and if the patient is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g). A soda can and a straw may be of assistance when offering charcoal to a child.

Advanced Treatment

In cases of respiratory compromise secure airway and respiration via endotracheal intubation. If not possible, perform cricothyroidotomy if equipped and trained to do so.

Patients who have bronchospasm may be treated with aerosolized bronchodilators. However, the use of sympathomimetic agents such as epinephrine and isoproterenol could precipitate fatal arrhythmias and should be avoided. Selective beta-2 agonists would be preferred, but clinical reports of their use are lacking. Theophylline derivatives have not been studied. Use all catecholamines with caution because of the enhanced risk of cardiac arrhythmias. Also consider the health of the myocardium before choosing which type of bronchodilator should be administered.

Patients who are comatose, hypotensive, or having seizures or cardiac arrhythmias should be treated according to advanced life support (ALS) protocols.

Monitor fluid and electrolyte status carefully. Correct hypokalemia with potassium phosphate (phosphate levels are also generally low). Hypocalcemia may occur following fluid and electrolyte replenishment. Do not administer bicarbonate therapy until potassium and calcium are adequately replaced.

Transport to Medical Facility

Only decontaminated patients or patients not requiring decontamination should be transported to a medical facility. "Body bags" are not recommended.

Report to the base station and the receiving medical facility the condition of the patient, treatment given, and estimated time of arrival at the medical facility.

If toluene has been ingested, prepare the ambulance in case the victim vomits toxic material. Have ready several towels and open plastic bags to quickly clean up and isolate vomitus.

Multi-Casualty Triage

Consult with the base station physician or the regional poison control center for advice regarding triage of multiple victims.

Patients with evidence of substantial inhalation exposure (e.g., confusion, syncope, or coma) and all patients who have ingested toluene should be transported to a medical facility for evaluation. Others may be discharged at the scene after their names, addresses, and telephone numbers are recorded. Those discharged should be advised to seek medical care promptly if symptoms develop (see *Patient Information Sheet* below).

Emergency Department Management

- **Hospital personnel can be secondarily contaminated by direct contact or vapor off-gassing from heavily soaked skin or clothing. Patients do not pose contamination risks after clothing is removed and the skin is washed. Toxic vomitus from patients who have ingested toluene may also off-gas toluene vapor.**

- **Toluene is irritating to the skin, eyes, and respiratory tract. It can cause systemic toxicity by ingestion or inhalation. The most common route of exposure is via inhalation. Symptoms of toluene poisoning include CNS effects (headache, dizziness, ataxia, drowsiness, euphoria, hallucinations, tremor, seizures, and coma), ventricular arrythmias, chemical pneumonitis, respiratory depression, nausea, vomiting, and electrolyte imbalances.**

- **There is no antidote for toluene. Treatment consists of support of respiratory and cardiovascular functions.**

Decontamination Area

Unless previously decontaminated, all patients suspected of contact with liquid toluene and all victims with skin or eye irritation require decontamination as described below. All other patients may be transferred to the Critical Care area.

Be aware that use of protective equipment by the provider may cause fear in children, resulting in decreased compliance with further management efforts.

Because of their relatively larger surface area:body weight ratio, children are more vulnerable to toxicants absorbed through the skin. Also emergency room personnel should examine children's mouths because of the frequency of hand-to-mouth activity among children.

ABC Reminders

Evaluate and support airway, breathing, and circulation. In cases of respiratory compromise secure airway and respiration via endotracheal intubation. If not possible, surgically create an airway.

Patients who have bronchospasm may be treated with aerosolized bronchodilators. However, the use of sympathomimetic agents such as epinephrine and isoproterenol could precipitate fatal arrhythmias and should be avoided. Selective beta-2 agonists would be preferred, but clinical reports of their use are lacking. Theophylline derivatives have not been studied. Use all catecholamines with caution because of the enhanced risk of cardiac arrhythmias. Also consider the health of the myocardium before choosing which type of bronchodilator should be administered.

Patients who are comatose, hypotensive, or have seizures or ventricular arrhythmias should be treated in the conventional manner. Avoid sympathomimetics or catecholamines or use them with caution. Beta-blockers may be more effective than lidocaine in cases of prolonged or resistant arrhythmias.

Monitor fluid and electrolyte status carefully. Correct hypokalemia with potassium phosphate (phosphate levels are also generally low). Hypocalcemia may occur following fluid and electrolyte replenishment. Do not administer bicarbonate therapy until potassium and calcium are adequately replaced.

Basic Decontamination

Patients who are able may assist with their own decontamination. Remove and double-bag contaminated clothing and personal belongings.

Flush liquid-exposed skin and hair with plain water for 2 to 3 minutes, then wash with mild soap. Rinse thoroughly with water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

Flush exposed or irritated eyes with plain water or saline for at least 15 minutes or until pain resolves. Remove contact lenses if present and easily removable without additional trauma to the eye. If a corrosive material is suspected or if pain or injury is evident, continue irrigation while transferring the victim to the Critical Care Area.

In cases of ingestion, **do not induce emesis**. The use of activated charcoal for hydrocarbon absorption is limited, but it may have some effect, especially in cases of mixed overdose. If the victim is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g). A soda can and a straw may be of assistance when offering charcoal to a child.

Critical Care Area

Be certain that appropriate decontamination has been carried out (see *Decontamination Area* above).

ABC Reminders

Evaluate and support airway, breathing, and circulation as in *ABC Reminders* above. Establish intravenous access in seriously ill patients if this has not been done previously. Continuously monitor cardiac rhythm. To avoid inducing ventricular fibrillation, use sympathomimetics or catecholamines with caution. Beta-blockers may be more effective than lidocaine in treating patients who have arrhythmia.

Patients who are comatose, hypotensive, or have seizures or ventricular arrhythmia should be treated in the conventional manner. Avoid sympathomimetics or catecholamines or use them with caution. Beta-blockers may be more effective than lidocaine in cases of prolonged or resistant arrhythmia.

Inhalation Exposure

Administer supplemental oxygen by mask to patients who have respiratory complaints. Patients who have bronchospasm may be treated with aerosolized bronchodilators. However, the use of sympathomimetic agents such as epinephrine and isoproterenol could precipitate fatal arrhythmia and should be avoided. Selective beta-2 agonists would be preferred, but clinical reports of their use are lacking. Theophylline derivatives have not been studied. Use all catecholamines with caution because of the enhanced risk of cardiac arrhythmia. Also consider the health of the myocardium before choosing which type of bronchodilator should be administered.

Skin Exposure

If the skin was in prolonged contact with liquid toluene, chemical burns may result; treat as thermal burns.

Because of their larger surface area:body weight ratio, children are more vulnerable to toxicants absorbed through the skin.

Eye Exposure

Ensure that adequate eye irrigation has been completed. Examine the eyes for corneal damage and treat appropriately. Immediately consult an ophthalmologist for patients who have corneal injuries.

Ingestion Exposure

Do not induce emesis.

The use of activated charcoal for hydrocarbon absorption is limited, but it may have some effect, especially in cases of mixed overdose. If activated charcoal has not been given previously and if the patient is alert, asymptomatic, and has a gag reflex, administer a slurry of activated charcoal at 1 gm/kg (usual adult dose 60–90 g, child dose 25–50 g). A soda can and a straw may be of assistance when offering charcoal to a child.

Consider endoscopy to evaluate the extent of gastrointestinal-tract injury. Extreme throat swelling may require endotracheal intubation or cricothyroidotomy. Gastric lavage is useful in certain circumstances to remove toxic material and prepare for endoscopic examination. Consider gastric lavage with a small nasogastric tube if: (1) a large dose has been ingested; (2) the patient's condition is evaluated within 30 minutes; (3) the patient has oral lesions or persistent esophageal discomfort; and (4) the lavage can be administered within one hour of ingestion. Care must be taken when

placing the gastric tube because blind gastric-tube placement may further injure the chemically damaged esophagus or stomach.

Because children do not ingest large amounts of toxic materials, and because of the risk of perforation from NG intubation, lavage is discouraged in children unless performed under endoscopic guidance.

Toxic vomitus or gastric washings should be isolated, e.g., by attaching the lavage tube to isolated wall suction or another closed container.

Antidotes and Other Treatments

There is no antidote for toluene. Hemodialysis and hemoperfusion are ineffective.

Monitor fluid and electrolyte status carefully. Correct hypokalemia with potassium phosphate (phosphate levels are also generally low). Hypocalcemia may occur following fluid and electrolyte replenishment. Do not administer bicarbonate therapy until potassium and calcium are adequately replaced.

Laboratory Tests

Routine laboratory studies for all exposed patients include CBC, glucose, and electrolyte determinations. Additional studies for patients exposed to toluene include ECG monitoring, renal-function tests, and liver-function tests. Chest radiography and pulse oximetry (or ABG measurements) are also recommended for severe inhalation exposure or if pulmonary aspiration is suspected.

Blood levels of toluene may be useful in documenting exposure, but are not useful clinically. Toluene is metabolized to hippuric acid, which is excreted in urine with a biologic half-life of about 3 hours. Results of urinary hippuric acid tests do not correlate well with systemic effects and are not available on an emergency basis; however, they can help confirm the diagnosis or etiology. The ACGIH suggests that levels exceeding 0.5 mg/L of o-cresol or 1.6 g of hippuric acid/g creatinine in urine, or 0.05 mg/L of toluene in blood indicate potential overexposure to toluene, but these are not useful clinically.

Disposition and Follow-up

Consider hospitalizing symptomatic patients who have significant inhalation or ingestion exposure with symptoms of CNS depression or respiratory distress.

Delayed Effects

Observe hospitalized patients for signs of acute tubular necrosis, encephalopathy, and arrhythmia. In addition, patients who have inhaled large amounts of toluene should be observed for signs of pulmonary edema, and those who have ingested toluene should be watched for signs of aspiration pneumonitis.

Patient Release

Patients who remain asymptomatic for 6 to 12 hours after exposure may be discharge with instructions to seek medical care promptly if symptoms develop (see the *Toluene—Patient Information Sheet* below).

Follow-up

Obtain the name of the patient's primary care physician so that the hospital can send a copy of the ED visit to the patient's doctor.

Patients who have corneal injuries should be reexamined within 24 hours. No long-term sequelae due to a single acute exposure to toluene have been reported.

Reporting

If a work-related incident has occurred, you may be legally required to file a report; contact your state or local health department.

Other persons may still be at risk in the setting where this incident occurred. If the incident occurred in the workplace, discussing it with company personnel may prevent future incidents. If a public health risk exists, notify your state or local health department or other responsible public agency. When appropriate, inform patients that they may request an evaluation of their workplace from OSHA or NIOSH. See Appendices III and IV for a list of agencies that may be of assistance.

Toluene
Patient Information Sheet

This handout provides information and follow-up instructions for persons who have been exposed to toluene.

What is toluene?
Toluene is a clear, colorless liquid with a sweet odor. It is obtained from crude petroleum and is highly flammable. Toluene is used in a variety of industries and is a common solvent for products such as paints, thinners, and glues. It is found in small amounts in gasoline.

What immediate health effects can be caused by exposure to toluene?
Breathing toluene vapors in small amounts may cause a mild headache, dizziness, drowsiness, or nausea. With more serious exposure, toluene may cause sleepiness, stumbling, irregular heartbeat, fainting, or even death. Toluene vapor is mildly irritating to the skin, eyes, and lungs. If liquid toluene contacts the skin, it may cause irritation and a rash. Liquid toluene splashed in the eyes can damage the eyes. Generally, the more serious the exposure, the more severe the symptoms.

Can toluene poisoning be treated?
There is no antidote for toluene, but its effects can be treated, and most exposed persons get well. Persons who have experienced serious symptoms may need to be hospitalized.

Are any future health effects likely to occur?
A single small exposure from which a person recovers quickly is not likely to cause delayed or long-term effects. After a serious exposure to toluene, some symptoms may take a few days to develop.

Repeated sniffing of toluene can cause permanent damage to the brain, muscles, heart, and kidneys.

What tests can be done if a person has been exposed to toluene?
Specific tests for the presence of toluene in blood or urine generally are not useful to the doctor. Hippuric acid, a breakdown product of toluene, can be measured in urine if the toluene dose was high. If a severe exposure has occurred, blood and urine analyses and other tests may show whether the brain, heart, or kidneys have been injured. Testing is not needed in every case.

Where can more information about toluene be found?
More information about toluene can be obtained from your regional poison control center; the state, county, or local health department; the Agency for Toxic Substances and Disease Registry (ATSDR); your doctor; or a clinic in your area that specializes in occupational and environmental health. If the exposure happened at work, you may wish to discuss it with your employer, the Occupational Safety and Health Administration (OSHA), or the National Institute for Occupational Safety and Health (NIOSH). Ask the person who gave you this form for help in locating these telephone numbers.

Follow-up Instructions

Keep this page and take it with you to your next appointment. Follow *only* the instructions checked below.

[ ] Call your doctor or the Emergency Department if you develop any unusual signs or symptoms within the next 24 hours, especially:
fatigue, headache, dizziness, tremor or seizures.
coughing, shortness of breath or wheezing
chest pain or tightness
increased pain or a discharge from injured eyes
increased redness or pain or a pus-like discharge in the area of a skin burn
fever

[ ] No follow-up appointment is necessary unless you develop any of the symptoms listed above.
[ ] Call for an appointment with Dr. _____ in the practice of _____.
When you call for your appointment, please say that you were treated in the Emergency Department at _____ Hospital by _____ and were advised to be seen again in _____ days.
[ ] Return to the Emergency Department/ _____ Clinic on (date) _____at _____ AM/PM for a follow-up examination.
[ ] Do not perform vigorous physical activities for 1 to 2 days.
[ ] You may resume everyday activities including driving and operating machinery.
[ ] Do not return to work for _____ days.
[ ] You may return to work on a limited basis. See instructions below.
[ ] Avoid exposure to cigarette smoke for 72 hours; smoke may worsen the condition of your lungs.
[ ] Avoid drinking alcoholic beverages for at least 24 hours; alcohol may worsen injury to your stomach or have other effects.
[ ] Avoid taking the following medications: _____
[ ] You may continue taking the following medication(s) that your doctor(s) prescribed for you: ___
_____
_____
[ ] Other instructions: _____
_____
_____

- Provide the Emergency Department with the name and the number of your primary care physician so that the ED can send him or her a record of your emergency department visit.

- You or your physician can get more information on the chemical by contacting: _____ _____ or _____, or by checking out the following Internet Web sites: _____; _____.

Signature of patient _____ Date _____

Signature of physician _____ Date _____