

Probably Not Wired To Code



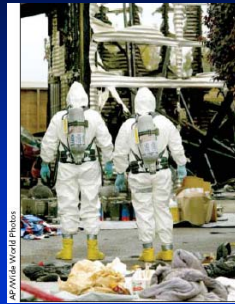
Booby Traps and IEDs

- Suspects engaged in criminal enterprise.
- Comfortable with handling of dangerous chemicals.
- EPIC Data:
 - 0.4 – 0.8% of all labs contain IED/booby trap



Burns

"Fires at covert improvised laboratories used to produce illicit methamphetamine are producing a new type of burn patient."
-AP Photo Caption



Burns

Methamphetamine Laboratory Explosions: A New and Emerging Burn Injury

Ariel P. Santos, MD, MPH,* † Ashley K. Wilson, MD,*
Carlton A. Homung, PhD, MPH, † Hiram C. Polk, Jr., MD,*
Joel L. Rodriguez, MD,* Glen A. Franklin, MD*

The proliferation of clandestine methamphetamine laboratories (meth labs) as a result of the growing popularity of the drug has resulted in an increasing incidence of burn injuries associated with laboratory accidents. We undertook this study to characterize these injuries. Fifteen consecutive patients were identified and case-matched by age and TBSA to 45 control subjects. Most meth lab patients were men, Caucasian, unemployed, and positive for polysubstance abuse. Resuscitation requirements were 1.8 times greater in these patients. There was a higher incidence of inhalational injury corresponding to higher intubation and tracheostomy rate and longer ventilator days among meth lab patients. The rate of nosocomial pneumonia, skin graft loss, and mortality were not different between the two groups. Meth lab injury is unique and requires more critical care resources. It also is associated with lack of insurance coverage and poor follow-up after injury. This injury has a significant impact not only on patients but also on the healthcare system. (J Burn Care Rehabil 2005;26: 228-232)



Precursor Chemicals

- Highly toxic, corrosive, and/or flammable
- Many restricted by OSHA regulations requiring hazardous materials teams to clean up sites
- Five pounds of toxic waste are generated for every pound of methamphetamine produced.
- Commonly disposed of in backyards, dumpsters, storm drains, parks or along roadsides and farm fields.

Chemicals

- Precursors
 - phenyl-2-propanone
 - ephedrine
 - pseudoephedrine
- Solvents
 - methanol
 - diethyl ether
 - freon
- Reagents (catalysts & caustics)
 - Catalysts*
 - mercuric chloride
 - sodium acetate
 - hydrogen sulfide
 - hydroiodic acid (HI)
 - iodine
 - red phosphorus
 - Caustics*
 - hydrochloric acid
 - phosphoric acid
 - sodium hydroxide

On-Site Chemicals

- Depends on methods being used
- Quantities vary based on size and activity of lab



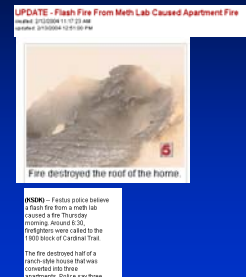
Chemicals

- Over 350 chemicals have been associated with meth labs
- 50 – 60 chemicals are commonly found
- By volume/quantity

Solvents	↓	Most
Caustics		
Precursors		
Catalysts		Least

Solvents

- Solvents are the most commonly encountered class of chemicals and the most common dermally-absorbed class of chemicals
- Leading cause of fires and explosions at clandestine labs.



Meth Lab Waste



Rural Environmental Fallout



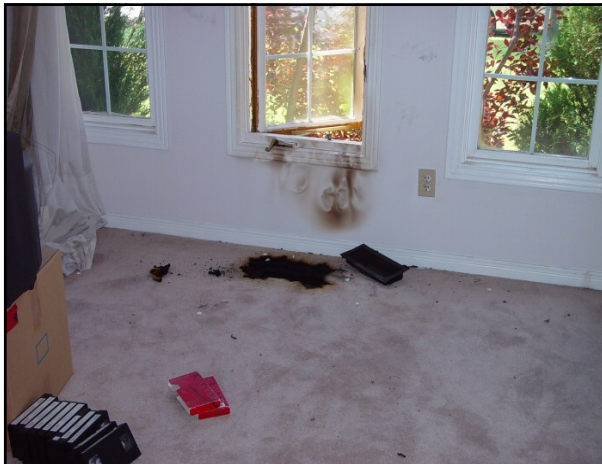
Reported Deaths / Illnesses

- Cooks
- Families / roommates of cooks
- Law enforcement and forensic personnel
- Phosphine (PH₃)
 - Implicated in at least 3 deaths (Willers-Russo, 1999)
 - One forensic worker got sick during processing (Burgess, 2001)
- Deaths due to fires, explosions and homicides also reported

Health Effects

- Most commonly reported adverse effects are headache and airway irritant symptoms
- Most associated with “processing phase”
- 7 to 15 fold risk of becoming ill during a seizure of active lab compared to setup and in-transit¹

Burgess et.al. Am J Ind Med. 20:488-494 (1996)



Hazardous Substances Emergency Events Surveillance (HSEES) System

- 40,349 hazmat events from 2000-2004
 - 1791 events involves methamphetamines
 - 558 events resulted in injuries, 947 total victims.
 - 5 percent of all hazmat injuries
 - 86% occurred in private households
 - 10% involved fires

Am J Ind Med 45:538-548, 2005

HSEES System

- 24% of all household events involving hazmat were methamphetamines related
 - More than one victim per event
 - 90% of victims are law enforcement and EMS responders

HSEES System

- Most common methamphetamine lab toxicants
 - Ammonia
 - Ethyl ether
 - Hydrochloric acid
- Most common methamphetamine lab symptoms
 - Respiratory irritation
 - Headache
- 25% treated at hospital & released
- 5% admitted, 2 deaths (burns)

Chemical Toxicity

- Irritant gases
- Corrosives
- Solvents

- Pharmacologically active agents are covered in a separate training module

Corrosives

- Local toxicity only
- Produces chemical burns
- Factors influencing exposure severity:
 - Time of contact
 - Concentration of agent

Corrosives

- Strong acids produce coagulative necrosis
 - Hydrochloric acid
 - Hydriodic acid
 - Sulfuric acid
- Strong bases (alkalis) produce liquefactive necrosis
 - Sodium Hydroxide



Corrosives (acid)



Corrosives (base)



Solvents

- Hydrocarbons are highly flammable
- Exposure causes CNS excitation followed by depression (diethyl ether, toluene)
- Halogenated hydrocarbons (freon, chloroform) are arrhythmogenic
- Chronic exposure effects: anemia, leukemia (benzene), neuropathy (hexane, xylene)

Irritant Gases

- Usually not absorbed systemically
- Damage moist surfaces
- Defined by water solubility
 - High
 - Moderate
 - Low
- Water solubility determines clinical presentation
- Can decrease ventilation & oxygenation

Inhalation Exposures

- High water solubility
 - Ammonia, hydrochloric acid, hydriodic acid
 - Immediate symptoms, good warning properties
 - Tend to target/affect upper & central airways
 - Early signs & Symptoms: Noisy Breathing, Pain, Cough, Stridor, Wheezing
- Low water solubility
 - Phosphine
 - Delayed symptoms, poor warning properties
 - Affects peripheral airways & alveoli
 - Produces pulmonary edema
 - Delayed-onset: Shortness of breath, Chest tightness, Dry-land drowning
 - Needs 24 hour observation

The new meth lab



Questions?

