



National Institute of
Environmental Health Sciences
Worker Training Program



Prevention of Occupational Exposure to Fentanyl and Other Opioids

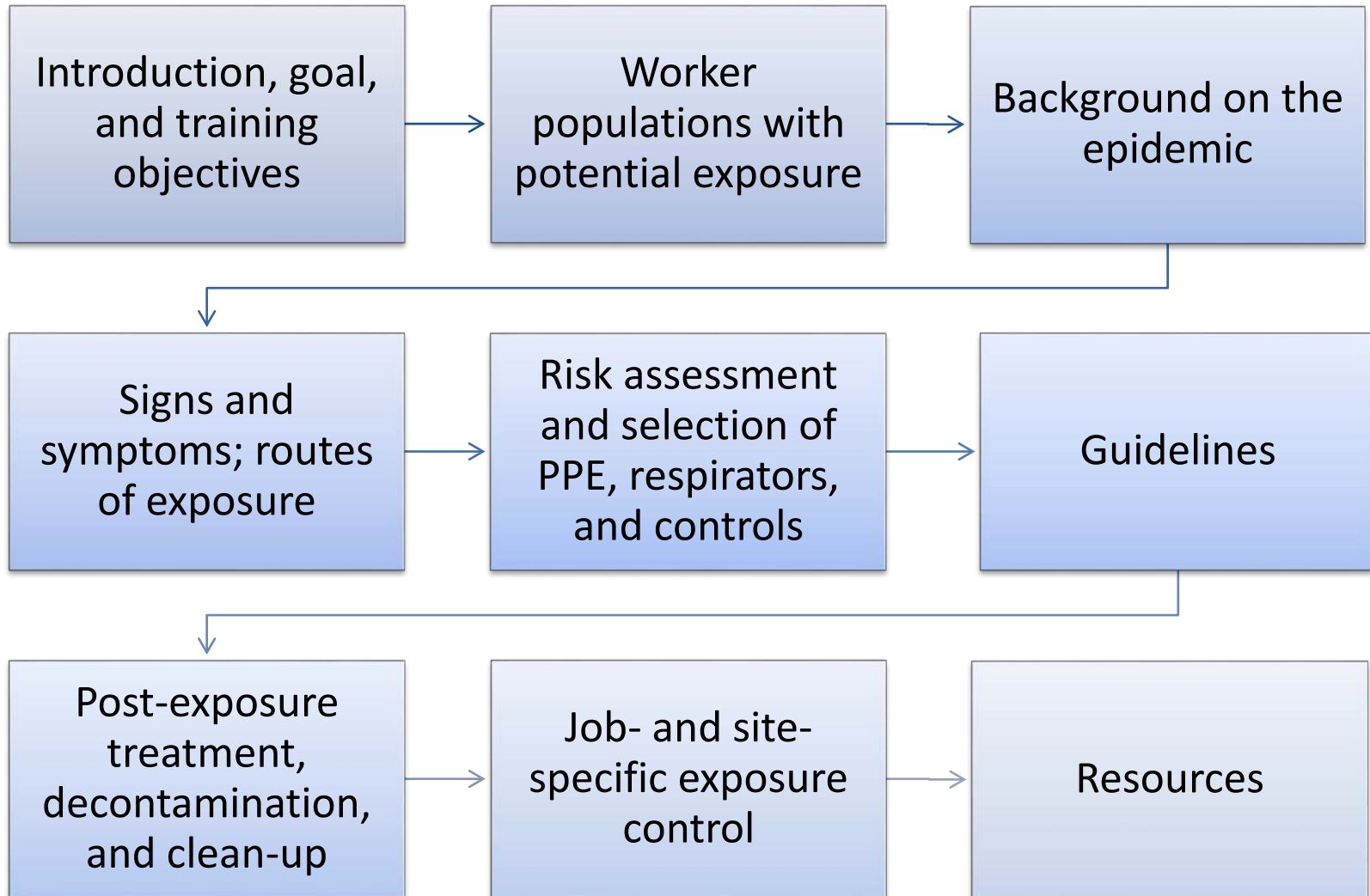
July 2018



INTRODUCTION, GOAL, AND LEARNING OBJECTIVES



Awareness Course Outline



Course Objectives



After completing this course, participants will be able to:

1. **Recognize** occupations with potential exposure to fentanyl and other opiates.
2. **Describe** signs and symptoms and treatment post-exposure.
3. **Explain** use of control measures for worker protection.
4. **Detail** methods for decontamination and clean-up.

CAUTION!

This presentation by itself *is not* sufficient training for personnel who have potential for occupational exposure to fentanyl and other opioids.



- Personnel must be trained to their employer's site-specific policies and procedures. Training must include *practice* putting on and taking off PPE and respirators and performing decontamination procedures until they are confident in doing so.

Small Group Activity



Workshop participant concerns about opioids

Time for activity: 20 minutes

Objective: The goal of this activity is to learn from participants about their concerns and experiences with opioids in the workplace and community.

Task: Choose a recorder/reporter. Ask each participant what their concerns and experiences are with opioids in the workplace and community and why they are attending the workshop. Report back and discuss.

What Is an Opioid?

- A class of drugs used to reduce pain.
- Prescription opioids are prescribed to treat moderate to severe pain, but have serious risks and side effects. Examples: oxycodone, hydrocodone, morphine, methadone, and fentanyl.
- Illegal opioid: heroin, illegally produced fentanyl and other synthetic opioids.



What Is Fentanyl?

- A powerful synthetic drug, similar to morphine and heroin.
- 50 to 100 times more potent than morphine.
- A rapid-acting synthetic opioid that alleviates pain.
- Acts quickly to depress central nervous system and respiratory function.
- Exposure may be fatal.



What Color Is Fentanyl?

Fentanyl powder may be:

- White
- Pink
- Purple
- Blue
- Green



How Much Fentanyl Is Fatal?

2-3 milligrams of fentanyl can induce respiratory depression, arrest, and death.

Comparable to 5-7 grains of salt!



What Are Some Other Drugs in This Class?

Acrylfentanyl

Butyrfentanyl

Carfentanil

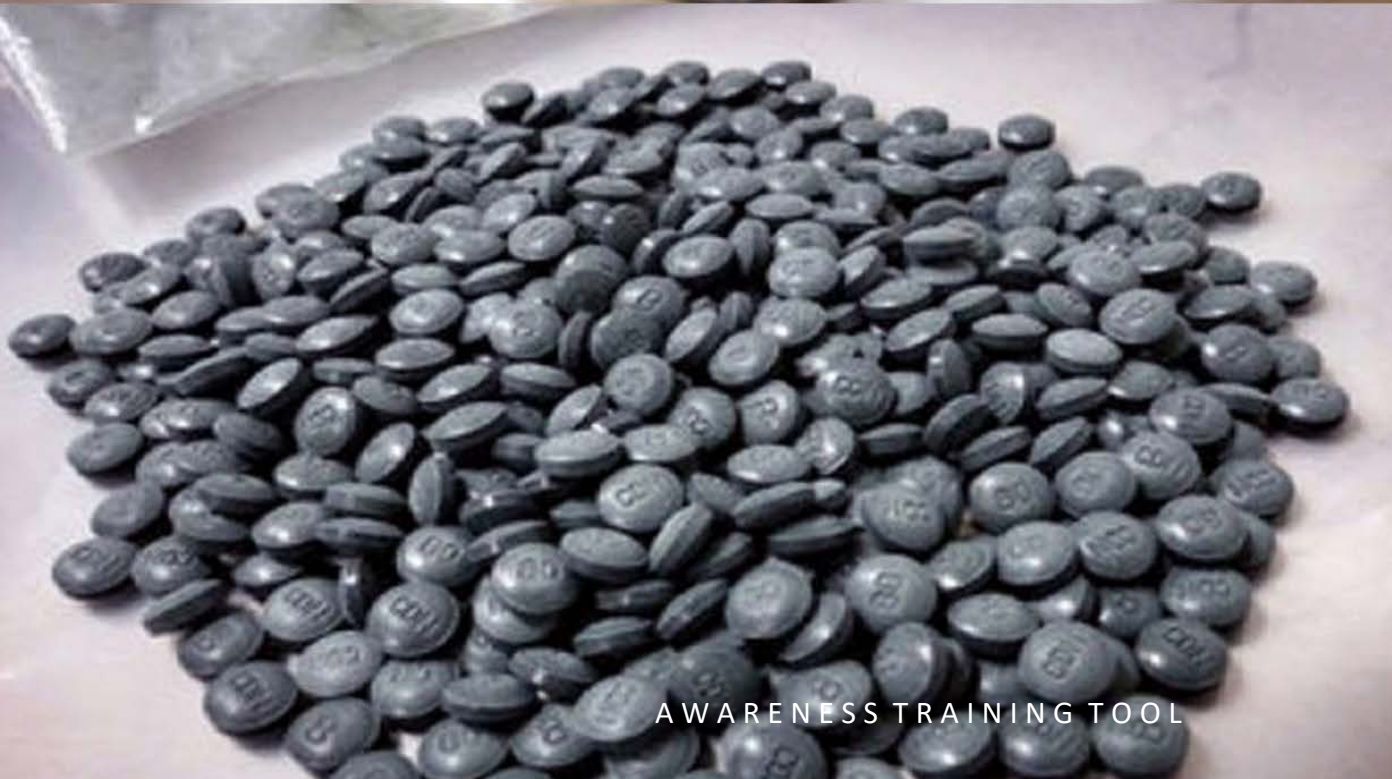
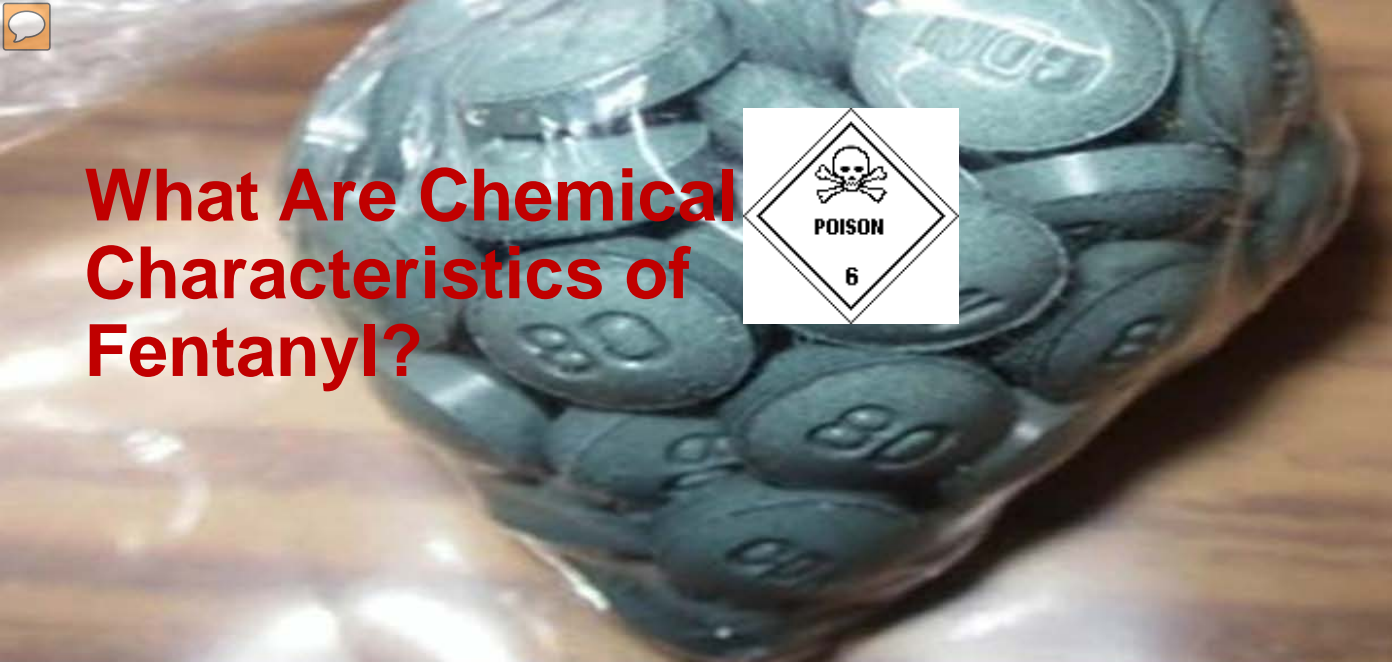
Alfentanil

Sufentanil

Remifentanil



What Are Chemical Characteristics of Fentanyl?



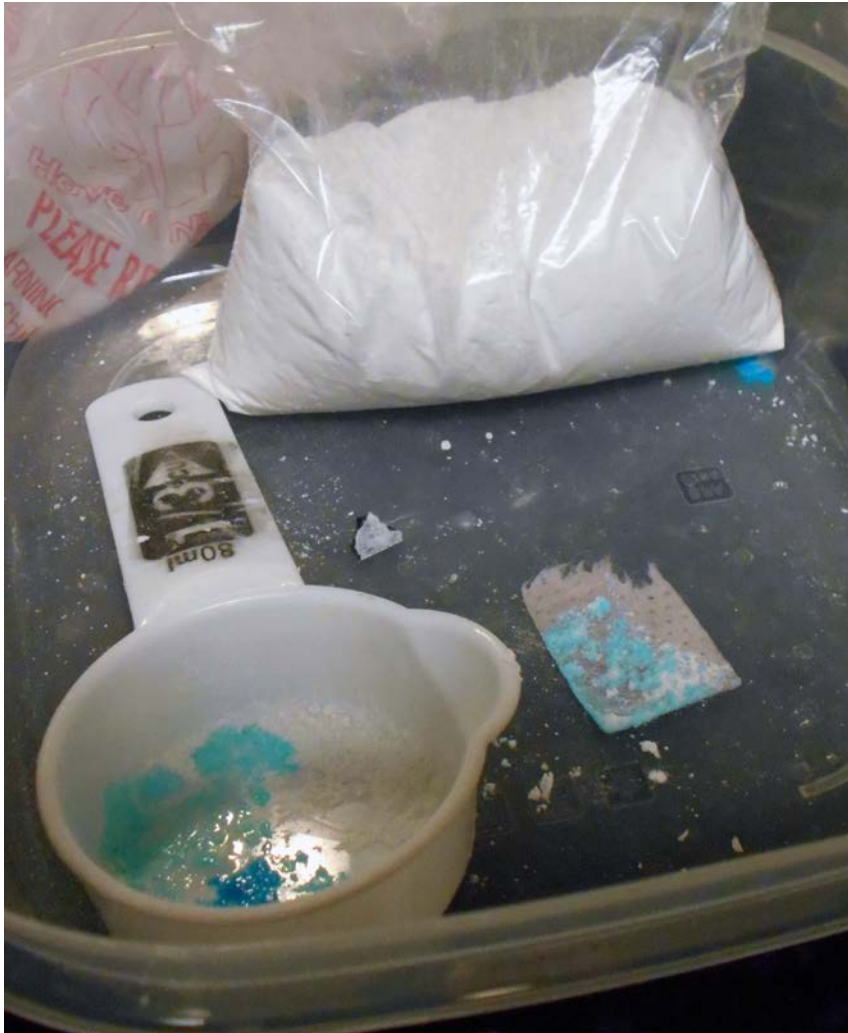
Legal Forms of Fentanyl and Synthetic Opioids

What do they look like?

- Lozenges called “lollipops”
- Tablets
- Sprays
- Patches
- Injectables



Photos of Illegal Fentanyl



Illegal Forms of Fentanyl and Synthetic Opioids

Street names?

Apache, China Girl,
China Town, Dance
Fever, Friend,
Goodfellas, Great Bear,
He-Man, Jackpot,
King Ivory, Murder 8,
and Tango & Cash.

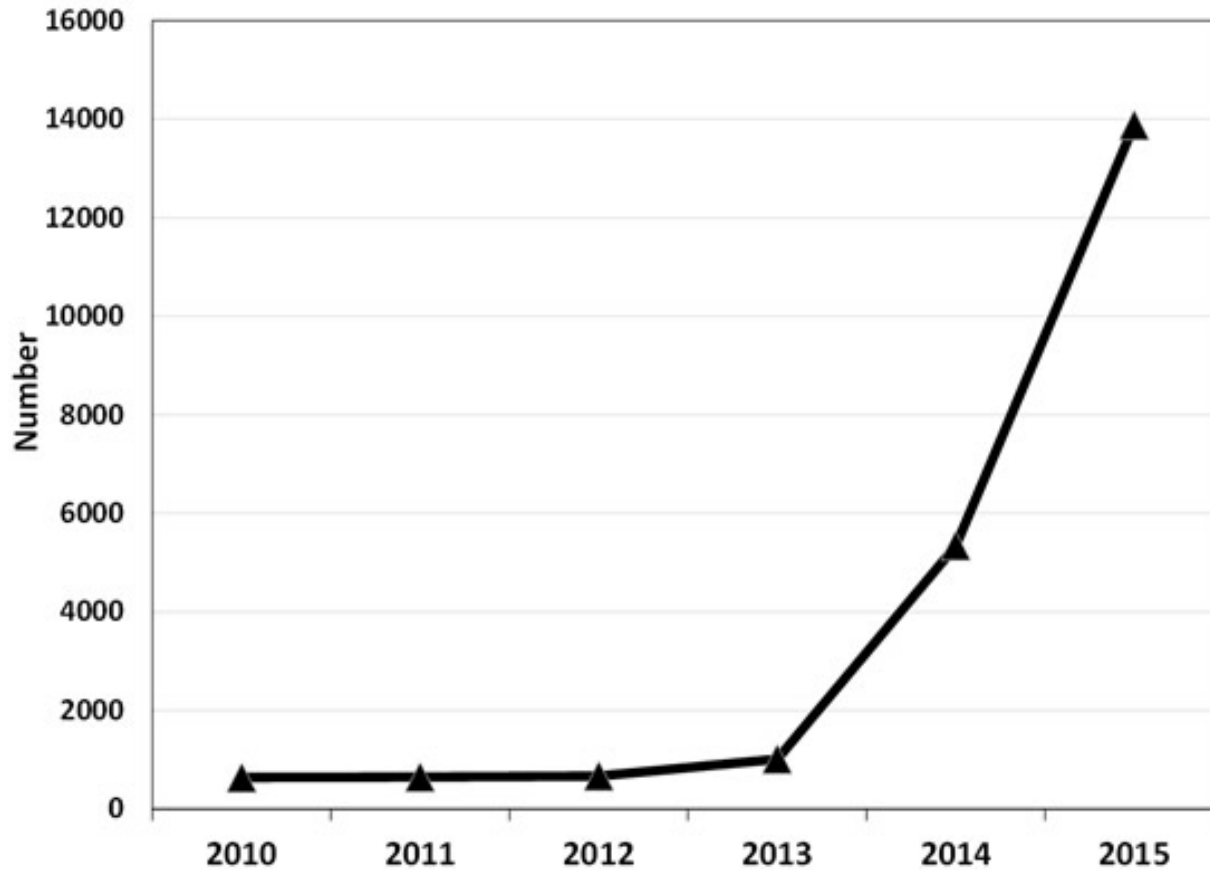




(U) Significant Fentanyl Seizures of More than 1 Kilogram, January 2016 - June 2017



Number of Reported Law Enforcement Encounters Testing Positive for Fentanyl in the U.S. 2010–2015



www.cdc.gov
Your Source for Credible Health Information

Worker Populations with Potential Exposure



Small Group Activity



Affected worker populations and job tasks

Time for activity: 20 minutes

Objective: The goal of this activity is to brainstorm which industries and job tasks have potential exposure to fentanyl and other synthetic opioids.

Task: Choose a recorder/reporter. List industries and job tasks that have potential exposure. Report back and discuss.

Worker Populations with Potential Exposure

Industry	Job Tasks
Pre-hospital (EMS)	911 calls involving treating, stabilizing, and transporting overdose cases. Exposure to needles and drug paraphernalia.
Law enforcement	Investigating, frisking, arresting, transporting people with drugs or who have overdosed.
Crime laboratories	Evidence handling and laboratory evaluation of confiscated drugs and drug paraphernalia.
Health care	Emergency department treatment of overdose cases. Use of Illicit opioids in patient rooms.
Environmental services, response and cleanup workers	Cleaning of affected crime scenes, spills, or abandoned drug labs.
Fire service	Fire suppression at contaminated locations.
Public employers (DOT, Highway Maintenance, Parks, Environmental Conservation, Corrections & Parole Officers)	Removal of needles/ drug paraphernalia from public roads, highways, and parks. Confiscation of contraband, searching, arresting.

New York State Department of Transportation Photos



Discarded syringes left in public parks and roadside rest stops.

Are These Substances a “Take Home Hazard”?

A take home hazard is when workers are contaminated with a chemical or biological at work and then bring it home and expose family members.

Workers can inadvertently bring home fine powders or tars on their hair, skin, clothes, shoes, vehicles, or equipment.

Examples include lead, pesticides, beryllium, asbestos, influenza, C. Difficile and MRSA.

Bottom Line: Protect your family by making sure proper procedures are in place for decontamination of clothing, equipment, vehicles, and personnel.

Scope of the Problem



As many as
1 in 4
PEOPLE

receiving prescription
opioids long term in a
primary care setting
struggles with
addiction.

Prescription Pain Killers

- In 2014, nearly 2 million Americans abused or were dependent on prescription opioid pain relievers.
- Providers wrote nearly a quarter of a billion opioid prescriptions in 2013, enough for every American adult to have their own bottle of pills.
- Taking too many prescription opioids can stop a person's breathing—leading to death.

Prevention of Occupational Exposure to Fentanyl and Other Opioids



More than
40
PEOPLE

die every day from
overdoses involving
prescription opioids.



Nearly
HALF


of all opioid overdose
deaths involve a
prescription opioid.



Prescription Opioid Deaths

- Prescription opioid overdose deaths often involve drug interactions with benzodiazepines.
- Benzodiazepines are central nervous system depressants used to sedate, induce sleep, prevent seizures, and relieve anxiety.
- Examples include alprazolam (Xanax[®]), diazepam (Valium[®]), and lorazepam (Ativan[®]). Avoid taking benzodiazepines while taking prescription opioids whenever possible.

Background on the Epidemic

- Fentanyl overdoses  up 540% in 3 years.
- Drug overdoses killed 64,000 in the U.S. in 2016.
- Leading cause of death for Americans under 50.
- Deaths from synthetic opioids, mostly fentanyl, increased from 3,000 (2013) to 20,000 (2016).



Lethal doses of heroin, fentanyl, and carfentanil.
(U.S. DEA photo)

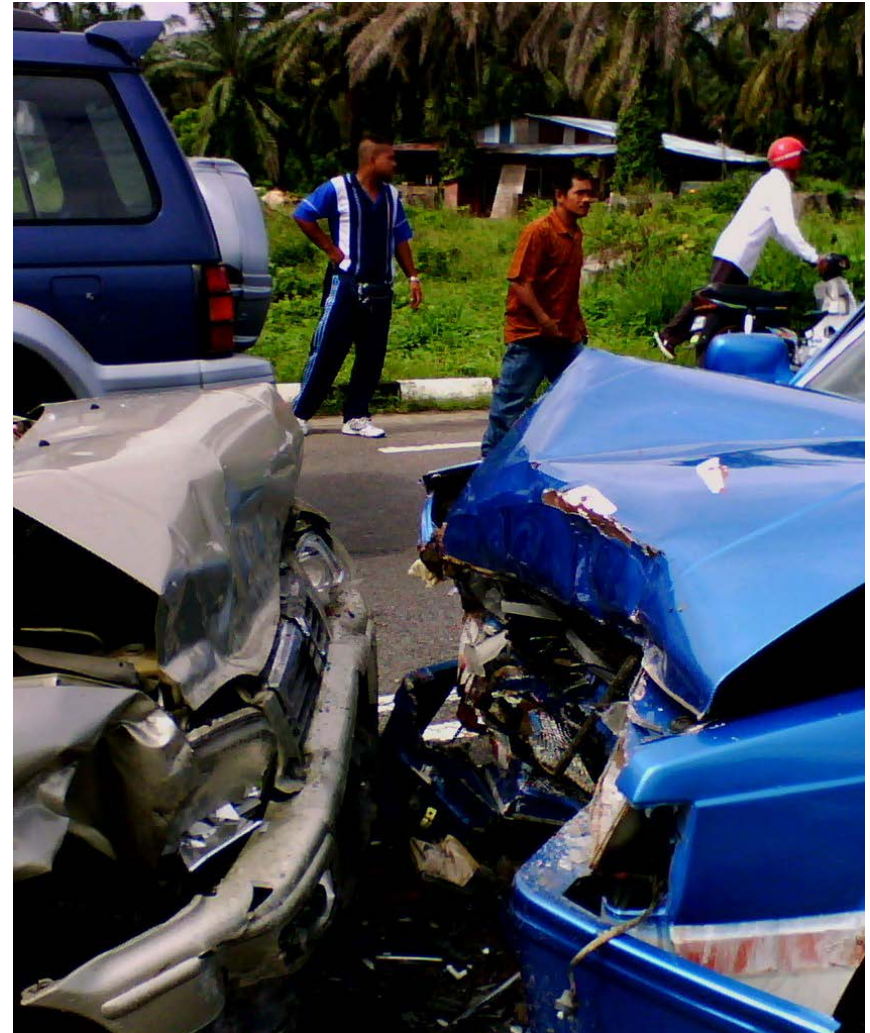
Illicit Opioids Are the Major Cause of the Crisis

- Synthetic opioids are often mixed with heroin and other illicit drugs.
- Formulated into tablets that look like therapeutic drugs.
- Frequently, users don't know that the drug they are using has fentanyl in it.

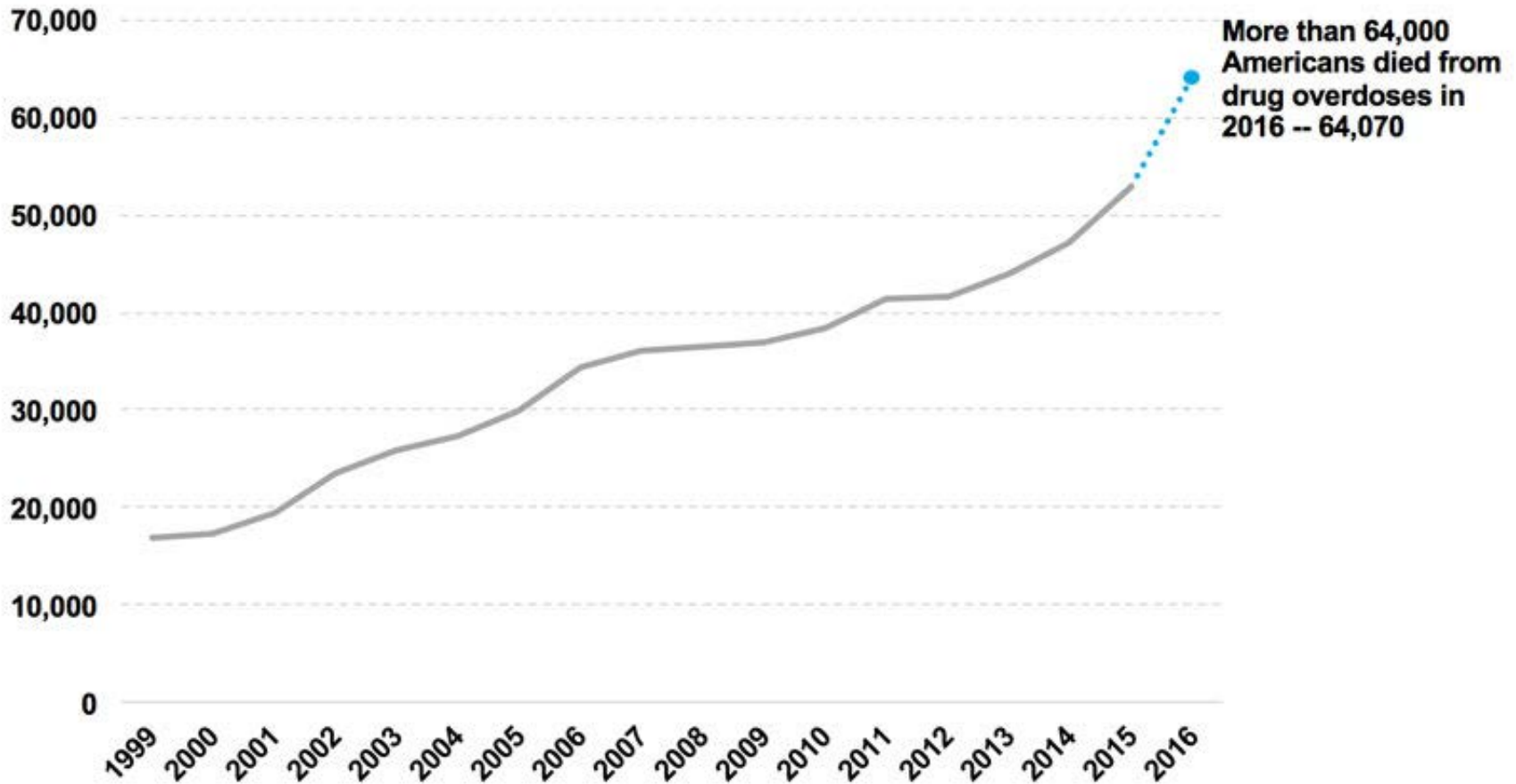


National Health Emergency

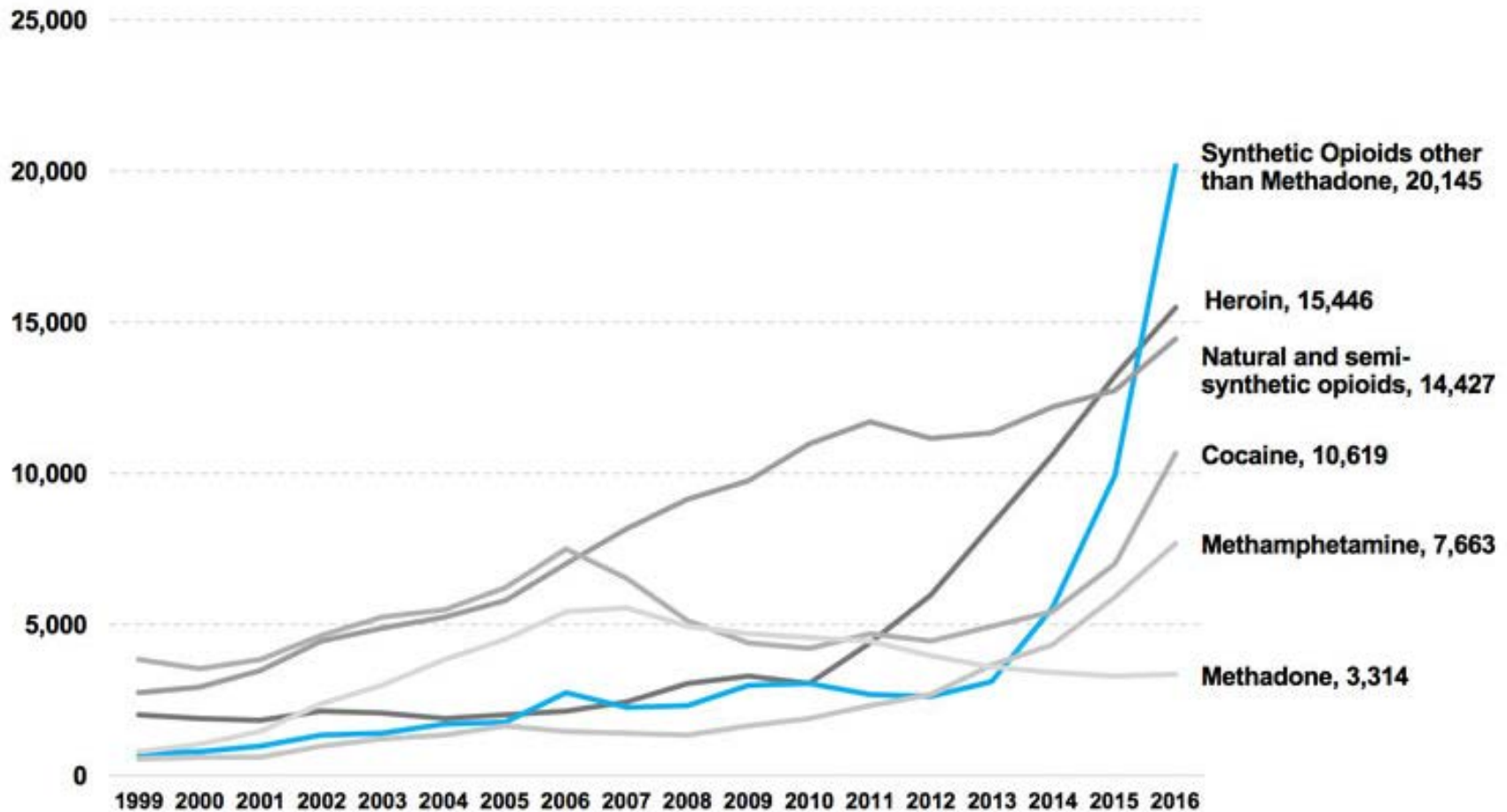
Drug overdose fatalities exceeded auto accidents as a cause of death for the first time in 2016. Illegally manufactured fentanyl is chiefly responsible for the current crisis.



Total U.S. Drug Deaths



Drugs Involved in U.S. Overdose Deaths, 2000–2016



Increased Hepatitis C Infection

- Acute Hep C incidence doubled between 2004 – 2014
- The main cause was use of injection drugs
- The increase was highest among those injecting prescription opiates

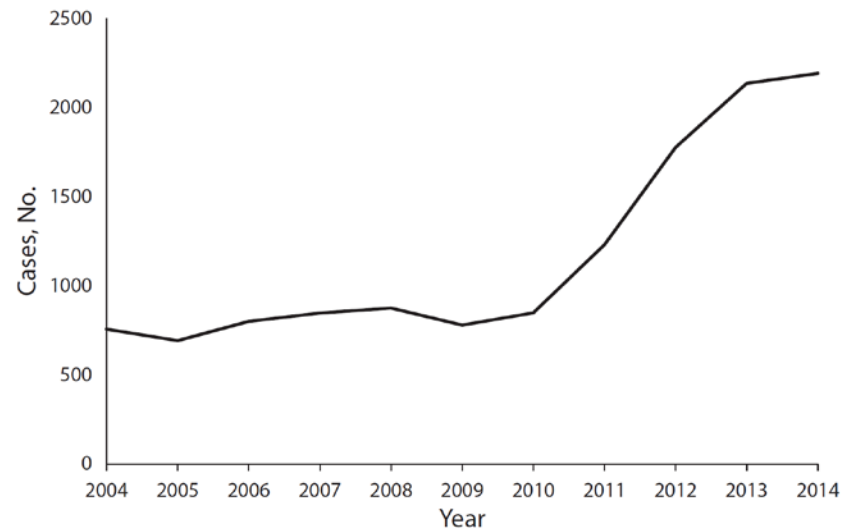


Figure 1—Reported Cases of Acute HCV Infection by Year: National Notifiable Disease Surveillance System, United States, 2004–2014

Signs and Symptoms; Routes of Exposure



What Are the Routes of Occupational Exposure?

Inhalation of
powders and
aerosols

Skin, eye, and
mucous
membrane
absorption

Incidental
ingestion
(hand to
mouth)

Accidental
inoculation
with sharps
or needles

Leading science organizations advise that incidental skin contact with dry products is not likely to cause overdoses.

Skin contact with liquid or gel can be highly toxic.

Skin Exposure

- Skin exposure to powdered or dry forms of fentanyl is not likely to cause overdoses in small amounts if promptly removed.
- Liquid or highly concentrated fentanyl can be absorbed rapidly via skin and can be extremely toxic.

It is prudent to provide full skin protection because the fatal dose is so low.

Signs and Symptoms

Overdose may result in:

- Stupor
- Pinpoint pupils that later may become dilated
- Cold and clammy skin
- Cyanosis: blue or purplish discoloration due to low oxygen
- Coma
- Respiratory failure leading to death

The presence of a triad of symptoms is strongly suggestive of opioid poisoning:

1. Coma
2. Pinpoint pupils
3. Respiratory depression

Post-exposure Treatment

- Naloxone (Narcan[®]) should always be on hand when there are potential exposures!
- Naloxone doesn't work with drugs other than opioids
- Naloxone is safe and effective



Naloxone (Injectable and Nasal Spray)

Sometimes multiple doses are required.





Prevention of Occupational Exposure to Fentanyl and Other Opioids

**The use of multiple
doses of naloxone
given by emergency
responders to
prevent opioid
overdose increased
by 26% (2012–2015)**



State Laws Vary on Naloxone

As of July 2017:

- 50 states passed laws making naloxone accessible without requiring a prescription.
- 40 states passed “Good Samaritan” laws to eliminate arrest, charging, or prosecution for reporting overdoses.
- These laws are all different. Check your state’s law for more info. <http://www.pdaps.org/datasets/laws-regulating-administration-of-naloxone-1501695139>
- As of 2014, 150,000 lay people received training and naloxone kits, reversing 26,000 overdoses.

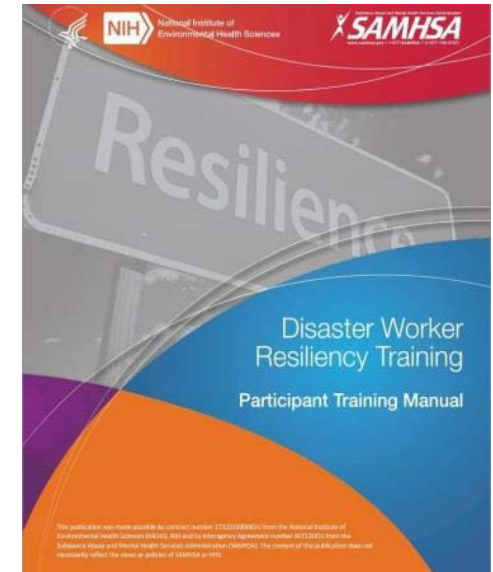
Occupational Exposure Case Reports

- Law Enforcement: Police, Probation, Corrections Officers.
- EMS and Fire Fighters.
- Emergency Department Staff.
- Crime Lab Analysts.
- “Sniffer” Dogs.
- The specific routes of exposure were not identified.
- All were administered naloxone and recovered.



Exposure to Opioids and Overdose Emergencies Are Traumatic Events

- Resilience is the ability to become strong, healthy, or successful again after something bad happens.
- It is normal to have a reaction to an abnormal event.
- Everyone reacts differently to stress and trauma.
- Stress can impact thinking, behavior, social interaction, and cause physical pain.
- Organizations should provide training and other supports to help increase worker resilience.



Hazard Communication

Annex A – Fentanyl Hazardous Substance Workplace Label

Labelling Info – FENTANYL CITRATE – CAS# 990-73-8



Toxic Material

Label Hazard Warning DANGER! Potent Narcotic. May be fatal if inhaled, absorbed through skin, or swallowed. Causes central nervous system effects.



Irritants

Safe Handling Precautions: do not breathe dust. Do not get in eyes, on skin, or on clothing. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear suitable protective clothing, respirator, eye protection and gloves.



Health Hazards

First Aid: Immediately flush eyes with plenty of water for at least 15 minutes. Immediately flush skin with plenty of water. If gas/fume/vapor/dust/mist from the material is inhaled, remove the affected person immediately to fresh air. Get medical attention immediately. Do not use mouth-to-mouth method if victim inhaled the substance.

IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.



Flammable

Never give anything by mouth to a victim who is unconscious or is having convulsions.

Do not induce vomiting without advice from poison control center.

Do not use mouth-to-mouth method if victim ingested the substance.

Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

Rinse mouth thoroughly. If vomiting occurs, keep head low so that stomach content doesn't get in to the lungs.

Are There Any Occupational Exposure Limits?

- OSHA and NIOSH have not developed OELs.
- Some of the drug manufacturers have OELs, 8-hour time weighted average and short-term exposure limits:

**0.1 microgram / M³ for
fentanyl, 8-hour TWA**



NFPA 704 Signal for Fentanyl

- **Health: 4**
- **Flammability: 1**
- **Reactivity: 0**
- **Special:**



Key Elements of an Exposure Control Program

- Management commitment and worker Involvement
- Hazard assessment
- Hazard control: environmental, administrative, PPE and respirators
- Decontamination
- Reporting and recordkeeping
- Training
- Post-exposure procedures (naloxone, etc.)
- Plan updates
- Evaluation

Hazard Assessment, Consider:

Which occupations/job tasks include potential exposure to fentanyl?

Are workers required to work in close proximity to potential exposure sources?

Will workers be at risk of exposure through inhalation, contact, splash, ingestion, or injection?

Will the work environment, equipment, or job tasks increase potential exposure?

OSHA Requirements

- OSHA's PPE and Respiratory Protection standards detail employer requirements.
- Employers must try to eliminate hazards before employing PPE and respirators.
- Selection of PPE and respirators must be based on a site-specific hazard assessment.
- The hazard assessment must be documented.



Engineering Controls

A laboratory chemical fume hood protects lab workers using an enclosure and ventilation.



Administrative Controls

DEA recommends that evidence should not be tested in the field to prevent officer exposures.

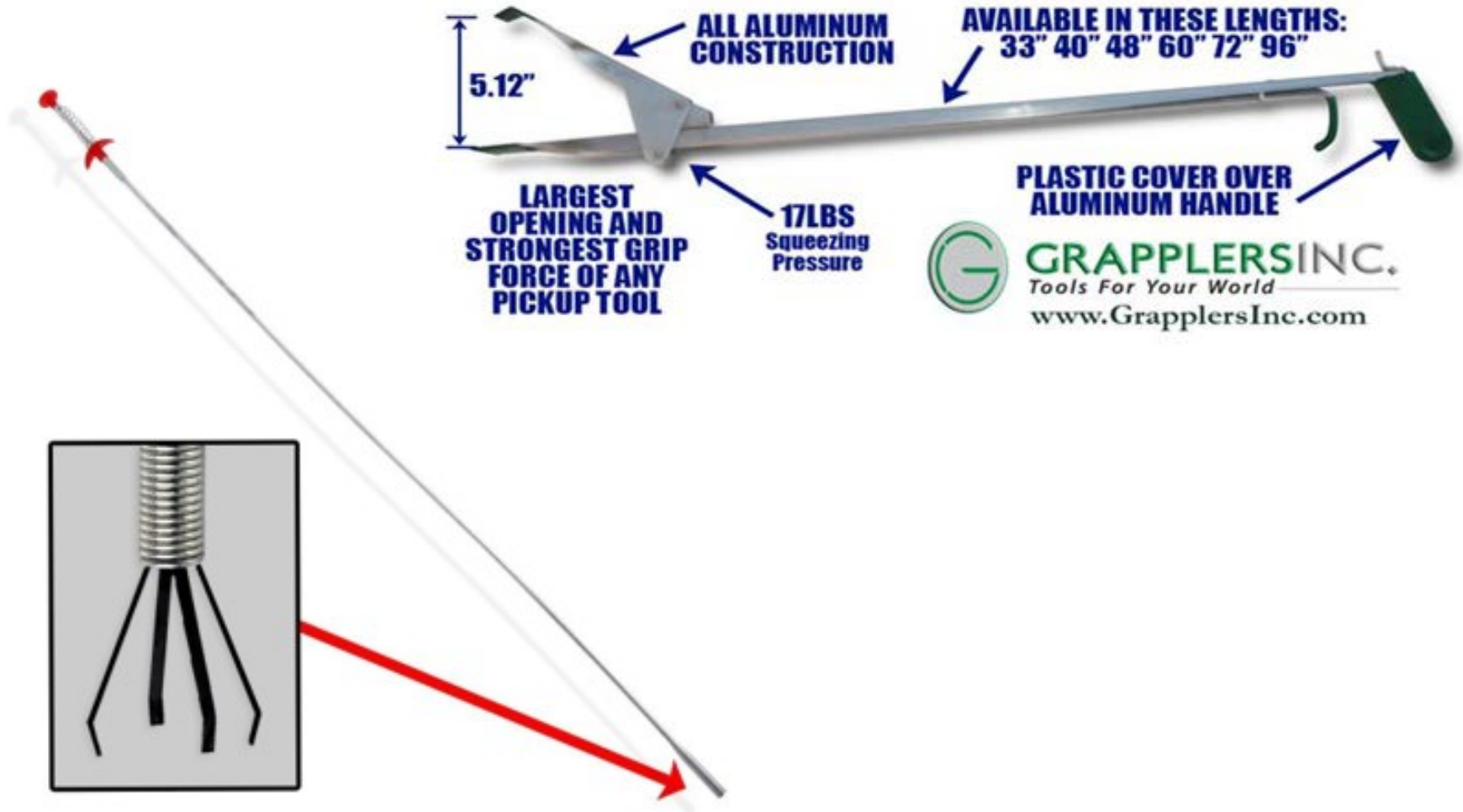
Engineering Controls

New York State DOT uses an industrial grade pick up tool to prevent exposure to contaminated sharps and drug paraphernalia dumped along the highway.



Prevention of Occupational Exposure to Fentanyl and Other Opioids

INDUSTRIAL GRADE PICK-UP TOOL



Disposal of Contaminated Sharps

- OSHA requires sharps containers must be puncture-resistant.
- The sides and the bottom must be leakproof.
- They must be appropriately labeled or color-coded red. They must be closable and they must be kept upright to prevent spillage.



GUIDELINES AND BEST PRACTICES

We will now review guidelines and best practices from several federal agencies and science organizations.



NIOSH Standard Operating Procedures

- Hazard assessment.
- No drinking, eating, smoking at the scene.
- Do not touch eyes, nose, mouth.
- Field testing is NOT recommended.
- Avoid tasks that aerosolize suspected fentanyl.
- Wash hands with soap and water.

Do NOT use hand sanitizer or bleach to clean contaminated skin as they may enhance skin absorption of fentanyl.

NIOSH Recommendations

- Training.
- Employer compliance with OSHA HAZWOPER Standard, 29 CFR 1910.120; PPE Standard, 29 CFR 1910.132; and Respiratory Protection Standard, 29 CFR 1910.134.
- PPE categories: minimal, moderate, and high (see next slide).
- Working dogs should be removed from the scene.



NIOSH Guidelines

- Fentanyl: Preventing Occupational Exposure to Emergency Responders
- Identifying the PPE appropriate for the risk is done by first selecting the correct job category, as defined above, and then the level of exposure anticipated
- Job Categories
 1. Pre-hospital Patient Care
 2. Law Enforcement
 3. Investigation and Evidence Handling
 4. Special Operations and Decontamination



NIOSH Exposure Categories

- 1. Minimal:** Response to a situation where it is suspected that fentanyl may be present but no fentanyl products are visible
 - Ex: Response to a suspected fentanyl overdose or law enforcement operation where intelligence indicates fentanyl products are suspected but are not visible on scene
- 2. Moderate:** Response to a situation where small amounts of fentanyl products are visible
 - Ex: Response to a suspected fentanyl overdose where fentanyl products are suspected and small amounts are visible on scene
- 3. High:** Response to a situation where liquid fentanyl or large amounts of fentanyl products are visible
 - A fentanyl storage or distribution facility, fentanyl milling operation, or fentanyl production laboratory

It is important to recognize that the exposure level initially selected can change and PPE should be adjusted accordingly.

Prevention of Occupational Exposure to Fentanyl and Other Opioids

Key	
✓	Minimum protection recommended.
●	When an on-scene health risk assessment is conducted and higher protection is warranted.
■	If particulate + gas/vapor hazard is expected above the immediately dangerous to life or health (IDLH) values or concentration is unknown, SCBA is recommended.
	Not recommended, refer scene to special operations response workers (such as local hazmat team)

Personal protective equipment recommendations for protection against fentanyl													
Personal Protective Equipment	Exposure Level	Pre-Hospital Patient Care			Law Enforcement Routine Duties			Investigations and Evidence Collection			Special Operations and Decontamination		
		Minimal	Moderate	High	Minimal	Moderate	High	Minimal	Moderate	High	Minimal	Moderate	High
<i>Respiratory Protection</i>													
Disposable N100, R100, or P100 FFR ¹			✓			✓			✓	✓		✓	✓
Elastomeric APR ²									●	✓		●	✓
PAPR ³										●		●	●
SCBA ⁴										■			■
<i>Face and Eye Protection</i>													
Safety goggles/glasses ⁵			✓			✓			✓	✓		✓	✓
<i>Hand Protection</i>													
Nitrile gloves ⁶		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓
Nitrile gloves, double or use of thicker gloves			●			●			●	●		●	✓
<i>Dermal Protection</i>													
Wrist/arm protection ⁷			✓			✓			✓	✓		✓	✓
Particulate hazards protective ensemble (i.e., NFPA 1999 Single or Multi-Use or NFPA 1994 Class 4 Ensemble)										✓			✓
Chemical hazards protective ensemble (i.e., NFPA 1994 Class 3 Ensemble or Higher)										●			●

InterAgency Board Guidance

- Best practices to minimize exposure to first responders.
- PPE based on potential for exposure and wearer's operational response function.
- Skin decontamination.
- Medical countermeasures, including naloxone.



IAB Recommended Best Practices

Exposure Risk	Operational Functions	Minimum Recommended PPE	Decon Recommendations
Minimal (no visible product or product contained within syringe or other package)	Response to a person with suspected overdose	Standard duty uniform and nitrile gloves (NFPA 1999)	<ul style="list-style-type: none"> • People: Wash with soap and water • Surfaces: Peracetic acid, hydrogen peroxide, or dichloroisocyanuric acid solutions
Moderate (small volume [grams] of material visible and not contained within a package)	Response to one or more persons with suspected overdose; response to a localized seizure (e.g., traffic stop)	Standard duty uniform; nitrile gloves (NFPA 1999); P100 filtering facepiece respirator; safety glasses	<ul style="list-style-type: none"> • People: Wash with soap and water • Surfaces: Peracetic acid, hydrogen peroxide, or dichloroisocyanuric acid solutions
Moderate (large volume [kilograms] of material)	Response to a bulk storage or distribution facility	Standard duty uniform with long sleeves or sleeve covers; nitrile gloves (NFPA 1999); P100 filtering facepiece respirator; non-vented or indirect vented goggles	<ul style="list-style-type: none"> • People: Wash with soap and water • PPE and Sensitive Equipment: Peracetic acid solutions (pH ≤ 7) • Surfaces: Peracetic acid, hydrogen peroxide, or dichloroisocyanuric acid solutions
High (milling lab with particulates present)	Response to a suspected opioid milling operation that mixes synthetic opioids with binders or other illicit materials to produce a street-level product	NFPA 1999 multi-use ensemble or NFPA 1994 Class 4 or 4R ensemble; full face air-purifying respirator (APR) with P100 filters	<ul style="list-style-type: none"> • People: Wash with soap and water • PPE and Sensitive Equipment: Peracetic acid solutions (pH ≤ 7) • Surfaces: Peracetic acid, hydrogen peroxide, or dichloroisocyanuric acid solutions
High (production lab with bulk chemicals present)	Response to a suspected opioid production laboratory, potentially including a milling operation, that produces illicit materials using any combination of chemical precursors	NFPA 1994 Class 3 or 3R ensemble or higher; full face CBRN APR or higher	<ul style="list-style-type: none"> • People: Wash with soap and water • PPE and Sensitive Equipment: Peracetic acid solutions (pH ≤ 7) • Surfaces: Peracetic acid, hydrogen peroxide, or dichloroisocyanuric acid solutions

Pharmaceutical Laboratory PPE Examples

- Half-face respirator with HEPA filters
- Safety goggles or full-face respirator
- Double nitrile gloves
- Coated gown or jumpsuit
- Shoe covers
- Head cover



What Can We Learn from Pharmaceutical Industry?

- Fentanyl exposure events have occurred when handling small (gram) quantities in laboratory settings.
- Multiple doses of naloxone have been required to reverse significant exposure events.
- How PPE is worn and how it is removed are essential skills to control exposures to fine powders.
 - Potential to disperse powders on protective clothing during doffing.
 - Clean gloves required to remove respirators.
 - Personal clothing is always protected with disposable sleeves, coats, or jumpsuits.
 - Putting on and taking off PPE must be practiced.

Packaging and Transportation

- DEA recommends against field testing of suspected fentanyl.
- DEA provides detailed guidance on packaging and transporting evidence in compliance with U.S. DOT regulations.



Detection and Testing

- Sampling and laboratory testing can detect fentanyl and many of its sister drugs at very low levels.
- Some of these methods can also detect fentanyl that has been combined with heroin down to 0.1% level.



IAB Personal Decontamination

- Direct skin contact with suspected fentanyl should be immediately washed with large amounts of water.
- As soon as feasible, skin surfaces should be additionally washed with soap and water.
- Do NOT Use alcohol-based hand disinfectants or hypochlorite bleach solutions as they may enhance skin absorption of fentanyl.



IAB Clean-up and Decontamination

- Avoid contamination while removing PPE.
- Isolate used PPE for decon or disposal.
- Decon PPE surfaces with absorbent wipes, and a peracetic acid (5%) or hydrogen peroxide-based (10%) solution.
- Minimize the use of free chlorine-based decon solutions, as they may deteriorate the PPE.





JOB-SPECIFIC HAZARD CONTROL AND TRAINING

The next few slides show some
occupation-specific concerns.

EMS



Law Enforcement



This photo shows powdered fentanyl on the floor of a car seized during the Ohio arrest.

Clandestine Labs



Crime Laboratories

- Q1 2017: DEA laboratory system had 230 identifications of fentanyl or fentanyl-related substances.
- Heroin was found in combination with fentanyl in 61% of the identifications.



Death Care Sector

Examples of hazard assessment:

- Assessing the remains and surroundings before transfer to a stretcher.
- Searching pockets for material before removing remains.
- Removing and storing the deceased's clothing and personal effects.
- Often cause of death is unknown.
- Treat all unknown substances as hazardous until identified.
- Availability of PPE and respirators.
- Availability of naloxone.

Opioid Addiction and Work-related Injuries

- 2.9 million work injuries and illnesses reported in 2016.
- We don't know how many of the 64,000 opioid deaths in 2016 began as treatment for work injury.
- Often insurance companies and self-insured employers challenge the necessity of treatment under state workers' compensation systems, causing delays, and continued pain for affected workers and lead to addictions.
- **Solutions:**
 - Prevention of work-related injuries is the primary prevention.
 - Alternative treatments for pain are needed.
 - Eliminating delays in treatment for work injuries.
 - Expand and improve access to addiction treatment.

Support for Addicted Workers

- In healthcare, alternative-to-discipline (ATD) programs help licensed workers recover from addiction and return-to-work without losing their license and career
 - The addicted workers stop practicing during treatment.
 - An individual sobriety and recovery program is established.
 - Return-to-work agreements may involve reduced hours, limited shifts, and restrictions to assignments (no access to narcotics).
 - Continued treatment and monitoring for periods of 2 to 5 years.
- These programs have been successful by providing a non-punitive pathway for addicted workers to obtain treatment and keep their employment.

Should this approach and model be applied to other occupations and industries?

Small Group Activity



Applying what you learned today

Time for activity: 15 minutes

Objective: The goal of this activity is to discuss any potential actions you may take based on today's workshop.

Task: Choose a recorder/reporter. List job categories and job tasks that have potential exposure. Report back and discuss.

Summary

Thank you for attending today's training program. The opioid crisis is a public health crisis of serious dimensions. Today's awareness program provides an overview on the crisis and addresses key points related to occupational exposure to fentanyl and other synthetic opioids.

We encourage you to take this information to your organization(s) and advocate for additional awareness and operational training as needed.

Resources

1. [Fentanyl: Preventing Occupational Exposure to Emergency Responders](#) – CDC
2. [IAB First Responder PPE and Decontamination Recommendations for Fentanyl](#)
3. http://www.acmt.net/_Library/Fentanyl_Position/Fentanyl_PPE_Emergency_Responders_.pdf – ACMT/AACT Position Statement
4. [Fentanyl: A Briefing Guide for First Responders](#) – DEA
5. [Fentanyl Safety for First Responders](#)
6. [Back From the Brink: Need for Narcan](#) (video) – Connecticut Department of Mental Health and Addiction Services (CTMHAS)
7. [DEA Officer Safety Alert: Fentanyl – A Real Threat to Law Enforcement](#) (video)
8. [DEA Warning to Police and Public: Fentanyl Exposure Kills](#)
9. [Fentanyl Safety Recommendations for First Responders](#) – NIOSH/ CDC