Medical Assessment of the Drug Endangered Child

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Course Overview and Objectives

- Understand methamphetamine and its effects
- Understand the health hazards of the meth lab environment
- Understand the general abuse and neglect issues
- Learn the standard medical protocol for drug endangered children

Methamphetamine and Its Effects

- Physiology
- Metabolism
- Effects on adults
- Effects on children

Methamphetamine Physiology

- Dopamine centers in the brain: caudate nucleus
- Methamphetamine stimulates excess release of dopamine
- Flood the dopamine centers
Metabolism

- Ingested, Smoked, IV
- Half-life is variable (4-24 hrs)
- Metabolized by the liver
- Excreted in the urine
  - 1/3 of meth is excreted in active form as meth

Medical Effects of Methamphetamine

- Adults
  - Short term
  - Long term
  - Permanent?
- Children
  - Short term
  - Long term

Effects on Adults: Short term

- Increased energy, sexual arousal, euphoria
- Decreased appetite
- Increased heart rate, abnormal rhythm, high blood pressure, heart attack
- Dizziness, seizures
- Extremely high temperature

Effects on Adults: Long term

- Powerful addiction: unable to stop use, tolerance, withdrawal symptoms
- Neurotransmitters “turned off”
- Tremor, uncontrolled movements (Parkinson’s Disease)
- Paranoia, hallucinations, compulsive and aggressive behavior
- Weight loss
- Insomnia, memory loss
- Persistent abnormal heart rhythms, stroke
**Effects on Adults:**

*“Permanent”*

- After meth is stopped
- At least 6-12 months of symptoms
  - Profound depression, lack of pleasurable feelings
  - Insomnia
  - Psychosis, paranoia
- Permanent brain changes
  - Brain scan studies show 25-80% reduction in dopamine metabolism after > 6 months abstinence
  
  Davidson 2001

**Brain Changes with Meth Use**

- PET scans comparing dopamine metabolism in control subject, abstinent meth subject (~3 yrs), and Parkinson’s Disease
  
  McCann 1998

**Brain changes with Meth Use**

- PET scans show loss of dopamine transporters with meth use/addiction, and improvement after long-term sobriety
  
  Volkow 2001

**Brain Changes with Meth**

- Axons don’t always grow back correctly
- Different parts of brain recover at different rates
- Impairment of word and picture recall persist
- Impaired ability to manipulate information
  - Ignore information
  - Inability to filter irrelevant information
  - Studies show impairment worse at 12 weeks of non-use than is evident in current user
  - Word recall gets worse, picture recall gets better
  
  Volkow 2001
Medical Effects on Children

- Short-term
  - Similar to adults, but children are not just “small adults”
  - Symptoms occur at lower doses
- Long-term
  - Unknown

Children Are NOT Small Adults

- Different diet
- Growing & developing (brain, liver, kidney, lungs); still vulnerable to damage
- Higher metabolic rate: absorb & metabolize toxins at a higher rate
- Developing nervous system
- Unusual habits (i.e. hand-to-mouth behaviors; eating strange things; close to ground/floor; unknowingly imitating; etc.)

Few Case Series

- Few cases reported in the literature
  - 18 children under 7 years old accidentally ingested methamphetamine
  - Their parents had left drugs out in easy access
  - Symptoms: Increased heart rate, agitation, irritability and vomiting, muscle breakdown, fever, ataxia, seizure
    » Kolecki, 1998

What Toxins Are in a Meth Lab?

Red-P Method
- Methamphetamine powder and solution
- Flammable solvents
- Red Phosphorus
- Acid
- Lye
- Iodine
**Solvents**

- Highly flammable, large quantities
- Many solvents used: camp fuel, toluene

**Inhalation/aspiration**
- Cause pneumonitis, pulmonary edema, death
- Ingestion may cause liver or bone marrow failure
- Chronic inhalation causes brain damage

**Red Phosphorus**

- Inhalation of powder causes respiratory and eye irritation: cough, bronchitis, burning eyes
- When heated with acid, produces LETHAL phosphine gas. Sx’s = pulmonary edema, liver and kidney failure, psychosis, sz’s, coma
**Acids**

- Stored in large quantities in unmarked containers, frequent spills

**Acids**

- Acid inhalation causes respiratory irritation, skin and mucosal erosion, pulmonary edema, death

**Lye**

- Severe caustic burns on the skin, eyes, mouth, esophagus (if swallowed)

**Iodine**

- Concentrated iodine causes irritation and burns to skin, eyes, respiratory tract, mouth, esophagus
Iodine

- Chronic ingestion can cause diarrhea, vomiting, pain, thyroid disease. Large ingestion can be fatal.

What Toxins Are in a Meth Lab? New Research

- John Martyny, Ph.D, Industrial Hygienist
- National Jewish Medical Center at Denver and NIOSH
- Measure toxicities
  - Meth Red-P labs: controlled mock lab, abandoned house mock lab, actual meth seizures
  - Meth Ammonia Labs: abandoned house mock lab
  - Mock smoked meth

New Research

- Meth Labs – Red-P method
  - Lethal phosphine gas level around stove
  - Toxic levels of hydrochloric acid throughout cook time, some lethal levels
  - Toxic iodine around cook area
  - All persons and items in the building are contaminated with meth and chemicals
  - Law enforcement personnel should not enter unless wearing PPE with self contained breathing apparatus

New Research

- Controlled smoke of methamphetamine
  - Standard motel room, smoked 2.45 g, none inhaled
  - Toxic meth levels airborne during smoke and on all surfaces after smoke
Other Health Hazards

- Smoke detectors disabled or non-existent, though risk for house fire or explosion is very high
- Filthy home environment, filthy children.
  - Littered with rotten food, garbage, feces = risk for food poisoning and diarrheal illnesses
  - Skin infestations and infections
- No utilities, condemned housing
- Booby traps

General Abuse and Neglect Issues

- Physical abuse
- Sexual abuse
- Neglect
- Increased risk for “accidental” injury
- Increased risk for infant mortality

Physical Abuse

- Remember this little girl?
- 2-year-old found in “box” meth lab, locked up in a back bedroom
- Parents high on meth
- Chemical burns on the face and mouth
- Patterned burns on the back from a hair dryer
- Untreated tibia fracture

Sexual Abuse

- Meth increases sexual arousal in adults
- Meth addict homes littered with pornography
- Children are unsupervised around multiple strangers (drug buyers and associates) in the home
- Children may be sexually abused by their own parents, prostituted for drugs, or forced to view sexual acts, pornography
**Neglect**

- Lack of nurturing and emotional stimulation results in developmental delays, depression and attachment disorder
- Malnutrition/Failure to Thrive

**Neglect**

- Poor hygiene and infectious skin conditions (scabies, impetigo)
- Medical neglect of chronic medical problems (asthma, epilepsy)
- Little well child care/ immunization delay
- No insurance/ inadequate medical care

**Increased Risk for Injury**

- Lack of supervision results in increased injury from falls, burns, lacerations, drowning
- DUIs increases serious risk for injury from MVA w/wo car seat/ seatbelt
- Increases risk of injury in house fire
Risk for Injury

- 10-month-old female rescued from a house fire in a trailer. Drugs and paraphernalia found in easy access.
- This infant and 5-year-old sibling urine tox meth+

Risk for Injury

- Contact burns from falling debris
- Singed hair

Risk for Injury

县级报纸

Local

Toddler burned by meth lab in home

The boy's parents originally told health-care workers that the child was injured when they were burning leaves.

The boy was then transported to Denver, where social workers determined that he was the center of drug-related activity in the household.

The social workers then contacted members of the medical team at Tulsa Children's Hospital, who arranged for the child's care.

Following the questionnaire, the Joplin Police Department contacted Tulsa Police officers to investigate the possibility that the child was injured in a meth lab. Their investigation revealed that the child was burned by a meth lab.

### Increased Infant Mortality

- Associated increased risk of SIDS
- Associated risk of positional overlay
- Associated risk of very premature birth and severe complications

### National DEC Alliance Medical Protocol

- **Decontamination**
  - Immediate
  - Within 72 hours
  - Follow-up

**NATIONAL PROTOCOL FOR MEDICAL EVALUATION OF CHILDREN FOUND IN DRUG LABS**

**PERSONNEL DECONTAMINATION**

- Decontamination of the children should occur prior to transport to the medical facility as medically appropriate.
- Removal of clothing, cleansing of the skin and hair and new clothes are the minimum requirements of decontamination.

**LAB SITE**

- **ACTIVATE**
  - If explosion, obvious chemical exposure, active lab, or child appears ill
  - TRANSPORT IMMEDIATELY VIA EMS

**PLACEMENT per local protocol**

- **Emergency Department**
  - 1. Neurological status
  - 2. Respiratory status: O2 sat
  - 3. Blood: CBC, Chemistry panel
  - 4. Urine toxicology via chain of custody

**LAB ENFORCEMENT**

- 1. Head to toe exam of the children within 2 to 4 hours to assess acute status 1, 2, 3 in Emergency Department
- 2. Specific attention to the respiratory status as the chemicals can cause acute respiratory problems.
- 3. There may have been other children in the family or home who were not present at the time of the seizure.

**MEDICAL FACILITY**

- 1. Complete Medical evaluation:
  - Hepatitis B, C panel if elevated LFT's
  - Developmental and Mental Health Evaluation
- 2. Blood test if not done on the earlier exam.
- 3. Follow-up developmental evaluations as needed based on the initial exam.
- 4. Developmental evaluation using an age appropriate standardized tool.
- 5. Mental health evaluation.
- 6. Medical follow-up: Within 30 days, 6 mos, 1 yr

**NATIONAL ALLIANCE FOR EARLY CHILDHOOD INJURY PREVENTION**

Decontamination and Cleansing

- Protocol presently under revision
- Based on risk for serious victim contamination
  - High risk
  - Lower risk
- Triage based on scene and victims
- Leave all personal items at scene

Decontamination and Cleansing

- High risk for serious contamination
  - Active lab
  - Chemical spills at scene
  - Chemical stains or burns on children/occupants
  - Child appears ill
  ⇒ Shower at scene or immediately at hospital
  ⇒ Change to clean clothing, shoes

Decontamination and Cleansing

- Lower risk for serious contamination
  - Inactive “box” lab
  - No chemical spills, stains, odors
  - Child appears healthy
  ⇒ Change clothes, shoes immediately
  ⇒ Shower before or immediately upon placement

Medical Exam - Immediate

- Examination – Within 2 to 4 hours
  - Vital Signs
  - Lungs
  - Skin
- Urine Tox Screen at exposure level
- Blood Tests - CBC, LFT’s, RFT’s
Blood Tests

- Complete blood count (CBC)
  - anemia (solvents, nutrition)
  - cancers (solvents)
- Liver function tests (LFT’s)
  - solvents
- Kidney function tests (BUN, Cr)
  - solvents

Urine Tox Screens

- NIDA levels - work place screening
  - 500 ng/dl-confirmatory level
- Exposure levels
  - Usually done by lab
  - Reported out only if asked
  - Level down to 50 to 100 ng/dl
- Collect first urine after leaving scene

New Research on DEC labs

- Dr. Penny Grant, Tulsa, OK DEC project
- 85 children under 13 years with urine toxicology and blood analysis (chemistries and cell count)
- <10% had mild changes in blood chemistries, none that were clinically apparent
- When the urine was collected within an average of 2.45 hours of removal, 71% were positive

Exam – Within 72 hours

- Comprehensive Medical Exam
- Developmental Testing
- Mental Health Assessment
- Dental Evaluation
- Further Blood tests if any abnormalities on first set
Medical Evaluation – Follow-Up

- Repeat Exams in 30 days, 6 months and 1 year
- Specific medical follow up as indicated by exam findings
- Follow up developmental evaluations as indicated
- Follow up mental health evaluation and service

How can I remember all of this?

- Hazards
- Explosions
- Location
- Poisons
- Methamphetamine

QUESTIONS?

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