Chapter 27

Poisoning &
Overdose Emergencies

Chapter Goal

- Use assessment findings to formulate field impression & implement treatment plan for patients with toxic exposure

Learning Objectives

- Identify appropriate PPE & scene safety awareness concerns in dealing with toxicological emergencies
- Identify appropriate situations in which additional non-EMS resources need to be contacted
- Review routes of entry of toxic substances into body
- Discuss role of Poison Control Center in U.S.
- List toxic substances specific to your region
Learning Objectives

- Identify need for rapid intervention & transport of patients with toxic substance emergencies
- Review management of toxic substances
- Differentiate among various treatments & pharmacological interventions in management of most common poisonings by inhalation, ingestion, absorption, & injection

Learning Objectives

- Integrate pathophysiological principles & assessment findings to form field impression & implement treatment plan for patients with most common poisonings by inhalation, ingestion, absorption, & injection
- Review poisoning by overdose
- Review signs & symptoms related to most common poisonings by overdose

Learning Objectives

- Correlate abnormal assessment findings with their clinical significance in patients with most common poisonings by overdose
- Differentiate between various treatments & pharmacological interventions in management of most common poisonings by overdose
- Integrate pathophysiological principles & assessment findings to form field impression & implement treatment plan for patients with most common poisonings by overdose
Poisoning
- Exposure to substance generally only harmful & no beneficial effects

Overdose
- Excessive exposure to substance with normal treatment uses

Types of toxicological emergencies:
- Intentional
  - Chemical warfare
  - Assault/homicide
  - Suicide attempts
- Unintentional
  - Dosage errors
  - Idiosyncratic reactions
  - Childhood poisoning
  - Environmental exposures
  - Occupational exposures
  - Neglect & abuse
  - Drug/alcohol abuse
  - Intentional poisoning/overdose

Provider safety & resources identification
- Conduct scene size-up first
- Assess need for PPE
- Consider need for hazmat team
- Examples of concern for toxic exposure:
  - Response to known chemical plant or fertilizer storage
  - Multiple patients encountered on arrival
  - Dead animals
  - Unusual odor/vapor
General Toxicology, Assessment & Management

- Provider safety & resources identification (cont’d)
  - Appropriate equipment includes:
    - Airway protection equipment
    - Hooded chemical barrier suit
    - Thick butyl rubber protective gloves
    - Boots
    - Specialized equipment
  - Other possible resources necessary:
    - Police
    - Fire department
    - Specialized rescue services
    - Local EMA

General Toxicology, Assessment & Management

Routes of poisons introduced into body

- Geographically specific toxicological emergencies
  - Venomous snakes
  - Spiders
  - Marine animals
  - Manufacturing industries
  - Transportation industries
General Toxicology, Assessment & Management

- Grouping of toxicologically similar agents
  - Key approach
  - Self-protection
  - Maintenance of ABCs
  - Toxidromes
    - Groups of drugs with similar clinical patterns of toxicity

General Principles: Toxicological Emergencies

- Patient assessment
  - Gather information
  - Signs & symptoms
    - Burning, tearing of eyes, blurred vision
    - Respiratory distress
    - Cyanosis
    - Nausea, vomiting, diarrhea, abdominal pain
    - Excessive sweating, salivation
    - Weakness
    - Headache, dizziness, seizures
    - Altered LOC
    - Pain, burning, itching of skin
    - Burns or stains around mouth

- Physical findings
  - Pulse
  - Respiratory rate
  - Temperature
  - BP

- Body systems that may be affected:
  - Respiratory
  - Cardiovascular
  - Neurological

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General Principles: Toxicological Emergencies

- Care of poisoned patient
  - Assess, maintain airway
  - Monitor ECG
  - Position patient to prevent aspiration
  - High-concentration O₂
  - Uncooperative patient—restrain per local protocol
  - Notify hospital of suspected substances

Ingested poisons:
- Consider administering activated charcoal

Shake container to suspend medication

Pour liquid into container

Have patient drink full dose
General Principles:
Toxicological Emergencies

- Inhaled poisons
  - Survey scene for:
    - Multiple unconscious patients without obvious explanation
    - Unusual odors or vapors
    - Dead animals
  - Care
    - Remove patient from source
    - Assist breathing as necessary; administer high-concentration O2
    - Keep patient at rest
    - Transport without delay

- Absorbed poisons
  - Care
    - Brush away any visible chemical
    - Flush affected area with copious amounts of water
    - Remove contaminated clothing
    - Protect yourself from exposure

Cholinergics

- Common caustic agents
  - Pesticides
    - Organophosphates
    - Carbamates
  - Nerve gas agents
    - Sarin
    - Soman
Cholinergics

- Assessment findings
  - Early symptoms
    - Nausea
    - Headache
    - Dizziness, weakness
    - Nausea
  - More severe symptoms—SLUDGEM
    - Salivation
    - Lacrimation
    - Uribation
    - Defecation
    - Gastrointestinal cramping
    - Eritis
    - Muscle twitching

- Management
  - Ensure your own safety first!
  - Maintain ABCs
  - Atropine
  - Pralidoxime
  - Diazepam
  - Activated charcoal

Anticholinergics

- Common causative agents
  - Atropine
  - Ipratropium
  - Antihistamines
  - Antispasmodics

- Assessment findings:
  - Opposite effects of anticholinergic agents (ANTI-SLUDGE)
  - “Red, hot, hyper, & mad”
Anticholinergics

- Management
  - Ensure your own safety
  - Maintain ABCs
  - Supportive treatment
  - Activated charcoal may be helpful
  - Provide psychological support
  - Transport to appropriate facility

Narcotics/Opiates

- Common causative agents
  - Heroin
  - Morphine
  - Codeine
  - Meperidine
  - Propoxyphene
  - Fentanyl
  - Oxycodone
  - Hydrocodone

Narcotics/Opiates

- Assessment findings
  - Euphoria
  - Hypotension
  - Respiratory depression, arrest
  - Nausea
  - Pinpoint pupils
  - Seizures
  - Coma
Narcotics/Opiates

- Management
  - Ensure your own safety
  - Maintain ABCs
  - Naloxone
  - Continuous monitoring
  - Provide psychological support
  - Transport to appropriate facility

Toxic Gas Inhalation

- Categories
  - Inert gases
  - Irritant gases
  - Systemic toxins

- Sources
  - Accidents & fires—most common
  - Road crashes
  - Leaking chemical storage tanks
  - Home heaters/space heaters
  - Products of chemical reactions

Toxic Gas Inhalation

- Pathophysiology
  - Factors that determine effects
    - Water solubility
    - Depth, rate of breathing
    - Smell
    - Concentration of gas
    - Length of exposure
    - Differences in host susceptibility
    - Smoking habits
    - Underlying lung disease
Toxic Gas Inhalation

- Clinical presentation
  - Fatigue
  - Headache
  - Dizziness
  - Confusion
  - Dyspnea
  - Laryngotracheal bronchitis
  - Bronchospasm
  - AMI
  - Laryngeal edema
  - Hoarseness
  - Inspiratory stridor
  - Noncardiogenic pulmonary edema

Toxic Gas Inhalation

- Management
  - Ensure your own safety
  - Remove patient from source
  - High-concentration O₂, intubate if necessary
  - IV line
  - Bronchodilators
  - Prompt transport

Carbon Monoxide Poisoning

- Pathophysiology
  - CO has greater affinity to hemoglobin than O₂
    - Carboxyhemoglobin
      - Hemoglobin unable to carry O₂
        - Perfusion
Carbon Monoxide Poisoning

- Assessment findings
  - Suspect if patient exposed to fire, smoke, or found in closed space
  - Signs & symptoms
    - Malaise, weakness, headache
    - Confusion, dizziness
    - Nausea, shortness of breath
    - Drowsiness
    - Unconsciousness without warning
    - Chest pain
    - Cherry red skin/mucous membranes (late sign)
    - Abnormal lung sounds
    - Seizures
    - Blisters

- Management
  - Ensure your own safety
  - Remove patient from source and into fresh air
  - Secure airway; ventilate as necessary
  - Give high-concentration O₂; intubate if necessary
  - IV line
  - Treat life-threatening injuries
  - Make patient comfortable
  - Consider hyperbaric capabilities if appropriate

Tricyclic Antidepressants

- Common causative agents
  - Amitriptyline
  - Amoxapine
  - Clomipramine
  - Desipramine
  - Doxepin
  - Imipramine
  - Nortriptyline
Tricyclic Antidepressants

- Pharmacology & pharmacokinetics
  - Blocks reuptake of norepinephrine & serotonin
  - Anticholinergic & cardiac membrane actions
  - Dry mouth, heat intolerance
  - Minor prolongation of QT interval
  - Widened QRS complex, at toxic levels
  - Low therapeutic/toxicity ratio
  - Onset of toxicity rapid

- Assessment findings
  - Early signs/symptoms
    - Dry mouth
    - Confusion
    - Hallucinations
  - More serious findings
    - Delirium
    - Respiratory depression
    - Hypotension
    - Hyperthermia
    - Seizures
    - Coma

- Management (per local protocols)
  - Ensure your own safety
  - Administer O2
  - Start IV line
  - NaHCO₃
  - Activated charcoal
  - Diazepam

Narrowing of QRS complex after Administration of NaHCO₃
Bites & Stings

- Common causative agents
  - Hymenoptera
  - Spiders
  - Other arthropods
  - Snakes
  - Marine animals

Bites & Stings

- Assessment findings
  - Depend on organism involved

- Management
  - Ensure your own safety
  - Maintain ABCs

Bites & Stings

- Black widow spider
- Brown recluse spider
- Brown recluse spider bite
- Giant hairy scorpion
Coral snakes
- Found in southern states
- Distinguishing feature—nasal area totally black
- "Red on yellow will kill a fellow, red on black, venom lack"
Snakebites

- Vipers
  - Cottonmouth
  - Copperhead
  - Massasauga
  - Pigmy rattlesnake
  - "True" rattlesnake
  - Widely seen throughout U.S.

Snake Venoms

- Physiological properties
  - Neurotoxicity
  - Hemotoxicity
  - Cardiotoxicity

Snake Venoms: Coral Snakebite

- Assessment findings
  - No pain around wound initially
  - Venom primarily neurotoxic
  - Rarely fatal
  - Euphoria, drowsiness, nausea, vomiting
  - ↑ Salivation
  - Paresthesias, headache
  - Ptosis, blurred vision
  - Shortness of breath, abnormal reflexes
  - Generalized paralysis

- Management
  - Antivenin
Snake Venoms: Pit Viper

- Assessment findings
  - Visible puncture wound, often oozing blood
  - Rapidly occurring local pain & numbness
  - Early edema traveling up extremity
  - Ecchymosis
  - Local blebs filled with hemorrhagic transudate
  - Signs of lymphangitis/lymphadenitis
  - Paresthesias, muscle fasciculations, generalized weakness
  - Unresponsive hypotension, petechiae, conjunctival hemorrhage, bleeding
  - Abnormal ECG

Snake Venoms: Pit Viper

- Management
  - Support ABCs
  - Administer high-concentration O2
  - Start IV per local protocols
  - Keep patient still
  - Transport without delay
  - Splint bitten extremity; keep at level of heart
  - Provide local wound care

Snake Venoms

- Snakebite “pearls”
  - Do not chill or apply ice to wound
  - Do not apply tourniquet
  - Do not give alcohol to patient
  - Do not incise bite site
  - Only use steroids/antihistamines if severe hypersensitivity reactions
  - Do not apply electric shocks
Summary

- Poisoning—ingestion, inhalation, absorption, or injection of any harmful substance
- Nearly one-half of poisonings involve prescription drugs
- Many poisonings unintentional but preventable

Summary

- Poisoning—exposure to substance generally only harmful & has no usual beneficial effects
- Overdose—excessive exposure to substance having normal treatment uses
- Generic classes of toxicological emergencies:
  - Unintentional poisoning
  - Drug & alcohol abuse
  - Poisoning or overdose

Summary

- Virtually no toxin affects only patients & not EMS providers
- Enlisting assistance of special hazmat teams to extricate may be necessary to remove & detoxify patient before providing care
- Many EMS systems require or encourage contacting poison control center
Summary

- Poisons or toxins are introduced into body through:
  - Inhalation
  - Absorption
  - Ingestion
  - Injection

- Possible exposures may vary according to geographical area

Summary

- Groups of agents with similar clinical presentations are often grouped together as "toxidromes"

- Careful history helpful in determining clinical approach

- Control of ABCs is first concern in poisoning management

Summary

- Depending on agent, specific antidotes may be available

- Follow local protocols regarding naloxone, activated charcoal, ipecac, atropine, sodium bicarbonate, diazepam, & any other pharmacological agents