Observed Behaviors During Mass Chemical Exposures

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Chemical Agents of Opportunity

Learning Objectives

By the end of this module participants will be able to:
• Understand the psych impact of mass chemical exposures
• Provide appropriate response to the mental health needs of victims of real & perceived events
• Describe expected behaviors of large groups of people after a perceived toxic chemical exposure
• Recognize signs & symptoms of acute psychological / emotional response to a traumatic event
• Develop a strategy to aid victims with fear/strong emotions following a real or perceived toxic chemical exposure

Some Key Messages

• Physiologic responses to a perceived threat can lead to a range of symptoms
• There are characteristic features of crowd response
• Sorting out physical responses to a toxic exposure from physiological and psychological responses to a stimulus can take time and may not be “100% provable”
50 people report nausea and several vomit after smelling a sulfur-like odor. What is a likely explanation?

1. Hydrogen sulfide poisoning
2. Food poisoning
3. Mass psychogenic illness
4. Panic

Case 1: “The Toxic Lady”

- A 31-year-old cancer patient is rushed by EMS to the nearest LA suburb ED on March 19th, 1994.
  - An “oily sheen” is noted on her chest.
- During the resuscitation, a nurse drawing her blood notices a peculiar acrid smell that seems to be coming from the patient and passes out.
- The senior EM resident picks up the syringe used to draw the blood and notices yellow crystals, smells it, collapses.
  - Within minutes, 4 more care providers are “overcome.”
- During the ensuing evacuation the patient dies

Case 1: Leading Theories

- Patient drank pesticide in suicide attempt or used a solvent (DMSO) as a home cancer remedy
- Hospital plumbing emitted a toxic gas
- A secret methamphetamine lab operated in the hospital basement.
- “Mass hysteria”
Case 1: “The Toxic Lady”

- 37 exposed
  - 11 noticed unusual smell
    - Description varied: garlicky, ammonia like, gas-like, or chemical-like
    - 26 did not notice odor
  - Paramedics who transported patients and drew blood in the ambulance noticed no odor and developed no symptoms
- 23/37 developed at least one symptom

Case 1: Mass Psychogenic Illness or Toxic Exposure?

- 5 health care staff hospitalized
  - ED nurse hospitalized for 9 days developed chronic severe headaches, fatigue, dyspnea
    - A psychiatrist insisted it was an organic cause
  - ED physician hospitalized in ICU for 2 weeks requiring mechanical ventilation
    - 3 months in a wheelchair
    - Avascular necrosis of knees requiring 20 operations

Case 1: Three Investigations

- Coroner
  - Patient died from cervical cancer
  - Fumes that sickened hospital workers were just the “smell of death”
- Cal-OSHA
  - No safety violations
  - Three employees had “involuntary psychological reaction to some agents” while the rest suffered from mass hysteria
- California Dept of Health Services (CDC)
  - “An outbreak of mass sociogenic illness perhaps triggered by an odor”
  - Also possible that a few staff members were exposed to unknown toxic chemical
What is the correct terminology to identify “mass psychogenic illness”?

More Common Terms
• Mass Sociogenic Illness
• Epidemic Hysteria
• Mass Hysteria
• Traumatic stress response

Less Common Terms
• Epidemic transient situational disturbance
• Psychosocial casualties
• Environmental somatization syndrome
• Psychological sequelae
• Psychic possession
• Crowd poison

Definitions
• Diagnostic and Statistical Manual of Mental Disorders-IV-TR
  – Epidemic Hysteria
    • Shared symptoms develop in a circumscribed group of people following “exposure” to a common precipitant.
• Medical literature
  – Multiple Unexplained Symptoms
    • Typically chronic and not triggered by a specific event

Faculty Disclosure
• Faculty: Mark Kirk MD
  – Relationships with commercial interests: none
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  – Other: none
Be Careful What You Call It!

- Condescending terms
  - Negative connotations
  - Hysteria implies individual is to blame for illness
- Of course, physicians cannot have mass psychogenic illness
  - 1955 hospital epidemic with 300 affected
    - Once medical staff became affected, condition labeled as “epidemic benign myalgic encephalomyelitis”

Case 2: Cyanide

- 06:00 am
  - A pail caught fire at a plating company containing:
    - Sodium meta-nitrobenzene (85%)
    - Potassium cyanide (15%)
  - 15 workers of a downwind warehouse smelled smoke and noticed brief upper respiratory irritation
  - Evacuated to nearby (5 miles) airport facility but not informed of potential cyanide exposure

Case 2: Cyanide (Continued)

- The original 15 evacuees and 85 contacts learned of cyanide exposure and several began complaining of chest tightness, nausea and dizziness
- “Several are feeling ill and we’ve got about 50 people that were exposed over there, they’re awake and oriented, they just wanted to be checked out.”
Case 2: Cyanide (Continued)

- 9:30 am Incident Command decides
  - No decontamination at scene necessary
  - Transport to area hospitals
    - Hospital 1: 36 patients
    - Hospital 2: 52 patients
    - Hospital 3: 12 patients
- 9:50 am Treatment and Disposition
  - Hospital 1:
    - Gross decontamination in parking lot
    - Lilly Cyanide Antidote Kit (N=2)
    - Media interviews with cameras rolling
  - Hospitals 2 & 3: Quick check and release

Medical Personnel Responses

“Cyanide is deadly. Cyanide is bad stuff! If it were me, I’d go get checked out.”

- EMTs wearing surgical masks to drive.
  - Upset that patients were not decontaminated.
- Medics c/o lightheadedness and smelled ‘bitter almonds’

Case 2: Cyanide (Continued)

- 12:30 pm media coverage
  - Footage and interviews from Hospital 1
- Calls to Poison Center from:
  - Previously treated and released employees concerned they had not received “appropriate treatment”
  - Hospitals 2 and 3 because several patients returned for “appropriate treatment”
Lessons Learned

- Patients remote to exposure may exhibit symptoms
  - May develop symptoms on learning of the exposure
- Medical personnel can be affected
  - They can become victims
  - They may react inappropriately
    - e.g., use therapies with potential for adverse reactions
- Treatment for presumed poisoning can be harmful
  - Decontamination in extremely cold weather
  - Adverse effects of antidotes

Expect Large Numbers of Patients after Mass Chemical Exposure

- Types of Patients
- Obvious Medical Needs
  - Poisoned
  - Contaminated
- Nonspecific symptoms
  - With no apparent exposure
- Asymptomatic
  - “Just want to get checked out”

Magnitude of Problem

- Tokyo Sarin Incident 1995
  - 12 died
  - 1,200 required some care
  - 5,500 sought medical care but had no exposure
- Bhopal Disaster 1984
  - >10,000 severe and 5000 died
  - 200,000 sought medical care
Magnitude of Problem

• Operation Desert Storm 1991
  – 39 Scud missiles reached ground
  – 1000 casualties/ 2 deaths
  – 544 “anxiety attacks” and 230 “atropine overdoses”

What is Panic?

• Panic is:
  – A sudden fear which dominates or replaces thinking [wikipedia.org]
  – A sudden unreasoning terror often accompanied by mass flight [www.merriam-webster.com]
  – Often used incorrectly to describe any type of fear, flight, evacuation, or lack of coordination
  – Flight is often appropriate
• Panic flight is
  – Irrational, hysterical or groundless flight
  – Reckless disregard for others

Can People Panic during a Disaster?

http://scifipedia.scifi.com/
Cycle of Fear and Perceived Poisoning

- Perceived high risk of uncontrolled release of dreaded toxin
- Input
  - Mucous membrane irritation
  - Lightheadedness
  - Noticing a bad odor
  - Observing friends become ill
- Natural response is fear
- Fear leads to autonomic arousal
  - Palpitation
  - Sweating
- Autonomic arousal misinterpreted as a symptom of poisoning

Panic is Rare During a Disaster

- Observed groups of patients in period of impact
  - “Cool and Collected” (75%)
  - Stunned and bewildered (>20%)
  - Confused, anxious, hysterical crying (<5%)
- Not terribly different than what occurred on 9/11/2001

A lump in the throat and a sudden urge to urinate are signs of what type of reaction?

1. Fear
2. Panic
3. Hysteria
4. Epidemic myalgic encephalomyelitis
5.
6.
7.
8.
9.
10.
Case 3: A Gas Smell

- A gas odor is noted in a school classroom
- The teacher complains of headache, nausea, shortness of breath and dizziness
- 80 students, 19 staff, 1 family member go to the ED
  - 38 hospitalized for unclear reasons
- Scene investigation: no environmental cause
  - 5 days later school reopened
  - 71 people return to the ED for similar symptoms
- Exhaustive investigation: no environmental cause

Features Suggestive of "Mass Psychogenic Illness"

- Rapid onset and recovery
- Contagious, spreads via:
  - Sight (particularly "line of sight")
  - Smell
- Diversity of symptoms w/o physical signs or abnormal labs
- Benign morbidity with no sequelae
  - Though remember the "Toxic Lady"
- Often recurs when returning to environment
- No reasonable organic basis
  - Environmental investigation is negative

Symptoms Suggestive of "Mass Psychogenic Illness"

From Jones, et al. (in order)
- Headache
- Dizziness/lightheadedness
- Nausea
- Drowsiness
- Chest tightness
- Breathing difficulty
- Sore throat
- Burning eyes
- Cough
- Abdominal pain/cramps
- Nervousness
- Watery eyes

Other typical symptoms:
- Diaphoresis (sweating)
- Dry mouth
- Involuntary Urination
- Numbness and tingling
- Palpitation/tachycardia
- Syncope
- Tremor
- Weakness
Evidence for Mass Psychogenic Illness

IN FAVOR
- No source identified
  - Exposures are below occupational exposure standards
- No correlation between attack rate and presumed level of exposure to toxic agent
  - Lack of dose-response

AGAINST
- Adequacy of patient evaluations:
  - Can everything be ruled out?
- Can you ever have a comprehensive environmental investigation?
  - Delayed environmental sampling
  - Passing plume

Is it Psychological or Is it Poisoning?

Psychological
- Chest Tightness
- Breathing difficulty
- Tachycardia
- Nausea/Vomiting
- Involuntary Urination
- Headache
- Tremor
- Sweating
- Syncope

Nerve Agent Poisoning
- Chest Tightness
- Breathing difficulty
- Bradycardia or Tachycardia
- Nausea/Vomiting
- Involuntary Urination
- Headache
- Fasciculations
- Diaphoresis
- Paralysis
- Coma

Cyanide Poisoning
- Breathing difficulty
- Tachycardia
- Nausea/Vomiting
- Headache
- Dizziness
- Coma
- Seizures
- Dysrhythmias
Is there a solution?

Is it Real?

- Emergency Response
  - Don’t get caught up on figuring out if it exists or not
  - “Psychogenic illness” is a diagnosis of exclusion
  - Create a "holding environment"
    - Location away from high-tempo triage activities
    - Symptoms monitored and re-evaluated
- Research
  - Need for good epidemiological data that clarifies characteristics of each group (defines needs)

Planning Suggestions

- Expect the problem – Plan for it
- “Base disaster plans on what people are likely to do rather than what they should do”
  
  Auf der Heide: Disaster Response: Principles of Preparation and Response
- Don’t ignore these patients
  - And take them seriously
- Early diagnostic & management decisions are critical to the success of the emergency response
  - EDs have little surge capacity
  - Decontamination and PPE burden the health care system
Training Suggestions

• Teach emergency responders basic toxicology principles
  – e.g. Dose-Response (“dose makes the poison”)
• Look for objective signs of toxicity
  – Toxidrome recognition
    • Irritant Gas Syndrome
    • “Knock-down” or metabolic poisoning
    • Opioid intoxication
    • Cholinergic/Cholinesterase inhibitor

Improve Communications

• Information is the ANTIDOTE for fear
• Make substance identification a priority and report to health care providers as soon as possible
• Make inter-agency coordination a priority in planning
  – Strive for “single voice” communications with the media and the public. When you speak, you speak for all of us!
• Teach risk communication skills to ALL responders

Unconventional Partnerships

• Behavioral care experts
• Epidemiologists
  – Develop tools to evaluate behaviors during catastrophic events
  – Evidence based planning based on Social-behavioral observations
• Medical Toxicologists
  – Medical Toxicologists are clinical experts in the human health effects of poisoning
  – Accessed through ACMT, poison centers, or direct contact
Role of Media and Scientists in a Disaster

• Communication is very important, but miscommunication is very common
• Statements such as “it is unknown” are taken as “it will be very bad”
• The next video clip is an earlier report on the polybrominated biphenyl (PBB) cattle feed contamination discussed in the “Delayed Onset Toxin” module (Module 6)
  – Note the unrelated disorders, frustrations, and fear depicted as causally linked to the cattle feed contamination

Information Resources

• Poison information recognized as an essential component in chemical emergencies
• Many excellent sources
  – ATSDR Planning Guide
  – CDC website

Summary

• Expect large numbers of patients after mass chemical exposure
  – Often difficult to identify those needing immediate medical care
• Avoid labels without objective diagnostic criteria
  – “Worried well”, “Mass hysteria” less helpful than “I know you are worried; things check out OK now. I will check on you again…”
• Use historic lessons, expected behaviors to guide planning
• Communication is Key
  – Interagency coordination may avoid needless fear
• Know your resources and partner with them
  – Including ACMT/Medical Toxicologists
Questions