

UNIVERSITY OF MICHIGAN **SCHOOL OF PUBLIC HEALTH**



School Nurse Survival Techniques for Disaster Preparedness

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Disaster Preparedness Outline

I. Overview

- a) Chemical attack/accident
- b) Personal and crowd protection in a chemical accident
- c) Educational introduction to anthrax and smallpox



Disaster Preparedness Outline

II. School disaster plan

- a) Designated school safe hold area
- b) Disaster cabinets
- c) Disaster preparedness forms



Disaster Preparedness Outline

III. CBRNE tabletop exercise

- a) Scenario - chemical agent
- b) Question and answer discussion
- c) Scenario written answers
- d) Evaluation

CBRNE Acronym

- C Chemical
- B Biological
- R Radiological
- N Nuclear
- E Explosion

Chemical Bioterrorist Attack

Chemical warfare

Some agents are odorless and colorless, and may not produce a visible cloud.

A good rule of thumb:

- ~ If one person is affected, assume another medical cause.
- ~ If several people are down, assume a toxin

Chemical Terrorism Agents

- Nerve agents
- Cyanide
- Blister agents/sulfur mustard
- Pulmonary agents/phosgene
- Ricin/caster bean agent
- T2 mycotoxin

U.S. Department of Veteran Affairs (2003, Aug.),
Chemical terrorism general guidance pocket guide.

Indicators of a Chemical Hazard

- Blisters or rashes
- Unusual liquid droplets or oily film
- Unexplained odors
- Unexplained coughing, fatigue, tearing in eyes, dizziness
- Unexplained animal sickness or death

Signs and Symptoms of a Chemical Attack

Any sudden increase in the following non-specific syndromes:

- a) Sudden unexplained weakness, collapse, apnea, or convulsions in a previously healthy person
- b) Dimmed or blurred vision
- c) Hypersecretion syndromes (drooling, tearing, and diarrhea)

Signs and Symptoms of a Chemical Attack

- d) Inhalation syndromes (eye, nose, throat, chest irritation, or shortness of breath)
- e) Burn-like skin syndromes (redness, blistering, itching, and sloughing)

Route of exposure may delay the onset of the symptoms

Effects of Chemical Attack

Chemical effects are dependent upon:

- a) Volatility and amount of chemical
- b) Water solubility

Higher water solubility leads to mucosal deposition, and less deep lung deposition and toxicity

- c) Increased fat solubility and smaller molecular size of chemical increases absorption by skin

What to Do During a Chemical Attack/Accident

If it occurs outside:

- Note distressed birds or animals
- Have students and staff enter a building or vehicle & close all windows, doors and vents

What to Do During a Chemical Attack/Accident

If it occurs outside (continued):

- Place physical barriers between yourself and the outside air
- Bag the exposed clothing and take a shower
- Remain indoors and listen for media directives

What to Do During a Chemical Attack/Accident

If it occurs inside:

- Exit the structure
- If you or others have been directly exposed, remove your clothes. This can save your life.
- Quickly and thoroughly rinse any exposed skin with complete immersion if possible

Biological Warfare

- Use of bacteria, fungi, and viruses to kill or incapacitate
- Danger grows because of replication and transmission of these living organisms
- Anthrax used because it has a hardy spore casing and becomes highly lethal under the right conditions

What to Do During a Biological Terrorist Attack

- Have students and staff get indoors or stay indoors if there are reports of a release of a biological agent
- Once inside, turn off the air conditioning, close vents, windows and doors and plug all air drafts
- Watch for signs of flu-like malaise and refer for medical care immediately
- Place physical barriers between self, others and any aerosol cloud

Radiation

- Nuclear facilities: Need to be aware of evacuation routes, signs of acute radiation exposure
- Dirty bombs and the aftermath

Indicators of a Biological Attack

- Groups of individuals become ill around the same time
- Sudden increase of illness in previously healthy individuals
- Simultaneous disease outbreaks in human and animal or bird populations
- Unusual temporal or geographic clustering of illness

Signs and Symptoms of a Biological Attack

A sudden increase in the following non-specific illnesses:

- a) Pneumonia, flu-like symptoms, or fever with atypical features
- b) Bleeding disorders
- c) Unexplained rashes and mucosal or skin irritation, particularly in adults

Facts About Anthrax

- Caused by spore forming bacteria, *Bacillus anthracis*
- Incubation period: 7 days
- Not spread person-to-person
- Infections prevented in exposed persons by use of ciprofloxacin or doxycycline
- Anthrax vaccine available, but not to general public

Types of Anthrax

Inhalation anthrax

- Initial symptoms flu-like
- Tracheal lymph node infection
- Within 1-6 days, sudden onset of mediastinal infection, stridor, cyanosis, and pulmonary edema

Types of Anthrax (continued)

Inhalation anthrax (continued)

- May develop hemorrhagic meningitis
- After an additional 24-36 hours, septicemia, toxic shock and death

Types of Anthrax (continued)

Cutaneous anthrax

- Caused by skin inoculation with anthrax spores, often through skin abrasions
- Toxins released interrupting microvascular circulation and causing tissue destruction
- Incubation period: 1-5 days

Types of Anthrax (continued)

Cutaneous anthrax (continued)

- Initially, red papules followed by progressive regional edema, then lymph node infection. No fever.
- Development of painless necrotic ulcer with black necrotic base
- May heal spontaneously, but may progress to septicemia and death

Photo of Cutaneous Anthrax



Source: Centers for Disease Control, n.d.

Types of Anthrax (continued)

Gastrointestinal anthrax

- Toxin released from spores destroys mesenteric lymph nodes and circulation to the small intestine
- Initial symptoms: fever, nausea, vomiting, abdominal pain, bloody diarrhea, ascites
- Often presents as an “acute abdomen”

The School Nurse's Role Regarding Smallpox

- **Protect**

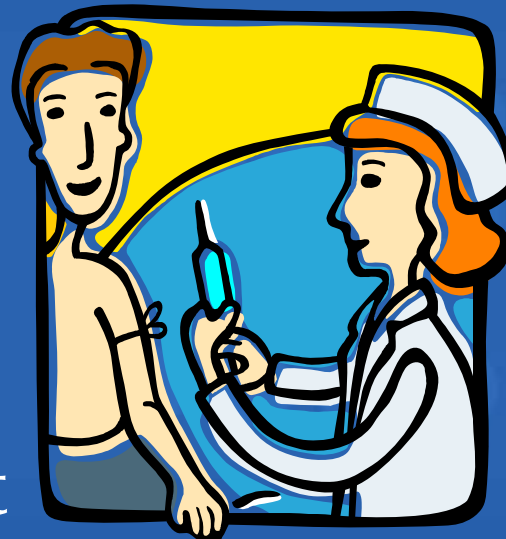
Be informed, involved, and ready for action

- **Detect**

Be alert and analytical

- **Treat**

Be calm and confident



Development of School Nurse Role

Protect

- Role in vaccination programs
- Role in planning and implementing protective actions in the case of an incident
- Have in place a plan for decontamination, health room evacuation, and communication
- Role in communicating to teachers & students actions to take in case of an chemical or biological emergency

Development of School Nurse Role (continued)

Detect

- Be a sentinel for indications of suspicious illnesses
- Be alert for risks in the environment
- Enlist the help of other school employees in surveillance
- Invite yourself to community emergency preparedness planning meetings

Development of School Nurse Role (continued)

Treat

- Role in administration of first aid
 - ~ Triage
 - ~ Decontamination
 - ~ Physical removal of patients from exposure to ongoing risk
 - ~ Management of ABC's

Smallpox Facts

- Disease declared extinct in 1980 by WHO
- Caused by variola virus
- Is uniquely a human disease
- Incubation 12-14 days (range of 7-19 days)
- Predicted that transmission higher now than in previous outbreaks (1:10 vs. 1:5)

Clinical Features of Smallpox

- **Influenza Symptoms**
High fever, fatigue, severe head and back aches, prostration for 2 to 3 days
- **Characteristic Rash**
Occurs 2 to 3 days after prodromal period, appearing first on oral mucosa, face, forearms; spreading to trunk, and legs (possibly palms and soles)

Characteristics of the Smallpox Rash

- Macular rash progressing in 1-2 days to papules
- Vesicles appear on 5th day
- Pustules appear by 7th day
- Scab lesions appear on 14th day
- As lesions heal, scabs separate and pitted scarring gradually develops

Distinguishing the Diseases

Chicken Pox

- Crops of lesions in different stages
- Starts on trunk, moves to extremities and face; rapid evolution
- Most cases have mild prodrome and mild systemic involvement

Smallpox

- Numerous lesions all in the same stage
- Starts on oral mucosa, face, extremities; slow evolution
- Significant prodrome and systemic involvement

Smallpox/Chicken Pox Comparison Day 2



Source: World Health Organization, 2001

Smallpox/Chicken Pox Comparison Day 5



Source: World Health Organization, 2001

Smallpox/Chicken Pox Comparison Day 7



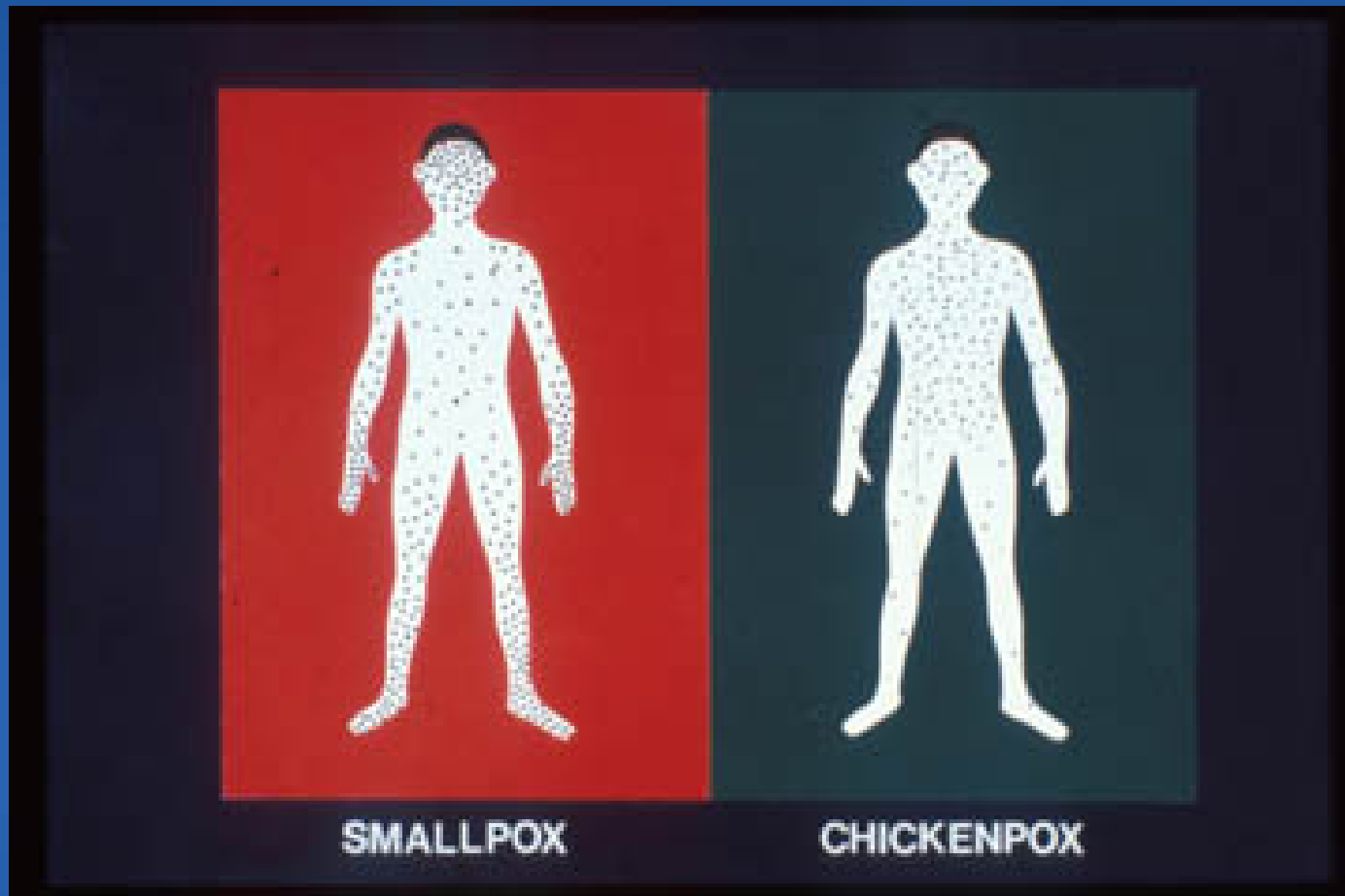
Source: World Health Organization, 2001

Smallpox/Chicken Pox Comparison Day 10



Source: World Health Organization, 2001

Smallpox/Chicken Pox Density Comparison



Source: World Health Organization, 2001

Management of Smallpox

- Treatment is supportive, maintaining adequate hydration and nutrition
- Isolation/quarantine preferably at home
- External lesions kept clean and dry
- Medication may include antipyretics, antibiotics for infection
- Emotional support regarding disfigurement, fear of death

Smallpox Vaccination

- Pre-exposure vaccination is not recommended and not available to health providers or the public
- In an outbreak, CDC has clear guidelines to swiftly provide vaccine to exposed persons
- Vaccine given within 4-7 days after exposure to smallpox can lessen the severity of illness or even prevent it

Vaccination in Smallpox Outbreak

For individuals who are:

- Exposed to initial release of the virus
- In close proximity contact from onset of patient's fever until all scabs separated
- Involved in direct medical evaluation, transportation, collection/processing of clinical specimens of confirmed or suspected patient
- Experiencing an increased likelihood of contact with infectious materials (laundry, medical waste, etc.)

Photo of Smallpox



Source: Centers for Disease Control, n.d.



Schools and Disaster Preparedness

*An Organized Response To
A Biological/Chemical
Disaster*

Activities

Assess, Develop and Evaluate

- The school building(s) will effectively assess, develop and evaluate emergency planning efforts that will ensure their welfare and safety of their students, staff and property from all hazards, specially CBRNE (Chemical, Biological, Radiological, Nuclear and Explosive) events

Activities

Recovery

- The school building(s) will demonstrate their capability to recover from any potential hazard, specifically CBRNE events

Coordinate and Communicate

- School building (s) will be able to coordinate and communicate within their organization and with all responding agencies in CBRNE events

Disaster Plan

- 1) Notify staff/alert
- 2) Activate the emergency prepared response team (disaster/CPR/first aid trained)
- 3) Classes will proceed to the following:

GYM

BASEMENT

COMMONS

ELEMENTARY

MIDDLE SCHOOL

HIGH SCHOOL

Disaster Plan (continued)

- 4) Custodial staff will cover select windows/doors with plastic and duct tape (plastic and tape found in emergency preparedness cabinet)
- 5) Bathroom access
 - Elementary buildings -- gym office
 - Middle school building -- any lower level bathroom
 - High school -- kitchen bathroom
 - Administration -- high school cafeteria

Disaster Plan (continued): Emergency Cabinets

6) Emergency cabinet contents

- Radios/batteries
- First aid container
- Antibacterial sheets
- Eye contact solutions
- Diabetic kits
- Splints/Ace bandages
- Gloves

Disaster Plan (continued)

6) Emergency cabinet contents (continued)

- Soap/shampoo
- Clothes
- Garbage/freezer bags/Ziploc[®]
- Wrist bands
- Paper/pencils/permanent markers
- Cleaning supplies
- Flashlights/batteries
- Feminine products
- Blankets

Disaster Plan (continued)

- 7) Office staff will bring emergency yellow cards/medicines to the holding area
(Emergency cards/student medicines kept in a portable container on wheels)
- 8) Teachers will bring class/attendance list to the holding area
- 9) Area designation

Disaster Plan (continued): Area Designation

9) Area designation

Elementary

- Gym floor -- students per class
- Stage -- hospital
- Classroom -- morgue
- Gym office -- bathroom/shower
- Kitchen -- communication area
- Music/media -- contaminated area

Disaster Plan (continued)

9) Area designation (continued)

Middle school

- Basement/classrooms -- student holding area
- Teachers' lounge -- hospital
- Locker bay -- contaminated area
- Custodial room -- decontamination area/shower
- Supply room -- morgue

Disaster Plan (continued)

9) Area designation (continued)

High school

- Commons -- student holding area
- Kitchen -- bathroom
- Senior cafeteria -- hospital
- Kitchen supply room -- morgue
- Custodial closet (by kitchen) -- shower
- Gym/pool/locker rooms -- contaminated area

Disaster Plan (continued)

9) Area designation (continued)

Church school

- Basement -- decontamination area
- Main floor -- student holding area
- Altar -- hospital
- Sacristy -- communication area

Disaster Plan (continued)

10) Gallons of H₂O, CapriSuns, baking soda, crackers, Pop Tarts, applesauce/fruit cups

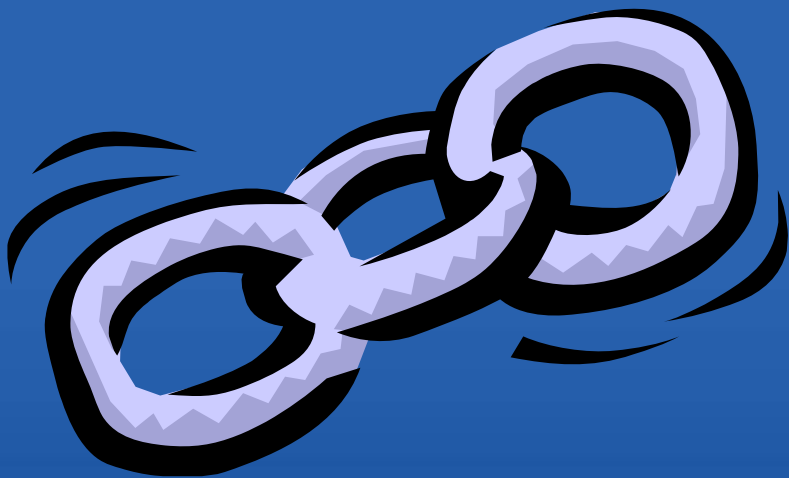
11) High alert

- Blanket drive
- H₂O drive (5)
- Extra clothes/underwear/sweatshirt
(Kept in locker in a Ziploc[®] bag)

Disaster Plan (continued)

12) Communication chain

- Coordinator -- superintendent
- Principals -- elementary/middle/high school



Disaster Plan (continued)

- 13) Disaster preparedness forms
 - A. Record of disaster lockdown
 1. Time of alert announced
 2. Time holding area sealed
 3. Number of staff/students/visitors in holding area

Disaster Plan (continued)

A. Record of a disaster lockdown (continued)

4. Number of staff/students contaminated

- Student/staff list contaminated
- Time exposed outside
- Time before showered/clothes changed
- Reportable signs and symptoms
- List of staff/students sent to hospital

Disaster Plan (continued)

A. Record of a disaster lockdown (continued)

5. Number of staff/students in hospital area

- Time staff/students arrived
- Signs and symptoms of staff/students
- Separate chart on each person
 - ~ Name
 - ~ Arrival time
 - ~ Signs and symptoms
 - ~ Departure time
 - ~ Staff members in hospital area

Disaster Plan (continued)

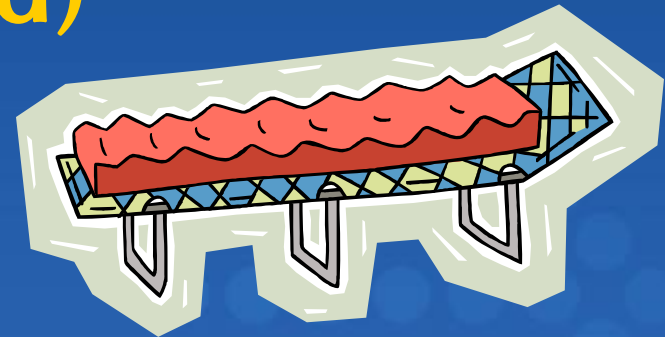
A. Record of a disaster lockdown (continued)

6. Number of staff/students in morgue

- Tag information
 - ~ Name
 - ~ Teacher's name
 - ~ Time of passing
 - ~ Reason of passing
 - ~ Person tagging deceased

Disaster Plan (continued)

- 14) Natural gas generator
- 15) Protective gear
- 16) Decontamination tanks/curtains
- 17) Blankets and cots for each building



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Decontamination

Use for this procedure:

- To prevent the chemical from being further absorbed or spread to other parts of the body
- To prevent the chemical from spreading to other people, including staff who might come in contact with the person who is contaminated with the chemical

Steps for Decontamination

Most chemical agents can penetrate clothing and absorbed rapidly through the skin. The most important and effective decontamination is done within the first minute or two after chemical exposure.

Steps to take

- 1) Removal of clothing
- 2) Washing yourself
- 3) Disposal of clothing

Decontamination: Removal of Clothing



- Quickly take off any contaminated clothing
Do not pull clothing over your head,
instead clothing should be cut off
- Appropriate protective gear should be
worn by anyone assisting in the
decontamination process

Decontamination: Clothing Disposal

- Wear protective gear to dispose of the contaminated clothing
- If no protective gear is available, wear gloves or use objects such as tongs, sticks, tool handles, to place the contaminated clothing in the plastic bag. Then follow total decontamination for yourself

Decontamination: Clothing Disposal (continued)

- After you have removed your clothing, showered, and disposed of clothing, change into clothing that has been stored in drawers, closets, or plastic bags



Decontamination: Clothing Disposal (continued)

- Avoid the areas contaminated by chemicals
- Seal the bag, and then place inside another plastic bag
- Avoid the areas contaminated by chemicals
- Seal the bag, and then place inside another plastic bag

Traumatic Event

- An event, or series of events, that cause(s) moderate to severe stress reaction. Trauma events affect survivors, rescue workers, friends, relatives of victims directly involved
- It may also affect people who witnessed the event
- Stress reactions immediately follow a traumatic event and will resolve within 10 days of the event

Interaction Techniques After a Traumatic Event

- Listen and encourage patients to talk about their reactions when they are ready
- Validate the emotional reactions of the person. The reaction may be intense and painful at times
- De-emphasize clinical, diagnostic, and pathological terms
- Communicate, person to person rather than “expert” to “victim,” using straightforward terms

Rapid Assessment of Injuries

Assessment

- The sooner a rapid assessment begins, health department authorities can respond to circumstances specific to the event
- The survivors of the event should be examined by health care personnel within 16 hours
- After survivors are seen, the local and state health departments then begin an assessment of casualties

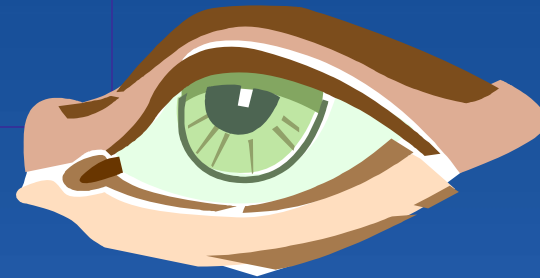
Hospital Selection

- The location of the event will determine which hospital emergency departments, trauma facilities, or other field hospitals are being used to care for casualties

Common Injuries of Mass Trauma

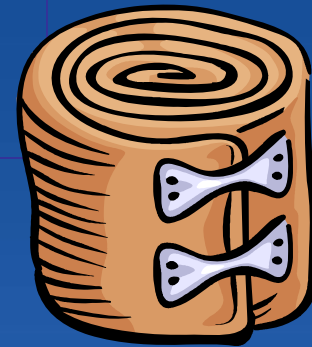
- Eye injuries
- Sprains
- Strains
- Minor wounds
- Eardrum damage

Eye Injuries



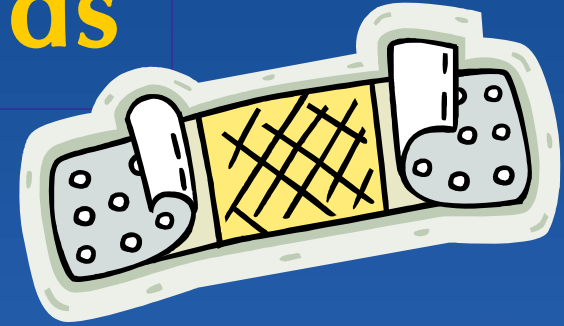
- Eye injuries and irritation can occur from excess particles (dirt, soot, powder, paint chips), fumes or smoke present in the air after the disaster event
- Serious eye injuries will result from high velocity metal or glass fragments to the eye

Sprains and Strains



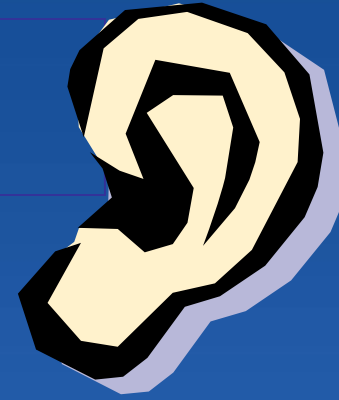
- Sprains and strains are common in these situations and occur as people escape, fall, are thrown or pushed down by force, or carry others to safety

Superficial Wounds



- Flying debris and falling on or scraping against sharp objects usually cause superficial wounds

Eardrum Damage



- Damage to the eardrum can occur from foreign bodies entering the ear, a blow or jolt to the head, or an extreme sudden noise (explosion,) all of which are likely in a disaster



Activity: CBRNE Tabletop Exercise

Scenario: Chemical Agent

Scenario

- At 11:10 a.m., on a hot, still day in early September, Trenton High School's main office receives a frantic call from one of the teachers at the far end of the building.

Scenario (continued)

- The teacher reports that students in her class are having trouble breathing, and between her coughs, says that at least four students are vomiting. The secretary quickly calls 9-1-1 for help and tries to contact the principal via the school's intercom as s/he was not in the office at the time of the call.

Scenario (continued)

- The first arriving ambulance sees parents running into the building and notices that a local TV station has arrived and is setting up near the bus lane in front of the school
- A local radio station is reporting that a group identifying themselves as RIOT claims they released a “deadly” substance near the school, and soon the community will mourn for their children

Questions for Discussion

- What are the immediate actions the school should take in the event of a CBRNE incident?
- What type of communication system or policy does the school district have in place?
- How is notification of an emergency situation made?

Questions for Discussion (continued)

- Are there any immediate protective measures the school should take (e.g., evacuation, shelter-in-place, etc.)?
- How will the school account for persons inside the school and on campus grounds?
- How will the school disseminate timely information to the parents and the community?

Questions for Discussion (continued)

- If the local school evacuates:
 - ~Are there enough busses to transport students?
 - ~If needed, where will the school obtain additional busses?
 - ~Where will students be taken?
 - ~How will parents be notified?
 - ~How will the school provide food, water and medication?

Questions for Discussion (continued)

- How will students be released to parents?
Does the school have:
 - ~ A designated assembly or staging area?
 - ~ A planned and alternative evacuation route?
- Is there a plan or policy in place for after-incident or stress debriefing?

Staff

- If a chemical attack or release is suspected, notify the principal's office immediately
 - Advise of injuries/anyone in immediate danger
 - If evident, notify principal's office of adverse physical symptoms present

Principal's Office

- If chemical attack or release is suspected, turn off HVAC (heating, ventilation, air condition) systems
- Call Emergency 9-1-1 and notify administration
- Control building ingress/egress

Staff

- Stay calm and keep students calm
- Remain in room with door and windows closed. Await further instructions
- Take attendance and keep class roster in your possession
- If outside with students, seek shelter immediately

Principal's Office

- Use PA announcement directing staff and students to remain in classrooms or move to a pre-designated safe/assembly area
 - Only at the direction of the incident commander
- Conduct attendance audit of visitors, staff and students

Staff

- Have students cover nose and mouth with handkerchief or other material

Principal's Office

- Public announcement through local emergency manager or broadcast media

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