# Emergency Preparedness
# and
# the Vulnerable Population


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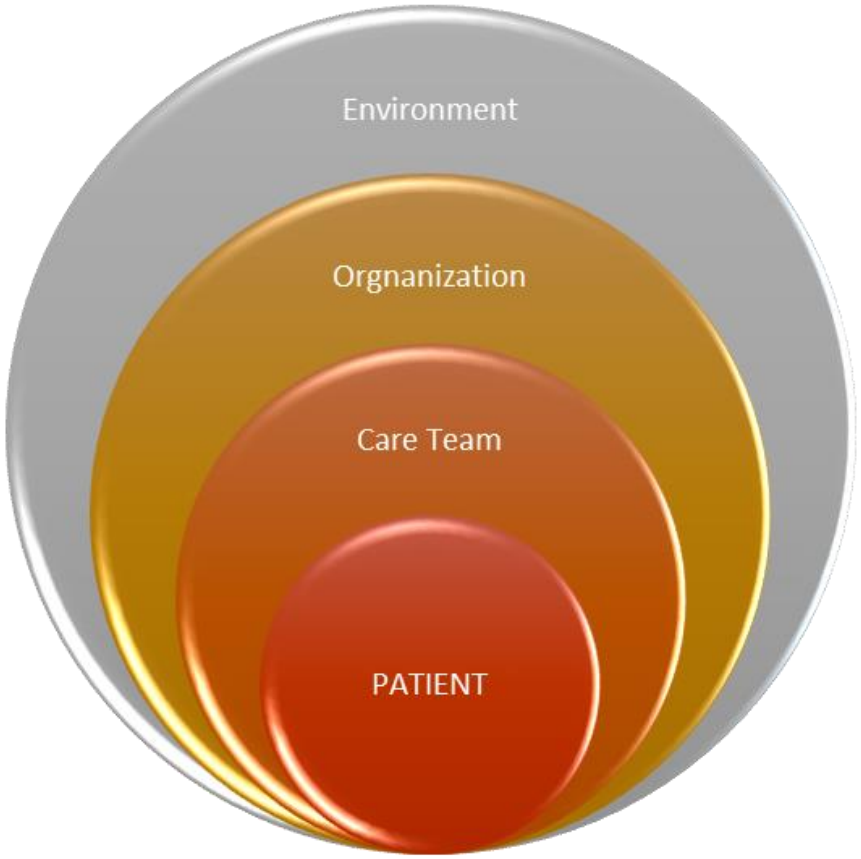
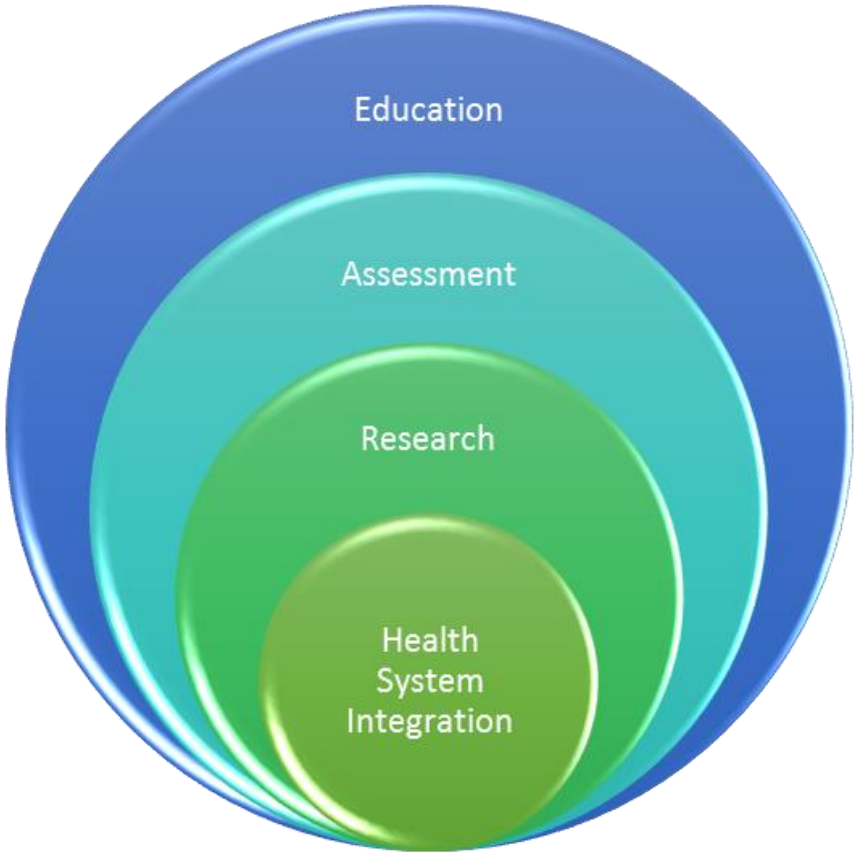
# OBJECTIVES

- 1. Describe the need for emergency preparedness in the health care setting.
- 2. Identify the health education model and how it pertains to emergency preparedness.
- 3. Understands the risk assessment in emergency preparedness and how it pertains to the health care setting.
- 4. Explain the differences in Chemical, Biological, Radiation, Nuclear and Explosive disasters.

# Health Care Model




(Reid, Compton, Grossman, & Fanjiang., 2005) (Batey, 2017)

# EMERGENCY PREPAREDNESS

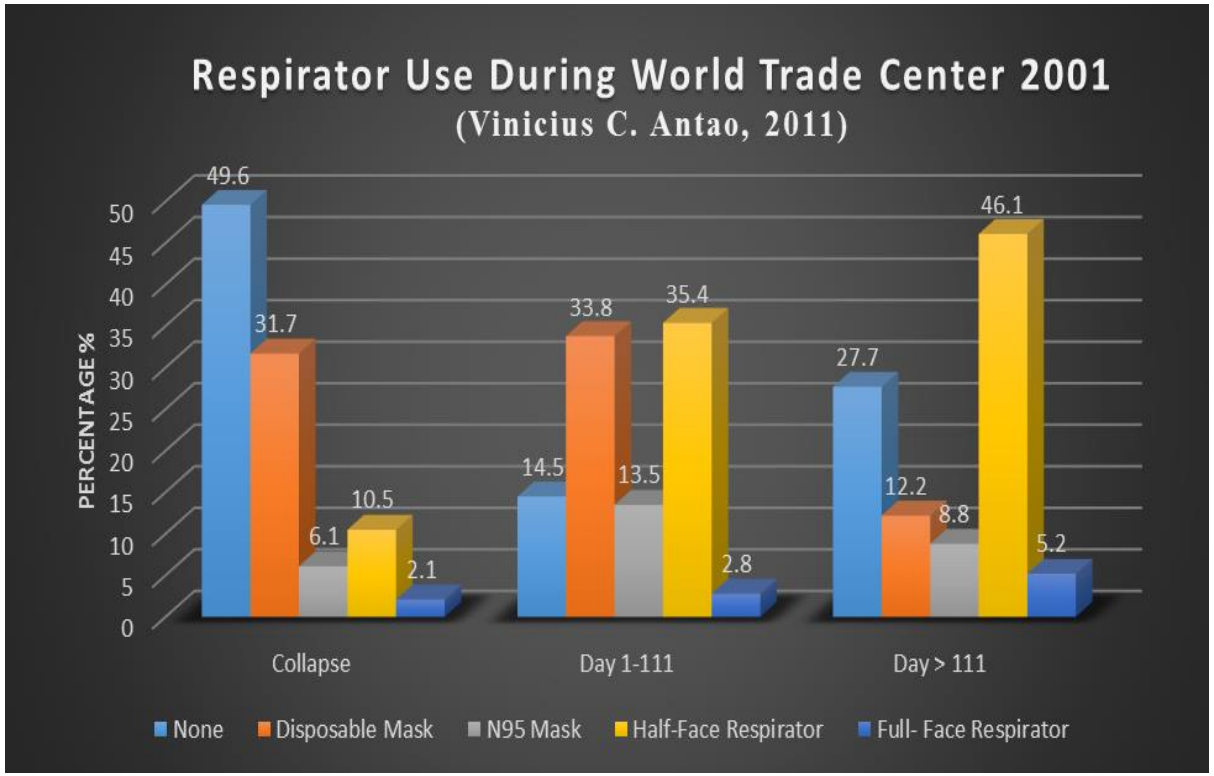
- Types of Disaster Events
- Natural disaster
  - Floods
  - Tornadoes
  - Hurricanes
  - Earthquakes
  - Landslides
  - Snowstorms
  - Tidal waves
  - Wildfires
- Technological disasters
  - Computer failures
  - Widespread computer viruses
  - Telecommunications breakdown
- Transportation disasters
  - Bus crashes
  - Train wrecks
  - Airplane crashes
  - Bridge collapses
- Terrorist attacks
  - Many serious physical injuries
  - Mental and emotional injuries

**Chemical and Biological weapons**

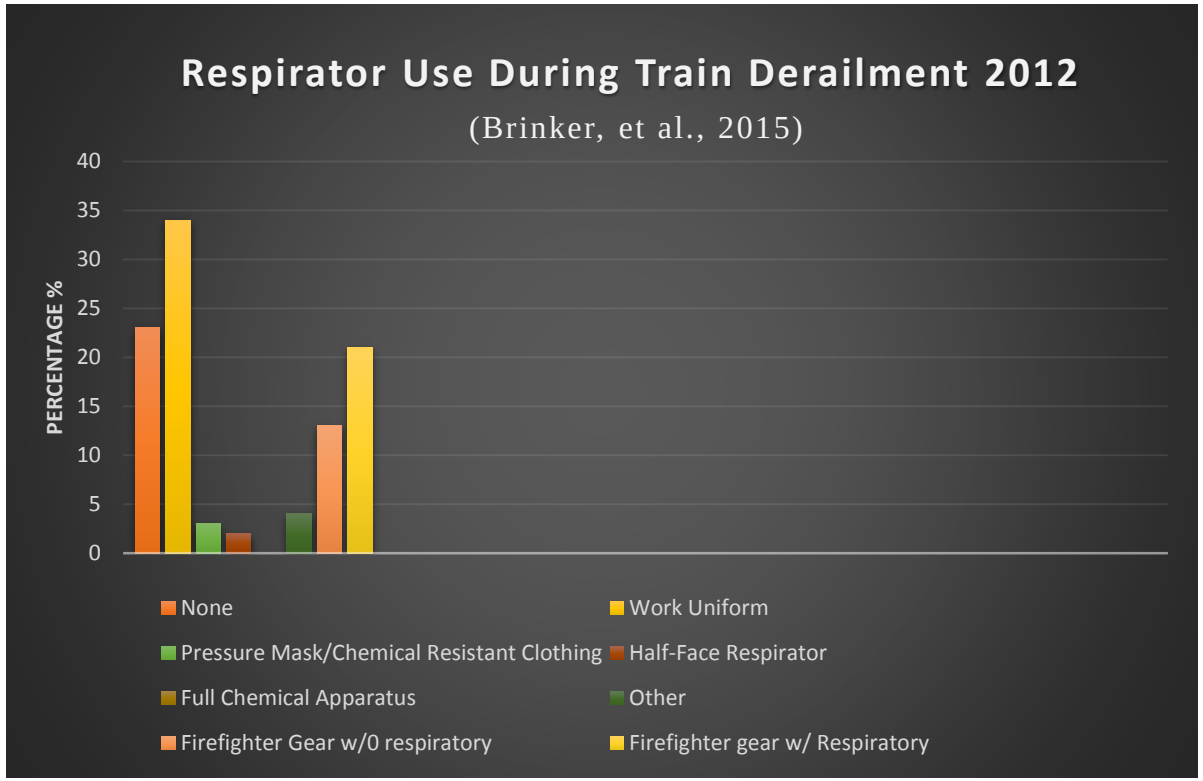
(Federal Emergency Management Agency, 2017)

# Evidence Based Guidelines

## World Train Center

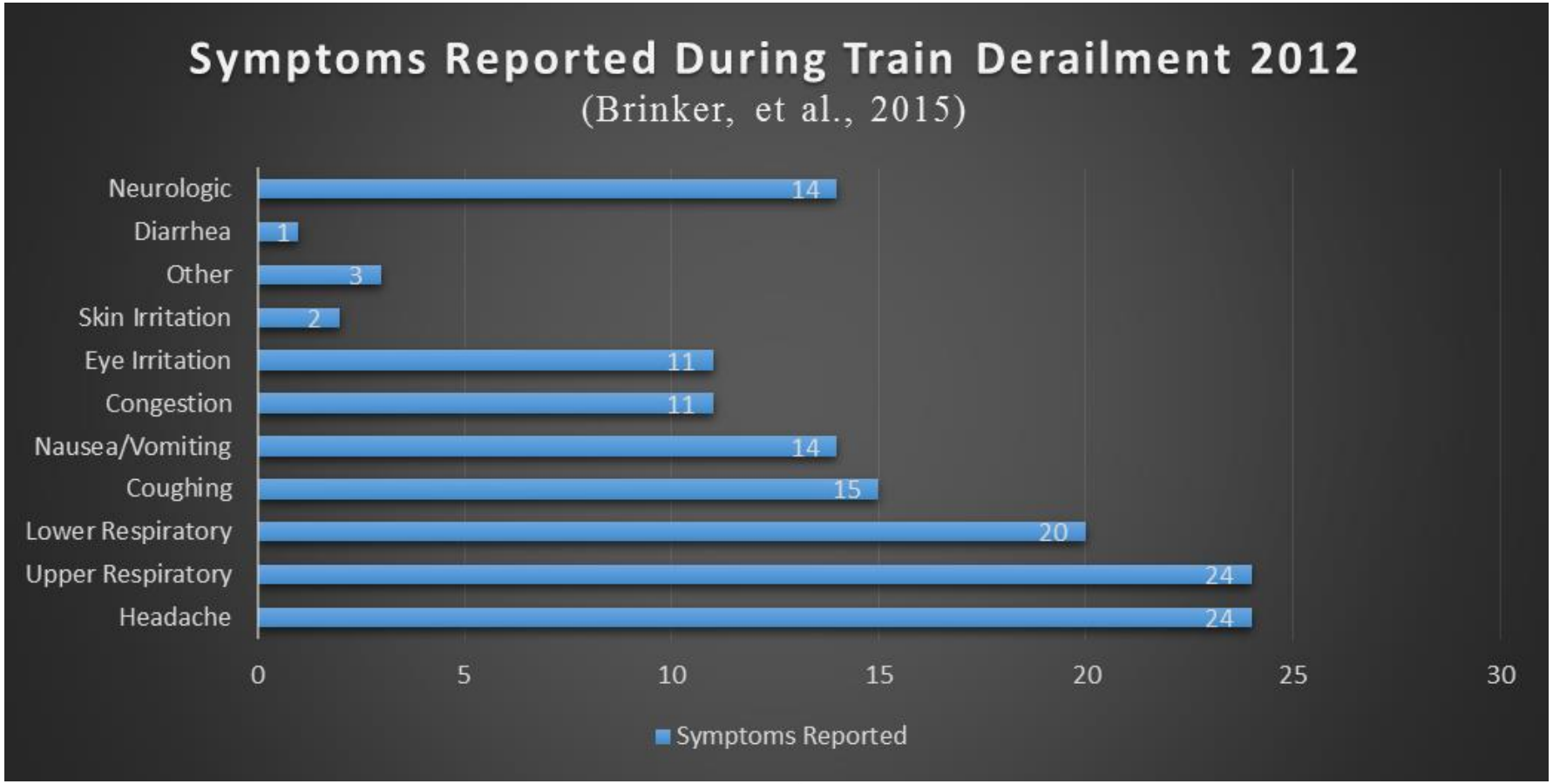



## New Jersey Train Derailment




(Vinicius C. Antao, 2011) (Brinker, et al., 2015)

# Evidence-Based Guidelines




(Brinker, et al., 2015)

# Risk Assessment

- Population
  - Nurses
  - Doctors
  - Ancillary Staff
  - Nurse Aides
  - EMS
  - Firefighters
  - Police Officers

(Sruti Sharma, 2016)

# Educational Program

**Culture-** To develop a public health response to pandemic influenza; transparency and public engagement, allocation of resources, social distancing, and obligations to and of health care workers and international collaboration

**Socioeconomic**-To prepare the United States hospital facilities in modifying dangerous deficiencies in disaster planning

**Genetics/Genomes-** To assess the ability of a specific large hospital laboratory to use whole-genome sequencing in a mock outbreak (Olsen, et al., 2014).

**Ethical-**To analyze the role of legal and ethical considerations for pandemic preparedness (Bennett & Carney, 2010)

(Golabek-Goldman, 2016) (Lor, Thomas, Barrett, Ortmann, & Guibert, 2016) (Olsen, et al., 2014) (Bennett & Carney, 2010)

# Educational Program

- Lab Simulation on a Labor and Delivery Unit.
- Includes Health care staff who work directly on the Labor and Delivery Unit; RNs, Doctors, Techs.
- Four scheduled meeting times in two hour increments.
- Patient presents with a Sarin chemical exposure from a terrorist attack at local parade.
- Educational material provided.
- Policy and procedure tour to decontaminate patient performed.

(Federal Emergency Management Agency, 2017) (Batey, 2017)

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**Chemical and Biological weapons**



(Federal Emergency Management Agency, 2017)

**C** hemical

**B** iological

**R** adioactive

**N** uclear

**E** xplosive

SAMPLE MATERIAL

(Federal Emergency Management Agency, 2017)

Chemical:

- Blister agents
- Nerve agents
- Choking agents

**Blister agents**

Mustard gas; When these agents are breathed in, they damage the lungs. If they are swallowed, they cause vomiting and diarrhea.

Symptoms: Blister/burns of the skin, eyes, mucous membranes, lungs, and other organs. inflammation and severe pain in the eyes, congestion, burning pain in the throat, hoarse voice, large amounts of phlegm, fluid in the lungs, pneumonia.

**Nerve agents**

Sarin; Very toxic chemical warfare gas. Related to a group of insecticides. Symptoms depend on the amount of exposure.

Symptoms: Runny nose, sweating, blurred vision, headache, difficulty breathing, drooling, nausea and vomiting, muscle cramps and twitching, confusion, convulsions, paralysis, and coma.

**Choking agents**

Chlorine; This attacks lung tissue. Will cause a large amount of fluid in the lungs. A high concentration of a choking agent can cause death within hours.

Symptoms: coughing, choking, tightness in the chest and nausea.



(Federal Emergency Management Agency, 2017)

# Biological:

- Anthrax (inhalational)
- Botulism
- Pneumonic plague
- Cholera
- Smallpox

## Botulism

- Transmission: Not contagious from human to human
- Incubation period: 6 hours to 2 weeks (often within 12-36 hours) after exposure
- Length of illness: Days, weeks, or months
- Symptoms: Dizziness, dry throat and mouth, blurred vision, muscle weakness, difficulty speaking and swallowing, respiratory paralysis leading to death (descending paralysis)
- Death rate: High if untreated
- Treatment: Treatable with antitoxin early in the course of the disease
- Vaccine: Available for military and high risk workers (e.g., in labs)

## Anthrax (inhalational)

- Transmission: Not contagious from human to human
- Incubation period: One to seven days
- Length of illness: One to two days
- Symptoms: Fever, feeling tired, severe breathing problems, shock, pneumonia, death within two to three days
- Death rate: Extremely high if untreated
- Treatment: Treatable with antibiotics after symptoms start
- Vaccine: Available for military and high risk workers (e.g., in labs)



(Federal Emergency Management Agency, 2017)

## Pneumonic plague

• Transmission: Contagious from human to human. It is transmitted when a person breathes in *Y. pestis* particles in the air.
• Incubation period: One to six days
• Length of illness: One to two days
• Symptoms: Fever, weakness, rapid development of pneumonia, chest pain, cough, bloody or watery sputum, nausea and vomiting, abdominal pain
• Death rate: Variable depending on early treatment
• Treatment: Treatable with antibiotics within 24 hours of when symptoms start
• Vaccine: Not available. Large supplies of drugs for treatment are available at the state and national levels.

## Smallpox

• Transmission: Contagious from human to human (directly and indirectly)
• Incubation period: 12 days (average)
• Length of illness: Several weeks
• Symptoms: Fever, malaise, head and body aches, vomiting during the first three days; sores then appear in the mouth and then on the skin
• Death rate: Up to 30%
• Treatment: Treatable if vaccine is given before infection develops; Treatment is supportive and antibiotics are given if secondary infection occurs.
• Vaccine: Some doses available (available to the general public in the event of an outbreak)

## Cholera

• Transmission: Rarely contagious from human to human
• Likely methods of being spread: Food and water supplies, air
• Incubation period: 1 to 5 days
• Length of illness: At least one week
• Symptoms: Watery diarrhea, dehydration, vomiting, leg cramps
• Death rate: Extremely low with treatment, high without treatment
• Vaccine: Not available in the United States



(Federal Emergency Management Agency, 2017)

# Nuclear and Radioactive:

- Though an accident at a commercial nuclear power plant is highly unlikely, the consequences would be severe.
- Plant workers and members of the public would be at risk of radiation exposure in the event of an accident.
- 120 million Americans living within 50 miles of a nuclear reactor, stringent oversight of emergency planning and preparedness in the event of a nuclear accident is a crucial public health and safety measure.
- Terrorists could explode a radioactive device. Mass causalities could result.
- The presence of radioactive material on clothing and bodies is a hazard to healthcare responders and requires decontamination.
- Low level exposure to radiation may not produce symptoms.
- Exposure to high levels of radiation may cause: Nausea, vomiting, diarrhea, swelling, redness of the skin.

(Federal Emergency Management Agency, 2017)

# Explosives:

A violent release of energy caused by the almost instantaneous combustion or decomposition of a chemical compound or mixture of compounds that releases extreme heat and an extremely large quantity of gaseous products.

| System | Injury or Condition |
|---|---|
| Auditory | Tympanic membrane rupture, ossicular disruption, cochlear damage, foreign body. |
| Eye, Orbit, Face | Blast lung, hemothorax, pneumothorax, pulmonary contusion and hemorrhage, AV fistulas, airway epithelial damage, aspiration pneumonitis, sepsis |
| Digestive | Bowel perforation, hemorrhage, ruptured liver or spleen, sepsis, mesenteric ischemia from air embolism |
| Circulatory | Cardiac contusion, MI, shock, hypotension, peripheral vascular injury, air embolism-induced injury |
| CNS Injury | Concussion, closed and open brain injury, stroke, spinal cord injury, air embolism-induced injury |
| Renal Injury | Renal contusion, laceration, acute renal failure due to rhabdomyolysis, hypotension, and hypovolemia |
| Extremity Injury | Traumatic amputation, fractures, crush injuries, compartment syndrome, burns, cuts, lacerations, acute arterial occlusion, air embolism-induced injury. |

(Federal Emergency Management Agency, 2017)

# Educational Program Evaluation


- Expected appropriate actions during simulation.
- Hands-on educational process including the simulation.
- Post verbal multiple choice quiz for evaluation.

# Educational Program Evaluation


- With CBRNE exposure, non-sterile gloves and regular mask are sufficient to treat patients.
  - A) True
  - B) False
- What is Sarin?
  - A) Radioactive material
  - B) Food
  - C) Chemical nerve agent
- Where do patients go who need decon?
  - A) Home
  - B) Emergency room
  - C)Decontamination room
- What is the acronym CBRNE?
  - A) Carry, blood, resuscitation, newborn, early
  - B) Chemical, biological, radiation, nuclear, explosive
  - C) Culture, biological, race, newborn, expectant

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