

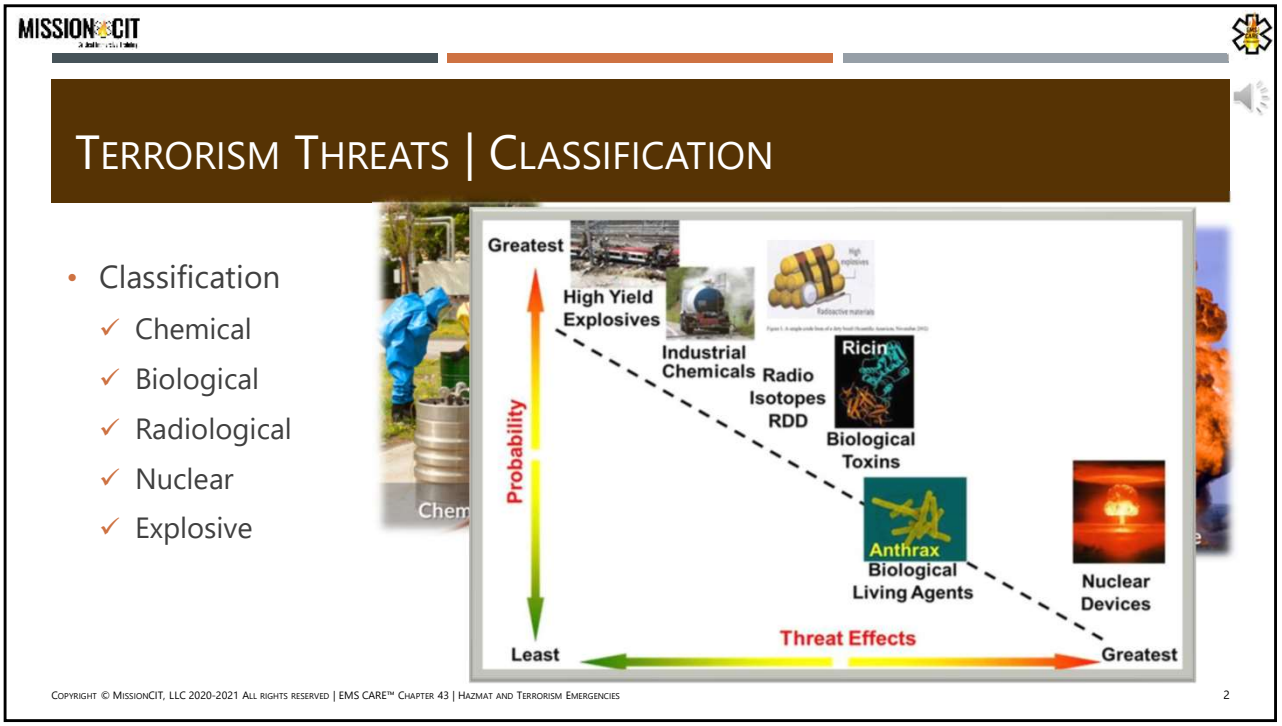
Thank you, Missah.

Terrorism that makes use of CBRNE materials, poses a clear threat to public health and safety, national security, and economic and political stability on a global level. They include disasters and emergencies that result from the conscious anti-social or anti-establishment acts of individuals or groups of individuals.

B-NICE and C B R N E are mnemonics to remember the

kinds of weapons of mass destruction. In this lesson, we will define C B R N E, and recall its characteristics. We will also study the different routes of exposure, and review some types of harm associated with such incidents.

Good studying.



The federal government groups terrorist threats into five categories — chemical, biological, radiological, nuclear, and explosive. When such devices or agents are used to cause mass disruption and possibly mass casualties, they are referred to as CBRNE incidents. Each type of threat has unique characteristics and medical impacts:

Chemical. A chemical emergency occurs when a hazardous chemical has been released, and the release has the potential to harm people's health. In the United States, 60,000 chemical spills, leaks, and explosions

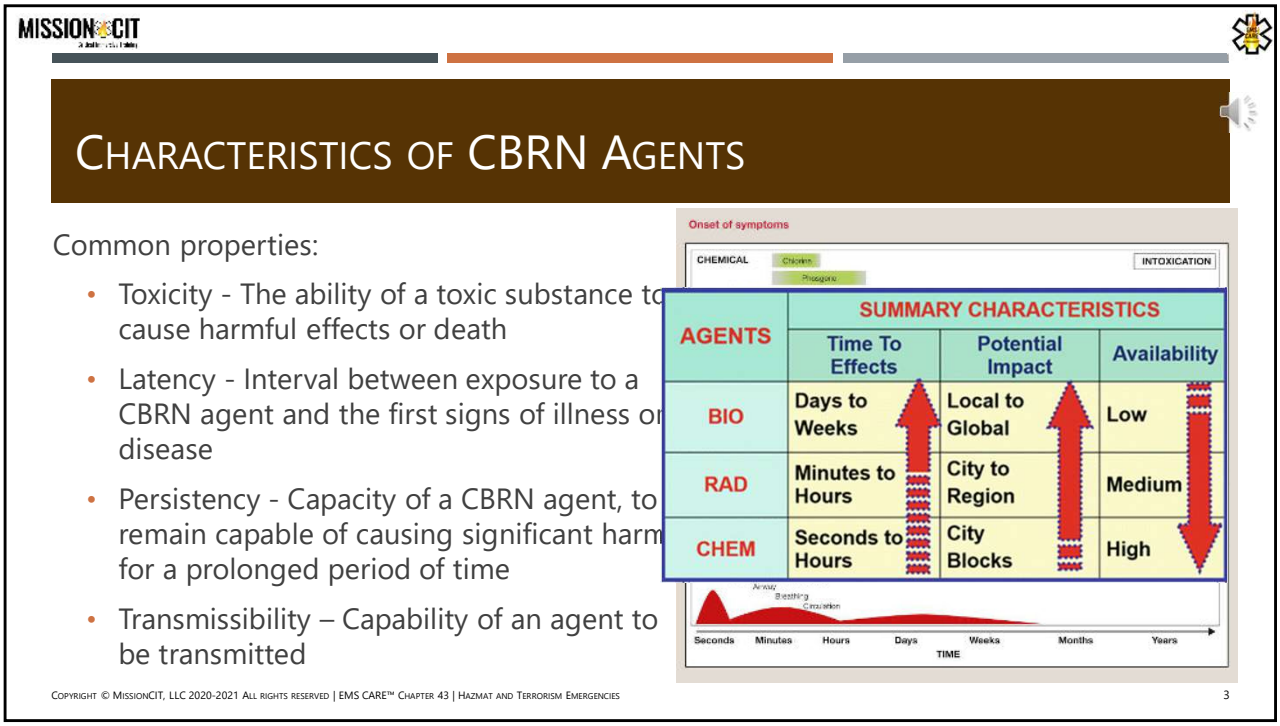
involving more than 300 deaths occur each year. Many hazardous chemicals are used in industries. Chemical releases can be unintentional, as in the case of an industrial incident, or intentional, as in the case of a terrorist attack.

Biological. This category includes bioterrorism agents, such as anthrax, smallpox, botulism, and plague. In the non-terrorism context, it can include outbreaks of infectious disease with a high risk of transmission and serious health effects, such as severe acute respiratory syndrome (SARS), and avian influenza.

Radiological. Wide-scale exposure to radiation could result from a dirty bomb, in which radioactive material is dispersed through an explosive device, or by a compromise of the containment of nuclear power stations or nuclear storage facilities.

Nuclear. Resulting from the detonation of a nuclear device, this type of incident can result in a wide range of injuries, including explosive, radiological, and burns.

Explosive. Explosive injuries can include blunt and shock wave-induced trauma, as well as burns, hearing loss, and injuries from shrapnel and the secondary collapse of structures.



C B R N agents have four key properties in common, which influence our overall approach to treating adverse health effects and managing CBRN events, namely, toxicity, latency, persistency, and transmissibility.

Toxicity is a measure of the ability of a toxic substance to cause harmful effects or death. Toxicity is generally used to describe chemical agents, whereas the terms ‘morbidity’ and ‘mortality’ or ‘lethality’ are more commonly used for biological agents. For nuclear and radiological agents, ‘deterministic effects’ refer to

immediate damage linked to levels of radiation exposure; ‘stochastic effects’ are chance effects that appear at a later date (e.g., cancer

Latency is the interval between exposure to a C B R N agent and the first signs and symptoms of illness or disease. The time of onset depends on many factors, including the type of agent, its concentration, the amount of exposure, and the individual’s response. For biological agents, the latency period is often called the ‘incubation period.’ A related factor is the time window for medical treatment. Where this falls entirely within the latency period, it may not be possible to deliver effective treatment.

Persistency, is the capacity of a C B R N agent, once released, to remain capable of causing significant harm for a prolonged period of time. This characteristic depends on two main factors: the inherent physical or chemical stability of the agent, and its propensity to degrade in line with specific environmental conditions, such as temperature, moisture, and ultraviolet radiation, that is, sunlight levels.

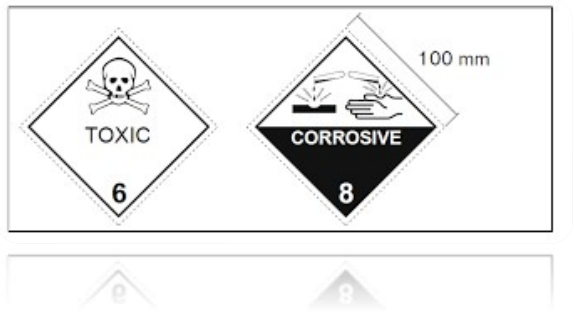
Transmissibility is the term used to describe whether an agent can be transmitted from one person to another. The main means of transmission of C B R N agents are cross-contamination and direct physical contact. However, transmissibility is understood differently for specific infectious biological agents, which can be transmitted from person to person directly but without contact (e.g. through the air) or indirectly (e.g., through insect vectors).

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Types of Harm – Chemical

Types

- Toxic – produce harmful effects
- Corrosive – cause visible destruction or irreversible alterations in human tissue



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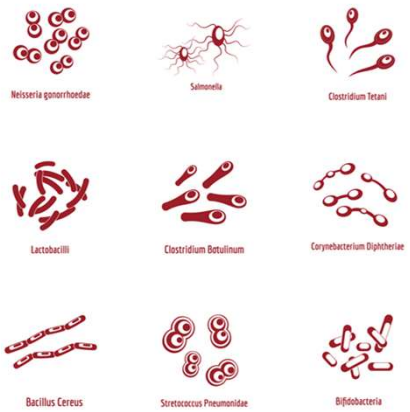
There are two broad types of chemicals used that can cause harm: they are toxic, and corrosive materials. Both of these can exist as solids, liquids, or gases.

Toxic materials produce harmful effects, depending on the materials' concentration and the length of exposure to them. An individual can have chronic or acute exposure to toxic materials. Nerve agents are examples of toxic materials.

Corrosive materials are liquids or solids, causing visible destruction or irreversible alterations, in human skin tissue at the site of contact. They may be liquids that have a severe corrosion rate on steel or aluminum. Sulfuric acid is an example of corrosive material. Blister agents also behave like corrosives.

Types of Harm – Etiological

- Exposure to a living microorganism or its toxin
- Example – Biological agents



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Etiological harm involves exposure to a living microorganism, or its toxin, which causes, or may cause, human disease.

Biological agents are the most obvious examples of etiological agents.

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TYPES OF HARM – MECHANICAL

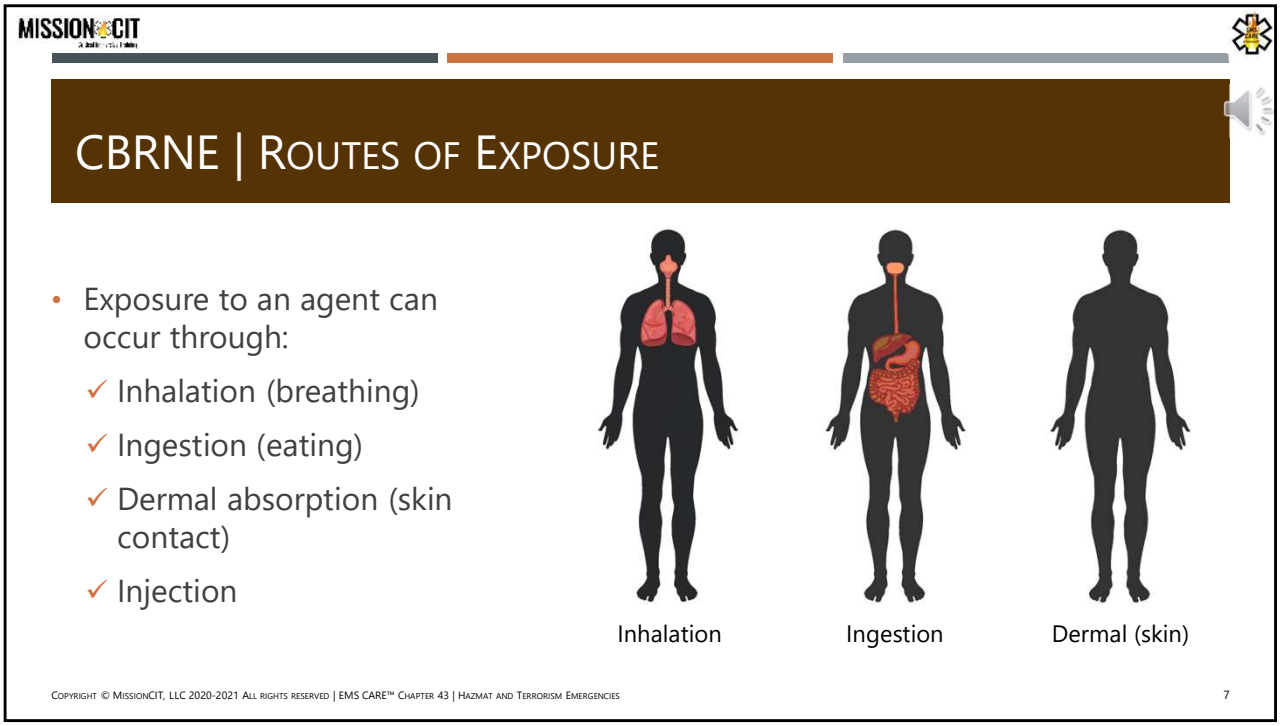
- Causes trauma from contact with mechanical or physical hazards
- Example – Mechanical injury from explosive device



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Mechanical is the most common type of harm. It causes trauma from contact with mechanical or physical hazards.

One form of mechanical injury can result from an explosive device, in the form of shrapnel or antipersonnel materials, such as nails, contained in the explosion.



As we discuss these incidents, it is essential to remember the routes of exposure to Chemical, Biological, and Radiological Agents. The four routes of entry are, inhalation, absorption, ingestion, and injection.

In the Inhalation route, the agent enters via the respiratory tract, by vapor, aerosols, or contaminated dust that can be inhaled into the lungs.

Ingestion is when the agent is being ingested into the

digestive system, via contaminated drinks or food.

Dermal or Skin Absorption means the agent is absorbed through the skin, sometimes even through layers of clothing. These agents can be in solid, liquid, or vapor form. Most biological agents do not pose contact hazards unless the skin is cut or abraded.

and through Injection – Though not common, injection of chemicals into the body can occur either by the agent moving from the injection site into the bloodstream, or being injected directly into a vein or artery.

In addition to these four types of hazard, radiological agents present a significant additional threat that results from the radiation they emit.

Nuclear hazards, in this context, will be those resulting from a nuclear explosion. These will include extensive blast and fire damage, direct radiation effects, and widespread radiological contamination.

Exposure can often occur as a combination of these different routes.