# MODULE 2

## Biological Agents of Concern

Category A, B, and C Threat Agents: Recognition and Clinical Features

**Bioterrorism Preparedness for Nevada Nurses**

4.0 Contact Hours | Nevada Board of Nursing Approved

Provider: NV-14175 | NAC 632.340 & NAC 632.355

## Learning Objectives

| | |
|---|---|
| 1 | Classify biological agents into CDC Categories A, B, and C based on threat level |
| 2 | Identify clinical presentations of Category A biological agents |
| 3 | Describe transmission routes and infection control requirements for each agent |
| 4 | Explain treatment protocols and nursing interventions for biological agent exposure |
| 5 | Differentiate between agents based on pathognomonic clinical features |

## CDC Classification System

| Category | Priority | Examples | Characteristics |
|---|---|---|---|
| A | Highest | Anthrax, Smallpox, Plague, Botulism | Mass casualties, easy dissemination |
| B | Second | Brucellosis, Q Fever, Ricin | Moderate morbidity, lower mortality |
| C | Emerging | Nipah, Hantavirus, Novel pathogens | Future bioterrorism potential |

## ANTHRAX (Bacillus anthracis)

Gram-positive, spore-forming bacterium. Spores can survive decades in soil. NOT transmitted person-to-person. Standard Precautions adequate.

| Form | Route | Presentation | Mortality |
|---|---|---|---|
| Inhalational | Inhaled spores | Flu-like → respiratory distress, WIDENED MEDIASTINUM | Up to 95% |
| Cutaneous | Skin contact | Painless papule → vesicle → BLACK ESCHAR | <1% treated |
| Gastrointestinal | Ingestion | Nausea, vomiting, bloody diarrhea, ascites | 25-60% |

### CLINICAL PEARL

Widened mediastinum on chest X-ray is the pathognomonic finding of inhalational anthrax. Treatment: Ciprofloxacin or Doxycycline for 60 days. Antitoxins for severe cases.

## SMALLPOX (Variola major)

**■ HIGHLY CONTAGIOUS**

Airborne + Contact Precautions required! Mortality 30% in unvaccinated. Eradicated in 1980 but laboratory stocks remain.

| Feature | Smallpox | Chickenpox |
|---|---|---|
| Distribution | CENTRIFUGAL (face, extremities) | Centripetal (trunk) |
| Lesion Stage | All lesions SAME stage | Multiple stages simultaneously |
| Palm/Sole | Commonly involved | Rarely involved |
| Fever Timing | BEFORE rash (prodrome) | With rash onset |
| Patient Status | Very ill (toxic) | Usually mild illness |

## PLAGUE (Yersinia pestis)

Gram-negative bacterium. Natural vector: fleas. Bioterrorism route: aerosolized → pneumonic form. Pneumonic plague IS transmitted person-to-person and requires Droplet Precautions.

| Form | Presentation | Person-to-Person |
|---|---|---|
| Bubonic | Painful lymph nodes (buboes), fever | NO |
| Septicemic | Septic shock, DIC, gangrene | NO |
| Pneumonic | Severe pneumonia, HEMOPTYSIS, rapid progression | YES - HIGHLY CONTAGIOUS |

Treatment: Streptomycin, Gentamicin, or Doxycycline. Must begin within 24 hours.

## BOTULISM (Clostridium botulinum toxin)

Most potent toxin known. Blocks acetylcholine release → flaccid paralysis. NOT transmitted person-to-person. Standard Precautions.

**CLASSIC PRESENTATION**

Descending, symmetric flaccid paralysis with cranial nerve involvement. Patient is ALERT with clear sensorium (unlike stroke). Key signs: Diplopia, dysarthria, dysphagia, NO FEVER. Antidote: Botulinum antitoxin from CDC.

## Quick Reference Chart

| Agent | Key Finding | Person-to-Person | PPE |
|---|---|---|---|
| Anthrax | Widened mediastinum | NO | Standard |
| Smallpox | Centrifugal rash, same stage | YES | Airborne + Contact |
| Plague (pneumonic) | Hemoptysis, rapid pneumonia | YES | Droplet |
| Botulism | Descending paralysis, alert | NO | Standard |
| Tularemia | Ulcer + lymphadenopathy | NO | Standard |

✓ Category A agents pose highest risk due to ease of dissemination and high mortality
✓ Smallpox and pneumonic plague require enhanced isolation precautions
✓ Anthrax, botulism, and tularemia are NOT transmitted person-to-person
✓ Recognize pathognomonic findings: widened mediastinum (anthrax), centrifugal rash (smallpox)