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Table 1: Category A biological agents and their characteristics

Disease/Agent	Incubation	Initial Symptoms	Transmission	Nursing Implications
Anthrax (*Bacillus anthracis*)				Contact precautions-
Cutaneous	<1 week	Localized itching, popular lesion that turns vesicular, development of black eschar	Animal-to-human	antibiotic therapy
Inhalational	1-13 days	fever, cough, headache, myalgias, malaise, and dyspnea	Inhalation of aerosolized spores	
Gastrointestinal	3-5 days	Fever, nausea, vomiting, and anorexia	Consumption of infected Meat or dairy products	
Botulism (*Clostridium botulinum*)	18-36 hours			Droplet precautions-
Foodborne		Blurred vision, mydriasis, diplopia, ptosis, photophobia, hoarseness, dysarthric speech, dysphonia, and dysphagia	Contaminated food Antitoxin	establish a clear airway, aid
Wound			Wound infected with *C. botulinum*	breathing, give botulinus
Infant			*C. botulinum* in intestinal tract	anti-toxin, and provide supportive therapy.
Plague (*Yersinia pestis*)				Droplet precautions-
Bubonic	2-10 days	Enlarged, tender, regional lymph nodes, malaise, headache, and high fever	Fleas-to-human	antibiotics, oxygen, intravenous fluid,
Pneumonic	1-6 days	High fever, chills, headache, malaise, and myalgias	Airborne, human-to-human	respiratory support.
Smallpox (variola major)	3-5 days	Fever, malaise, headache, backache, chills, vomiting, pharyngitis, delirium, abdominal pain, measle-like rash, diarrhea, seizures	Close contact with fluids	Contact precautions- negative pressure room with HEPA -filtration
Tularemia (*Francisella tularensis*)	1-21 days	Fever, chills, headaches, diarrhea, muscle aches, joint pain, dry cough, progressive weakness	Insect vector or bodily fluids	Standard precautions- antibiotic therapy.
Viral hemorrhagic fevers (VHFs)				Contact precautions-
Ebola	2-21 days	Fever, headache, joint and muscle aches, sore throat, weakness, diarrhea, vomiting, and stomach pain.	Contact with fluids	HEPA filter mask or respirator; restricted access to patients.
Marburg	5-10 days	Fever, chills, headache, and myalgia	Contact with fluids	
Lassa Fever	1-3 weeks	Fever, retrosternal pain, sore throat, back pain, cough, abdominal pain, vomiting, diarrhea, facial swelling, proteinuria, mucosal bleeding	Contact with feces of rodents, aerosolization	

Note: Information gathered from the Centers for Disease Control and Prevention at www.bt.cdc.gov
Medline Plus. Medical Encyclopedia. Available at http://www.nlm.nih.gov/medlineplus/encyclopedia.html.

Table 2: Emerging infectious diseases and their characteristics

Disease/Agent	Incubation	Initial Symptoms	Transmission	Nursing Implications
Severe acute respiratory syndrome (SARS)	2-7 days	Headache, discomfort, body aches, mild respiratory symptoms, and diarrhea	Close person-to-person	Droplet precautions- antibiotics, supplemental oxygen, chest physiotherapy, or mechanical ventilation.
Avian Influenza (bird flu) H5N1 strain		Fever, cough, sore throat, and muscle aches	Bird-to-human	Droplet precautions- antibiotic therapy for human flu viruses.
Bovine spongiform encephalopathy (BSE) and **Creutzfeldt-Jakob disease** (CJD)		Muscle spasms, lack of muscle control, worsening problems with memory, speech impairment, delirium.	Contaminated meat products	Standard precautions- provide a safe environment, control aggressive or agitated behavior, and meet physiologic needs.
Monkeypox (*Monkeypox virus*)	12 days	Fever, headache, muscle aches, backache, lymph nodes swell, and malaise	Animal-to-human	Contact precautions- receive smallpox vaccine in early stages.
Tuberculosis (*Mycobacterium tuberculosis)*	1-21 days	Bad cough, pain in chest, coughing up blood or sputum, fatigue, weight loss, anorexia, chills, fever, sweating at night	Airborne	Airborne precautions- antitubercular drugs for up to 6 months.
Pertussis (*Bordella pertusis*)	7-10 days	Fever, fatigue, dizziness, muscle aches, loss of strength, and exhaustion	Contact with fluids of infected person	Droplet precautions- antibiotics if detected early enough; oxygen tent with high humidity; intravenous fluid if patient cannot drink water.

(Note: Information gathered from the Centers for Disease Control and Prevention, available at www.cdc.gov/az.do and Medline Plus, Medical Encyclopedia, available http://www.nlm.nih.gov/medlineplus/encyclopedia.html)

Table 3. Examples of Factors that Play a Role in Human Disease Infection

Host Characteristics	Types of Agents	Environmental Factors	Vectors
Age	Biologic	Temperature	Insects
Race	Chemical	Heat	Birds
Ethnicity	Radiological	Humidity	Animals
Gender	Nuclear	Air pollution	Rodents
Socioeconomic	Natural	Water	
Status	Nutritional	Living conditions	
Occupation		Housing	
Family history		Urban vs. Rural	
Religion			

Adapted from Gordis, L. (2004) *Epidemiology* (3rd ed.). Philadelphia: W.B. Saunders.

Table 4. Overview of Types of Isolation Precautions and Patients Requiring Precautions

Precaution	Requirements	Examples of Infectious Diseases
Standard	Wash hands after patient contact. Wear gloves when touching blood, body fluids, secretions, excretions contaminated items. Wear a mask and eye protection, or a face shield during procedures likely to generate splashes or sprays of blood, body fluids, secretions, or excretions. Handle used patient-care equipment and linen in a manner that prevents the transfer of microorganisms to people or equipment. Use care when handling sharps and use a mouthpiece or other ventilation device as an alternative to mouth-to-mouth resuscitation when practical.	Use Standard Precautions for the care of all patients.
Airborne	Standard Precautions plus: Place the patient in a private room that has monitored negative air pressure, a minimum of six air changes/hour, and appropriate filtration of air before it is discharged from the room. Wear respiratory protection when entering the room. Limit movement and transport of the patient. Place a mask on the patient if they need to be moved.	Measles Varicella (including disseminated zoster) Tuberculosis
Droplet	Standard Precautions plus: Place the patient in a private room or cohort them with someone with the same infection. If not feasible, maintain at least 3 feet between patients. Wear a mask when working within 3 feet of the patient. Limit movement and transport of the patient. Place a mask on the patient if they need to be moved.	Invasive Haemophilus influenzae type b disease, Invasive Neisseria meningitidis disease, Diphtheria (pharyngeal), Mycoplasma pneumonia, Pertussis, Pneumonic plague, Adenovirus, Influenza, Mumps, Rubella
Contact	Standard Precautions plus: Place the patient in a private room or cohort them with someone with the same infection if possible. Wear gloves when entering the room. Change gloves after contact with infective material.	Shigella, Hepatitis A, rotavirus, Diphtheria (cutaneous), Herpes simplex virus, Impetigo, Pediculosis, Scabies, Viral hemorrhagic infections

	Wear a gown when entering the room if contact with patient is anticipated or if the patient has diarrhea, a colostomy or wound drainage not covered by a dressing. Limit the movement or transport of the patient from the room. Ensure that patient-care items, bedside equipment, and frequently touched surfaces receive daily cleaning. Dedicate use of non-critical patient-care equipment (such as stethoscopes) to a single patient, or cohort of patients with the same pathogen. If not feasible, adequate disinfection between patients is necessary.

(CDC, 2005b; Veenema, 2003)

Table 5: International and national infectious disease surveillance systems

Surveillance System	Object of Surveillance System	Website or Contact Information
121 Cities Mortality Reporting System	The Epidemiology Program Office of the CDC compiles and summarizes Death reports from 122 cities and metropolitan areas in the United States. Focus on deaths due to pneumonia and influenza.	www.cdc.gov/epo/dphsi/phs.htm#121.
Active Bacterial Core Surveillance (ABCs)	At 9 Emerging Infections Program sites (EIPs), surveillance is conducted for invasive bacterial diseases.	www.cdc.gov/ncidod/dbmd/abcs/default.htm
Border Infectious Disease Surveillance Project (BIDS)	Active, sentinel surveillance for syndromes consistent with hepatitis and febrile-rash illness at clinical facilities in 4 areas on both sides of the U.S.-Mexico border	
Centers for Disease Control and Prevention (CDC)	Responsible for disease control and prevention in the U.S.	www.cdc.gov
Electronic Foodborne Outbreak Investigation and Reporting System (EFORS)	Used in 50 states to report data about foodborne outbreaks on a daily basis.	www.cdc.gov/foodborneoutbreaks/reporting_outbreak.htm
EMERGEncy ID NET	To expand and complement existing disease detection and control Activities, as well as develop a mechanism for rapidly responding to new disease or epidemics.	IDNET@ucla.edu
Foodborne Diseases Active Surveillance Network (FoodNet)	Active surveillance for foodborne diseases to help public health officials better understand the epidemiology of foodborne diseases in the U.S.	www.cdc.gov/foodnet/
Global Emerging Infections Sentinel Network (GeoSentinel)	Consists of travel/tropical medicine clinics around the world that monitor geographic and temporal trends in morbidity among travelers and other globally mobile populations.	www.istm.org/geosentinel/main.html
Integrated Disease Surveillance and Response (IDSR)	Aims to improve the availability and use of surveillance and laboratory data to control priority infectious diseases that are the leading causes of death, disability, and illness in the African region.	www.cdc.gov/idsr/index.htm

Intensive Care Antimicrobial Resistance Epidemiology (ICARE)	Provides data on the prevalence of antimicrobial resistance and antimicrobial use in U.S. healthcare settings.	www.sph.emory.edu/icare
International Network for the Study and Prevention of Emerging Antimicrobial Resistance (INSPEAR)	Response to the global emergence of drug-resistant organisms and the resulting need for international surveillance programs and the strengthening of the microbiologic and epidemiologic capacities of hospitals worldwide	www.cdc.gov/ncidod/hip/surveill/inspear.htm
National Antimicrobial Resistance Monitoring System: Enteric Bacteria (NARMS)	monitor the antimicrobial resistance of human nontyphoid *Salmonella*, *Escherichia coli* O157:H7, and *Campylobacter* isolates.	www.cdc.gov/narms/
National Malaria Surveillance System	Collects epidemiological and clinical information on malaria cases diagnosed in the U.S.	www.cdc.gov/malaria/clinicians.htm#report
National Molecular Subtyping Network for Foodborne Disease Surveillance (PulseNet)	Performs DNA "fingerprinting" on bacteria that may be foodborne.	www.cdc.gov/pulsenet/
National Nosocomial Infections Surveillance System (NNIS)	High quality nosocomial infection surveillance data.	www.cdc.gov/ncidod/hip/surveill/nnis.htm
National Notifiable Diseases Surveillance System (NNDSS)	Collects, compiles, and publishes of reports of disease considered notifiable at the national level.	www.cdc.gov/epo/dphsi/phs.htm
National Respiratory and Enteric Virus Surveillance System (NREVSS)	Monitors temporal and geographic patterns associated with the detection of respiratory syncytial virus (RSV), human parainfluenza viruses (HPIV), respiratory and enteric adenoviruses, and rotavirus..	www.cdc.gov/ncidod/dvrd/revb/nrevss/index.htm
National Surveillance System for Health Care Workers (NaSH)	Collects information important to prevent occupational exposures and infections among health care workers.	www.cdc.gov/ncidod/hip/SURVEILL/nash.htm
National Tuberculosis Genotyping and Surveillance Network	The members of the network input data on DNA fingerprint images, along with epidemiologic information, to a centralized database at CDC.	www.cdc.gov/ncidod/dastlr/tb/tb_tgsn.htm
National West Nile Virus Surveillance System	Monitors the geographic and temporal spread of West Nile virus in the U.S.	www.cdc.gov/ncidod/dvbid/westnile/surv&control.htm
Public Health Laboratory Information System (PHLIS)	Collects data on cases/isolates of specific notifiable diseases from every state within the U.S.	www.cdc.gov/ncidod/dbmd/phlisdata/default.htm
Surveillance for Emerging Antimicrobial Resistance Connected to Healthcare	Report the isolation of *Staphylococcus aureus* with reduced susceptibility to vancomycin.	www.cdc.gov/ncidod/hip/aresist/search.htm

(SEARCH)		
Unexplained Deaths and Critical Illnesses Surveillance System	Improve CDC's capacity to rapidly identify the cause of unexplained deaths or critical illness and to improve understanding of the causes of specific infectious disease syndromes for which an etiologic agent is frequently not identified.	www.cdc.gov/ncidod/dbmd/diseaseinfo/unexplaineddeaths_t.htm.
United States Influenza Sentinel Physicians Surveillance Network	260 physicians around the country report each week the total number of patients seen and the number of those patients with influenza-like illness by age group.	www.cdc.gov/ncidod/diseases/flu/weekly.htm
Viral Hepatitis Surveillance Program (VHSP)	Collects clinical, serologic, and epidemiologic data pertaining to risk factors of disease acquisition.	(888) 4-HEP-CDC or (888) 443-7232
Waterborne-Disease Outbreak Surveillance System	Collects data on the occurrences and causes of waterborne-disease outbreaks.	(770) 488-7760
World Health Organization (WHO)	Collects international surveillance data on infectious diseases.	www.who.int

Note: Information gathered from the Centers for Disease Control and Prevention at http://www.cdc.gov/ncidod/osr/site/surv_resources/surv_sys.htm

Table 6. Epidemiological Patterns Indicating a Potential Biological Attack

1. A cluster of cases with similar clinical presentation and at a similar stage of illness.
2. A cluster of unexplained illness in a defined population, such as that associated with a specific location or event.
3. Unusually severe disease or higher mortality than expected for a given agent.
4. A cluster of cases with an unusual or uncommon mode of transmission for a given agent.
5. Multiple or serial outbreaks of different diseases in a defined population.
6. A disease atypical for a given age category.
7. A disease unusual for the region and/or season.
8. Clusters or the same illness in dispersed locations.
9. Clusters of illness or deaths in animal or livestock occurring in a similar time frame as human illness.

Source: Veenema, T.G. (2003). Disaster Nursing and Emergency Preparedness for Chemical, Biological and Radiological Terrorism and Other Hazards. New York: Springer Publishers.

Table 7. Classification of Biological Agents and Appropriate Precautions

CDC Classifications

The Centers for Disease Control and Prevention categorizes biological agents according to characteristics such as accessibility, ease of use and potential for causing a public health burden. The categories are labeled as A, B and C.

Characteristics	Agents
Category A ▯ Are easily disseminated or transmitted from person to person ▯ Result in high mortality rates and have the potential for major public health impact ▯ Cause public panic and social disruption ▯ Require special action for public health preparedness	Anthrax Botulism Plague Smallpox Tularemia Viral hemorrhagic fevers
Category B ▯ Are moderately easy to disseminate ▯ Result in moderate morbidity rates and low mortality rates ▯ Require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance	Brucellosis Food/water safety threats Glanders Melioidosis Psittacosis Q fever Ricin toxin Staphylococcal enterotoxin B Typhus Viral encephalitis
Category C Emerging infectious diseases that could be engineered for mass dissemination because of their: ▯ Availability ▯ Ease of production and dissemination ▯ Potential for high morbidity and mortality rates and major health impact	Nipah virus Hantavirus Monkeypox SARS CJD Avian Influenza Pandemic Flu

Precautions: Protection from Biological Agents

(This table is a partial listing. For other agents, see the CDC website. Available: www.cdc.gov)

	Standard	Airborne	Contact	Droplet

Anthrax, Inhalational	X			
Avian Influenza	X	X	X	X
Botulism	X			
Brucellosis	X		X	
Cholera	X			
Clostidium difficile	X		X	
Crimean-Congo	X		X	X
Cruetzfeld-Jacob Disease	X			
Ebola	X		X	X
Escherichia coli	X		X	
Glanders	X		X	X
Hantavirus	X			
Invasive Haemophilus influenzae, type B (including meningitis, pneumonia, epiglottitis, and sepsis	X			X
Lassa	X		X	X
Marburg	X		X	X
Measles	X	X		
Melioidosis	X		X	
Monkeypox	X	X	X	X
Nipah Virus	X		X	
Pandemic Influenza	X	X	X	X
Parvovirus B19	X			X
Plague	X			X
Psittacosis	X			X
Q Fever	X			
Ricin Toxin	X			
Salmonellosis	X			
Severe Acute Respiratory Syndrome	X	X	X	
Shigellosis	X		X	
Smallpox	X	X	X	
Staphylococcal Enterotoxin B	X			
Tuberculosis	X	X		
Tularemia	X			
Typhus, Epidemic	X		X	
Varicella (including disseminated zoster)	X	X		
Viral Encephilitides	X			

West Nile Fever	X		X	

Indicated precautions by diagnosis.

Information compiled from the Centers for Disease Control and Prevention website.

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