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RECOGNIZING BIOTERRORISM

Bioterrorism refers to the use of infectious agents to intentionally cause disease or inflict terror in a population. Motivations may include advancing social or political goals, creating mass hysteria, challenging government and community response efforts, and creating mass casualties that may overwhelm medical systems. Any infectious agent (bacteria, viruses, parasites) or their byproducts (toxins such as ricin) may be used in a bioterrorist attack. However, experts have designated anthrax, smallpox, botulinum toxin, plague, tularemia, and viral hemorrhagic fever agents to be of highest concern in terms of the widespread disease and devastation that may occur if intentional release occurred in a population. Biological agents can be dispersed to large numbers of people with little to no risk of immediate detection, and in some cases infected individuals can further disseminate the contagious organisms before they develop symptoms.

In October 2001, a multi-state outbreak of human anthrax resulting from intentional release of anthrax spores via the mail delivery system has highlighted the reality of the threat of bioterrorism in the United States. The fact that the release of biological agents may be difficult to detect until cases of illness appear makes prevention or early intervention a formidable task for the public health community. In the event of a bioterrorist incident, health care personnel will be among the first to encounter victims seeking care. In fact, the index case in the human anthrax outbreak mentioned above was detected by an astute clinician in Florida who had a raised index of suspicion for anthrax (despite its rarity in the United States) and notified the local health department before ordering confirmatory diagnostic tests. By increased vigilance for unusual diseases and improved clinical recognition of syndromes potentially caused by bioterrorism agents, the medical community actually serves as "first responders" to bioterrorism events. In addition, by providing immediate notification to local or state public health officials, the medical community serves as the integral bridge to rapid epidemiologic investigation. This investigation (in coordination with criminal investigation if bioterrorism is being considered) will establish the potential source and/or risk factors of the outbreak, followed by determination of the at-risk population so that appropriate preventive measures (for example, immunization or administration of antibiotic prophylaxis) can be implemented.

Role of the Medical Community in Recognizing Bioterrorism

Illnesses potentially resulting from bioterrorism may be non-specific, especially in the early stages of the clinical course of infection. For example, clinical syndromes such as influenza-like illness, encephalitis, meningitis, pneumonia, rash with fever, or gastrointestinal symptoms such as nausea, vomiting, and diarrhea may be apparent.

Victims of a bioterrorist event at a local public gathering may present with symptoms en masse to local health care facilities after the incubation period of the agent that was intentionally released. However, persons exposed to a biological agent at an airport may be spread across several states and countries when symptoms appear and they seek medical care. Therefore, whether encountering clusters of illnesses or seemingly sporadic cases of disease, medical practitioners must be able to recognize the possibility of intentional infection and alert public health officials.

Most likely, a bioterrorist event will disproportionately affect people within a certain geographic area. Hospitals, urgent care clinics, individual healthcare providers, and even local pharmacies would presumably see numerous patients with similar illnesses or clinical syndromes in a short period of time. Such a scenario should send up a "red flag" of suspicion, which would prompt health care personnel to notify the local, district, or state public health agency **before** confirmation of an etiologic agent. Another scenario that may provide an "early warning" of a bioterrorist event is the discovery of one or more patients presenting with clinical syndromes consistent with very rare diseases or diseases not usually found in a given geographic area (for example, smallpox or pneumonic plague). Clues to possible bioterrorist events are listed in Table 1.

Table 1. Clues to Possible Bioterrorism Incidents

- Unusual levels or patterns of disease in a population
- Unusual seasonal occurrence of a disease
- Unusual course of a disease not consistent with natural course
- Unusual syndromes with unknown etiology
- Unusual antibiotic resistance patterns in common pathogens
- Illness caused by unusual or unrecognized pathogens

(continued from page 1)

By law, Georgia physicians, laboratories, or other health care providers are required to report patients with designated conditions or diagnoses to the local, district, or state health department by mail or phone. Timeliness of this system will be improved with the advent of a new electronic web-based system for timely reporting of suspected or confirmed notifiable diseases, referred to as the State Electronic Notifiable Disease Surveillance System (SENDSS). This system will alert public health officials of disease occurrences more quickly than previous notifiable disease reporting systems so that unusual illnesses or clusters can be investigated rapidly. SENDSS may also allow public health personnel to identify seemingly unrelated cases of unusual illness that are occurring in various parts of the state but may have a common etiology. The system is expected to be available sometime next year. However, it will never replace the speed and sensitivity of immediate telephone reporting by care-givers' of large numbers of ill persons or highly suspicious individual cases should still be reported to the local, district, or state health department **immediately** by phone.

Clinical Presentation of Bioterrorism Agents

Routes for dissemination of infectious agents intentionally in a population may include via aerosol, food, water, insect vectors, blood products, etc. Aerosolization of agents (resulting in inhalation of the infectious organisms) may be accomplished using building air handling systems, crop dusters, individual sprayers, or even powder in envelopes. Many illnesses resulting from aerosol exposure will begin with "flu-like" symptoms, but each critical bioterrorism agent has a unique clinical presentation that may allow it to be differentiated from influenza. See Table 2 for comparison of signs and symptoms of influenza with those of other illnesses. If any of the agents in the chart are suspected, treatment should not be delayed if the clinical presentation does not exactly match that in the chart. For example, if

Table 2. Differentiation of Influenza and Bioterrorism Agents Spread by Aerosol

Signs and Symptoms	*Influenza*	*Inhalation Anthrax*	*Pneumonic Plague*	*Q Fever*	*Tularemia*	*Ricin intoxication*	*Smallpox*	*Hemorrhagic Fevers*	*Botulism*
Fever	Y	Y	Y	Y	Y	N	Y	Y	
Chills	Y		Y	Y			Y	Y	
Headache	Y		Y	Y	Y		Y	Y	
Anorexia								Y	
Lymphadenopathy			Y						
Nausea/vomiting			Y			Y		Y	
Diarrhea									
Abdominal Pain									
Malaise/fatigue	Y	Y	Y	Y	Y		Y	Y	
Myalgias	Y		Y					Y	
Arthralgia	Y					Y			
Back Pain	Y						Y	Y	
Chest Tightness						Y			
Chest Pain		Y		Y					
Substernal Discomfort					Y				
Shortness of Breath		Y				Y			
Cyanosis						Y			
Cough	Y	Y		Y		Y			
Hemoptysis			Y					Y	
Rash*							Y		
Purpura								Y	
Hematochezia/melena								Y	
Hematuria								Y	
Blurred Vision									Y
Ptosis									Y
Diplopia									Y
Dysphonia									Y
Dysphagia									Y
Weakness									Y
Paralysis, descending								Y	Y
Paralysis, ascending								Y	
Ataxia								Y	Y
Coma								Y	Y
Gram + rods		Y							
Gram – ovoid bipolar			Y						
Gram – coccobacillus					Y				
Mediastinal widening on CXR		Y							
Elevated LFTs								Y	
Thrombocytopenia								Y	

* Centrifugal rash distribution, with lesions progressing through stages of macules, papules, vesicles, pustules, and crusted scabs; all lesions in a given area in the same stage of development.

Adapted from the Texas Department of Health

treatment for suspected inhalational anthrax is delayed until a widened mediastinum is visible on chest x-ray, the disease may have progressed too far for therapy to be beneficial. Table 3 also lists common signs and symptoms of potential bioterrorism agents.

Virtually any infectious agent could be used in bioterrorism. In the past, common bacteria such as *Salmonella* and *Shigella* have been used intentionally to cause disease. While clusters of salmonellosis may not raise a "red flag," this illustrates why health care professionals should be suspicious of any clusters of illness and involve public health professionals as soon as possible. Additionally, a bioterrorist attack could occur using genetically modified agents, so that the clinical presentation is unfamiliar. Again, reporting unusual or unexplained cases immediately is vital. In this way, rapid investigation can begin in coordination with other community response partners (law enforcement, emergency management, environmentalists, pharmacists, other health care providers) to mitigate the consequences of a bioterrorist event and to learn valuable lessons in protecting community health in the future.

To report a suspicious illness or cluster of illnesses, call the Georgia Division of Public Health Epidemiology Branch during regular business hours at 404-657-2588. On weekends, evenings, and holidays call 770-578-4104. You may also contact your local District Health Office and their phone numbers can be found at, http://health.state.ga.us/epi/disease/report.shtml#District.

The Georgia Division of Public Health has a bioterrorism website, http://health.state.ga.us/programs/emerprep/bioterrorism.shtml. The site contains links to general information about bioterrorism agents and resources for health care personnel, health facilities, and laboratories. This site is frequently updated with recent information released by state and federal agencies regarding bioterrorism.

This article was written by: Cherie Drenzek, D.V.M., M.S. and Katherine Bryant, M.P.H.

Table 3. Clinical Features of Potential Agents of Bioterrorism

AGENT	CLINICAL FEATURES	CONTAGIOUS
Bacillus anthracis (anthrax)	Cutaneous: • Begins as itchy bump resembling insect bite • Develops into painless vesicle or ulcer • Characteristic black eschar appears in center Inhalation: • Initial symptoms are flu-like, including fever, cough, headache, vomiting, chills, weakness, abdominal pain, and chest pain • Rapid progression to dyspnea, diaphoresis, and shock • Widened mediastinum is often visible on chest x-ray Gastrointestinal: • Primary signs and symptoms include abdominal pain, nausea, vomiting, and fever • Rapid progression to bloody diarrhea, acute abdomen, and sepsis	NO
Yersinia pestis (plague)	Primary Pneumonic Plague: • Primary signs include fever, dyspnea, headache, weakness, chest pain, cough with watery or bloody sputum production and possibly nausea, vomiting, abdominal pain, and diarrhea • Rapid progression to respiratory failure, sepsis, and shock	YES
Variola virus (smallpox)	• Initial prodrome of flu-like symptoms leading to high fever, malaise, prostration, headache, and backache • Development of centrifugal rash progressing through stages of macules, papules, vesicles, pustules, and scabs	YES
Botulinum toxin from *Clostridium botulism* (botulism)	• Blurred vision, double vision, drooping eyelids, slurred speech, difficulty swallowing, muscle weakness, nausea, and vomiting • Descending skeletal muscle weakness or paralysis	NO
Ricin toxin from *Ricinus communis* (castor plant)	• When ricin is inhaled, symptoms are similar to pneumonia and include fever, tightness in chest, cough, dyspnea, nausea, and arthralgia, followed by severe lung inflammation, cyanosis, and pulmonary edema • When ingested, ricin causes abdominal pain, vomiting, diarrhea, and dehydration	NO

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Reported Cases of Selected Notifiable Diseases in Georgia Profile* for September 2001

Selected Notifiable Diseases	Total Reported for Sept 2001	Previous 3 Months Total Ending in Sept			Previous 12 Months Total Ending in Sept		
	2001	1999	2000	2001	1999	2000	2001
Campylobacteriosis	37	183	181	205	769	634	633
Chlamydia trachomatis	2274	8179	7821	7989	30412	27742	30389
Cryptosporidiosis	16	36	79	51	175	190	147
E. coli O157:H7	1	20	23	9	46	51	30
Giardiasis	74	474	382	277	1336	1288	1006
Gonorrhea	1385	5989	5528	4673	21328	18789	17472
Haemophilus influenzae (invasive)	5	8	7	13	83	77	100
Hepatitis A (acute)	81	127	127	282	638	341	843
Hepatitis B (acute)	38	77	100	119	204	305	413
Legionellosis	0	2	1	1	2	10	12
Lyme Disease	0	0	0	0	0	0	0
Meningococcal Disease (invasive)	3	11	6	5	75	61	50
Mumps	0	3	0	0	5	2	7
Pertussis	1	23	17	4	48	59	20
Rubella	0	0	1	0	0	1	0
Salmonellosis	219	795	680	705	1990	1786	1678
Shigellosis	57	90	94	133	435	300	352
Syphilis - Primary	3	48	29	28	149	125	94
Syphilis - Secondary	12	71	88	67	282	303	260
Syphilis - Early Latent	24	153	118	104	745	559	519
Syphilis - Other**	22	198	195	110	774	718	668
Syphilis - Congenital	0	4	9	1	19	23	11
Tuberculosis	42	160	178	119	623	676	555

* The cumulative numbers in the above table reflect the date the disease was first diagnosed rather than the date the report was received at the state office, and therefore are subject to change over time due to late reporting. The 3 month delay in the disease profile for a given month is designed to minimize any changes that may occur. This method of summarizing data is expected to provide a better overall measure of disease trends and patterns in Georgia.

** Other syphilis includes latent (unknown duration), late latent, late with symptomatic manifestations, and neurosyphilis.

AIDS Profile Update

Report Period	Total Cases Reported*	Percent Female	Risk Group Distribution (%)						Race Distribution (%)		
			MSM	IDU	MSM&IDU	HS	Blood	Unknown	White	Black	Other
Latest 12 Months:											
10/00-09/01	1243	25.1	28.6	9.6	2.1	10.3	1.2	48.3	19.2	76.1	4.7
Five Years Ago:											
10/95-09/96	2414	18.7	46.9	17.7	5.2	18.6	1.3	10.3	34.2	63.2	2.6
Cumulative:											
7/81-09/01	23628	17.0	48.0	18.1	5.6	13.1	1.9	13.3	35.2	62.5	2.2

MSM - Men having sex with men **IDU - Injection drug users** **HS - Heterosexual**

* Case totals are accumulated by date of report to the Epidemiology Section