Public Health Emergencies Reference Manual

Indiana State Department of Health

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Indiana State Department of Health
July 2002

Public Health Emergencies Reference Manual

The manual, developed by the Public Health Emergencies Working Group, outlines potential public health emergencies and provides guidance for public health preparedness and response.

A publication of the Indiana State Department of Health
Public Health Emergencies Working Group

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Cover photos: Flooding (upper left), chemical depot storage facility in Newport, Indiana (upper right), tornado (bottom left), and hazardous materials response to possible biological hazard (bottom right)

Acknowledgements

The authors wish to acknowledge that materials and printing for this ***Public Health Emergencies Reference Manual*** was made possible by funding from the Centers for Disease Control and Prevention.

The authors wish to thank the following individuals who served as contributors and reviewers in the development and completion of this manual. Every attempt has been made to recognize all those who contributed to this manual.

Indiana State Department of Health

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Table of Contents

Obtaining Information and Reference Materials

Important ISDH Phone Numbers

Indiana State Department of Health	317-233-1325 Main Line
Epidemiology Resource Center	317-233-7664
	317-233-7378 Fax
Communicable Disease Program	317-233-7665
	317-233-7805 Fax
Food Protection Program	317-233-7360
	317-233-7334 Fax

To obtain additional reference materials, please contact the Epidemiology Resource Center Monday through Friday from 8:00 AM to 4:30 PM at the number listed above. Further information can be found on the Indiana State Department of Health website, which is available at *www.in.gov/isdh*.

Introduction

Traditionally, roles for Local Health Departments (LHDs) have not specifically included readiness for emergencies. However, the emerging communicable diseases, the possible use of biological agents by terrorists, and the inevitability of a future influenza pandemic have placed a spotlight on the importance of public health preparedness and planning. With the experience gained from events of the fall of 2001, public health officials recognize their importance in providing information and services during large-scale events, whether they be manmade or natural. This manual is designed to aid LHD staff in developing capacity for these important roles.

National initiatives, beginning in the 1990's, have led to explicit calls for advance planning such as those from the Group for Influenza Pandemic Preparedness and Emergency Response and the provisions of the Nunn-Lugar-Domenici legislation addressing civilian defense against terrorism. The Centers for Disease Control and Prevention (CDC) have provided funding to state health departments to become engaged in planning efforts coordinated with official first responders including emergency response professionals and law enforcement. Likewise, LHDs need to follow this lead and develop similar partnerships within their jurisdictions. CDC funding has been enhanced because of the events of fall of 2001 and because of the recognition of federal officials that the infrastructure of public health must be improved to guarantee safety and services for the public welfare. Therefore, efforts on both the state and local levels will be more completely funded through federal resources.

Partnerships between public health and other responding agencies have been fostered by county-level trainings arranged through the State Emergency Management Agency (SEMA). These trainings included LHDs and were designed to update county emergency plans to include responses to terrorist events. Also, the *Public Performance Assessment – Emergency Preparedness* survey designed jointly by the Department of Justice and CDC afforded LHDs with the opportunity to interact with other providers of medical services in their local jurisdiction. The relationship between public health and the providers of direct medical services (e.g. emergency medical services, emergency departments, hospitals, clinical laboratories) was highlighted in the survey and helps strengthen the awareness of the responsibilities both LHDs and local medical care providers have for the Health and Medical Emergency Support Function (ESF)

The usual functions of public health (surveillance, epidemiological investigation, health alerts, service to the underserved, disease control measures, and public information/education) are the cornerstones upon which emergency response will be based. Additional activities necessary for timely and effective response to public health emergencies include forging partnerships with the typical official first responders and medical care facilities. An important aspect of these partnerships, which may be new to your jurisdiction, is the inclusion of public health in emergency operations such as command structure, lines of authority, and joint communication efforts. Development of robust and active surveillance mechanisms is also important, because, in the instance of serious disease outbreak, public health and medical professionals will serve as the "first

responders." Early recognition of an outbreak, whether natural or manmade, will be necessary to reduce morbidity and mortality through appropriate public information, control measures, and mass prophylaxis. In addition, good relationships with print and electronic media are essential to assure fact-based public information and to minimize public concerns.

The purpose of this manual is to provide guidance for local public health preparedness and planning. Topics include information about large-scale disease outbreaks, especially those resulting from terrorist attack, as well as the details of local public health responsibilities. The emphasis is on practical and helpful information that will lay the groundwork for your planning efforts.

Contact Persons for Public Health Emergencies

	Agency/Facility Name	Contact Person	Primary phone #	After Hours phone #	Other Comments
ISDH	ISDH	Bruce Farrar Public Health Emerg. Director	(317) 233-9246	(317) 233-1325	
County Sheriff					
Police					
Regional FBI Office					
SEMA					
Local EMA					

Contact Persons for Public Health Emergencies

	Agency/Facility Name	Contact Person	Primary phone #	After Hours phone #	Other Comments
Local Hospital					
Medical Lab					
Television					
Radio					
Other					

Section 2: Communication

Table of Contents **Page**

Communication during Public Health Emergencies

Detailed communication plans must be in place before a public health emergency occurs. **See page 2-5, *Official Communication during a Public Health Emergency,* illustrating possible patterns of communication described in this chapter.**

External Communication

There will be communication to other agencies that will respond to the emergency situation accompanying public health threats. A designated person and a back up should arrange to coordinate all communication to the other agency partners. If advance warning of an emergency occurrence is possible, the lines of communication should be activated and frequent reports and updates should be made. Once an emergency is declared, the communication patterns may be altered depending on which agency assumes the lead role. In large-scale events, an "Incident Command" structure will be the likely organizational structure. Among the staff will be a Public Information Officer (PIO) and all communications should be routed through the PIO to assure coordinated responses by the different agencies.

It will also be necessary for the LHD to be in constant touch with ISDH, both to report local situations and to receive helpful information. Frequent reports should be coming into the LHD from any enhanced local surveillance network activated during the emergency. At the same time, health alerts should be going out of the LHD to local medical facilities or emergency medical services. ISDH will be generating updated health alerts to LHDs and to selected medical providers, but LHDs are responsible for guaranteeing that all health care personnel in their own jurisdiction are receiving these updates.

Internal Communication

Vertical communication will also be occurring within the Local Health Department (LHD) (as well as within the other responding agencies) so that field personnel reports are quickly received and passed up the lines of authority in the agency. Likewise, decisions made by those in charge must be quickly and efficiently passed to those who will carry out the directives.

Methods of Communication

Use of phone, radio equipment, faxes, e-mail and other efficient devices must be tested before there is a need to assure that the equipment and technology are fully functional. Depending on the nature of the emergency, some information may need to be sent or received through secure channels. If the LHD or other government agency maintains a hotline (e.g. a line for public complaints or public information), the number(s) for this line could be released for use during an emergency. Advance planning should include developing "surge capacity" for the phone line including expanded hours and back up staffing. Likewise, if the LHD has a web site, Frequently Asked Questions (FAQs) can be posted there for public information.

Public Affairs

During and after a public health emergency, the need for public information is critical. Heightened public fear and misinformation can thwart efforts to reach affected populations and provide adequate control measures. Armed with factual information, the public can be a powerful ally in combating a public health emergency. Coordination between the local health department (LHD) and the ISDH is extremely important, particularly in multi-county situations. The LHD has more knowledge and trust of the population within its jurisdiction. ISDH has current information on a wide range of public health emergency issues that is readily available to LHDs. A consistent message must be provided to maintain smooth operations and credibility.

The ISDH Office of Public Affairs (OPA) is available at any time to assist the LHD with media issues. The ISDH media relations staff can be contacted 24/7 at one of these numbers:

Margaret Joseph, 317-233-7315 Pager 317-381-3906

Jennifer Dunlap, 317-233-7090 Pager 317-393-0954

If the crisis involves multiple counties, the OPA will issue news releases and handle print and electronic media inquiries. OPA staff may be dispatched to a central location in the affected area to assist, and is equipped to issue news releases in the field. If the crisis occurs in one county, the LHD may elect to issue news releases and take media inquiries or may request that the ISDH cover that responsibility. **If the LHD elects to handle media issues itself, it should send copies of releases to the OPA (FAX: 317-233-7873) prior to sending them to the media.** The LHD should evaluate alternative media avenues that might effectively reach potentially high-risk populations, hearing impaired, vision impaired, and shut-ins. It's important to prepare extra staff to handle the large number of phone calls that will result after the news release is issued.

Establishing good communication with local media can be accomplished in advance. Relationships with local reporters can be developed through routine announcements or "stories" of public interest generated by the LHD. Once an emergency is underway, reporters will know the spokesperson. This individual should be readily available to take advantage of the opportunity to provide high quality information, particularly if misinformation or rumors are fueling public concern. The LHD can inform reporters about when the next updates will be available and can proactively schedule press conferences. Lack of cooperation by officials will not prevent the story from being covered. Reporters may turn to other less reliable sources, especially if they do not receive information from official sources. Statements of what is being done to address the situation help reassure the public. In instances where the LHD is not the lead agency it is sometimes helpful to hold joint press conferences with the lead agency so that public health information is integrated into other announcements.

The ISDH *Protocol for Mass Prophylaxis* contains a sample community alert for use in the event of a public health emergency. The ISDH also has information for each county regarding languages spoken other than English and levels of English proficiency for those individuals whose primary language is not English. The ISDH can provide translation of typical public health alert announcements in several different languages. Other strategies to acquire translation services include contacting local colleges and universities, as well as cultural centers.

Even after the crisis, local print and electronic media will usually want updates of any further cases of illness and control measures implemented. The ISDH will generally handle these calls. If the LHD elects to take these calls, the LHD should inform the ISDH of the information released.

Addressing Public Concerns

With respect to the media during an outbreak of disease, it is essential that there is accurate and timely information in a manner that addresses the nature of the outbreak in question and outlines how those exposed are being handled and the steps being taken to minimize the threat to the community. Demand for treatment or prophylaxis may outstrip available resources, especially if the "worried well" self report to facilities where these operations are underway. Useful information about who may be at risk and who is not at risk can help focus resources on those most in need.

Preparation for communication to all potential recipients of LHD information should include generalized fact sheets, health alerts, mass prophylaxis arrangements, and press releases that can be customized to the particulars of the emergency. Be aware of possible disease agents and maintain files with information for quick reference. These files help answer questions from law enforcement, fire departments, medical personnel, the public, and the media. Know where to seek additional information from ISDH, medical experts, or other reliable sources.

Messages provided need to be tailored to the audiences in a way that makes the messages easy to understand and relevant to them. Effective strategies to reach culturally diverse populations include:

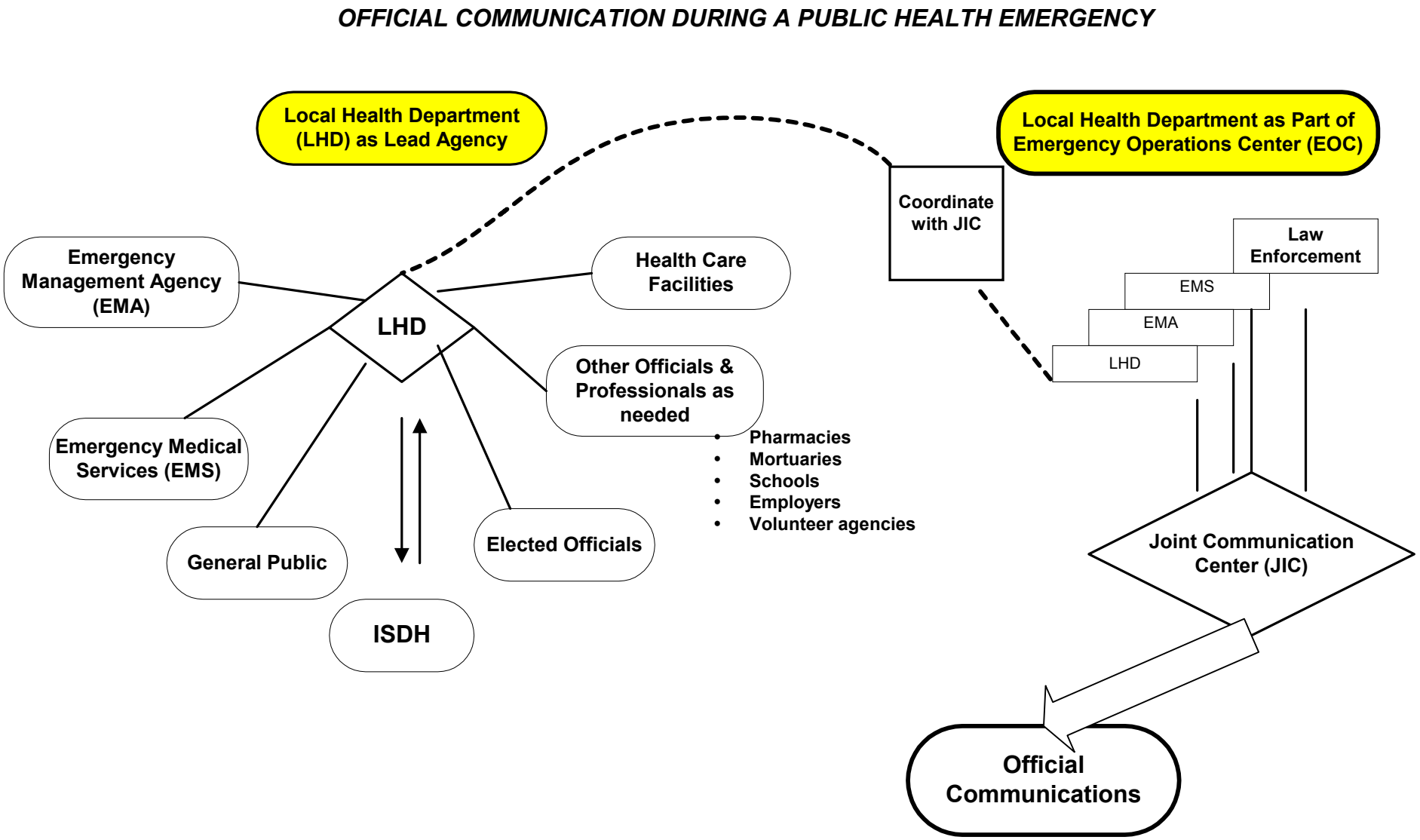
- identifying respected leaders or healers within the population
- identifying bilingual programs to craft and translate public health information
- developing lists of locations where culturally diverse groups gather (e.g., churches, restaurants, markets)
- linking with school nurses in schools that serve students who speak languages other than English.

Recent experience with public concerns about potential exposure to spores of *Bacillus anthracis* has highlighted the need for effective communication. Recommendations for helpful messages include statements that:

1. Recognize and empathize with public concerns
2. Acknowledge that reports from the media may be confusing
3. Avoid comparing the present risk to other risks that are not part of the present fears
4. Provide frequent updates of information based on medical and scientific data
5. Give the public suggestions for actions that will help safeguard health
6. Assure the public that the LHD is also working actively to minimize health risks

These same type messages can be adopted for interactions with individuals who may be phoning or making visits to the LHD staff.

Figure 1


OFFICIAL COMMUNICATION DURING A PUBLIC HEALTH EMERGENCY
Local Health Department (LHD) as Lead Agency
Local Health Department as Part of Emergency Operations Center (EOC)
Coordinate with JIC
Emergency Management Agency (EMA)
Health Care Facilities
LHD
Other Officials & Professionals as needed
Pharmacies
Mortuaries
Schools
Employers
Volunteer agencies
Emergency Medical Services (EMS)
General Public
Elected Officials
ISDH
Law Enforcement
EMS
EMA
LHD
Joint Communication Center (JIC)
Official Communications

Section 3: Standard Operating Procedures

Table of Contents **Page**

Templates for Creating Standard Operating Procedures (SOPs)

Introduction

Performance of major functions of public health generally requires completion of clusters of related tasks. Some will be sequential in time, each task leading to the next, and some tasks need to be carried out concurrently. This template will help you identify tasks that would be important in the event of a large-scale disease outbreak. Generic SOPs for two tasks are provided to serve as examples of a format that you may wish to use in developing your own SOPs. Some effort will be required to create SOPs but it is only in this way that the particulars of your community, staffing pattern, and resources can be incorporated into your operations.

Public Health Functions During a Large Scale Outbreak

Function	Task* Clusters Required for Public Health Functions
Surveillance, both active and passive	• Receive & analyze reports from local providers • Receive from and send to ISDH reports on disease occurrence • Log & respond to calls from providers and the public • Refer to baseline data to identify unusual occurrences • Contact local providers to determine disease occurrence • Establish "triggers" for epidemiologic investigation
Epidemiologic investigation	• Gather basic data on possible outbreak • Develop a case definition and, a working hypothesis • Collect clinical specimens appropriate for the suspected agent • Develop or modify a questionnaire to collect patient histories in a consistent manner • Identify affected persons and secure information • Analyze information collected on questionnaires • Combine clinical, laboratory, and patient history to "trigger" control measures
Control measures	• Develop control strategies appropriate to the presumptive or confirmed causative agent and to your local situation • Secure input from ISDH, local providers and other sources to refine the control measures in light of the current situation • Implement control measures under the purview of the health department • Alert other responsible parties of their roles in control measures
Prophylaxis	• When appropriate, provide information on prophylactic measures to providers and the public • Set up public health clinics for situations requiring large scale prophylactic measures • Work with ISDH, local supplies, and local health care facilities to assure adequate personnel, pharmaceuticals and supplies

* = in an ideal situation listed functions might be undertaken in a sequential manner as listed. However, during an actual outbreak, several different tasks would be ongoing and concurrent.

Function	Task* Clusters Required for Public Health Functions
Communication, both to providers and the public	• Maintain disease agent fact sheets both for providers and for the general public • Establish relationships with local media representatives • Provide information to providers in a timely fashion about a disease occurrence • Maintain generic press releases on a variety of disease agents • Maintain generic press releases on an announcement of wide scale prophylactic clinics • Customize press releases on the particulars of a disease occurrence, control measures and on the particulars of a prophylaxis effort • Respond to calls from the general public • Depending on the circumstances hold press conferences or participate jointly with other responding agencies in press conferences

- = in an ideal situation listed functions might be undertaken in a sequential manner as listed. However, during an actual outbreak, several different tasks would be ongoing and concurrent.

Guidelines for Creating Standard Operating Procedures (SOPs)

What are SOPs?

An SOP is a detailed description of the steps to take in performing a task.

Why use SOPs?

SOPs support uniformity, correctness, and effectiveness of performance.

When are SOPs particularly helpful?

SOPs are important when a task is complicated, is performed under pressure, or performed by several different persons. For example a plan for response to a public health emergency will require some functions that are infrequently performed. Ready access to SOPs will assure plan functions are carried out quickly and correctly.

What should be included in an SOP?

An SOP is like a recipe. It should include:

1. supplies and equipment necessary
2. stepwise progression of steps that complete the task
3. ways to check that the task has been completed

For example in baking a cake the recipe or SOP would include

1. Cake "raw" ingredients (sugar, flour, eggs, etc.), oven preheated, mixing bowl, utensils, cake pan, timer
2. Steps in measuring and mixing the ingredients and baking instructions
3. How to test when the cake is done

What are the steps in creating an SOP?

Identify the specific task to be described

Determine

Who performs this task
When should the task be performed
What they need to complete the task
What steps are needed to complete the task
What standard or test shows successful completion of the task

Who should create the SOP?

A team approach is best. Possible members of the team would be

A person who understands how this task fits in with other activities that might be concurrently required
A person who is experienced in performing the task
A person unfamiliar with the task but who might be called upon to complete it

What are the characteristics of an effective SOP?

Convenient, user-friendly format
Easily transportable
Easily available to all who might have occasion to perform the task
Periodically tested, reviewed, and updated

Summary: SOPs assure that workers know when to do a task, that they know how to do it correctly, and that they have what they need to perform it.

Suggested Format for Standard Operating Procedures (SOPs)

Task: _____.

Responsible Person _____. Name Title

Alternate _____. Name Title

Supervisor _____. Name Title

When to Perform _____.

Materials & Equipment Needed

Steps in Performing Task

1
2
3
4
5
6
7
8
9
10
Add steps as necessary

Outcome _____.

Standard for successful completion _____.

Section 4: Suspicious Packages/Mail

Table of Contents **Page**

Guidelines for Dealing with Suspected Chemical or Biological Substances in Packages

(updated October 29, 2001)

In these guidelines, the word "package" describes any parcel, package, envelope, or other item received through the mail or by other services such as Federal Express, UPS, etc.
In general, suspicious packages for which there is no reason to suspect chemical or biological substances should be treated according to the guidelines issued by the US Postal Service, which can be found at http://www.usps.gov/postalinspectors/is-pubs.htm Further guidance can be found http://www.usps.gov/news/2001/press/pr01_1010tips.htm

Stay Calm and Do Not Panic.
Anthrax organisms can cause infection in the skin, gastrointestinal system, or the lungs. To do so, the organism must be rubbed into abraded skin, swallowed, or inhaled as a fine, aerosolized mist. Disease can be prevented after exposure to the anthrax spores by early treatment with the appropriate antibiotics. Anthrax is not spread from one person to another person.

For anthrax to be effective as a covert agent, it must be aerosolized into very small particles. This is difficult to do and requires a great deal of technical skill and special equipment. If these small particles are inhaled, life-threatening lung infection can occur, but prompt recognition and treatment are effective.

If you receive a package suspected of containing chemical or biological substances, please follow the steps below:

1. Handling of Suspicious Packages or Envelopes

- Do not shake or empty the contents of a suspicious package or envelope.
- Do not carry the package or envelope, show it to others, or allow others to examine it.
- Put the package or envelope on a stable surface. Do not sniff, touch, taste, or look closely at the package/envelope or any contents that may have spilled.
- If there is powder and it spills out onto a surface**:** Do not try to clean up the powder. Cover the spilled contents immediately with anything (e.g., clothing, paper, trash can, etc.) and do not remove this cover.
- Alert others in the area about the suspicious package or envelope. Leave the area, close any doors, and take actions to prevent others from entering the area. If possible, shut off the ventilation system.

- Wash hands with soap and water to prevent spreading potentially infectious material to face or skin.
- Seek additional instructions for exposed or potentially exposed persons.
- If at work, notify a supervisor, a security officer, or a law enforcement official.
- If at home, contact the local law enforcement agency.
- If possible, create a list of persons who were in the room or area when this suspicious letter or package was recognized and a list of persons who also may have handled this package or letter. Give the list to both the local public health authorities and law enforcement officials.

Go to Step 2.

For threat of contamination by aerosolization

For example: small device triggered, warning that air-handling system is contaminated, or warning that a biological agent has been released in a public space.

- Turn off local fans or ventilation units in the area,
- Leave the area immediately.
- Close the door or section off the area to prevent others from entering
- Shut down the air-handling system in the building, if possible.
- Follow steps listed above and *continue to step 2*

If the package contains powder and it spill out onto a surface:

- Do not try to clean up the powder
- Cover the spilled contents immediately with anything (e.g., clothing, paper, trash can, etc.) and do not remove this cover.
- *Follow steps listed above and continue to step 2*

2. Determining Threat

Local emergency response authorities (fire department or hazardous materials team) should determine whether there is any immediate chemical or physical threat (e.g., a letter bomb) posed by the package or substance. If local emergency response authorities determine that there is an immediate chemical or physical threat, they should respond to this threat as they would any other similar hazardous material or bomb incident, and decontamination of those exposed and cleanup of the scene should be coordinated by emergency response authorities.

Conduct a risk assessment of an individual's potential exposure to anthrax prior to choosing a course of action. Consider the credibility of the exposure and if the exposure could result in either inhalational or cutaneous anthrax.

The potential that an exposure really is anthrax is higher when:

- There is a distinct threatening message accompanying the powder or substance.
- The substance is brown or sandy-brown rather that stark-white.
- If a letter or package is otherwise suspicious as described by the ***CDC Health Advisory**: **Updated Information about How to Recognize and Handle a Suspicious Package or Envelope*** **see page 4-7.**

The potential that an exposure really is anthrax is lower when:

- The exposure includes situations in which a white power is found without an accompanying note.
- Where someone might expect a spill of a common substance, e.g., spilled sugar, creamer, talcum powder, etc.
- The substance comes in a package or letter that can be traced to the sender

If there is:

- a physical or chemical threat was found, after that threat has been contained, go to Step 5.
- no immediate chemical or physical threat was found, the possibility of biological agents may still exist.
- contents of the package are still completely contained in the package, go to Step 5
- any of the package contents have leaked or spilled outside the package, go to Step 3.

See ISDH Handout: *Strategies for Threat Assessment of Possible Exposure to Anthrax* on page 4-9, and the accompanying ISDH flow chart, *On-scene Assessment of Material that Might Contain Anthrax Spores* on page 4-11.

3. Contamination by the contents from the package

No contamination: After they have been identified by either law enforcement or local health officials, all exposed persons with no contamination can be released from the area to go to their homes, remove and place their clothing into a plastic bag, and then shower with soap and water.

Contamination: Any persons who have been contaminated should be brought a change of outer clothing from their home, and they should change into that clothing at the site. Then those persons can go home and shower as described above. All bagged clothing should be kept bagged and sealed until the nature of the contamination has been determined. Go to Step 4.

4. Cleanup of Area

If health department, law enforcement, and emergency response authorities authorize cleanup of the area, it can be done by:

- Gently wetting the scene with a disinfectant (to minimize dust)
- Removing any spilled material using rags or paper towels
- Thoroughly wiping down the area with disinfectant

The appropriate disinfectant is a 0.5% hypochlorite solution (i.e., one (1) part household bleach to ten (10) parts water). Those involved in the cleanup should wear a dust mask, surgical mask, or some similar mask. They should also wear latex or rubber gloves that will not be damaged by the bleach solution. All materials used in the cleanup, including masks and gloves, should be placed into plastic bags and sealed, secured, and kept until health officials determine how to dispose of the material. Go to Step 5.

5. Laboratory Testing

When authorized by law enforcement authorities, and after a determination that **no physical threat exists** in further handling of the package, the container (plastic bag or large envelope) that the original package was placed in should itself be placed in yet another plastic bag and sealed. Then the now double-wrapped and sealed package should be sent to the Indiana State Department of Health Laboratories (ISDH Labs) for testing to determine if a biological agent is present. Law enforcement authorities, assisted by local health and emergency response officials, should coordinate transporting the package to the ISDH Labs in such a way that the chain of evidence custody is maintained. **Because these incidents are potential crimes, ISDH Laboratories will accept materials for testing from law enforcement authorities only. If in Step 4 a chemical threat was found to exist with the substance involved, the ISDH Labs MUST be notified of this threat so that any necessary precautions can be taken in handling the substance.** As soon as results are available, usually within 24-48 hours, the ISDH will contact the submitter of the envelope with the results of any testing done on the contents of the package. Treatment with antibiotics or other prophylactic measures is not indicated or necessary until the results of the testing is available or unless specifically recommended by the ISDH. If any antibiotic treatment or other prophylactic measures are found to be necessary after testing has been done, these measures will be coordinated by the local health department in conjunction with the ISDH.

NOTIFICATION

Notify the following authorities:

Local Law Enforcement:
Name of Agency_____ Tel #_____ or 911

Local Health Department:
Name of Agency_____ Tel #_____

Local Fire Department/Hazmat:
Name of Agency_____ Tel #_____ or 911

References

Centers for Disease Control and Prevention. (2002). *CDC Health Advisory.* http://www.bt.cdc.gov/DocumentsApp/Anthrax/10312001/han50.asp

Centers for Disease Control and Prevention. (2002). *Mail Handlers*. DC Available: http://www.bt.cdc.gov/Mail/MailHandlers.asp

Indiana State Department of Health. (2002). *Guidelines for Handling Suspicious Packages.* Available: http://www.in.gov/isdh/healthinfo/package.pdf

This is an official

CDC Health Advisory

Distributed via the Health Alert Network
October 31, 2001, 21:25 EST (9:25 PM, EST)
CDCHAN-00050-01-10-31-ADV-N

Updated Information About How to Recognize and Handle a Suspicious Package or Envelope

This information supplements CDC's recommendations for recognizing and handling suspicious packages or envelopes that were published as a CDC Health Advisory on October 27, 2001, and replaces information about identifying suspicious packages that was published as a Health Advisory on October 12, 2001.

Letters containing *Bacillus anthracis* (anthrax) have been received by mail in several areas in the United States. In some instances, anthrax exposures have occurred, with several persons becoming infected. To prevent such exposures and subsequent infection, all persons should learn how to recognize a suspicious package or envelope and take appropriate steps to protect themselves and others.

Identifying Suspicious Packages and Envelopes

Some characteristics of suspicious packages and envelopes include the following:

- Inappropriate or unusual labeling
  - Excessive postage
  - Handwritten or poorly typed addresses
  - Misspellings of common words
  - Strange return address or no return address
  - Incorrect titles or title without a name
  - Not addressed to a specific person
  - Marked with restrictions, such as "Personal," "Confidential," or "Do not x-ray"
  - Marked with any threatening language
  - Postmarked from a city or state that does not match the return address

- Appearance
  - Powdery substance felt through or appearing on the package or envelope
  - Oily stains, discolorations, or odor
  - Lopsided or uneven envelope
  - Excessive packaging material such as masking tape, string, etc.

- Other suspicious signs
  - Excessive weight
  - Ticking sound
  - Protruding wires or aluminum foil

If a package or envelope appears suspicious, DO NOT OPEN IT.

Handling of Suspicious Packages or Envelopes*

- Do not shake or empty the contents of any suspicious package or envelope.
- Do not carry the package or envelope, show it to others or allow others to examine it.
- Put the package or envelope down on a stable surface; do not sniff, touch, taste, or look closely at it or at any contents which may have spilled.
- Alert others in the area about the suspicious package or envelope. Leave the area, close any doors, and take actions to prevent others from entering the area. If possible, shut off the ventilation system.
- WASH hands with soap and water to prevent spreading potentially infectious material to face or skin. Seek additional instructions for exposed or potentially exposed persons.
- If at work, notify a supervisor, a security officer, or a law enforcement official. If at home, contact the local law enforcement agency.
- If possible, create a list of persons who were in the room or area when this suspicious letter or package was recognized and a list of persons who also may have handled this package or letter. Give this list to both the local public health authorities and law enforcement officials.

*These recommendations were published on October 26, 2001, in "Update: Investigation of bioterrorism-related anthrax and interim guidelines for exposure management and antimicrobial therapy." MMWR 2001;50:909-919 <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5042a1.htm>.

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Indiana State Department of Health

October 18, 2001

Strategies for Threat Assessment of Possible Exposure to Anthrax

See the accompanying flow chart for an overview of on-scene assessment. The first step is to secure the scene and prevent exposure to additional persons. Then, each type of item requires an investigation of probable source. We have designed the questions below to help establish whether or not the threat is credible.

Questions to ask and information to collect at the scene

1. Are the persons at the scene likely targets of threat (e.g., media representatives, elected officials, others that might be targeted for effect by terrorists)?
2. Is the location accessible to possible attack (i.e., easy public access versus semi-restricted or restricted access)?
3. Is there a logical explanation for the presence of the item(s) causing concern?
   For mail in general – Does not have stains, enclosed powder, suspicious addressing, bulkiness, evidence of tampering, or other "flags"
   For envelopes – unsolicited but often-received items such as credit card invitations, magazine or sweepstakes solicitations, etc.
   For packages – from recognized charities that might send bulky enclosures such as greeting cards or mailing labels, from manufacturers who might enclose desiccants, from publishers who might enclose powder to avoid adherence of covers to shrink wrap, etc. A phone call to point of origin may establish that presence of such enclosures is standard.
   For powders – items consistent with the location (flour in the kitchen, dairy creamer in the coffee break room, talcum powder in the bathroom, dry-wall debris at a construction site, chalk dust at the blackboard, etc.)
4. In the case of spills, does anyone on site remember who might have spilled something?
5. Who might have witnessed the arrival of a suspicious container or package? Was it a usual source of deliveries (e.g., Fed Ex, U.S. mail, contracted courier)? Was the item received in the usual manner (e.g., at the loading dock, in the mailbox, etc.)?

Once these types of questions have been addressed and the source of the item(s) has been determined to be suspicious, please summarize the following information to forward with the lab specimens:

1. What exactly is to be analyzed by the laboratory (e.g., the powder, the envelope)?
2. How many persons have been exposed and are their names and phone numbers available for public health follow-up?

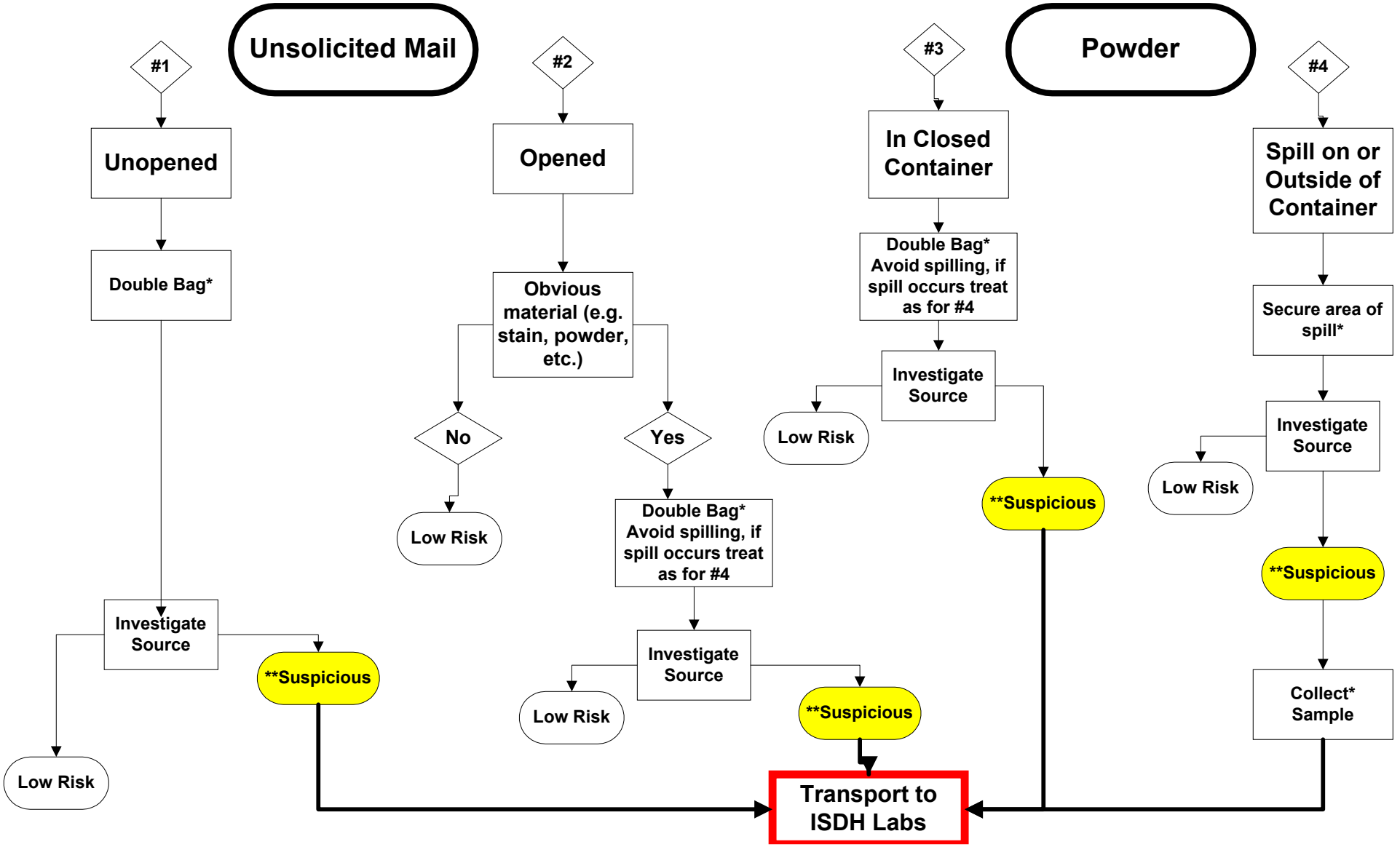
Finally, please reassure those present

1. Decontamination of persons can usually be accomplished by removal of outer garments and placement of clothing in plastic bags and by shower and shampoo with the usual personal hygiene products.
2. Bagged, sealed clothing can remain with their owner until laboratory results are available and instructions for cleaning are provided.
3. Anthrax is not spread from person to person, and exposed persons can receive antibiotic treatment.
4. Nasal swabs aid the public health investigation but are not an effective means of determining appropriate medical treatment.
5. There is an incubation time before disease occurs of one or more days, allowing enough time to receive appropriate medical evaluation.
6. The on-site investigation, along with the lab analysis, will help determine if an exposed person needs to receive medication.

Indiana State Department of Health

October 2001

On-Scene Assessment of Material that Might Contain Anthrax Spores



* See accompanying instructions for techniques **See accompanying instruction for identifying suspicious situations

Section 5: Anthrax

Table of Contents **Page**

Overview

Causative Agent: *Bacillus anthracis*

Disease Forms:

- **Cutaneous anthrax-** Lesions on the skin resulting from the introduction of spores through the skin.
- **Gastrointestinal anthrax-** Spores germinate in the upper or lower gastrointestinal tract, usually a result of eating contaminated foods.
- **Inhalational anthrax-** Infection is a result of inhaling the anthrax spores into the respiratory tract.

Transmission: There is no person to person transmission of any form of anthrax.

Precautions & Decontamination: Standard precautions and standard hospital infection control are recommended.

Treatment:

- **Cutaneous anthrax-** Ciprofloxacin, doxycycline, and penicillins are FDA approved for the treatment of anthrax. Ciprofloxacin and doxycycline are the antibiotics of choice for adults, children, pregnant women and immunocompromised persons.
- **Gastrointestinal anthrax-** Ciprofloxacin, doxycycline, and penicillins are FDA approved for the treatment of anthrax.
- **Inhalational anthrax –** Ciprofloxacin, doxycycline, and penicillins are FDA approved for the treatment of anthrax. In a contained casualty setting, ciprofloxacin and doxycycline are the antibiotics of choice for adults, children, pregnant women and immunocompromised persons. In a mass casualty setting ciprofloxacin is the treatment of choice.

Vaccine - Anthrax Vaccine Adsorbed (AVA). It is not available to the general public.

Post Exposure Prophylaxis: An antibiotic course of ciprofloxacin or doxycycline, the recommended antibiotics, alone or in conjunction with the AVA.

Anthrax

Introduction

Bacillus anthracis is the etiological agent that causes anthrax. It is a large, gram-positive, nonmotile spore-forming bacterial rod. Anthrax is a disease that commonly occurs in warm-blooded animals, such as goats, sheep, cattle, and pigs, which acquire spores through ingestion of contaminated soil. *B. anthracis* germinates in environments rich in amino acids, glucose, and nucleosides, such as the blood or tissues of animals and humans.

Although it is mostly found in animals, anthrax can also naturally occur in humans through skin contact, ingestion, or inhalation of spores from infected animals or contaminated animal products. Anthrax occurs globally and is most common in agricultural regions, especially in South and Central America, Asia, Africa, Caribbean, Middle East, and parts of Europe. Anthrax that humans have contracted from exposure to goat hair is commonly referred to as Woolsorter's disease. Among livestock, Anthrax is controlled throughout the world by vaccination programs, rapid case detection, rapid reporting, and burning and burial of animal carcasses infected with the disease. Likewise, humans are protected by the same methods, plus restrictions on importations of hides and wool products from countries in which anthrax occurs and veterinary supervision of slaughtering practices.

In addition to its natural occurrence, anthrax is considered to be a likely disease used for bioterrorism. The CDC prioritizes anthrax as a category A biological agent, meaning it is of the highest priority as a terrorist threat. The ability for cases of anthrax to cause panic, require a high amount of preparedness on the part of public health, ease of dissemination of the agent, and also the potential for major public health impact are reasons for the classification of anthrax as a high priority agent.

History

Anthrax derives its name from the Greek word for coal because of the black appearance of cutaneous eschars that result in some cases. The disease has been documented since ancient times, with biblical citations of the fifth and sixth plagues, which are thought to have been human and cattle anthrax case references. Then, in the 16th century a disease known as the "Black Bane" that is also thought to have been a reference to anthrax swept through Europe.

In addition to naturally occurring cases and outbreaks of anthrax, there has been interest to use anthrax intentionally as weapon. During World War II, the British military tested explosives weaponized with anthrax on Gruinard Island. The island was contaminated with anthrax spores that persisted for more than 36 years, with decontamination starting in 1979 and being declared fully decontaminated in 1987. The Iraqis have acknowledged

that they have researched and weaponized anthrax, and both the Soviet Union and the US developed anthrax as part of their biological weapons programs. In 1979, an outbreak of inhalational anthrax occurred in Sverdlovsk, Russia as a result of an accidental release of aerosolized spores at a military biology facility. Seventy-nine cases of inhalational anthrax were reported, with 68 being fatal. In recent decades, the Aum Shinrikyo religious cult developed anthrax to be used as a biological weapon. Members attempted to cause disease by placing anthrax spores and botulism toxin throughout Tokyo on at least 8 occasions. None of the attacks were successful at causing illness.

In October, 2001 an intentional case of inhalational anthrax was identified in a Florida journalist. This was the first of twenty-two confirmed or suspected cases that occurred as a result of a bioterrorism attack in New York, Florida, New Jersey, the District of Columbia, and Connecticut. Of those twenty-two, 11 were confirmed inhalational cases, seven were confirmed cutaneous and four suspected cutaneous cases. All of these confirmed and suspected cases are thought to have occurred as a result of contact with mail containing or contaminated with *B. anthracis* spores. Prior to the fall of 2001, the last case in the U.S. of reported cutaneous anthrax occurred in 1992, and the last inhalational case of anthrax occurred in 1976. Of the 11 inhalational cases of anthrax, 6 survived with the use of aggressive supportive care and multi-drug antibiotic therapies. All patients with the cutaneous form of anthrax survived. The source of the mail has not been identified.

Clinical Features

Human anthrax has three major clinical forms: Cutaneous, Gastrointestinal, and Inhalational. The form of anthrax is dependent on exposure. There is no person to person transmission of any form of anthrax.

Cutaneous Anthrax

The cutaneous form of anthrax is most common and results from the introduction of the spore through the skin. Previous cuts or abrasions are especially susceptible to infection, with most infections occurring on the hands, arms, face, and neck. It is usually seen following an infected animal exposure. Cutaneous anthrax is treatable with antibiotics and has high rates of cure. If left untreated, the mortality rate is 20%. The incubation period is 1-12 days.

Signs and symptoms include:

- Localized itching → papular skin lesion → vesicular lesion → (within 2 days) painless depressed black skin eschar → dries, loosens and falls off (within 1-2 weeks) → usually no scarring
- Extensive local swelling
- Lymphangitis and lymphadenopathy may occur
- Fever, malaise, and headache may occur

Gastrointestinal Anthrax

Gastrointestinal anthrax most often results from eating contaminated food, usually meat. It is the least commonly occurring form of anthrax. Once ingested, the spores germinate in the upper or lower gastrointestinal tract, then cause illness. Death usually results if the infection toxemia and sepsis. The incubation period is 1-7 days.

When the germination occurs in the upper gastrointestinal tract, the signs and symptoms include:

- Oral or esophageal ulcer
- Regional lymphadenopathy
- Regional swelling
- Sepsis

When the germination occurs in the lower gastrointestinal tract the signs and symptoms include:

- Primary intestinal lesions occur predominantly in the terminal ileum or cecum
- Nausea
- Vomiting
- Malaise
- Bloody diarrhea rapidly progressing
- Sepsis rapidly progressing
- Abdominal swelling in some cases

Inhalational Anthrax

Inhalational anthrax is the most severe and life threatening form, but also the most rare. Naturally occurring inhalational anthrax is usually associated with occupational risk, such as veterinarians, laboratorians, and animal handlers. Those who work in mills sorting wool are at an increased risk for inhalational anthrax, thus the name Woolsorter's disease has become another term for anthrax.

The inhalational form of anthrax results from inhaling the anthrax spores into the respiratory tract. Once the spores are inhaled, some are destroyed by the macrophages, but those that survive are transported to mediastinal lymph nodes, and then germination occurs. After germination, which can take as long as 60 days, the disease begins and progresses rapidly. As the bacteria replicate, toxins are released that cause hemorrhage, swelling, and necrosis. The sooner the infection is treated with antibiotics the better chance of recovery. Early diagnosis would require a high index of suspicion. The incubation period ranges from 1-7 days on average, but may be as long as 60 days.

The signs and symptoms may occur in two stages and include the following:
The first stage:

- Nonspecific prodrome of flu-like symptoms (fever, difficulty breathing, cough, headache, vomiting, chills, weakness, abdominal pain, and chest pain)

- Brief improvement after nonspecific flu-like symptoms (for most cases)

The second stage usually occurs 2-4 days after initial symptoms:

- Abrupt fever
- Difficulty breathing
- Sweating
- Widened mediastinum visible on chest radiograph suggesting mediastinal lymphadenopathy and hemorrhagic mediastinitis
- Hemorrhagic meningitis, delirium, and dulled sensitivity may occur in roughly half of cases
- Cyanosis progresses rapidly
- Hypotension progresses rapidly
- Shock and death may occur within hours

An aerosol release of the spores would be odorless and invisible, which would be an effective method of causing a covert bioterrorism event. However, there are several factors that can affect whether or not an intentional release of anthrax actually causes disease. Primary aerosolization, results from the initial release of the agent, where particles are in the air and potentially being inhaled and causing infection. Secondary aerosolization results from agitation of the particles that have settled from the primary release. Secondary aerosolization is less likely to cause infection. Also, there are two groups of particles, those larger than 5 microns and those between 1-5 microns. Particles larger than 5 microns fall quickly through the air and bond to any surface. To have these particles suspended in the air again after they have landed takes large amounts of energy, so they do not cause a very high threat for secondary aerosolization. Particles that are 1-5 microns in diameter act gaseous and move through the environment without settling, creating a greater risk to be inhaled and cause infection. In addition the type of aerosolization and particle size, other factors such as meteorological, aerobic, and biological factors can affect the result of an aerosolized anthrax attack.

The intentional cases of inhalational anthrax that occurred in 2001 exhibited a lot of similarities to cases that have occurred in the past century, which were mostly attributed to animal products and processing. However, there were some major differences cited. Excessive sweating, nausea and vomiting were all seen more commonly in the inhalational cases of 2001 than in those occurring prior. Another major difference was a less notable period of improvement than cases described prior to 2001. Finally, the most prominent difference is the mortality rate, which was thought to be extremely high, 90-100%, once symptoms develop. The intentional cases in 2001 resulted in 6 of the 11 people surviving the infection, which has showed that early recognition, aggressive support, and antibiotics can contribute to a lowered mortality rate.

Distinguishing Anthrax from Influenza-Like Illness

Distinguishing inhalational anthrax from influenza and other influenza-like illnesses may be aided with several important factors. Although the influenza vaccine may prevent flu

by as much as 90% in healthy adults, it is not recommended to aid in distinguishing these infections. The vaccine does not prevent influenza-like illnesses, nor does it increase the probability of inhalational anthrax being diagnosed as a cause of illness. The vaccine should only be used to prevent the flu. Epidemiological considerations, such as seasonality, can be helpful in distinguishing inhalational anthrax, influenza, and influenza-like illnesses. Influenza and many other influenza-like illnesses occur seasonally and are more commonly seen and expected during certain times of the year. Finally, the presence of certain signs and symptoms can help distinguish infections. A major difference is that rhinorrhea and nasal congestion are not commonly seen with inhalational anthrax, but are prominent in influenza and influenza-like illnesses. Other distinguishing signs and symptoms are identified in the following table:

TABLE 1. Symptoms and signs of inhalational anthrax, laboratory-confirmed influenza, and influenza-like illness (ILI) from other causes

Symptom/Sign	Inhalational anthrax (n=10)	Laboratory-confirmed influenza	ILI from other causes
Elevated temperature	70%	68%–77%	40%–73%
Fever or chills	100%	83%–90%	75%–89%
Fatigue/malaise	100%	75%–94%	62%–94%
Cough (minimal or nonproductive)	90%	84%–93%	72%–80%
Shortness of breath	80%	6%	6%
Chest discomfort or pleuritic chest pain	60%	35%	23%
Headache	50%	84%–91%	74%–89%
Myalgias	50%	67%–94%	73%–94%
Sore throat	20%	64%–84%	64%–84%
Rhinorrhea	10%	79%	68%
Nausea or vomiting	80%	12%	12%
Abdominal pain	30%	22%	22%

November 9, 2001 Morbidity and Mortality Weekly Report

Precautions and Decontamination

Standard precautions with confirmed and suspected anthrax infections are recommended. Health care workers treating hospitalized patients with all forms of anthrax are recommended to follow standard barrier isolation, but the use of airborne protection devices are not suggested because there is no person to person transmission. Standard hospital infection control can be performed to clean environmental surfaces that have been contaminated with infected body fluids.

When there has been direct physical contact with a substance alleged to be anthrax the following decontamination actions are recommended:

- Removal of contaminated clothing

- Handle clothing and contaminated items minimally
- Follow standard precautions when handling items
- Thoroughly wash exposed skin and clothing with soap and water

Facility Operations

Closing a facility or a part of a facility may be indicated:
- After an inhalational anthrax case is detected and a probable site of exposure in the facility is identified
- When there is a known aerosolization of *B. anthracis* in the facility
- When evidence strongly suggests an aerosolization of *B. anthracis* in the facility
- As determined by law enforcement authorities in a criminal investigation

Closing a facility is not indicated:
- Based only on the identification of *B. anthracis* from samples of environmental surfaces
- Based only on the identification of a cutaneous anthrax cases

Treatment

Since the development of anthrax infection may occur at a rapid pace, the delay of antibiotic treatment, even by hours, may substantially affect the chances for survival. Antibiotic resistance should be considered in the event of a terrorist attack, until antibiotic susceptibility of the strain is identified. Ciprofloxacin, doxycycline, and penicillins are FDA approved for the treatment of anthrax. For cutaneous and contained casualty setting inhalational anthrax, ciprofloxacin and doxycycline are the antibiotics of choice for adults, children, pregnant women and immunocompromised persons. For mass casualty setting of inhalational anthrax, ciprofloxacin is the treatment of choice for adults, children, pregnant women, and immunocompromised persons. Recent history has proven that aggressive supportive care and early antibiotic treatment are keys to recovery from inhalational anthrax.

See Appendix A for the Antibiotic Treatment Dosing Guideline recommendations.

Vaccines

For livestock, a live vaccine was developed for protection against anthrax. It has served as the primary veterinary vaccine in the western hemisphere. Livestock vaccines were considered unsuitable for humans, so the development of a human vaccine, the Anthrax Vaccine Adsorbed (AVA), followed.

Anthrax Vaccine Adsorbed, or AVA, was first developed in the 1950s and was approved for general use in humans in 1970. Since 1970, the vaccine has been used by at risk veterinarians, laboratory workers, and livestock handlers in the US. The AVA is a sterile anthrax vaccine product made from an avirulent nonencapsulated strain of *B. anthracis* and does not contain any whole bacteria. BioPort Corporation manufactures and distributes the vaccine. The dosing schedule for the vaccine is 0 weeks, 2 weeks, 4 weeks, 6 months, 12 months, and 18 months. The whole first series takes 18 months to complete and then annual boosters are required for ongoing protection.

The US Department of Defense announced it would begin anthrax immunizations in 1997 for all military due to threat of anthrax being used as a biological weapon. The plan is designed to immunize through phases that would be completed by 2004. The vaccination phase from 1998 through 2000 was for service members and mission essential Department of Defense (DoD) civilian employees that are assigned or deployed to high threat areas.

Negative reactions to the AVA are tracked and reported by the Vaccine Adverse Events Reporting System (VAERS) form through the CDC and FDA. Because of safety concerns the Department of Defense requested the DHHS to review all VAERS reports by scientific and medical experts. The panel, as of 2000, has not identified any unexpected patterns of adverse events among the VAERS reviewed.

Use of the AVA is only indicated for persons engaged in work involving production, concentrations, and quantities of *B. anthracis* and for those in activities with a high potential for aerosol production. Citizens, emergency responders, federal responders, and health care practitioners are not recommended to receive the immunization. In circumstances where calculable risk can be assessed, vaccination may be indicated. There are no studies that have been published regarding ADA use for pregnant women. Pregnant women should only receive the vaccine if the potential benefits outweigh the potential risks to the fetus.

In the event of a biological attack, the AVA may be recommended for post-exposure vaccination in conjunction with an appropriate antibiotic regimen to protect against residual spores that could potentially be retained in the body.

Post Exposure Prophylaxis

Guidelines to receive post exposure prophylaxis would be dependent on the specific use of anthrax as a biological weapon. Timing, location of exposure, and weather conditions would all impact guidelines. Prophylaxis will be determined by public health authorities through an epidemiological investigation of the circumstances. Ciprofloxacin and doxycycline are the recommended antibiotics for post exposure prophylaxis.

The DHHS provided persons who were exposed to inhalational anthrax in the fall of 2001 with three prophylaxis options: 1) Receiving a 60 days of antibiotics 2) Extending the 60 days course of antibiotics with an additional 40 days or 3) Extending the 60 days course of antibiotics with an additional 40 days and also receiving the anthrax vaccine. The 60 days of antibiotic treatment was the recommended option, with the other two additions being precautions that were offered to those who wished to take them.

Depending on circumstances, prophylaxis may be recommended for

- A person who is exposed to an air space where a suspicious material may have been aerosolized (e.g., near a suspicious powder-containing letter during opening)
- A person who has shared the air space likely to be the source of an inhalational anthrax case

Dependent on circumstances, prophylaxis may not be recommended for:

- Health care workers caring for patients using standard precautions
- For autopsy personnel using appropriate precautions and procedures when handling bodies infected with anthrax bacteria
- People who handle or open mail that does not bear a credible threat
- The prevention of cutaneous anthrax
- Patient contacts (friends, coworkers, household contacts), unless it is determined they were also exposed.

See Appendix B for the Antibiotic Post-Exposure Prophylaxis Dosing Guideline recommendations.

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November 16, 2001 / Vol. 50 / No. 45

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MORBIDITY AND MORTALITY
WEEKLY REPORT

Notice to Readers: Update: Interim Recommendations for Antimicrobial Prophylaxis for Children and Breastfeeding Mothers and Treatment of Children with Anthrax

Ciprofloxacin or doxycycline is recommended for antimicrobial prophylaxis and treatment of adults and children with *Bacillus anthracis* infection associated with the recent bioterrorist attacks in the United States. Amoxicillin is an option for antimicrobial prophylaxis for children and pregnant women and to complete treatment of cutaneous disease when *B. anthracis* is susceptible to penicillin, as is the case in the recent attacks (*1*--*3*). Use of ciprofloxacin or doxycycline might be associated with adverse effects in children (*4,5*), and liquid formulations of these drugs are not widely available. This notice provides further information about prophylaxis and treatment of children and breastfeeding mothers, including the use of amoxicillin.

Ciprofloxacin, doxycycline, and penicillin G procaine have been effective as antimicrobial prophylaxis for inhalational *B. anthracis* infection in nonhuman primates and are approved for this use in humans by the Food and Drug Administration (FDA) (*5,6*). Amoxicillin has not been studied in animal models and is not approved by FDA for the prophylaxis or treatment of anthrax. Other data indicate that *B. anthracis* strains produce a cephalosporinase and suggest that the strains contain an inducible beta-lactamase that might decrease the effectiveness of penicillins, especially when a large number of organisms is present (*2*). In addition, penicillin achieves low intracellular concentrations that might be detrimental to its ability to kill germinating spores in macrophages.

Because of these concerns, penicillins (including amoxicillin) are not recommended for initial treatment of anthrax, but are likely to be effective for antimicrobial prophylaxis following exposure to *B. anthracis*, a setting where relatively few organisms are expected to be present. Therefore, amoxicillin* may be used for the 60-day antimicrobial prophylaxis in infants and children when the isolate involved in the exposure is determined to be susceptible to penicillin. Isolates of *B. anthracis* implicated in the recent bioterrorist attacks are susceptible to ciprofloxacin, doxycycline, and penicillin (*2*).

Initial treatment of infants and children with inhalational or systemic (including gastrointestinal or oropharyngeal) anthrax should consist of intravenous ciprofloxacin† or

doxycyline[§], plus one or two additional antimicrobial[¶] agents. If meningitis is suspected, ciprofloxacin might be more effective than doxycycline because of better central nervous system penetration (*2*). Experience with fluoroquinolones other than ciprofloxacin in children is limited.

Ciprofloxacin or doxycycline should be the initial treatment of localized cutaneous anthrax in infants and children. Intravenous therapy with multiple antimicrobial agents is recommended for cutaneous anthrax with systemic involvement, extensive edema, or lesions on the head or neck (*2*). Whether infants and young children are at increased risk for systemic dissemination of cutaneous infection is not known; a 7-month-old patient infected during the recent bioterrorism attacks developed systemic illness after onset of cutaneous anthrax (*7*). For young children (e.g. aged <2 years), initial therapy of cutaneous anthrax should be intravenous, and combination therapy with additional antimicrobials should be considered.

After clinical improvement following intravenous treatment for inhalational or cutaneous anthrax, oral therapy with one or two antimicrobial agents (including either ciprofloxacin or doxycycline) may be used to complete the first 14--21 days of treatment for inhalational anthrax or the first 7--10 days for uncomplicated cutaneous anthrax. The optimal oral treatment regimen is unknown; some adults with inhalational anthrax as a result of the recent bioterrorist attacks are receiving ciprofloxacin and rifampin. For both inhalational and cutaneous anthrax in the setting of this bioterrorist attack, antimicrobial therapy should be continued for 60 days because of the likelihood of exposure to aerosolized *B. anthracis* and the need to protect against persistent spores that might germinate in the respiratory tract. Because of potential adverse effects of prolonged use of ciprofloxacin or doxycycline in children, amoxicillin is an option for completion of the remaining 60 days of therapy for persons infected in these bioterrorist attacks.

Because of its known safety for infants, amoxicillin is an option for antimicrobial prophylaxis in breastfeeding mothers when *B. anthracis* is known to be penicillin-susceptible and no contraindication to maternal amoxicillin use is indicated. The American Academy of Pediatrics also considers ciprofloxacin and tetracyclines (which include doxycycline) to be usually compatible with breastfeeding because the amount of either drug absorbed by infants is small, but little is known about the safety of long-term use (*8*). Mothers concerned about the use of ciprofloxacin or doxycycline for antimicrobial prophylaxis should consider expressing and then discarding breast milk so that breastfeeding can be resumed when antimicrobial prophylaxis is completed. Decisions about antimicrobial choice and continuation of breastfeeding should be made by the mother and her and the infant's health-care providers. Consideration should be given to antimicrobial efficacy, safety for the infant, and the benefits of breastfeeding.

Health-care providers prescribing antimicrobial drugs for the prophylaxis or treatment of anthrax should be aware of their adverse effects and consult with an infectious disease specialist as needed. Additional information about recognition, prophylaxis, and treatment of anthrax infection is available at <http://www.bt.cdc.gov>.

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The recommended dose of amoxicillin is 80 mg/kg/day orally divided every 8 hours (maximum 500 mg/dose).

† The recommended dose of ciprofloxacin is 10 mg/kg/dose every 12 hours intravenously (maximum 400 mg/dose) or 15 mg/kg/dose every 12 hours orally (maximum 500 mg/dose).

§ The recommended dose of doxycycline is 2.2 mg/kg/dose every 12 hours intravenously or orally (maximum 100 mg/dose).

¶ Options for additional drugs, based on in vitro sensitivity testing of isolates in the recent attacks, include rifampin, vancomycin, penicillin, ampicillin, chloramphenicol, imipenem, clindamycin, and clarithromycin (*2*).

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Page converted: 11/16/2001

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November 2, 2001 / Vol. 50 / No. 43

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WEEKLY REPORT

Notice to Readers: Updated Recommendations for Antimicrobial Prophylaxis Among Asymptomatic Pregnant Women After Exposure to *Bacillus anthracis*

The antimicrobial of choice for initial prophylactic therapy among asymptomatic pregnant women exposed to *Bacillus anthracis* is ciprofloxacin, 500 mg twice a day for 60 days. In instances in which the specific *B. anthracis* strain has been shown to be penicillin-sensitive, prophylactic therapy with amoxicillin, 500 mg three times a day for 60 days, may be considered. Isolates of *B. anthracis* implicated in the current bioterrorist attacks are susceptible to penicillin in laboratory tests, but may contain penicillinase activity (*2*). Pencillins are not recommended for treatment of anthrax, where such penicillinase activity may decrease their effectiveness. However, penicillins are likely to be effective for preventing anthrax, a setting where relatively few organisms are present. Doxycycline should be used with caution in asymptomatic pregnant women and only when contraindications are indicated to the use of other appropriate antimicrobial drugs.

Pregnant women are likely to be among the increasing number of persons receiving antimicrobial prophylaxis for exposure to *B. anthracis*. Clinicians, public health officials, and women who are candidates for treatment should weigh the possible risks and benefits to the mother and fetus when choosing an antimicrobial for postexposure anthrax prophylaxis. Women who become pregnant while taking antimicrobial prophylaxis should continue the medication and consult a health-care provider or public health official to discuss these issues.

No formal clinical studies of ciprofloxacin have been performed during pregnancy. Based on limited human information, ciprofloxacin use during pregnancy is unlikely to be associated with a high risk for structural malformations in fetal development. Data on ciprofloxacin use during pregnancy from the Teratogen Information System indicate that therapeutic doses during pregnancy are unlikely to pose a substantial teratogenic risk, but data are insufficient to determine that there is no risk (*1*). Doxycycline is a tetracycline antimicrobial. Potential dangers of tetracyclines to fetal development include risk for dental staining of the primary teeth and concern about possible depressed bone growth and defective dental enamel. Rarely, hepatic necrosis has been reported in pregnant women using tetracyclines. Penicillins generally are considered safe for use during pregnancy and are not associated with an increased risk for fetal malformation. Pregnant

women should be advised that congenital malformations occur in approximately 2%--3% of births, even in the absence of known teratogenic exposure.

Additional information about the treatment of anthrax infection is available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5042a1.htm>.

Reference

1. Friedman JM, Polifka JE. Teratogenic effects of drugs: a resource for clinicians (TERIS). Baltimore, Maryland: Johns Hopkins University Press, 2000:149--95.

2. CDC. Update: investigation of bioterrorism-related anthrax and interim guidelines for exposure management and antimicrobial therapy, October 2001. MMWR 2001;50:909--19.

Section 6: Botulism

Table of Contents **Page**

Overview

Causative Agent: ***Clostridium Botulinum toxin***

Disease Forms:

- **Intestinal -** Also known as infant botulism or floppy baby syndrome. Results from ingesting spores.
- **Wound -** Results from direct contamination of spores with an open wound
- **Foodborne -** Results from eating contaminated foods, usually improperly canned or processed foods.
- **Inhalational** - Results from inhaling spores into the respiratory tract. It is not a natural form of botulism and can only be man-made.

Signature Signs and Symptoms (all disease forms) :

- Symmetric descending paralysis with prominent bulbar palsies (double vision, imperfect articulation of speech, difficulty in speaking and swallowing)
- Afebrile
- Clear sensory, patients are not confused.

Transmission: There is no person to person transmission for any form of botulism.

Precautions and Decontamination: Standard precautions and standard hospital infection control are recommended.

Treatment (all disease forms): Supportive care and assisted ventilatory care are recommended treatments. A licensed equine antitoxin effective against toxin types A, B, and E, and an investigational antitoxin for types A-G is available upon need.

Vaccine: Investigational botulinum toxoid vaccine for toxin types A, B, C, D, and E. Not available to the general public.

Post Exposure Prophylaxis: None.

Introduction

Clostridium botulinum is an anaerobic gram-positive bacillus that produces a neurotoxin, commonly referred to as botulinum toxin. The natural habitat for *C. botulinum* is soil. The bacteria form spores, which allow them to survive harsh environments, such as oxygen, soil, and marine sediments throughout the world. There are seven types of botulinum toxin that are named letters A through G. Only types A, B, E, and F naturally affect humans. The toxin types are differentiated by various epidemiological markers.

Botulinum toxin is the most potent poison known. The toxicity level of botulinum is 15,000 times that of nerve agent VX and 100,000 times the potency of sarin. The toxin results in flaccid paralysis, which can inhibit a person from breathing resulting in death. Botulism is not spread from person to person. The disease occurs with a relatively low incidence, with only an average of 110 cases of botulism reported in the United States annually. The majority of cases, 72%, are intestinal (infant) botulism, while 5% are foodborne and the rest are wound botulism. All persons are susceptible to botulism.

Botulism toxin is classified as a Category A agent by the CDC, meaning it is considered a likely agent to be used as a biological weapon. Its ease of production and transport, ability to cause prolonged intensive care for affected persons, and lethality make it an efficient and likely effective agent for biological weaponry. The most likely forms of a bioterrorism attack with botulinum toxin would be through aerosol dispersion or foodborne transmission. An intentional outbreak of foodborne or inhalational botulism may be identified as such by the following epidemiological clues:

- A large number of cases presenting at once
- Cases of the uncommon toxin types (C, D, F, G, and for non-aquatic food, E)
- Common geographic locations, but not common dietary exposures
- Multiple and simultaneous outbreaks that lack a common source

In contrast to the threat for its use as a biological weapon, botulinum toxin in the United States is licensed for treatments of various afflictions. Crossed eyes, the involuntary contraction of neck muscles, and eye twitches associated with abnormal muscle tone are conditions in which botulism toxin ("Botox") is currently licensed for treatment. Botulism toxin has also been used "off label" for treatment of migraine headaches, chronic low back pain, and traumatic brain injuries, among others. There is no threat that these treatments containing botulinum toxin could be used as a biological weapons because the amounts are too minimal to cause botulism.

History

The development and use of *C. botulinum* as a biological weapon has occurred since the 1930s. The United States first produced botulism toxin during World War II through the US biological weapons program, which was halted in 1970. In 1991, Iraq admitted to the United Nations to having produced botulinum toxin prior to the Persian Gulf War, some

of which was loaded into weapons. Several other countries are alleged or reported to have produced or researched the use of botulism as a biological weapon.

Entities other than countries and states have also had interest in using botulinum toxin as a biological weapon. Between 1990 and 1995 the Japanese cult Aum Shinrikyo attempted to use botulinum toxin obtained from soil in northern Japan on at least three occasions. The failed attempts were made through botulinum toxin aerosols that were dispersed at multiple places in downtown Tokyo and at United States military installations in Japan. Ineffective microbiological techniques, deficient aerosol dispersion and internal sabotage have all been suggested reasons why the attempts failed.

Clinical Features

The modes of transmission define the four different types of botulism. The site of the toxin production is different for each of the forms, but all cause the same results. The signs and symptoms for all four types of botulism are similar. However, the extent to which a person experiences signs and symptoms may vary. The severity and rapidity of onset depend on the rate and amount of toxin absorbed into circulation. After the botulinum toxin is absorbed, it is carried by the bloodstream to neuromuscular junction where it binds irreversibly. Next, the toxin blocks the release of acetylcholine, which aids in the transmission of nerve impulses. This process produces an acute, afebrile, symmetric descending flaccid paralysis. It always begins in bulbar musculature and always causes cranial nerve palsies. Sometimes botulism is misdiagnosed as Guillain-Barré Syndrome, stroke, or chronic muscle weakness, as these maladies often produce the similar signs and symptoms. Recovery, which may take weeks or months, occurs from the development of new axon twigs that reinnervate muscle fibers. Botulism is not transmitted from person to person.

Intestinal Botulism

Intestinal botulism is also commonly referred to as infant botulism or floppy baby syndrome, although the disease can also occur in adults. It results from ingesting the spores, which often are found in honey. Once the spores are ingested, the botulinum toxins are produced in the intestinal tract. Most infants who become ill with intestinal botulism are less than six months of age. Because of their susceptibility, children less than 12 months of age should not eat honey, because of its potential to contain spores. Infant botulism is not suspected to be a high bioterrorism threat because of the age group in which the infection most commonly occurs and its mode of transmission.

The classic signs and symptoms are:

- Symmetric descending paralysis with prominent bulbar palsies
    - The prominent “4 D’s” of bulbar palsies:
        1. Diplopia (double vision)
        2. Dysarthria (imperfect articulation of speech)
        3. Dysphonia (difficulty in speaking)

4. Dysphagia (difficulty in swallowing)

- Afebrile
  - Because botulism is an intoxication, the patient will remain without a fever unless a secondary infection is acquired.
- Clear sensory
  - Patients are not confused or dull.
- Infants will demonstrate constipation, poor feeding, diminished suckling and crying and appear "floppy" by appearing weak and lacking muscle control.

Wound Botulism

Wound botulism occurs when there is direct contact of *C. botulinum* spores with an open wound. Botulinum toxin does not penetrate intact skin. The infection results from production of botulinum toxin in anaerobic tissues. Injection drug use is a major risk factor for wound botulism. Specifically, high rates of wound botulism have been seen among black tar heroin users who subcutaneously or intramuscularly inject the drug. Cocaine use, both by intravenously injecting and snorting, has also been specifically cited as causing wound botulism. Wound botulism is not suspected as being a high bioterrorism threat because of its mode of transmission.

The classic signs and symptoms are:

- Symmetric descending paralysis with prominent bulbar palsies
  - The prominent "4 D's" of bulbar palsies:
    1. Diplopia (double vision)
    2. Dysarthria (imperfect articulation of speech)
    3. Dysphonia (difficulty in speaking)
    4. Dysphagia (difficulty in swallowing)
- Afebrile
  - Because botulism is an intoxication, the patient will remain without a fever unless a secondary infection is acquired.
- Clear sensory
  - Patients are not confused or dull.

Foodborne Botulism

Foodborne botulism is the most common form of the infection among adults. It is transmitted by eating contaminated foods, usually through improperly canned or processed foods. To prevent foodborne botulism, proper home canning procedures, available through the US Department of Agriculture, should be used. In addition, methods for proper cooking, serving, and storing of foods should be followed. Foodborne botulism is considered to be a likely result of a biological attack because it potentially could be disseminated through a single food source covertly and could affect a large number of persons. The range for onset of signs and symptoms can be as early as 2 hours

or as late as 8 days. On average, symptoms begin to appear 12 to 72 hours after exposure.

The classic signs and symptoms are:

- Symmetric descending paralysis with prominent bulbar palsies
    - The prominent "4 D's" of bulbar palsies:
        1. Diplopia (double vision)
        2. Dysarthria (imperfect articulation of speech)
        3. Dysphonia (difficulty in speaking)
        4. Dysphagia (difficulty in swallowing)
- Afebrile
    - Because botulism is an intoxication, the patient will remain without a fever unless a secondary infection is acquired.
- Clear sensory
    - Patients are not confused or dull
- Abdominal cramps, nausea, vomiting or diarrhea may precede other signs and symptoms

Inhalational Botulism

Inhalational botulism is not a natural form; it is only a manmade form. Therefore, any cases of inhalational botulism are immediate cause for concern and public health attention. Inhalational botulism is transmitted by inhaling the spores into the respiratory tract. It has been experimentally demonstrated in primates and has accidentally occurred in humans. Inhalational botulism is considered a likely threat as a biological weapon. Since there have only been a few inhalational cases of botulism, the incubation time is not certain. The few cases of inhalational botulism that have been identified have demonstrated an approximate incubation period of 3 days.

The classic signs and symptoms are:

- Symmetric descending paralysis with prominent bulbar palsies
    - The prominent "4 D's" of bulbar palsies:
        1. Diplopia (double vision)
        2. Dysarthria (imperfect articulation of speech)
        3. Dysphonia (difficulty in speaking)
        4. Dysphagia (difficulty in swallowing)
- Afebrile
    - Because botulism is an intoxication, the patient will remain without a fever unless a secondary infection is acquired.
- Clear sensory
    - Patients are not confused or dull.

Precautions & Decontamination

Although botulinum toxin is extremely potent, it is easily destroyed. Botulinum toxin can not penetrate tact skin, so effective decontamination after exposure to botulinum toxin can be performed by washing clothing and skin with soap and water. Objects and surfaces that are contaminated should be cleaned with a 0.1% hypochlorite bleach solution. Five minutes of heating to an internal temperature of 85 degrees Cº will detoxify food or drinks that were contaminated. Atmospheric conditions and particle size can determine the persistence of an aerosolized release of botulinum toxin. Dissipation of fine aerosols will occur in the atmosphere, lessening their persistence, in addition to the extreme weather conditions and humidity which degrade the toxin.

Standard precautions should be used when dealing with a suspected or confirmed case of botulism. Patients with botulism do not need to be isolated or require droplet precautions, since the illness is not transmitted person-to-person.

Treatment

Supportive care is the recommended treatment. Intense nursing care may be needed for nutritional support, fluid support, assisted ventilation, and treatment of complications. The care may be required for a prolonged amount of time, as paralysis from botulism may last weeks to months before recovery. The mortality rate from all types of botulism has decreased over time. Ventilatory assistance with an opening to the windpipe or tracheal intubation to ventilate the lungs should result in a mortality rate that is less than 5%. Generally when fatality occurs, the cause of death is respiratory failure.

A licensed equine antitoxin, which is distributed by the CDC, may be used for treatment. The antitoxin is effective against toxin types A, B, and E, the most common forms. If the infection is caused by a type other than A, B, or E, then an investigational antitoxin held by the US Army may be used. The investigational antitoxin is effective against types A-G. With time and administration of antitoxin being major factors in treatment, the benefit of the investigational antitoxin may be lowered because of the time it would take to determine that the toxin was other than types A, B, or E, and therefore also creating a lapse in time to provide the correct antitoxin therapy.

Treatment should not be delayed for microbiological testing to confirm that the infection is caused by botulism. Antitoxin should be give to a patient as soon as possible after clinical diagnosis. Early suspicion and timely administration of antitoxin are keys to treatment. Antitoxin minimizes nerve damage and severity of disease but cannot reverse the extent of paralysis.

Special Populations

There has been no indication that children, pregnant women, and immunocompromised persons with botulism should receive any treatment different than the recommended standard therapy. Pregnant women and children have received the equine antitoxin without apparent short term adverse effects despite risk of immediate hypersensitivity to equine proteins. The risk of fetus exposure to equine antitoxin is unknown.

Vaccine

The US has developed a botulinum toxoid vaccine effective against toxin types A, B, C, D, and E. Currently, it is investigational and distributed by the CDC to laboratory workers who are at high risk of exposure and by the US military for protection of troops. In theory, this vaccine could eliminate the threat. However, the rarity of botulism, scarcity of toxoid available, and potential loss of medicinal qualities warrants mass immunization impractical. Therefore, routine vaccinations with the botulinum toxoid are not recommended or available for civilian populations. The botulinum toxoid would not be effective as a post exposure prophylactic measure because it takes several months to induce immunity.

Prophylaxis

It is recommended practice to monitor people who may have been exposed and promptly treat them at the initial signs of illness for those involved in a foodborne outbreak, as well as increasing surveillance to identify additional cases. It is recommended that persons who believe to have been exposed to an intentional release of botulinum toxin should remain under close medical observation and close to critical care services if feasible. Post exposure prophylaxis, through the use of antitoxin, is not recommended because of its scarcity and potential for adverse effects. Adverse effects from the equine antitoxin may include anaphylaxis and serum sickness. However, for aerosol exposures, animal studies have shown that antitoxin is effective if provided prior to the onset of signs and symptoms.

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Section 7: Plague

Table of Contents **Page**

Overview

Causative Agent: *Yersinia pestis*

Disease Forms:

- **Bubonic plague –** Inoculation of *Y. pestis* organisms into the skin, most commonly through a flea bite, that results in swelling, necrosis and destruction of the lymph nodes. Incubation period from 2-8 days**.**
- **Septicemic plague (primary & secondary) –** Primary occurs through the bite of an infected flea, but there is no development of buboes. Secondary occurs in people who develop septicemia after, or secondary to, bubonic plague infection.
- **Meningeal Plague –** Occurs when the *Y. pestis* bacteria are disseminated through the bloodstream into the membranes surrounding the brain and spinal cord.
- **Pharyngeal Plague –** Develops as an inflammation of the pharynx and lymph nodes around the neck from an exposure to infectious droplets expelled through coughing by a person or animal with a respiratory plague infection.
- **Pneumonic Plague (primary & secondary) –** Primary occurs as a result of directly inhaling *Y. pestis* and secondary develops from a bubonic or primary septicemic plague infection. Incubation period averages 1-3 days for naturally occurring primary, 2-6 for intentionally disseminated pneumonic plague.

Transmission: Pneumonic plague may be transmitted from person to person.

Precautions and Decontamination: Standard precautions and standard hospital infection control are recommended. For pneumonic plague, respiratory droplet precautions are recommended and for patients isolation for the first 48 hours of antibiotic treatment and continued until improvement. No environmental decontamination is necessary.

Treatment: Gentamicin and doxycycline are recommended.

Vaccine: A killed vaccine for bubonic plague exists, but is not available in the US.

Post Exposure prophylaxis: Doxycycline and ciprofloxacin are the preferred antibiotics for post exposure prophylaxis for adults, children, and pregnant women in a mass casualty setting. Streptomycin and gentamicin are the preferred antibiotics for adults and children in a contained casualty setting. For pregnant women in a contained casualty situation gentamicin is preferred.

Plague

Introduction

The etiological agent of plague is *Yersinia pestis*, a gram-negative bacillus. At one time, plague was the most feared and destructive disease known. In the United States, there are up to 40 cases, with an average of 13, reported annually. Most cases occur in the western states, such as California, New Mexico, Arizona, and Colorado. Plague is enzootic and commonly occurs in rodents, especially prairie dogs. There are many different forms of plague. The form of plague is often a result of the mode of transmission.

Today, there is still a serious threat of plague but more for its potential for being used as a biological weapon rather than its natural occurrence. Plague is a serious bioterrorism threat because *Y. pestis* is capable of being grown and disseminated by aerosol. It is considered a category A by the CDC, meaning it is of the highest priority as a terrorist threat. The ability of plague to cause a major public health impact, high mortality if left untreated, potential for spread, and the amount of preparedness needed by public health professionals are reasons for its classification as a high priority agent. When people develop plague through the aerosol route of transmission, they develop the pneumonic form of plague. Person-to-person transmission of pneumonic plague through respiratory droplets can occur but only with close and direct exposure to the infected person.

History

The first recorded plague pandemic began in 541 AD in Egypt and spread through Europe. Then, in 1346 a second plague pandemic was responsible for more than 20 million deaths in Europe. Because of the virulence and devastating effects of the pandemics, plague became commonly referred to as the "great pestilence" and the "Black Death". The pandemic was slowly spread by infected rats and humans from village to village and also to other countries by ships. In 1855, the third pandemic began in China. The incidence of plague has decreased significantly, and the threat of pandemic plague has eased throughout time through with the advent of improved living conditions, public health efforts, and antibiotic therapy.

The use of plague as a biological weapon has been alleged and reported throughout much of history. The intentional use of plague has been reported from as early as the 14th century. Tartar forces catapulted bodies of people who died of plague over the city walls of Kaffa to initiate an epidemic in the city. Also, there have been reports that secret branches of the Japanese army allowed fleas to feed on plague infected rats in laboratories. Then, the Japanese dropped as many as 15 million of these plague infected fleas by aircraft over targeted areas in China that resulted in plague outbreaks during World War II. Furthermore, the United States and the Soviet Union were also involved in biological weapons development of aerosolized plague. The US offensive program was halted in 1970 by executive order from President Nixon before there were large

quantities produced effectively. In contrast, the Soviet Union produced large quantities of plague that were suitable for weaponry. Other countries have also been alleged and reported to have been involved in research and production of *Y. pestis* as a biological weapon as well.

Clinical Features

Plague may result in the bubonic, septicemic, meningeal, pharyngeal, or pneumonic form. Modes of transmission and progression of the infection are distinct characteristics of the different forms of plague. Pneumonic plague may be transmitted from person to person.

Bubonic Plague

Most cases of bubonic plague result from a plague infected flea biting a human. Bubonic plague can also result from direct contamination of an open lesion with plague infected materials, such as handling tissues and fluids of infected animals. When an infected flea bites a human or there is direct contamination, there is an inoculation of *Y. pestis* organisms into the skin. The *Y. pestis* bacteria then migrate to regional lymph nodes and multiply quickly. This process leads to swelling, necrosis and destruction of the lymph nodes (buboes). The multiplication of *Y. pestis* may also result in bacteremia, septicemia, and endotoxemia, bleeding disorder, shock, and coma. The incubation ranges from 2 to 8 days.

The signs and symptoms of bubonic plague are as follows:

- Sudden onset of fever
- Sudden onset of chills
- Sudden onset of weakness
- Sometimes skin ulceration or pustule may form at the site of inoculation.
- A bubo, or enlarged and swollen lymph node, develops up to one day after initial signs and symptoms.
    - The buboes are 1 to 10 cm in diameter.
    - The overlying skin appears red.
    - Buboes are especially tender with considerable surrounding edema that typically develops in the groin, axilla, and cervical areas.
    - Buboes are extremely painful and may inhibit movement of the affected areas of the body.
- Progression to septicemia may occur resulting in secondary septicemic plague.

Bubonic plague is not thought to be the most likely result of a bioterrorism event using *Y. pestis*, but it is a possibility. Bubonic plague would not result from an aerosol release, though it could result from direct contamination or infective fleas.

Septicemic Plague

Development of septicemic plague can be primary or secondary. Primary septicemic plague occurs through the bite of an infected flea, but there is no development of buboes. Primary septicemic plague occurs in a minority of patients and is not very common. Secondary septicemic plague occurs in people who develop septicemia after, or secondary to, the development of bubonic plague.

The signs and symptoms of septicemic plague are as follows:
- Fever and chills
- Extreme exhaustion
- Bleeding disorder
- Necrosis of small vessels
- Hemorrhagic Skin lesions
- Gangrene of extremities, such as the nose or digits, in advanced disease

Septicemic plague is not thought to be the most likely result of a bioterrorism event using *Y. pestis,* though it is possible. Theoretically, septicemic plague could result directly from the initial infection from a bioterrorism attack or from the progression of a bubonic plague outbreak resulting from a bioterrorism attack.

Meningeal Plague

Plague meningitis is a very uncommon. Meningeal plague usually occurs a week or more after the onset of bubonic or septicemic plague, but also may occur as a primary manifestation. The development of plague meningitis occurs when the *Y. pestis* bacteria are disseminated through the bloodstream into the membranes surrounding the brain and spinal cord. This causes fever and pain surrounding the brain and spinal cord.

The signs and symptoms of meningeal plague are as follows:
- Fever
- Headache
- Stiff neck
- Delirium and confusion
- Dulling sensitivity
- Coma

Meningeal plague would probably not be a form of plague seen initially with a bioterrorism event because it mostly occurs through the progression of bubonic or septicemic plague. Theoretically, it could be seen if there were a terrorist event resulting in bubonic or septicemic plague, though these are not the most likely forms to be used in a biological attack.

Pharyngeal plague

Pharyngeal plague develops as an inflammation of the pharynx and enlargement of the lymph nodes around the neck. It results from an exposure to larger infectious droplets that are expelled through coughing by a person or animal with a respiratory plague infection. Ingestion of infected tissues or conceivably contaminated hands or materials used in skinning an infected animal could also transfer the *Y. pestis* to the mouth. Pharyngeal plague is an uncommon form of plague.

The signs and symptoms of pharyngeal plague are as follows:
- Clinically similar to streptococcal or viral pharyngitis
- Cervical lymphadenopathy of plague is very and painful and more severe than streptococcal or viral pharyngitis

Pharyngeal plague is not considered to the most likely result of a bioterrorism attack using *Y. pestis.* Although pharyngeal plague is transmitted through infectious droplets making it a feasible bioterrorism agent, pneumonic plague through aerosol dissemination is considered to be a more likely result of a bioterrorism attack.

Pneumonic plague

Natural occurrence of pneumonic plague. Naturally occurring pneumonic plague in humans occurs in two forms, primary and secondary. Both forms are uncommon. However, large outbreaks of naturally occurring pneumonic plague have occurred. Prior to antibiotics, large outbreaks in 1910 and in 1920 occurred in Manchuria with nearly a 100% fatality rate. Only small scale epidemics of pneumonic plague have occurred since.

Primary pneumonic plague occurs as a result of directly inhaling *Y. pestis*. Some cases have resulted in people who contracted the disease from handling their cats that were infected with pneumonic plague. Primary pneumonic plague patients have infectious pneumonitis from the onset of symptoms. The incubation period averages 1-3 days.

The signs and symptoms are as follows:
- Sudden onset of fever
- Sudden onset of chills
- Sudden onset of headache
- Sudden onset of body pains
- Sudden onset of weakness
- Sudden onset of chest discomfort and tightness
- Coughing with sputum production
- Difficulty breathing
- Coughing or spitting up blood
- Gastrointestinal symptoms (diarrhea, nausea, vomiting, abdominal pain)

Secondary pneumonic plague develops from a bubonic or primary septicemic plague infection. Secondary pneumonic plague develops when *Y. pestis* is disseminated through the bloodstream or by circulation to the lungs. Most secondary plague patients develop signs and symptoms prior to developing advanced pneumonitis.

The signs and symptoms are as follows:
- High fever
- Severe bronchopneumonia
- Chest pain
- Coughing or spitting up blood
- Difficulty breathing

Intentional dissemination resulting in pneumonic plague. The manifestation of pneumonic plague as a result of a biological weapon would display differently than naturally occurring plague. An aerosolized release of plague would result in primary pneumonic plague. Primary pneumonic plague features are similar to any severe rapidly progressing pneumonia. The incubation would likely range from 1 to 6 days with the average being 2-4 days.

The signs and symptoms are as follows:
- Fever occurring at onset
- Difficult breathing occurring at onset
- Coughing or spitting up blood occurring at onset
- Cyanosis
- Rapid breathing
- Chest pain
- Gastrointestinal symptoms (diarrhea, vomiting, nausea, and abdominal pain)
- Rapid development of sepsis, shock, organ failure, and respiratory failure
- No development of buboes
- Pneumonic consolidation on chest exam
- Bilateral infiltrates or consolidation are common
- Bronchopneumonia identified by chest radiograph

Pneumonic plague resulting from an aerosolized dissemination of plague is considered to be the most likely avenue of approach in a bioterrorism attack. The bacteria can be grown to distribute through aerosolized droplets creating a more severe mode of transmission by inhaling the organisms into the respiratory tract and causing the pneumonic form of plague. In addition, the organism could be transmitted person-to-person. The size and result of aerosolized dissemination of *Y. pestis* would be dependent on quantity of agent used, characteristics of the strain, environmental conditions, and methods of aerosolization. Because very few western physicians have seen plague, there is a strong possibility that an outbreak of plague could be overlooked and diagnosed a similar manifesting bacterial or viral pneumonia.

Epidemiological clues to indicate that a plague outbreak had occurred intentionally would include:

- The occurrence of cases in areas of no known enzootic infections
- The occurrence of cases in persons with no known risk factors
- No rodent deaths in the area prior to the cases.

Precautions and Decontamination

Close Contacts

Standard precautions should also be observed with all forms of plague. Because coughs contain infectious aerosol droplets, persons who have had close contact to a suspected or confirmed pneumonic plague patient who has not undergone 48 hour of antibiotic treatment should follow respiratory droplet precautions and wear surgical mask. Close contact with the pneumonic plague patients should be limited to only what is necessary until the patient has completed 48 hours of antimicrobial therapy and shown clinical improvement. In addition, other standard respiratory droplet precautions, such as gloves, gown, and eye protection should also be used when caring for a pneumonic plague patient.

Patient

Isolation for the first 48 hours of antibiotic treatment and continued until improvement is seen is recommended for patients with pneumonic plague. If isolation is not feasible, then cohorting patients receiving antibiotics is one option. Surgical masks should be worn by patients during transport. Strict precautions should be taken when handling bodies of patients who have died from plague.

Hospital infection control protocol should be followed for cleaning hospital rooms and patients' clothing and linens. Standard precautions should be used in hospital rooms of patients. Plague bacteria are very susceptible to environmental conditions, such as sunlight and heating. There is no evidence that Y. pestis presents an environmental risk to humans, therefore, no environmental decontamination is recommended.

Treatment

Gentamicin and doxycycline are the recommended therapies for plague. The preferred treatment for plague, historically, has been streptomycin; it has decreased the mortality caused by plague. However, the supply of the antibiotic is low and use in the US is infrequent, so it is not included in the dosing guidelines. Resistance to antibiotics should be taken into account when making treatment decisions. There has been naturally

occurring resistance documented to the tetracycline class of antibiotics, but rarely. In the event of a bioterrorism event involving plague, recommendations may be revised accordingly. If gentamicin or doxycycline is not available or cannot be used, decisions to use other antibiotic treatment must be weighed with the risks associated with treatment against those associated with pneumonic plague.

See Appendix A for the National Pharmaceutical Stockpile Antibiotic Treatment Dosing Guideline Recommendations.

Vaccine

In 1999, the killed whole bacillus vaccine was discontinued, and therefore is no longer available. A killed vaccine for plague does exist for the bubonic form of the disease, but is not available in the United States at this time. The vaccine has not been proven effective for pneumonic plague. Therefore, if a plague outbreak were initiated through aerosol dispersal, the likely route of a biological attack, the vaccine will not protect adequately. Furthermore, the vaccine is not recommended for the general population. Routine vaccination requires multiple doses over several weeks, also making the vaccine ineffective as post-exposure prophylaxis.

An improved vaccine is needed due to the shortcomings of current vaccines. Supply and manufacturing problems, short duration of immunity, and ineffectiveness of protection from plague that is transmitted by aerosol, give proof to the need for an improved vaccine.

Post Exposure Prophylaxis

Prophylaxis should be administered upon confirmed or suspected plague exposures. Doxycycline and ciprofloxacin are the preferred antibiotics for post exposure prophylaxis for adults, children, and pregnant women in a mass casualty setting. Streptomycin and gentamicin are the preferred antibiotics for adults and children in a contained casualty setting. For pregnant women in a contained casualty situation gentamicin is preferred. Recommendations may change according to circumstances in which plague is present. Close contact is defined as contact with a patient at less than 2 meters. Asymptomatic persons that have had household, hospital or other close contact with untreated plague persons should receive prophylaxis and watch for fever and cough. Those persons who develop fever or cough while receiving prophylaxis should seek immediate medical attention and start antibiotic treatment accordingly. In addition, during the first 48 hours of post exposure prophylaxis of antibiotic therapy contacts should follow respiratory precautions and wear a surgical mask.

Isolation of close contacts is not necessary for those who refuse post exposure prophylaxis, because pneumonic plague is not rapidly or widely spread in a community, in contrast to the past. Contacts that do refuse post exposure prophylaxis should be watched carefully for the development of a cough or fever during the first 7 days after the exposure and then immediately treated upon appearance.

See Appendix B for the National Pharmaceutical Stockpile Antibiotic Post-Exposure Prophylaxis Dosing Guideline Recommendations.

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Section 8: Smallpox

Overview

Causative Agent: Variola Virus

Disease Forms:

- **Variola major -** Results in a nonspecific prodrome with fever and deep-seated, firm, round, well-circumscribed vesicle or pustule lesions that are in the same stage of development on any one part of the body.
- **Variola minor –**Variola minor results in an illness similar to variola major, but is less severe.
- **Hemorrhagic –** Results in redness of the skin that eventually develops and hemorrhages into the skin and mucous membranes. Usually fatal.
- **Flat-type** – Results in confluent lesions that do not progress to pustular stage. Usually fatal.

Incubation period: The incubation period for smallpox is 7 to 17 days with an average of 12 to 14 days.

Transmission: Person to person transmission may occur through aerosol droplets by face to face contact, direct contact with lesions or secretions, contaminated clothing/linens. Smallpox becomes contagious with the onset of symptoms and is most infectious during the first week of rash illness.

Precautions Standard contact and airborne precautions for all patient care. Patients in the hospital should be confined to negative pressure rooms with high efficiency particulate air filtration. Suspected cases of smallpox should be immediately isolated, vaccinated, and placed under surveillance. All household and face to face contacts with the suspected smallpox cases should be vaccinated and placed under surveillance.

Decontamination: Decontamination should only occur by vaccinated personnel who are wearing protective clothing. All bedding and clothing of smallpox patients should be autoclaved or laundered in hot water with bleach. Environmental decontamination should be performed according to standard hospital infection control.

Treatment: There is no treatment for smallpox patients other than supportive therapy.

Vaccine: There is an effective smallpox vaccine developed and over 300 million doses are being produced for the US government. It is currently not available to the public.

Post Exposure Prophylaxis: All household and face to face contacts with the suspected smallpox cases should be vaccinated and placed under surveillance. Suspected smallpox cases should receive a vaccination.

Introduction

After one of the most accomplished public health achievements of eradicating smallpox worldwide, we are faced with the possibility that smallpox may be brought back into human populations through bioterrorism. Smallpox is a serious illness caused by the variola virus. It is a member of the genus of orthopoxviruses, which are among the largest and most complex viruses known. Smallpox is only a disease of humans; there are no animal reservoirs, insect reservoirs, or vectors for the disease.

The age distribution of smallpox in a population is dependent on the population's susceptibility. If the population is equally susceptible, with no immunity, then the distribution of smallpox would be similar to the age distribution of the population. Because the immunity in the population has largely decreased, it is likely that the U.S. would be affected this way if smallpox were to be reintroduced into the American population.

Because transmission from person to person does not occur until the onset of the rash, smallpox spreads to people more slowly than other diseases, such as chickenpox and measles. Historically, by the time people had a rash from smallpox they were already confined to bed because of the sickness, and therefore would not expose as many people. Additional cases of smallpox were usually restricted to those persons who came into contact with patients, usually in a home or hospital.

After the eradication of smallpox in 1980, two known stores of the virus were retained, one at the CDC in Atlanta, Georgia and the other at the Institute of Virus Preparations in Moscow, Russia. Serious concerns have been raised that Soviet scientists have sold productions of the smallpox virus after they experienced diminished financial support for laboratory work. If that has happened, a bioterrorism attack with the use of smallpox could become a reality. Smallpox is a severe bioterrorism threat because it has potential to cause severe morbidity and mortality in a population that no longer has high immunity. In addition, smallpox can be transmitted person to person via aerosol droplets that are expelled from the infected person's mouth and throat, and by direct contact. A single case of smallpox would be considered an international public health emergency and an unprecedented crime. One case would create widespread panic and call for extensive emergency control measures.

History

The British forces were probably the first to use smallpox as a biological weapon in North America during the French and Indian Wars from 1754-1767. Blankets that had been used by smallpox patients were distributed to American Indians by the soldiers with the intent of initiating smallpox outbreaks. American Indians had no natural immunity to smallpox because they were a population that had never been exposed to the disease prior

to the Europeans' introduction of it. With no natural immunity to the disease, it severely affected tribes, which resulted in extensive losses.

In 1796, Edward Jenner demonstrated the ability to protect against smallpox. Jenner demonstrated that an infection caused by cowpox virus protected against smallpox. With the worldwide practice of cowpox inoculation, what is known today as vaccination, the threat of naturally occurring smallpox and also smallpox used as a biological weapon was greatly reduced at that time.

A global campaign to eradicate the disease was launched by the World Health Organization (WHO) in 1967. Routine vaccination of children at the age of one year was recommended and required by most countries in the past. Vaccinations in the United States were ceased in the 1972, and eventually throughout the world due to the dwindling threat and eradication of the disease. Vaccine production also stopped. In 1977, the last naturally occurring case of smallpox occurred in Somalia. Eradication of smallpox was announced in 1980 by the WHO. Military personnel continued smallpox vaccinations until 1990.

Clinical Features

Smallpox is primarily spread from one person to another through aerosol droplets by face to face contact. Direct contact with lesions or secretions may also transmit the disease. In addition, contaminated clothing or bed linen can also transmit the virus. Smallpox becomes contagious with the onset of symptoms and is most infectious during the first week of rash illness, because that is when the largest amount of virus is present in saliva. As the scabs form, the infectivity of smallpox declines. However, there is still risk of transmission until all scabs have fallen off. Death most often occurs in the second week of illness and is usually from toxemia.

Once the viruses are inhaled, they implant on the orophryngeal or respiratory mucosa. The viruses then migrate to the regional lymph nodes where they multiply. Next, they multiply in the spleen, bone marrow and other lymph nodes. They then localize in the small blood vessels of the skin and beneath the oral and pharyngeal mucosa where they infect adjacent cells, and then cause illness.

Variola major, variola minor, hemorrhagic smallpox, and flat-type smallpox are all forms in which smallpox disease may present. Virological differentiation can be used today to identify the form, whereas in the past only clinical evaluation could differentiate the forms of smallpox. Variolas major and minor were the most common forms of smallpox seen. Flat-type and hemorrhagic were less commonly seen, but they were also more severe.

Variola Minor & Variola Major

Variola minor causes a less severe smallpox disease with a case fatality rate of 1% or lower. In 1904, variola minor was first described in South Africa and then in 1913 in the United States. In some areas of Europe, North America, South America, and in many parts of Africa variola minor was endemic. The last case of smallpox seen on earth was of variola minor in Somalia in 1977.

Variola major is the more severe form of smallpox. It results in a more extensive rash, higher fever, and a greater degree of pain than variola minor. The case fatality rate of variola major is 30% or higher. Variola major was the only form of smallpox that was known until the end of the nineteenth century. During the first half of the twentieth century, most outbreaks in Africa and all outbreaks in Asia were due to variola major. The last case of variola major occurred in 1975 in Bangladesh. The incubation period for smallpox is 7 to 17 days with an average of 12 to 14 days.

Signs and symptoms of smallpox are as follows:

- Nonspecific prodrome for 2-4 days consisting of:
    - High fever (usually $\geq$101° F)
    - Headache
    - Malaise
    - Muscle pain
    - Back pain
- A rash develops on the mouth, pharynx, face, hands, forearms, palms and spreads to the trunk and lower extremities
    - Appears as a single crop on any one part of the body
    - Centrifugal distribution: Most dense on the face and extremities than it is on the back or abdomen
    - Slow evolution through the following stages:
        Day 1: Macular rash
        Day 2: Papular rash
        Day 3-4: Vesicular rash
        Day 5-12: Pustular rash
        Day 13-18: Scabs form
    - Lesions are all in the same exact stage of evolution on any one part of the body
    - Lesions are deep, firm, round and circumscribed
    - Lesions may be umbilicated or confluent
    - Lesions on palms and soles serve as a significant marker of the infection
    - With recovery, the scabs separate and pitted scarring occurs, especially on the face
- Abdominal pain and delirium may occur

Hemorrhagic Smallpox

Hemorrhagic smallpox is a less common but a more severe type of smallpox. Cases of hemorrhagic smallpox occur in all ages and in both sexes uniformly, but pregnant women appear to be more susceptible. Hemorrhagic smallpox is almost always fatal.

The signs and symptoms are as follows:
- Shorter incubation period than variola major and minor cases
- Severely painful prodrome with high fever, head, back, and abdominal pain
- Redness of the skin develops → purplish red spot → then hemorrhages into the skin and mucous membranes
- Toxemia often develops
- Death usually occurs by day 5 or 6 after the onset of the rash

Flat-Type Smallpox

Flat-Type smallpox is also less common but a more severe type of smallpox. It is commonly referred to as malignant smallpox. It is almost always fatal.

The signs and symptoms are as follows:
- Abrupt and painful onset
- Confluent lesions develop slowly but do not progress to pustular stage
- Lesions remain soft and are velvety to the touch
- The skin has a reddish colored appearance
- Severe toxemia develops
- If recovery follows, the lesions slowly disappear without forming scabs
- In more severe cases upon recovery, large amounts of skin might peel away

Smallpox Criteria and Risk Categories

Major Smallpox Criteria

The characteristic signs and symptoms of smallpox are categorized into major and minor criteria. The major smallpox criteria consist of three key signs and symptoms associated with smallpox. (*Table 1: Major Criteria for Smallpox*). First, there must be a febrile prodrome, which occurs within one to four days before the rash onset and consists of a fever that is equal to or higher than 101° F. In addition, the prodrome must also include at least one of the following symptoms: prostration, headache, backache, chills, vomiting, or severe abdominal pain. Second, a classic smallpox lesion appears. The lesions are deep seated, firm and hard to the touch; round and well circumscribed, and be umbilicated or confluent. The lesions may appear as vesicles or pustules. Finally, the

lesions must be in the same stage of development on any one part of the body (e.g., the face, or arm) and in the same stage of development (i.e. all are vesicles, or all are pustules).

Table 1: Major Criteria for Smallpox

Major Smallpox Criteria
Febrile Prodrome: occurring 1-4 days before rash onset: fever ≥101°F **and** at least one of the following: prostration, headache, backache, chills, vomiting or severe abdominal pain. All smallpox patients have a febrile prodrome. Fever may drop with rash onset.
Classic Smallpox Lesions: deep-seated, firm/hard, round, well-circumscribed vesicles or pustules; may be umbilicated or confluent
Lesions in Same Stage of Development: on any one part of the body (e.g., the face, or arm) and in the same stage of development (i.e. all are vesicles, or all are pustules)

Minor Smallpox Criteria

The characteristic signs and symptoms of smallpox are categorized into major and minor criteria. The minor smallpox criteria consist of less significant signs and symptoms associated with smallpox than the major smallpox criteria. (*Table 2. Minor Smallpox Criteria*) First, the distribution of the rash is centrifugal, with the greatest concentration of lesions occurring on face and distal extremities. Second, the lesions first appear on the oral mucosa and palate within the mouth, face, and the forearms. Third, the patient appears toxic or moribund. Fourth, the lesions evolve slowly from macules to papules, then to pustules over days. Each stage of evolution lasts 1-2 days. Finally, the majority of smallpox cases develop lesions on the palms and soles.

Table 2. Minor Smallpox Criteria

Minor Smallpox Criteria
Centrifugal distribution: greatest concentration of lesions on face and distal extremities
First lesions on the oral mucosa/palate, face, forearms
Patient appears toxic or moribund
Slow evolution: lesions evolve from macules to papules→pustules over days (each stage lasts 1-2 days)
Lesions on the palms and soles (majority of cases)

Risk Categories of Smallpox

When evaluating patients for smallpox, they are categorized as being a high, moderate, or low risk for having smallpox (*Table 3: Risk Categories for Smallpox*). The major and minor criteria categories help to identify the level of high, moderate, or low risk the patient is of having smallpox. The patient is considered to be at high risk for smallpox when he or she displays all of the major smallpox criteria of the febrile prodrome, classic smallpox lesions, and the lesions being in the same stage of development. High risk cases of smallpox should be reported immediately. Patients considered being a moderate risk have a febrile prodrome and one other major smallpox criteria (*Table 1: Major Criteria for Smallpox*) or they have a febrile prodrome and at least four minor criteria (*Table 2: Minor Smallpox Criteria*). Those patients identified as being a moderate risk of having smallpox require urgent evaluation by medical personnel. Patients considered to be at low risk of having smallpox do have a mild or no febrile prodrome or have a febrile prodrome along with less than four minor criteria (*Table 2: Minor Smallpox Criteria*). Patients categorized as low risk of having smallpox should be managed by health care personnel as indicated clinically. **See page 8-19, *Evaluating Patients for Smallpox,* for information on how to follow up with an appropriate evaluation of each risk category.**

Table 3: Risk Categories for Smallpox

High Risk of Smallpox → report immediately
Febrile prodrome **AND** Classic smallpox lesions **AND** Lesions in same stage of development
Moderate Risk of Smallpox → urgent evaluation
Febrile prodrome **AND** One other MAJOR smallpox criterion **OR** Febrile prodrome **AND** ≥ 4 MINOR smallpox criteria
Low Risk of Smallpox → manage as clinically indicated
No/mild febrile prodrome **OR** Febrile prodrome **AND** <4 MINOR smallpox criteria (no major criteria)

Smallpox Differentiation

Smallpox is most likely to be confused with varicella, or more commonly known as chickenpox. However, there are other illnesses and conditions to consider in the differential diagnosis of a person with a generalized rash illness. A variety of rashes may be caused by drug eruptions or allergies that may present with similar symptoms. For this

reason it important to take a detailed history of all medications, including prescriptions and over the counter medications.

Critical factors for case history differentiation of smallpox and chickenpox:

- The past history of chickenpox infection may help identify the likelihood of the illness as variola because chickenpox is primarily a disease of children and second cases of chickenpox are very rare.
- The past history of chickenpox vaccination may help identify the possibility of a variola illness because chickenpox is unlikely in a person who has received the varicella vaccine.
- Recalling an exposure to a case of chickenpox or herpes zoster 10 to 21 days before rash onset can increase the probability of the infection being varicella. However, it does not help in making the diagnosis if an exposure is not recalled.

In addition to a comprehensive patient history, a clinical evaluation may serve to differentiate smallpox from other infections, specifically chickenpox (*Table 4: Differentiation between Smallpox and Chickenpox*). A varicella vaccine was licensed in 1995 and has resulted in a dramatic decrease in the number of cases, but has not eliminated all cases of chickenpox within the United States. The course of disease, appearance, distribution, and evolution of the rash are the key characteristics in differentiating smallpox from chickenpox through clinical evaluation.

Table 4: Differentiation between Smallpox and Chickenpox

Smallpox – Variola	Chickenpox - Varicella
Course of Disease • Severe febrile prodrome 1-4 days before onset of the rash • High fever at least 101ºF (usually 102-104°F) • Persons appear extremely ill	**Course of Disease** • Short & mild prodrome, or none at all • Low or no fever prior to rash • Persons may feel tired • Persons do not appear to be very ill
Appearance of the Rash • Lesions are deep in the dermis • Lesions feel hard to the touch • Lesions are round and well circumscribed • Lesions evolve slowly	**Appearance of the Rash** • Lesions are superficial • Lesions appear to be delicate • Lesions are not well circumscribed • Lesions evolve quickly
Distribution of the rash • The rash is most dense on the face and extremities • The rash is less dense on the abdomen or back • Lesions on the palms or soles are seen in the majority of cases	**Distribution of the rash** • The rash is less dense on the extremities. • The rash is generally most dense on the abdomen and back • Lesions on the palms or soles are rarely seen in cases
Evolution of the rash • Rash evolves at a slower pace • Lesions evolve from macules to papules to vesicles to crusts, with each stage lasting 1 or 2 days • All lesions on any one part of the body appear to be at the same stage of development	**Evolution of the rash** • Rash evolves at a quicker pace • Some lesions will have evolved from macules to crusts within 1 day • Lesions typically appear in crops • In any one area of the body you will find lesions in all stages of evolution

A variety of other rashes may present with signs and symptoms similar to smallpox (*Table 5: Conditions That Might Be Confused with Smallpox*). For this reason it important to take a detailed history of all medications including prescriptions and over the counter medications.

Table 5: Conditions That Might Be Confused With Smallpox

Condition	**Clinical Clues**
Varicella (primary infection with varicella-zoster virus)	Most common in children <10 years; children usually do not have a viral prodrome
Disseminated herpes zoster	Prior history of chickenpox; immunocompromised hosts
Impetigo (*Streptococcus pyogenes, Staphylococcus aureus*)	Honey-colored crusted plaques with bullae are classic but may begin as vesicles; regional not disseminated
Drug eruptions and contact dermatitis	Exposure to medications; contact with possible allergens
Erythema multiforme (incl. Stevens Johnson Sd)	Major form involves mucous membranes and conjunctivae
Enteroviruses (including Hand, Foot and Mouth disease)	Summer and fall; fever and mild pharyngitis at same time as rash; distribution of small vesicles on hands, feet and mouth or disseminated
Disseminated herpes simplex	Lesions indistinguishable from varicella; immunocompromised host
Scabies; insect bites (incl. fleas)	Pruritis; in scabies, look for burrows (vesicles and nodules also occur); flea bites are pruritic, patient usually unaware of flea exposure
Molluscum contagiosum	Healthy afebrile children; HIV+ individuals
Bullous Pemphigoid	Bullous lesions. Positive Nikolski sign.
Secondary syphilis	Rash can mimic many diseases; rash may involve palms and soles; 95% maculo-papular, may be pustular. Sexually active persons.

Precautions

Standard contact precautions and airborne precautions (fitted N95 masks) for all patient care should be strictly followed. Patients in the hospital should be confined to negative pressure rooms that are equipped with high efficiency particulate air filtration.

Suspected and confirmed smallpox cases:

Suspected cases of smallpox should be immediately isolated, vaccinated, and placed under surveillance. Isolation within the person's home or a non-hospital facility is preferred because of the threat of spreading the disease in a health care facility. The suspected smallpox cases should receive a vaccination because if they were mistakenly identified as such and placed in a facility or had contact with confirmed smallpox cases, the vaccination would ensure they would not be at risk of acquiring smallpox. Laboratory testing should be performed to diagnose a case as confirmed smallpox. Once testing has identified the cause of an epidemic to be smallpox, clinically typical cases would not require laboratory confirmation.

Contacts of smallpox cases

All household and face to face contacts with the suspected smallpox cases should be vaccinated and placed under surveillance. Vaccination administered within the first few days after exposure may prevent or significantly reduce illness. Contacts are defined as persons who have been in the same household as the infected individual or who have had face to face contact within 6 and a half feet of the patient after the onset of the fever. All close contacts of smallpox patients should be vaccinated. Contacts are not recommended to be isolated due to practicality and difficulty. Instead, contacts of smallpox patients should be monitored for the development of a fever. Contacts should have their temperature taken at minimum once a day for 17 days following the last exposure to the smallpox patient. If during that time, the contact person's temperature is 101° F or higher, immediate isolation, clinical and laboratory examination should occur.

Isolation of smallpox patients:

In large outbreaks, where there would not be enough room for all patients to be in negative pressure rooms, patients with smallpox are recommended to be isolated in their homes or somewhere other than a hospital facility when possible. This is recommended because little can be done other than supportive therapy for treatment for a patient at that time. Also, the potential for aerosol transmission in a hospital setting poses a very serious threat. If isolated at home, the exposure and therefore risk to other people is decreased. Isolation and care should be provided to patients with smallpox who are at home. If this is not a feasible method, authorities should consider designation of a specific hospital or facilities to care for patients.

Decontamination

Decontamination should only occur by vaccinated personnel. Protective clothing including gowns, gloves, shoe covers, caps, and masks should be worn during decontamination. If possible, all protective clothing worn during decontamination procedures should be placed in biohazard bags and incinerated or autoclaved and then disposed. After decontamination, personnel should immediately shower with soap and water after the protective clothing is removed.

Clothing, bedding, and linens of smallpox patients may be autoclaved or laundered in hot water (71°C) and bleach. Reusable medical equipment should first be cleaned with a 5% phenolic germicidal solution and then decontaminated by autoclaving, using ethylene oxide, or soaking in a 5% phenolic germicidal detergent for at least an hour. Medical waste should be placed in biohazard bags and incinerated or autoclaved.

In aerosolized release of smallpox, the virus would be inactivated in two days eliminating the risk of environmental exposure after that time. Standard hospital infection control disinfectants, such as hypochlorite and quaternary ammonia, are effective for cleaning surfaces contaminated with smallpox virus. Formaldehyde decontamination should only be performed by experienced personnel.

If formaldehyde decontamination is not feasible, then the following should be performed at a minimum:

- All disposable items that were in contact with a smallpox patient should be bagged and incinerated.
- Cloth materials, such as clothing, bedding, linens, curtains that came into contact with a smallpox patient should be transported in biohazard bags to be laundered in hot water (71°C) and bleach or incinerated.
- Surfaces, furniture, fixtures, walls, carpets and upholstery should be cleaned with a 5% solution of phenolic germicidal detergent.

Treatment

Supportive therapy is the best that can be offered to smallpox patients. Antibiotics for bacterial infections that are secondary to the smallpox infection may be necessary. There are no antivirals that have proven to be effective for the treatment of smallpox infections.

In the future, Cidofovir, a polymerase inhibitor, may prove useful for treatment of smallpox. Studies on tissue culture, mice and a small number of monkeys have suggested cidofovir's potential for preventing smallpox infection if administered within 1 to 2 days after exposure. However, currently there is no indication that cidofovir will prove more effective than vaccination. In addition, the drug has disadvantages because it must be administered intravenously and is often accompanied by serious renal toxicity.

Vaccine

The smallpox vaccine is performed by using a bifurcated needle. The needle is inserted into the vaccine trial to withdraw the vaccine, then fifteen perpendicular applications are made in about a 5 mm area on the arm to fully vaccinate. Three days after the vaccination a red papule appears at the site and then becomes vesicular. By the seventh day, the vaccination site becomes whitish and umbilicated. Fevers and regional lymphadenopathy are common during this time. By the third week the vaccination site has dried, crusted, and fallen off.

Current Supply and Production

In the United States, there is a limited reserve supply of vaccine, which is maintained by the CDC. The vaccine was produced in the 1970s by Wyeth laboratories in Pennsylvania. Approximately 15 million persons can be vaccinated with the reserve supply, which may be extended to 75 million doses by diluting on a 1:5 basis. Since the September 11th, 2001 terrorist attacks on the United States, there has been a higher priority placed on vaccine development and production. It is anticipated that over 300 million doses will be available in the US by the end of 2002.

Current Vaccination Immunity and Recommendations

There has been no measure of immunity for those who received vaccinations when routinely administered. Therefore, the immune status of those who were vaccinated is not clear. It is known that the vaccination does not provide life long immunity. Antibody levels correlate with the level of immunity, and these have been shown to decrease considerably during the 5-10 year period following the first vaccination. With this information, it is assumed that the general population at large is highly susceptible. Those who have at some point in the past been vaccinated would likely show some accelerated immune response in comparison to those who have never received the vaccination.

In the event of an intentional release of smallpox there should be an emergency vaccination response. The Advisory Committee on Immunization Practices recommends vaccination for the following groups in an emergency vaccination response situation:

- Persons who were exposed to the initial release of the virus;
- Persons who had face to face, household, or close contact with a confirmed or suspected smallpox patient at any time from the onset of the patient's fever until all scabs have separated;
- Personnel involved in he direct medical and public health evaluation, care, or transportation of confirmed or suspected smallpox patients;
- Laboratory personnel involved in collection or processing specimens from confirmed or suspected smallpox patients;
- Other persons who have an increased likelihood of contact with infectious materials from a smallpox patient.

Recommendations to provide the smallpox vaccine to the general public are made on the basis of calculable risk. Although the threat of reintroduction of smallpox in the population is serious, it is not considered to outweigh the risk of potential complications of the vaccine. Therefore, the smallpox vaccine is not recommended for the general public at this time. Because of the limited supply, vaccinating segments of the population, such as health care workers, is not an option at this time. The only current recommended use of the vaccine is for those laboratory workers who directly work with the virus.

High Risk Groups for Vaccine

During a smallpox emergency there are no absolute contraindications that exist regarding vaccination of a person that has experienced a high risk exposure to smallpox. Persons that are at risk for vaccine complications are also at a high risk for death from smallpox. The risk of developing serious complications from the vaccine must be weighed against the risk for developing smallpox. When the level of exposure to smallpox is undetermined, the decision to vaccinate should be made by the person and a clinician only after assessment of the risk and/or benefit from the decision.

The following are four groups that are considered to be at high risk for adverse events following smallpox vaccination:

- *Persons with eczema and other exfoliating skin conditions.* These persons are at a high risk for developing complications such as eczema vaccinatum.

- *Persons with immune deficiency disorders.* The risk group includes persons with leukemia, lymphoma, generalized malignancies, solid organ transplants, hematopoietic stem cell transplants, cellular or humoral immunity disorders, those receiving therapy with alkyating agents, antimetabolites, radiation, or large doses of corticosteroids. Replication of the vaccinia virus can be enhanced among immunocompromised persons resulting in complications.

- *Persons with HIV infections.* The risk for these persons is unknown at this time. There have been cases of persistent viremia and secondary viral infection of many organs that has been thought as a probable association with HIV infection.

- *Pregnant women.* Smallpox vaccine has been reported to cause fetal infection on rare occasions. It usually results in stillbirth or death of an infant shortly after delivery.

Vaccine Complications

In addition to a limited supply, another issue of the smallpox vaccine use is the potential for severe complications. Central nervous system disorders and skin conditions are the most frequently recognized adverse events with smallpox vaccinations. During the U.S. smallpox vaccination program, approximately seven to nine deaths per year were attributed to vaccination. The highest risk was for death was in infants. Most primary vaccinations in the United States were administered to children, so less is known about adverse events in adults.

The most common complications that have been associated with the smallpox vaccine include the following:

- *Postvaccinial Encephalitis.* Between 8 to 15 days after the vaccination signs and symptoms of encephalitis develop, including fever, headache, vomiting, and drowsiness. In addition, some cases develop spastic paralysis, signs of meningitis, coma, and convulsions. There may be complete recovery, residual paralysis, central nervous system symptoms, or death. Most infant deaths were attributed to postvaccinial encephalitis. Postvaccinial encephalitis occurs at a rate of 3 persons per 1 million primary vaccines. The case fatality rate for this infection is 40%.

- *Progressive Vaccinia (Vaccinia Gangrenosa).* Progressive vaccinia results when the site of vaccination fails to heal and progresses to adjacent areas of skin causing necrosis of tissue and then further to the bones and internal organs. With this complication, the vaccinia virus continues to grow, and would need treatment with vaccinia immune globulin to increase the likelihood of recovery. Progressive vaccinia most commonly occurs among those who are immunosuppressed because of a congenital defect, malignancy, radiation therapy, or AIDS.

- *Eczema Vaccinatum*. Eczema vaccinatum occurs when the vaccinial lesion covers all or most of the area that was once or currently affected with eczema. It has also been seen in persons with active or healed eczema that had contact with a recently vaccinated person. Eczema vaccinatum was associated with case-fatality rates of up to 10% overall. Within children less than two years of age, the case fatality rate was as high as 30% to 40%.

- *Generalized Vaccinia.* Generalized vaccinia occurs when there is blood-borne dissemination of the virus. Between 6-9 days after vaccination lesions emerged. Generalized vaccinia occurred in persons who are not identified as being at high risk for the vaccination. Most cases were self limited.

- *Inadvertent Inoculation.* Autoinoculation to the face, eyelids, mouth and genitals sometimes occurred. Also, inadvertent inoculation also occurred through transmission to close contacts. In patients who developed this complication, most lesions healed without a specific therapy.

VIG for Treatment of Complications

Vaccinia Immune Globulin (VIG) is recommended for the treatment of some severe cutaneous reactions caused by the vaccine. VIG is the only product available for therapy of smallpox vaccine complications. Like the vaccine, VIG is maintained by the CDC and is in very limited supply. The risks of receiving the smallpox vaccine should be analyzed with the risk of developing smallpox. VIG and the vaccine may be provided simultaneously for persons at risk for complications to the smallpox vaccine. If VIG is not available, the contraindications will have to be weighed against the risk of developing the disease.

Post Exposure Prophylaxis

Contacts of Smallpox Patients

Post exposure immunization with the vaccine is effective. Vaccination alone if given within the first few days and as late as four days after the exposure may prevent or greatly reduce illness. All household and face to face contacts with the suspected smallpox cases should be vaccinated and placed under surveillance. Contacts are defined as persons who have been in the same household as the infected individual or who have had face to face contact with the patient after the onset of the fever. All close contacts of smallpox patients should be vaccinated. Contacts are not recommended to be isolated due to practicality and difficulty. Instead, contacts of smallpox patients should be monitored for the development of a fever. Contacts should have their temperature taken at minimum once a day for 17 days following the last exposure to the smallpox patient. If during that time, the contact person's temperature reaches 101° F or higher, immediate isolation, clinical examination and laboratory testing should be performed.

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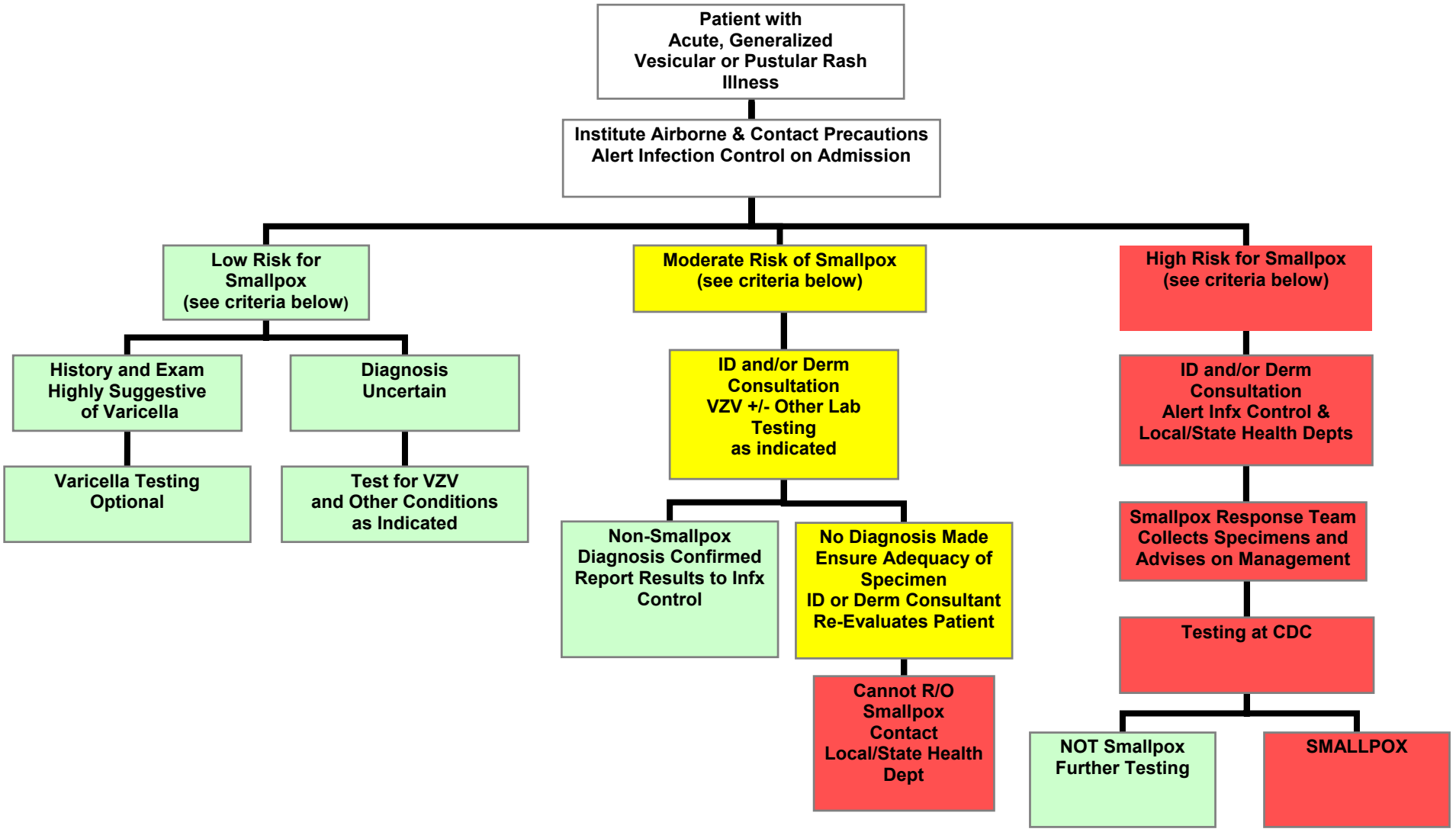
Evaluating Patients for Smallpox



Section 9: Tularemia

Table of Contents **Page**

Overview

Causative Agent: *Francisella tularensis*

Disease Forms:

- **Ulceroglandular –** Results from contact with contaminated tissues or fluids, bites from infected arthropods, or naturally aerosolized *F. tularensis* that enters broken skin. At the site of inoculation, an ulcer develops and lymph nodes in the area become swollen and painful.
- **Glandular –** Results from contact with contaminated tissues or fluids, bites from infected arthropods, or naturally aerosolized *F. tularensis* that enters broken skin. A tender lymphadenopathy forms, but no ulcer.
- **Oculoglandular –** Results from direct contamination of the eye. Conjunctivitis and lymphadenopathy in the area develop.
- **Oropharyngeal –** Results from ingesting contaminated food, water, or inhaling aerosols. Pharyngitis or tonsillitis along with lymphadenopathy develops.
- **Pneumonic –** Also known as pulmonary, pleuropulmonary and pleuropneumonic tularemia. Develops from inhaling contaminated aerosols or by spreading through the bloodstream.
- **Typhoidal –** Also known as septicemic tularemia and systemic tularemia. Most commonly it results from inhalation of infectious aerosols and is characterized by systemic illness that lacks signs indicating site of inoculation.

Transmission: There is no person to person transmission of tularemia.

Precautions & decontamination: Standard precautions and infection control procedures.

Treatment: For adults, children, and pregnant women the recommended therapies in a contained casualty setting for tularemia are gentamicin and streptomycin, in a mass casualty setting doxycycline and ciprofloxacin are recommended.

Vaccine: A live attenuated vaccine has been used to protect laboratorians who routinely work with the organism. The vaccine is currently under review by the FDA, future availability is unknown.

Post Exposure prophylaxis: For adults, children, and pregnant women the recommended prophylaxis for tularemia is doxycycline and ciprofloxacin.

Introduction

Tularemia is a bacterial zoonosis, is commonly called rabbit fever or deer-fly fever, caused by *Francisella tularensis*, a nonmotile gram-negative coccobacillus. *F. tularensis* is one of the most infectious pathogenic bacteria known; as few as ten organisms may cause the disease. It is commonly called rabbit fever and deer fly fever. Habitats for *F. tularensis* include contaminated water, soil and vegetation. Natural reservoirs include a variety of small animals such as rabbits, moles, squirrels, and mice. They acquire infection through tick, fly, and mosquito bites and through contaminated environments. The bacterium can survive for weeks at low temperatures in water, soil, and decaying animal carcasses, as *F. tularensis* is resistant to freezing.

Humans may become infected through bites from infective arthropods, handling infectious animal tissues or fluids, direct contact or ingestion of contaminated food, water, or soil, and inhalation of aerosol droplets. *F. tularensis* can infect humans through the skin, mucous membranes, lungs, and gastrointestinal tract. The lymph nodes, lungs, pleura, spleen, liver, and kidney are the major target organs of the organism. Tularemia is not transmitted from person to person. Recovery is often followed by permanent immunity.

Tularemia naturally occurs throughout much of Europe, Asia, and North America. Every state in the US, except for Hawaii, has reported cases of tularemia. However, cases of tularemia are mostly concentrated in the south central and western states, especially Missouri, Arkansas, South Dakota, and Montana. Tularemia is mostly a rural disease with cases of urban and suburban exposures rarely occurring. Most often cases occur between June and September when arthropod transmission is most common. There have been fewer than 200 cases per year and a case fatality rate of less than 2% for the past 15 years. Both sexes and all ages are equally susceptible to tularemia, but certain activities such as hunting and farming are more likely to expose adult men.

There are two subspecies of *F. tularensis*, biovar tularensis or type A, and biovar palaearctica or type B. Type A is very virulent in animals and humans. It is most commonly seen in North America. Type B causes a more mild illness and rarely causes death. Type B is widely thought to be the cause of most cases in Europe and Asia.

In addition to its natural occurrence, there is fear that tularemia could be used as a biological weapon. An aerosol release of *F. tularensis* would have the greatest consequences. Three factors make tularemia a serious threat as a biological weapon. First, tularemia could be easily disseminated. Second, tularemia is extremely infective. Finally, tularemia could cause substantial amounts of morbidity and mortality among populations.

History

Tularemia was first recognized as severe and potentially fatal to humans in Japan in the 1800's. In the early 1900's, an outbreak in San Francisco led to the bacterium being isolated. It was named "tularensis" after Tulare County, California where the work was performed. Later, it was named *Francisella tularensis,* after Dr. Edward Francis, who dedicated much of his life to researching the organism.

F. tularensis has been considered a potential biological weapon for much of the past century. Between 1932 and 1945, Japanese research units studied *F. tularensis* for use as a weapon. There have also been reports that tularemia outbreaks affecting thousands of Soviet and German troops in World War II may have been caused by intentional use of the agent. The Soviet Union had also done research, producing weapons with *F. tularensis* some of which were resistant to antibiotics and vaccines, which reportedly continued into the early 1990's. The United States began weaponizing *F. tularensis* in the 1950's and by the late 1960's had stockpiles of weaponized bacteria. In 1970, by executive order to terminate the offensive program, the production of *F. tularensis* as a biological weapon was halted. By 1973, the US arsenal had been completely destroyed.

Clinical Features

There are several distinct forms of tularemia. These clinical forms vary in severity and presentation according to virulence of the infecting organism, dose, and by the site of inoculation. The forms of tularemia reflect the organism's portal of entry and begins with a sudden onset of a flu-like illness. No form of tularemia is transmitted from person to person. After inoculation the bacilli multiply, spread to lymph nodes, multiply further, and then disseminate to other organs of the body through blood circulation. If left untreated the symptoms will persist for several weeks and possibly months, progressing into a more severe illness. The incubation period for tularemia is 3 to 6 days on average, but can range from 1 to 21 days.

All forms of tularemia can share the following signs and symptoms:

- Abrupt onset of fever, headache, chills, and tremors caused by a chill
- Generalized body aches (often in the lower back)
- Profuse discharge from the nose
- Sore throat
- Dry or slightly productive cough with chest pain
- Nausea, vomiting, and diarrhea
- Sweats, progressive weakness, malaise, anorexia and weight loss occur with continuing illness
- If left untreated, the infection will eventually spread through the blood and result in sepsis, secondary pneumonia, and possibly meningitis

Ulceroglandular Tularemia

Ulceroglandular tularemia results through various means of inoculation. Inoculation can occur from contact with contaminated tissues or fluids, bites from infected arthropods, or less commonly by naturally aerosolized *F. tularensis* that enters broken skin. In ulceroglandular tularemia, an ulcer develops and lymph nodes in the area swell and are painful at the site of inoculation. Most cases that occur from contaminated tissues or fluids are associated with handling infective carcasses and usually the lesion develops on the fingers or hand. Ulceroglandular is most common form of tularemia.

Characteristic signs and symptoms of ulceroglandular tularemia include:

- Cutaneous papule at inoculation site that becomes pustular and ulcerates within a few days
    - The ulcer is tender
    - The ulcer is generally slow to develop or heal
    - The ulcer may be covered by an eschar
- One or more lymph nodes become enlarged within several days of the development of the papule

Glandular Tularemia

Glandular tularemia is characterized by a tender lymphadenopathy. However, there is no appearance of an ulcer. This form of tularemia is generally mild and less common, often making it harder to correctly diagnose. Naturally aerosolized *F. tularensis* may enter through broken skin and cause infection, but more commonly it occurs from contact with contaminated tissues or fluids, and bites from infected arthropods.

Characteristic signs and symptoms of glandular tularemia include:

- No development of an ulcer
- One or more lymph nodes become swollen and painful

Oculoglandular Tularemia

The oculoglandular form of tularemia occurs from direct contamination of the eye. This may occur through contact with the eye or by aerosolized *F. tularensis* infecting the eye. This form of tularemia is very uncommon. The oculoglandular form results in conjunctivitis and lymphadenopathy in the area.

Characteristic signs and symptoms for oculoglandular tularemia are as follows:

- Ulcer develops on the conjunctiva of the eye
- The infected eye becomes red and very painful
- Swelling of the conjunctival tissue around the cornea
- Inflammation of blood or lymph vessels
- Lymph nodes around the ears, jaw, or neck may swell and become painful

Oropharyngeal Tularemia

Also referred to as gastrointestinal tularemia, the oropharyngeal form of tularemia affects the mouth and pharynx. It is acquired by ingesting contaminated food or water and sometimes by inhaling contaminated aerosols. Good hygiene after skinning and cleaning an animal obtained through hunting is helpful in preventing this form of infection.

Characteristics signs and symptoms of oropharyngeal tularemia include:
- Pharyngitis or tonsillitis with discharge
- Inflammation of the mucous tissue lining the mouth
- Ulcerations sometime develop in the mouth, throat, or intestine
- Abdominal pain may occur
- Intestinal bleeding may occur
- Lymph nodes around the neck swell and become painful.

Pneumonic Tularemia

Pneumonic tularemia is also known as pulmonary, pleuropulmonary and pleuropneumonic tularemia. The pneumonic form of tularemia can develop through two ways. First, it can develop from inhaling contaminated aerosols. Second, by spreading through the bloodstream or by circulation from a distal site, it can develop through progression of an already existing tularemia infection. Inhalational exposures commonly produce systemic illness but without prominent signs of respiratory disease. Symptoms of acute illness develop within 3-5 days after aerosol exposure. However, only 25-50% of cases show radiological evidence of pneumonia in the early stages.

Characteristic signs and symptoms of a pneumonic tularemia include:
- One or more of the following:
    - Pharyngitis
    - Inflammation of the bronchioles
    - Pleuropneumonia
    - Swelling of the lymph nodes in the lung
- May not be very prominent signs of respiratory disease
- Various manifestations of systemic illness
- Minimal or absent signs of abnormal pulmonary accumulation
- Minimal or absent signs of scattered healing tissue lesions of the lung or pleura
- May rapidly progress to severe pneumonia, respiratory failure, and death
- Lung abscesses occur infrequently

Typhoidal Tularemia

Typhoidal tularemia is also commonly referred to as septicemic tularemia and systemic tularemia. Typhoidal tularemia occurs mainly after inhalation of infectious aerosols. It is characterized by systemic illness that lacks signs indicating either the site of inoculation or swollen lymph nodes, which makes it difficult to diagnose. It can be differentiated

from pneumonic tularemia by the lack of pleuropneumonia. Of all naturally occurring tularemia cases 15% to 25% are typhoidal.

Characteristic signs and symptoms of typhoidal tularemia include:
- Low blood pressure
- Shock may develop
- No development of lesions
- No development of swollen lymph nodes
- Prominent gastrointestinal symptoms, including pain and diarrhea, may occur

Intentional Dissemination of Tularemia

The pneumonic and typhoidal forms of tularemia are thought to be the most likely results of an aerosolized bioterrorism attack of *F. tularensis*. There are various methods in which *F. tularensis* could be used as a biological weapon. It is likely that a biological attack with the intentional dissemination of *F. tularensis* would be through an aerosolized mode, which would cause the most devastating effects. If an aerosol release occurred in a densely populated area, the expected result would be a large number of abrupt onset cases of nonspecific febrile illness within 3-5 days. It is estimated that a large proportion of the cases would develop pleuropneumonia within days to weeks.

Several epidemiological clues would likely make health officials aware that the cases were due to intentional use of *F. tularensis*. The first clue would be the abrupt onset of large numbers of acutely ill persons. Distinguishing the outbreak from a natural outbreak of a contagious community infection, such as influenza, would likely be the difficult part. Second, rapid progression in a high proportion of the cases from bronchitis and upper respiratory infections to life threatening pleuropnuemonia and systemic illness in previously healthy persons should cause alert. Such an event should cause public health authorities to question bioterrorism as a possible cause. Finally, a single peak of cases without secondary transmission combined with the abrupt onset would provide another epidemiological clue. If an outbreak of tularemia occurs specifically in an urban area, a high level of suspicion should be aroused because all outbreaks of inhalational tularemia have occurred in rural areas.

Precautions and Decontamination

Since there is no person to person transmission of tularemia, isolation is not recommended. Standard precautions are recommended for treatment of patients with tularemia. Linens and clothing that are contaminated with fluids of patients with tularemia should be disinfected using standard precaution protocols. Bodies of patients who die of tularemia should also be handled using standard precaution protocols.

Persons who have had direct exposures to powder or aerosols containing *F. tularensis* and those alleged as such, should wash their clothing and body with soap and water. *F. tularensis* is susceptible to heat and disinfectants. For environmental risks, such as contamination of inanimate surfaces with *F. tularensis*, decontamination should be performed with a 10% bleach solution. Waterborne infection should be prevented by the standard levels of chlorine in municipal water sources.

Treatment

For adults, children, and pregnant women the recommended therapies in a contained casualty setting for tularemia are gentamicin and streptomycin, in a mass casualty setting doxycycline and ciprofloxacin are recommended by the Working Group on Civilian Biodefense.

For pneumonic, pleuropulmonary, and typhoidal tularemia, the antibiotic treatment recommended by the CDC and DHHS for the National Pharmaceutical Stockpile is gentamicin, doxycycline, or ciprofloxacin for adults, children, pregnant women and the immunocompromised. ***See Appendix A for the Antibiotic Treatment Dosing Guideline recommendations for the National Pharmaceutical Stockpile.***

Vaccine

Beginning in the 1930s, a live attenuated vaccine was used by the Soviet Union to immunize tens of millions of persons living in areas where tularemia infection was common. In the United States, a live attenuated vaccine has been used to protect laboratorians who routinely work with the organism. It does not provide complete protection from aerosol exposures of *F. tularensis*. The vaccine is currently under review by the Food and Drug Administration and its future availability is unknown.

Post Exposure Prophylaxis

The tularemia vaccine is ineffective as a post exposure prophylaxis for two reasons. First, the vaccine does not provide complete protection against inhalational forms of tularemia. Second, the protected immunity from the vaccine takes approximately two weeks to develop, whereas the incubation period for tularemia averages only 3 to 6 days.

However, antibiotic post exposure prophylaxis is recommended for use in appropriate circumstances. For adults, children, pregnant women, and immunocompromised persons the recommended prophylaxis for tularemia is doxycycline and ciprofloxacin by both the a CDC and DHHS, and the Working Group for Civilian Biodefense. If persons who were exposed to *F. tularensis* are identified during the incubation period, they should be placed on post-exposure prophylaxis. In a covert event situation where tularemia is identified

only after persons start to become ill, those persons who may have been exposed but have not developed illness should watch for a fever. Persons who develop an unexplained fever or flu-like illness within 14 days of the possible exposure should start antibiotic therapy. Close contacts of tularemia patients are not recommended to receive post exposure prophylaxis since there is no person to person transmission.

See Appendix B for the Antibiotic Post Exposure Prophylaxis Dosing Guideline recommendations.

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Section 10: Viral Hemorrhagic Fevers

Table of Contents **Page**

Overview

Causative Agents: arenaviruses, filoviruses, bunyaviruses, & flaviviruses

Disease Forms:

- **Arenaviruses –** The rodent transmitted diseases include lymphocytic choriomeningitis, Venezuelan, Brazilian, Argentine, Bolivian hemorrhagic fevers, and Lassa fever. Infections result from inhalation of contaminated aerosols of infective rodent excretions. Person to person transmission is associated from direct contact with infective fluids and contaminated materials.
- **Filoviruses –** Exact reservoirs and route of transmission for the two filoviruses, Ebola and Marburg, are unknown. Person to person transmission can occur through close contact with bodily fluids or contaminated materials.
- **Bunyaviruses –** Rift Valley Fever and Hemorrhagic Fever with Renal Syndrome are not transmitted from person to person. Crimean-Cong hemorrhagic fever can be transmitted from person to person through direct contact with infective fluids. Ticks, mosquitoes, flies or rodents act as reservoirs and pass infection through bites, infective fluid and tissue contact, and for Hemorrhagic Fever with Renal Syndrome inhaling infective aerosols.
- **Flaviviruses -** Omsk hemorrhagic fevers, Kyasanur Forest disease, dengue fever, and yellow fever are transmitted to humans through bites from arthropods, mostly mosquitoes and ticks. There is no direct person to person transmission.

Signature Signs and Symptoms: Each viral hemorrhagic fever has its own set of specific characteristics, though the majority shares common features of initial flu-like illness that progresses into both internal and external bleeding, and multiple system involvement, with shock and severe hemorrhage often resulting as well.

Precautions and Decontamination: Standard precautions should be used for disinfecting and cleaning contaminated environmental surfaces. Respiratory precautions should be used for VHF patients.

Treatment: Supportive therapy is the recommended treatment. An antiviral treatment ribavirin may be used as therapy for some arenaviruses and bunyaviruses; it is not effective against filoviruses and flaviviruses.

Post-Exposure Prophylaxis: Ribavirin may be used as a post exposure prophylaxis for Crimean-Congo hemorrhagic fever and Lassa fever.

Vaccine: Vaccines for Rift Valley fever and Argentine hemorrhagic fever have been developed. A vaccine for yellow fever is widely available, highly effective, and licensed.

Introduction

Arenaviruses, filoviruses, bunyaviruses, and flaviviruses are four viral families that cause hemorrhagic fevers. The viral hemorrhagic fevers (VHF) have an RNA genome and depend on an animal or insect host for replication and transmission. They naturally occur where their host lives, which are usually geographically restricted areas. They also all have animal reservoirs. There is no curative treatment for any of the viruses. Finally, they all cause sporadic and irregular occurrence of outbreaks. Humans naturally become infected when they come into specific types of contact with infected hosts or vectors that transmit the virus. Human cases of VHF are difficult to predict because they are sporadic and irregular due to incidental exposure.

The most likely use of hemorrhagic fever viruses in a bioterrorism attack would occur through aerosol dissemination. Most VHFs have shown aerosolized infectivity in laboratory settings, showing that they hold potential to be developed as aerosolized biological weapons. Once in an aerosol form the viruses could be disseminated for persons to inhale, which would then initiate infection. There are several major challenges in aerosolization of VHF viruses. First, for an agent to be effectively aerosolized, it must be small enough to be able to deposit deep into the lung. Second, weather and wind conditions would have to be optimal for wide-scale dissemination. Finally, the greatest challenge is stability through storage and the uncertainty of effectiveness in aerosol form.

Because of the potential severe impact they could cause, hemorrhagic fever viruses are a serious bioterrorism threat. First, hemorrhagic fever viruses have the ability to cause high morbidity and mortality rates. Second, there is potential for person to person transmission with many of the diseases. Third, most viruses have a low infective dose and are highly infectious by aerosol dissemination, which could cause large outbreaks. Fourth, Effective vaccines are not developed or available in large supplies. Fifth, the diseases could easily provoke an onslaught of panic. Sixth, some of the VHF pathogens are easily available. Seventh, large scale production of many of the diseases is feasible. Eighth, the viruses have a high level of environmental stability. Finally, many of the diseases have previously been researched and developed as biological weapons. An outbreak of VHF would likely result in disruption of vital services and possible occurrence of secondary cases. Also, there could be a negative impact on exposed domestic and wild animals.

Because VHFs that are classified as potential biological weapons do not naturally occur within the United States, it is important to have a complete case history when a case is suspected. The usual patient history for VHF patients includes foreign travel to an endemic or epidemic area, rural environments, nosocomial exposure, and contact with arthropod or rodent reservoirs, domestic animal, or blood exposure. If a patient with VHF does not have a typical patient history, it may serve as an epidemiological indicator of a bioterrorism attack.

Clinical Features

The overall incubation period for hemorrhagic fever viruses is 2 to 21 days. There is no documentation of transmission of disease during the incubation period. Patients usually exhibit nonspecific prodrome, which usually lasts less than a week. The primary prodrome features associated with VHF are often flu-like illnesses consisting of fever, muscle aches, malaise, joint and muscle pain, headache, nausea, abdominal pain and weakness initially but then progress into prominent symptoms of fever, hypotension, relative slow heart rate, increased respiration rate, conjunctivitis, pharyngitis, and rash. Then there may be progression to both internal and external bleeding and multiple system involvement. Often VHF results in severe life threatening conditions, including shock and severe hemorrhage. A convalescent period may be prolonged and complicated by weakness, fatigue, anorexia, malnutrition, balding, and joint pain. Sequelae may be present with hearing or vision loss, impaired motor coordination, inflammation of the testes, uvea, spinal cord, bone marrow, lining of the heart, and pancreas. While the majority of VHF cases have these common features, each hemorrhagic fever has its own set of specific characteristics. Case fatality rate ranges from .5% (Omsk hemorrhagic fever) to 90% (ebola). Death is usually preceded by hemorrhagic diathesis, shock, and multi-organ system failure 1 – 2 weeks following onset of signs and symptoms.

Arenaviruses

Arenaviruses are naturally found in animals, and are most commonly associated with rodent transmitted diseases in humans. The arenaviruses include the lymphocytic choriomeningitis, Guanarito, Sabia, Junin, Machupo, and Lassa viruses. In some areas of the world, arenavirus infections are relatively common in humans. Infections result from inhalation of aerosols of rodent excreta, ingestion of contaminated foods with rodent excreta, or by direct contact of rodent excreta with open skin and mucous membranes. Person to person transmission is associated from direct contact with infective fluids and contaminated materials, such as medical equipment.

Arenavirus	Disease
Lymphocytic choriomeningitis virus	Lymphocytic choriomeningitis
Guanarito virus	Venezuelan hemorrhagic fever
Sabia virus	Brazilian hemorrhagic fever
Junin virus	Argentine hemorrhagic fever
Machupo virus	Bolivian hemorrhagic fever
Lassa virus	Lassa fever

Lymphocytic Choriomeningitis. The lymphocytic choriomeningitis virus was first isolated in 1933. The disease causes meningitis, encephalitis, or both. It has been reported in Europe, the Americas, Australia, and Japan. The reservoir for the virus is the house mouse, which contains virus in blood and urine. Humans become infected by inhaling infectious aerosolized particles of excretions, by ingesting contaminated food, by mucus membrane contamination, or direct exposure to open wounds of the infective mouse. Person to person transmission has not been reported. The disease is usually not fatal, with mortality less than 1%. There are no specific treatments, but ribavirin may prove successful with more study. The incubation period is usually between 8 and 13 days.

The signs and symptoms of lymphocytic choriomeningitis include:

- Prodrome, lasting up to a week:
  - Fever
  - Malaise
  - Anorexia
  - Muscle aches
  - Headaches
  - Nausea and vomiting
  - Sore throat and cough may occur
  - Joint, chest, testicular, and salivary gland pain may occur
- Following a few days of remission, the second phase consists of:
  - Meningitis (fever, headache, and stiff neck)
  - Encephalitis (drowsiness, confusion, sensory disturbances, and/or motor abnormalities, such as paralysis)
  - Inflammation of the spinal cord may occur, but rarely

Venezuelan Hemorrhagic Fever. In 1989, an outbreak of a severe illness among rural dwellers occurred in Venezuela. The Guanarito virus was eventually identified the cause of the disease that is now known as Venezuelan hemorrhagic fever. Cases occur more frequently during the dry season of the region when agricultural activities are common. The cotton rat and the cane rat are reservoirs of guanarito virus. These rodents shed the virus in their urine and saliva. Transmission of Guanarito virus to people by inhaling infectious aerosolized particles of excretions of infected rodents. The sporadic occurrence cases suggest that the humans are infrequently infected and that transmission must occur under very specific circumstances. To date, there are no confirmed reports of secondary cases among close contacts, such as medical care takers of patients. The duration of the illness in nonfatal cases ranges from about 10-14 days.

Signs and symptoms of Venezuelan hemorrhagic fever include:

- Fever that may be unremitting
- Headache
- Muscle aches
- Sore throat
- Weakness
- Anorexia

- Nausea and vomiting
- Dehydration
- Convulsions may occur
- Hemorrhagic phenomena (nosebleeds, bleeding gums, vomiting blood, bleeding bowel and excessive menstrual bleeding)

Brazilian hemorrhagic fever. Caused by the Sabia virus, Brazilian hemorrhagic fever was first recognized in the 1990's. Direct contact with rodents, specifically with their excretions should be avoided. Person-to-person transmission can occur through direct contact with an infected patient's blood, urine, or pharyngeal secretions. The Sabia virus is considered a high laboratory hazard. Ribavirin has been used for treatment. The mortality rate ranges from 15 to 30%. The disease has 7 to 16 day incubation period and then develops with a gradual onset.

The signs and symptoms of Brazilian hemorrhagic fever include:
- Malaise
- Headache
- Pain behind the eyes
- Conjunctival infection
- Fever and sweats – sustained
- Weakness
- Skin blotching and bruising
- Deep depressed tendon reflexes
- Hemorrhagic phenomena (nosebleed, vomiting blood, bleeding into the bowel, blood in the urine, bleeding of the soft palate, and gingival hemorrhage)

Argentine Hemorrhagic Fever. The Junin virus was the first arenavirus to be discovered in 1956. It causes Argentine hemorrhagic fever, which is naturally limited to some agricultural areas in Argentina. The corn mouse acts as a reservoir and carries the Junin virus. Humans become infected by inhaling tiny aerosolized particles of infective rodent excretions. Distribution of Argentine hemorrhagic fever is seasonal, with the highest occurrence when autumn crops are harvested and corn mouse populations are high. In 1992, incidence of Argentine hemorrhagic fever declined due to the introduction of an investigational vaccine to prevent the illness. Studies have shown that ribavirin may be effective for treatment of Argentine hemorrhagic fever. The virus has been noted as a dangerous laboratory pathogen to work with.

The signs and symptoms of Argentine hemorrhagic fever include:
- Fever
- Malaise
- Headache
- Pain behind the eyes
- Sweats
- Encephalopathy

- Tremors
- Deep depressed tendon reflexes
- Hypotension
- Slow heart rate and shock
- Hemorrhagic phenomena (nosebleeds, passing blood, rash from bleeding in the skin, and bleeding from the gums)

Bioterrorism concern:
The Junin virus has qualities that allow it to be altered into an aerosolized biological weapon. In an aerosolized state, the Junin virus is stable and infectious.

Bolivian Hemorrhagic Fever. By 1962, Bolivian hemorrhagic fever was recognized as a new infectious disease after it had been seen in remote areas of Bolivia for several years. In 1963, the Machupo virus was isolated from a patient and identified as the cause. The vesper mouse, which is native to northern Bolivia, is the reservoir for the Machupo virus. The virus is shed by the rodent through excretions. Humans can become infected by eating food contaminated with infected excretions, direct contact with infected excretions, or inhaling tiny aerosolized particles of infective rodent excretions. Person to person transmission of Bolivian hemorrhagic fever is unusual, but can occur. Diagnosing Bolivian hemorrhagic fever is extremely difficult due similarity of other disease onsets, such as malaria. There is no vaccine, although the Argentine hemorrhagic fever vaccine has shown effectiveness against Bolivian hemorrhagic fever in studies. Treatment with ribavirin in trials has been promising. The Machupo virus can have a 25-30% mortality rate. The incubation period is 7 to 14 days on average.

The signs of symptoms of Bolivian hemorrhagic fever include:
- Fever
- Headache
- Fatigue
- Muscle pain and joint pain
- Hemorrhagic phenomena (vomiting blood, passing blood, nosebleeds, and bleeding from the gums) within 7 days of onset

Bioterrorism Concern:
The Machupo virus has qualities that allow it to be altered into an aerosolized biological weapon. It could be obtained from rodent reservoirs in its endemic areas. It is stable and infectious in aerosol form, but also has a significant drawback. Due to its composition, if the Machupo virus was to be used as a biological weapon it would have to be prepared just prior to its use, as it would not withstand storage unless new developments or techniques were created.

Lassa Fever. This virus was identified in 1969 from an outbreak in Africa and was named after the town where it had first originated. It naturally occurs in Africa, where it is a major contributor to morbidity and mortality among the population. Certain types of rats carry the lassa virus and shed it in their excretions. Humans become infected through direct contact, contaminated materials, or by inhaling tiny aerosolized particles of infective excretions. Person to person transmission can occur through contaminated materials, such as reusing needles, or by contact with an infective patient's tissues, fluids, or expelled aerosols. The majority of those who are infected with the lassa virus have mild or no indicators of the disease, whereas the minority shows severe signs and symptoms. Ribavirin has been successfully used in the past to treat patients and may be provided as a post exposure prophylaxis. Signs and symptoms that may develop are highly varied from one person to another, making clinical diagnosis very difficult. Sequela includes baldness, crosswise ridges in fingernails, inflammation of the membrane surrounding the heart, and deafness. The incubation period for Lassa fever is 1-3 weeks.

The signs and symptoms of Lassa fever include:
- Gradual onset of fever
- Severe sore throat and cough
- Abdominal pain, back pain, and pain behind the chest wall
- Nausea and vomiting
- Diarrhea
- Exudative pharyngitis
- Conjunctivitis
- Facial swelling
- Hemorrhagic phenomena (mucosal bleeding)
- Hearing loss
- Tremors
- Encephalopathy
- Pleural and pericardial effusions

Bioterrorism concern:
Lassa virus has qualities that allow it to be altered into an aerosolized biological weapon. The Lassa virus is stable and infectious in an aerosolized state. It is a potential biological agent because of lethality, high infectivity by the aerosol route, and possibility for replication.

Bunyaviruses

There are several hundred bunyaviruses, but only the nairovirus, phlebovirus, and Hantaan viruses cause viral hemorrhagic fevers. The natural reservoirs for the bunyaviruses are animals, with most being ticks, mosquitoes, flies or rodents. The occurrence of each disease is determined by the distributions of the vector and reservoirs. Crimean-Congo Hemorrhagic fever (CCHF) may be transmitted from person to person through contact with infective fluids or tissues, but Rift Valley fever (RVF) and hemorrhagic fever with renal syndrome (HFRS) are not transmitted from person to person.

Bunyavirus	Disease
Nairovirus	Crimean-Congo hemorrhagic fever (CCHF)
Phlebovirus	Rift Valley fever(RVF)
Hantavirus	Hemorrhagic fever with renal syndrome (HFRS)

Crimean-Congo Hemorrhagic Fever (CCHF). The Nairovirus causes CCHF in humans. It was first described in 1944 in Crimea, and then in 1956 the same illness was described in the Congo. Finally, in 1969 it was recognized that the same pathogen was causing both of the described illnesses, giving it the name of CCHF. It is naturally seen in Europe, Asia, and Africa. Humans become infected when ticks transmit the virus through bites. The genus *Ixodes* tick carries the virus and passes it through biting humans and animals, such as goats, sheep, and cattle or contact with tissues and fluids of or infected livestock or other humans. Most cases occur among those involved in the livestock industry. The disease occurs sporadically, but has a mortality rate as high as 50%. Person to person transmission through contact with infective blood or secretions ca occur. Ribavirin may be used for treatment. Those who die from the disease usually do so during the second week of illness. The incubation period for the disease is largely dependent on the mode of transmission.

The initial signs and symptoms of CCHF include:
- Sudden onset of fever
- Muscle pain
- Dizziness
- Neck pain and Stiffness
- Sore eyes and sensitivity to light
- Headache
- Nausea, vomiting and abdominal pain, and sore throat may occur early on
- After 2-4 days of illness the following signs and symptoms develop:
    - Sharp mood swings (confusion and aggressiveness to sleepiness and depression)
    - Liver enlargement
    - Lymph node enlargement
    - Fast heart rate
    - Hemorrhagic phenomena (nosebleeds, passing blood, rash from bleeding in the skin, and bleeding from the gums)

Bioterrorism concern:
Technical difficulties, such as large scale production, would have to be overcome for CCHF to be used as a bioterrorism agent. In addition, CCHF is not as easily replicated to high concentrations in cell cultures like some other hemorrhagic fever viruses. These factors make CCHF a less desirable illness to be used as a bioterrorism weapon in comparison to other hemorrhagic fever viruses.

Rift Valley Feve r (RVF). Caused by the phlebovirus, RVF was first described in Africa in the early 1900's occurring among livestock. Commonly found in Africa, RVF occurs among cattle, buffalo, sheep, goats, camels, and humans. The genus *Aedes* mosquitoes are naturally infected with the phlebovirus and spread the virus to animals and humans through bites. Other species of mosquitoes can acquire the virus by feeding on already infected livestock. Humans become infected from the bite of an infected mosquito, direct contact with infected animal tissues, or aerosolization of virus from infected animal carcasses. There is no direct person to person transmission of the disease. RVF is considered a laboratory hazard, as it has resulted in aerosol transmission in that setting. There is no standard treatment for RVF, but ribavirin has been successful in some cases. There is also an inactivated vaccine used only by laboratory workers that has been successful and another vaccine under study that may prove effective. Often, RVF cases are asymptomatic. The mortality rate for RVF is low, only about 1%, but can cause severe liver damage, spontaneous abortion, and permanent vision loss. The incubation period averages from 2 to 6 days. There have not been reported cases of person to person transmission. If used as a biological weapon, sheep, cattle, buffalo, and goats could also be infected. This could result in establishment of the disease in new environment for the disease.

When signs and symptoms of RVF occur, they usually include:

- Only mild development of illness:
    - Fever
    - Liver abnormalities (jaundice)
- Full development at the onset of illness:
    - Fever
    - Weakness
    - Pain behind the eyes
    - Headache
    - Back pain
    - Dizziness
    - Sensitivity to light
    - Extreme weight loss
- Progression to more serious developments of disease:
    - Shock
    - Hemorrhagic phenomena (vomiting blood, passing blood, rash from bleeding in the skin and bleeding from the gums)
    - Coma
    - Seizures
    - Encephalitis
    - Diseases affecting the eyes

Bioterrorism concern:
RVF contains qualities that allow it to be altered a highly infectious aerosolized biological weapon. The virus is accessible, very stable in liquid form and easily replicates. With the low fatality rate, about 1%, it would not prove to be an efficient cause of death, but would cause disease and require a public health response. An

important factor in RVF virus being used as a biological weapon is the potential to affect agriculture. It could have the ability to induce outbreaks among cattle and sheep through infected mosquitoes. Mosquitoes could transmit the disease and further its spread. Such an event would require emergency actions by the U.S. Department of Agriculture.

Hemorrhagic Fever with Renal Syndrome (HFRS). Caused by the hantavirus, the disease is primarily found in Asia and the Balkans among rural populations. HFRS occurs seasonally with the majority of cases in the late fall and early winter. Hantavirus pulmonary syndrome occurs in North America but is a respiratory illness. Rodents act as a reservoir for the Hantaan virus and shed it through excretions. Humans become infected when they come into direct contact with infected rodents or by inhaling tiny aerosolized particles of infective excretions. There is no person to person transmission of the disease. Ribavirin has been successful in the treatment of some cases. The incubation period for HFRS is usually 2 to 4 weeks.

The signs and symptoms of HFRS include:
- Fever
- Chills
- Weakness
- Dizziness
- Headaches
- Muscle pain
- Back pain (lumbar)
- Hemorrhagic phenomena (rash from bleeding in the skin) may develop
- Acute renal failure may develop

Bioterrorism concern:
Technical difficulties, such as large scale production, would have to be overcome for HFRS to be used as a bioterrorism agent. In addition, HFRS is not as easily replicated to high concentrations in cell cultures like some other hemorrhagic fever viruses. These factors make HFRS a less desirable illness to be used as a bioterrorism weapon in comparison to other hemorrhagic fever viruses.

Filoviruses

The filoviruses are extremely virulent and cause severe diseases in both humans and primates. Both ebola and Marburg illness can lead to hemorrhagic susceptibility by direct damage of cells involved in hemostasis. To date, there have only been two viruses within the family identified, Ebola and Marburg. Most cases occur in Africa. The filoviruses are zoonotic, but the exact reservoirs are unknown. Humans become incidentally infected by acquiring the disease by the bite of an infected arthropod, inhalation of aerosols of rodent excreta, or by direct contact with infected animal carcasses. Evidence has suggested that exposures via the skin to very low amounts of virus can result in infection. Person to person transmission can occur through close contact with bodily fluids or contaminated

materials, such as reusing needles. Airborne transmission from person to person has not been proven of spreading infection, at most, it may be a minor mode of transmission.

Filovirus	Disease
Ebola virus	Ebola hemorrhagic fever
Marburg virus	Marburg hemorrhagic fever

Ebola Hemorrhagic Fever. Ebola gets its name from a river in the Republic of Congo in Africa, where the virus was first recognized. In 1976, two outbreaks of viral hemorrhagic fever occurred in Sudan and Zaire. It was determined that they were cause by two separate subtypes of a filovirus that was later named the Ebola virus. These highly lethal subtypes with 50-90% mortality rates were named after the locations where they were first seen, Sudan and Zaire. In 1989, a third Ebola virus subtype, named Reston, was identified from an outbreak in monkeys. The subtype causes severe illness in primates, but does not affect humans. The fourth subtype, Ivory Coast, was identified through an infected human in that region of Africa in 1994. Since 1976, mostly small and sporadic Ebola hemorrhagic fever outbreaks with about an 80% mortality rate have occurred. There is an animal reservoir but the exact species is unknown. Ebola is transmitted after the onset of fever through direct contact with blood, secretions, or tissues of infected patients or nonhuman primates. Transmissission increases with duration of the disease and the physical contact with infected persons during the late phase of clinical illness. There is no specific treatment for Ebola hemorrhagic fever. The incubation period can range from 2 to 21 days.

The signs and symptoms of Ebola hemorrhagic fever include:
- High fever
- Weakness and fatigue
- Headache
- Muscle pain
- Sore throat may occur
- Red and itchy eyes may occur
- Hemorrhagic phenomena (vomiting blood, passing blood, maculopapular rash from bleeding in the skin, and bleeding from the gums)
- Shock
- Limited kidney and liver functions within 1 week of infection
- Blindness may occur within 1 week of infection

Marburg Hemorrhagic Fever. In 1967, the first filovirus, Marburg, was recognized when an outbreak of viral hemorrhagic fever occurred among laboratory workers who had been exposed to African green monkeys. A total of 37 people fell ill from the outbreak. It was not until 1975 that Marburg hemorrhagic fever was seen again in South Africa. Since then, there have sporadic cases of Marburg hemorrhagic fever have been

identified. The reservoir and mode of transmission to humans is unknown. Once a person has Marburg hemorrhagic fever, it is theorized that it may be spread to other humans through inhaling tiny droplets of bodily fluids or direct contact with persons or contaminated equipment with tissues or fluids. Marburg hemorrhagic fever signs and symptoms are similar to other infectious diseases, especially malaria and typhoid fever, making it difficult to diagnose. The case fatality rate for Marburg hemorrhagic fever is about 25%. There are no known specific treatments. The incubation period is 5-10 days.

The signs and symptoms of Marburg hemorrhagic fever include:

- High fever
- Chills
- Headache
- Mylagia
- Nonpuritic maculopapular rash (face, neck, trunk, and arms)
- Nausea and vomiting
- Chest and abdominal pain
- Sore throat
- Diarrhea
- Increasingly severe symptoms may occur including:
    - Jaundice
    - Inflammation of the pancreas
    - Severe weight loss
    - Liver failure
    - Shock
    - Delirium
    - Massive hemorrhaging
    - Multi-organ dysfunction

Bioterrorism concern:
The Marburg virus has qualities that allow it to be altered into an aerosolized biological weapon. If the Marburg virus was used as a biological weapon, it would most likely be in its aerosolized form. The virus is stable enough to cause disease in an aerosolized state. The major drawback to Marburg virus being used as a biological weapon is that it is uncommon in nature and the natural reservoir is unknown, making it difficult to obtain. There are reports that Russia at one point had developed Marburg virus as a biological weapon.

Flaviviruses:

The flaviviruses that cause hemorrhagic fevers include the Omsk hemorrhagic fever virus, Kyasanur Forest disease virus, dengue viruses, and yellow fever viruses. The name flavivirus comes from the Latin word, flavus, meaning yellow, after historic yellow fever epidemics. The flaviviruses that cause hemorrhagic fevers are all transmitted to humans through arthropods, mostly mosquitoes and ticks. There is no direct person to person transmission of Omsk hemorrhagic fever, Kyasanur forest disease, yellow fever, or dengue fever. With the threat of flaviviruses being used as a biological weapon, there is a

risk for humans to be infected, as well as a theoretical risk of these diseases to be introduced into environments that have not harbored the diseases before.

Flavivirus	Disease
Omsk hemorrhagic fever virus	Omsk hemorrhagic fever
Kyasanur forest disease virus	Kyasanur forest disease
Yellow fever virus	Yellow fever
Dengue fever virus	Dengue fever

Kyasanur Forest Disease. Kyasanur Forest disease is endemic to parts of India, with the highest rates of the disease during the dry season in forests. Ticks serve as reservoirs to the virus. The virus is passed to humans through the bite of an infective tick. There is no direct person to person transmission of the disease. Laboratory infections are common with the virus. There is no treatment available; however an experimental vaccine has been used in endemic regions. Kyasanur Forest disease presents similarly to Omsk hemorrhagic fever. Kyasanur Forest disease causes degeneration of the larger visceral organs. Sequela including encephalitis and inflammation of the eye may result. The incubation period is usually 3 to 8 days.

The signs and symptoms of Kyasanur Forest disease include the following 2 phases:

- First phase, lasting 1 to 2 weeks:
    - Sudden onset of fever, chills, weakness, headache, back pain
    - Conjunctivitis, diarrhea, and vomiting by day 3 or 4
    - Swelling of lymph nodes in the neck
    - Papules and vesicles on the roof of the mouth
    - Infection of the eyes
    - Confusion
    - Encephalitis
- Second phase, lasting 9-21 days:
    - Central nervous abnormalities
    - Liver and spleen abnormalities
    - Hemorrhagic phenomena (bleeding from the gums, nose, uterus, GI tract, and pneumonia)
    - Shock and death may occur

Omsk Hemorrhagic Fever. This disease occurs seasonally in Siberia. Ticks serve as reservoirs for the Omsk hemorrhagic fever virus. Omsk hemorrhagic fever is very similar to Kyasanur Forest disease. Humans become infected with the disease through muskrats and bites from infected ticks. There is no direct person to person transmission of the disease. Laboratory infections are common with the virus. There is no treatment for Omsk hemorrhagic fever. The incubation period is 3 to 8 days on average.

The signs and symptoms of Omsk hemorrhagic fever include the following:

- First phase lasting 1 to 2 weeks:
    - Sudden onset of fever, chills, weakness, headache, back pain
    - Conjunctivitis, diarrhea, and vomiting by day 3 or 4
    - Swelling of lymph nodes in the neck
    - Papules and vesicles on the roof of the mouth
    - Infection of the eyes
- Second phase:
    - Central nervous abnormalities
    - Hemorrhagic phenomena (bleeding from the gums, nose, uterus, GI tract, and lungs)
    - Shock and death may occur

Yellow Fever. Yellow fever commonly occurs in South America and Africa. The disease has been present throughout much of history and has been cited as far back as 400 years ago. The yellow fever virus is transmitted to humans through infective mosquito bites. There is no direct person to person transmission. There is a live vaccine for yellow fever that confers immunity for years. This vaccine has been used for more than 60 years and is highly effective. Yellow fever is difficult to recognize, as it is often confused with malaria, typhoid, viral hepatitis and other diseases. The incubation period for yellow fever is 3 to 6 days.

The signs and symptoms of yellow fever include:

- Sudden onset:
    - Fever
    - Chills
    - Headache and backache
    - Conjunctival infections
    - Muscle pain
    - Weakness
    - Nausea and vomiting
    - Loss of appetite
- Some cases progress within 24 hours into the following:
    - Jaundice that intensifies with disease development
    - Liver and/or renal failure
    - Hemorrhagic phenomena (vomiting blood, nosebleeds, passing blood, rash from bleeding in the skin, and bleeding from the gums)

Bioterrorism concern:
Yellow fever can be a highly infective aerosolized agent and cause high case fatality rates. However, the effective vaccine for yellow fever greatly diminishes its appeal to be used as a biological weapon. The CDC has identified yellow fever as a category C biological agent. Category C means that the agent is in the third highest priority category of agents, or third highest priority agent because of the potential for mass dissemination, availability to terrorists, and ease of production.

Dengue Fever. Dengue fever has emerged through the urbanization of tropical areas, lack of mosquito control, migration due to globalization of travel, and water system factors. It was first recognized in the 1950's. Hundreds of thousands of cases of dengue fever occur annually. Cases of dengue fever can be found tropical areas of the Pacific, South America, Asia, and Central America. It is transmitted to humans through infective mosquito bites. Because signs and symptoms of dengue fever are nonspecific, it is difficult to identify it from other diseases. There is no direct person to person transmission of the disease. Dengue hemorrhagic fever occurs as a complication resulting from dengue fever. It first appeared in Asia and primarily occurs among children. If left untreated, the mortality from dengue hemorrhagic fever can be as high as 20%; however with intense supportive therapy the mortality rate can be reduced to less than 1%.

The signs and symptoms of dengue fever include:
- Fever
- Intense headache
- Pain behind the eyes
- Muscle and joint pain
- Rash

The signs and symptoms of dengue hemorrhagic fever, a complication of dengue fever, are as follows:
- High fever
- Febrile convulsions may occur
- Hemorrhagic phenomena (vomiting blood, passing blood, rash from bleeding in the skin, and bleeding from the gums)
- Liver enlargement
- Circulatory failure
- Shock and death may occur

Bioterrorism concern:
The dengue fever virus is less appealing compared to other hemorrhagic fever viruses to be used as an aerosolized biological weapon. It does not have a very high aerosol effectiveness to cause infection and it only causes a lesser, more mild form of disease. Also, dengue is not transmitted by small-particle aerosols.

Precautions and Decontamination

The risk for person to person transmission is highest during later stages of illness. Arenaviruses and filoviruses are highly infectious after direct contact with infected blood and body secretions, accounting for the majority of person to person spread. With any case or suspected VHF, specific barrier precautions are to be implemented immediately.

The following protective measures are recommended for VHF:

- Hand hygiene (washing hands prior to dressing with protective clothing and after patient contact)
- Double glove
- Impermeable gowns
- N-95 fitted masks or powered air purifying respirators
- Negative pressure isolation room with 6-12 air changes per hour
- Leg and shoe coverings
- Face shields
- Eye protection (goggles)
- Restricted access of nonessential personnel to patient's room
- Dedicated medical equipment (stethoscopes, glucose monitors, and point of care analyzers if possible)
- Environmental disinfection with EPA registered hospital disinfectant
- If multiple cases of VHF are being treated in a health care facility, all patients should be within the same area of the facility to minimize risk of nosocomial spread.

Persons with exposures to blood, body fluids, secretions, or excretions from a suspected VHF patient via the skin or mucous membranes should immediately and thoroughly wash the affected skin surfaces with soap and water. Universal precautions should be taken for the use of needles and other equipment. Association with the reuse of syringes and needles and lack of barrier precautions has been cited as a method of transmission. Needle sterilization and precautions should be strictly followed. Standard precautions should be used for disinfecting and cleaning contaminated environmental surfaces and materials with blood and other fluids. Contaminated linens and disposable equipment should autoclaved or incinerated.

Surveillance of contacts is a crucial factor in limiting the spread of disease and allowing immediate treatment if they too become ill. The following are three categories of contacts. Contacts are defined as those persons who had contact with the patient within three weeks of the patients' onset of illness. Those people considered potentially exposed in a bioterrorism attack and those identified as high risk and close contacts of diagnosed VHF patients should be immediately placed under medical surveillance.

- *Casual Contacts.* Persons who had remote contact with the infected person, such as being in the same building. There is no known risk to casual contacts.

- *Close Contacts.* Close contacts have had contact with the infected patient, such as household members, nursing care, or working with laboratory materials from the infected person. Close contacts should be identified and be placed under surveillance as soon as viral hemorrhagic fever is suspected. Close contacts should have their temperatures recorded twice daily for 2 days after last exposure. Any close contact that develops a temperature of 101° F or higher should be given ribavirin as presumptive treatment for VHF, unless an alternative diagnosis is established or the agent is a filovirus or flavivirus.

- *High risk contacts.* High risk contacts are those who have had mucous membrane contact or penetrating involvement with the patient's secretions, excretions, blood, tissues or other body fluids. High risk contacts should be under surveillance as soon as VHF is suspected and should have their temperatures recorded twice daily for three weeks following the exposure. Those that develop a fever of 101° F or higher should Any high risk contact who develops a temperature of 101° F or higher should be given ribavirin as presumptive treatment for VHF, unless an alternative diagnosis is established or the agent is a filovirus or flavivirus.

Treatment

Patients should be hospitalized quickly upon development of a viral hemorrhagic fever. For patients with VHF, supportive therapy is often the most that can be done. Fluid and electrolyte balance, circulatory volume, and blood pressure should be maintained as well. Secondary infections that develop should be immediately and aggressively treated. Fluid and electrolyte balance is an important part of care for VHF patients. Due to hemorrhage, aspirin or other anticoagulants, invasive techniques such as catheters, and intravenous lines should be avoided unless absolutely necessary for treatment of the patient. The development of the VHF may lead to support of several organ systems. Mechanical ventilation, renal dialysis, and therapy for seizures may be required upon viral hemorrhagic fever illness.

Ribavirin is an antiviral treatment that is effective for patients with some VHF. Although ribavirin is good for the treatment of arenaviruses and bunyaviruses, it is not effective against filoviruses and flaviviruses. Treatment with ribavirin is most effective if started within 7 days of onset of the infection. Although ribavirin is the most promising treatment for some of the VHF to date, currently it is not readily available and supply would be inadequate to respond to a large scale bioterrorism attack.

For the Working Group on Civilian Biodefense Recommendations for ribavirin therapy, see the JAMA Consensus Article *Hemorrhagic Fever Viruses as Biological Weapons* on Page 10-23.

Post Exposure Prophylaxis

There is no effective post-exposure prophylaxis because of the lack of effective vaccines and antiviral medications. When used as a post-exposure prophylaxis, ribavirin may delay onset of arenaviruses, but does not prevent them. CDC guidelines, recommend that ribavirin be given to high risk contacts of lassa fever patients. High risk contacts are those with mucous membrane contact (kissing or sexual activity) or exposure via skin injury

that involved contact with patient's secretions, excretions, or blood. There is an effective vaccine for yellow fever; however, it is not for use as a post exposure prophylactic because yellow fever has a short incubation period of only 3 to 6 days, whereas the neutralizing antibodies from the vaccine take longer than that to appear.

Vaccines

The lack of developed vaccines is one reason that VHF are a potentially devastating biological agent. There are only a few vaccines developed for VHF, and only one licensed vaccine. Argentine hemorrhagic fever vaccine is an investigational vaccine that is live and attenuated. It was developed at USAMRIID and has showed to be successful in prevention. Studies have shown that the vaccine may be effective against Bolivian hemorrhagic fever as well. There are two developed vaccines for Rift Valley fever, one of which is inactivated and used by laboratory workers. The vaccine for yellow fever is highly effective, and licensed. Yellow fever is not seen as a major bioterrorism threat because of vaccine.

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Section 11: Radiological Hazards

Table of Contents **Page**

Introduction

Radioactive materials benefit society in many ways, such as medical uses, industrial applications, and nuclear power applications. However, radioactive materials can also be used to cause injury and destruction through nuclear weapons. An example of a terrorist weapon is a dirty bomb. Dirty bombs are devices that contain radioactive material that are dispersed using conventional explosives. The detonation would be aimed at spreading radioactive contamination over a fairly large area. It is true that people could be seriously injured or killed by the explosion, however, people, even in close to the blast, would be unlikely to receive a dangerous dose of radiation. The main problem would be the cleanup of the radioactive contamination that would be dispersed by the explosion. State and Federal radiation authorities along with various allied health professionals would determine: 1) any possible exposures and potential health effects to the public and emergency workers during the emergency phase of the incident; 2) the extent and type of radioactive contamination; 3) help direct remediation efforts; and 4) assist law enforcement officials, as appropriate.

Radioactivity is the process of undergoing spontaneous transformation of the nucleus, generally with the emission of alpha or beta particles, often accompanied by gamma rays.

Types of Radiation

Alpha radiation. Alpha radiation is not able to penetrate skin. Alpha particles can be shielded by a sheet of paper or by human skin. However, if radionuclides that emit alpha particles are inhaled, ingested, or enter your body through a cut in your skin, they can be harmful. Alpha radiation is not able to penetrate turnout gear, clothing, or a cover on a probe. Turnout gear and dry clothing can keep alpha radiation off of the skin.

Beta radiation. Beta radiation may travel meters in air and is moderately penetrating. Just like alpha particles, beta particles can also cause serious damage to your health if they enter your body. Some beta particles can be stopped by human skin, but some need a thicker shield, like a sheet of aluminum foil, to stop them. Beta particles cannot be stopped by a sheet of paper. If radionuclides that emit beta particles are inhaled, ingested, or enter your body through a cut in your skin, they can be harmful. Clothing and turnout gear provide some protection against most beta radiation. Turnout gear and dry clothing can keep beta emitters off of the skin.

Gamma radiation. Gamma rays are the most penetrating of the three types of radiation listed here. Gamma rays usually accompany beta, and some alpha particles. Gamma rays penetrate most materials but can be blocked by lead shielding. Radioactive materials that emit gamma radiation constitute both an internal and external hazard. Clothing and turnout gear provide no shielding from penetrating radiation, but will prevent contamination of the skin by radioactive materials.

Exposure to Radiation

Exposure to radioactive materials from a terrorist attack can involve exposure from gamma rays or radioactive particles that can enter your body through ingestion, inhalation or a cut in your skin. You can also be exposed to radiation by having contaminated particles on your skin. Radiation exposure can be complicated by physical injury or illness. In such a case, serious medical problems always have priority over concerns about radiation, such as radiation monitoring, contamination control and decontamination.

External Irradiation

External irradiation occurs when radiation (gamma or x-ray) passes through the body from an external source. During exposure this radiation can be absorbed by the body or it can pass completely through. A similar thing occurs during an ordinary chest x-ray. Following external exposure, an individual is not radioactive and can be treated like any other patient. The severity of the injury depends on the amount of dose from the source.

Contamination

Contamination with radioactive materials occurs when a person is wholly or partially covered with radioactive materials. The contamination can be in the form of gases, liquids, or solids that were released into the environment. The person may be contaminated externally, internally or both. External contamination would result with radioactive materials on the outside of the body, such as on the skin. Internal contamination would result with radioactive materials inside the body such as through the skin, lungs, gut, or open wounds. Exposure to radiation does not necessarily mean contamination.

Absorption

Absorption is the uptake of radioactive materials by body cells, tissues, and target organs such as bone, liver, thyroid, or kidney. In general, radioactive materials are distributed throughout the body based upon their chemical properties and what it is attracted to. For example, iodine seeks out the thyroid and radium seeks out bone. Absorption can only occur if contamination has occurred.

Detecting and Measuring Radiation

Radiation cannot be detected by the human senses. Several instruments are available to detect and measure radiation. The Geiger-Mueller tube, or Geiger counter, is the most common instrument used in detecting and measuring radiation. Different measures of radiation include the following:

Gray (Gy). Gray is the amount of energy deposited in tissues or the unit of absorbed dose of ionizing radiation. The Gray and the Rad are units that describe similar measurements, and may be used interchangeably. However, they do not equal one another. To convert between these units, the following conversion factor must be used: one Rad = 0.01 gray.

Radiation absorbed dose (Rad). The rad measures the absorbed dose of radiation. This relates to the amount of energy actually absorbed in some material. It is used for any type of radiation and any material. It does not describe the biological effects of the different radiations. The Gray and the rad are units that describe similar measurements, and may be used interchangeably. However, they do not equal one another. To convert between these units, the following conversion factor must be used: one rad = 0.01 gray.

Roentgen equivalent man (Rem). The rem is a unit used to derive a quantity called equivalent dose. This relates the absorbed dose in human tissue to the effective biological damage of the radiation. Not all radiation has the same biological effect, even for the same amount of absorbed dose. Because some types of radiation cause more damage to biological tissue than other types, the rem is used to account for these differences. Rem is often expressed in terms of thousandths of a rem, or mrem.

Radiological Health

Some radiation naturally occurs in the environment. Humans are exposed to an average 0.002 Grays of radiation from natural, medical, and occupational sources per year for humans. However, too much radiation exposure can cause serious health problems. Any living tissue in the human body can be damaged by ionizing radiation, but some body parts are more sensitive to radiation than others. These include the breasts, thyroid gland, reproductive organs, and bone marrow. The body attempts to repair the damage, but sometimes the damage is too severe or mistakes are made in the natural repair process. Children and fetuses are more sensitive to radiation because they are growing more rapidly, and there are more cells dividing and a greater opportunity for radiation to disrupt the process. The amount of radiation received and the length of time involved are the two major factors that determine the amount of radiation injury. Generally, the higher the amount of radiation, the greater the severity of early effects and greater possibility of later effects, such as cancer. The radiation exposure effects on the body vary according to the circumstances in which they occur. Recovery from radiation injuries may take months or years. Chronic problems, such as chromosomal damage, may be irreversible and last a lifetime.

There are two broad categories of health effects: stochastic and non-stochastic. Stochastic effects are from long-term, low-level, chronic exposure to radiation. Increased levels of exposure make these health effects more likely to occur, but do not influence the type or severity of the effect. Radiation can cause changes in DNA, or mutations. Non-stochastic effects appear in cases of exposure to high levels of radiation, and become more severe as the exposure increases. Health effects from nonstochastic radiation usually appear quickly and include burns and radiation sickness. Radiation sickness is also called

radiation poisoning. It can cause premature aging or even death. The symptoms of radiation sickness include: nausea, weakness, hair loss, skin burns or diminished organ function.

Signs and Symptoms of Acute Whole Body Radiation Exposure	
Below 0.5 Gy	No injury
0.5 to 1.5 Gy	Mild nausea or vomiting For ~24 hours
1.5 to 4 Gy	Nausea Vomiting Diarrhea Fatigue Immunosuppression
At ~3 Gy	50% will die within 60 days without treatment
At 3 to 4 Gy	Hair loss occurs 3 to 4 weeks after exposure
4 to 6 Gy	Similar to previous category More severe Survival doubtful without treatment
6 to 15 Gy	GI epithelium destroyed Intensive treatment needed
At 11 Gy	50% will die by 60 days regardless of treatment
More than 15 Gy	Acute neurological problems Cardiovascular collapse Always fatal

Protection Guidelines

Time. The shorter the time in a radiation field, the less the radiation exposure. The longer there is an exposure to radiation, the greater the injury to the body. Work quickly and efficiently. A rotating team approach can be used to keep individual radiation exposures to a minimum.

Distance. The farther a person is from a source of radiation, the lower the radiation dose. Do not touch radioactive materials. Use shovels, brooms, etc., to move materials to avoid

physical contact. Exposure to radiation is always reduced by moving away from the source.

Shielding. A barrier between the person and the source of the radiation allows for protection. The denser the material the more radiation it blocks. Although not always practical in emergency situations, shielding offered by barriers can reduce radiation exposure. Because of its high density, lead is commonly used to shield against gamma rays.

Emergency Response, Decontamination, and Treatment

Upon suspicion or identification of a radiological incident contact the Indiana State Department of Health Indoor Radiological Health Division for assistance in responding to the incident. ***See Page 11-9 for more information.***

Emergency response recommendations for handling radiological incidents include:

- Avoiding contact with contaminants.
- Wear protective clothing (such as fire turnout gear, coveralls, gloves, and boots) that, if contaminated, can be removed.
- Use full respiratory protection if fire, smoke, fumes, gases, or windblown dusts are present.
- Wash any part of you that may have come in contact with contamination, as soon as possible after proper care of the victim and resolution of the emergency situation.
- Assume that all materials, equipment and personnel have been contaminated if they were in the immediate area of the incident. Radiological monitoring is recommended before leaving the scene.
- Do not eat, drink, smoke, rub eyes, or apply makeup within contaminated areas.
- If in doubt, assume contamination.

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Indiana State Department of Health

INDOOR &
RADIOLOGICAL HEALTH
DIVISION

2 North Meridian St., 5th Flr.
Indianapolis, IN 46204-3003

REPORTING OF RADIATION INCIDENTS

Incidents* involving radioactive materials or radiation producing devices shall be reported to the Indiana State Department of Health, Indoor and Radiological Health Division at one of the following numbers:

PRIMARY CONTACTS:	317/233-7153	EMERGENCY RESPONSE/ RADIOACTIVE MATERIAL PROGRAM COORDINATOR
	317/233-7564	RADIATION MACHINE PROGRAM COORDINATOR
	317/233-7146	DIVISION MANAGER
NORMAL OFFICE HOURS: 8:15AM - 4:45PM	317/233-7147/49	GENERAL OFFICE NUMBERS
	317/233-7154	TELEFAX
	317/233-8015/17	RADIOCHEMISTRY LABORATORY
	317/233-8115	AFTER HOURS EMERGENCY

* Incidents include, but are not limited to, theft or loss of radioactive material or devices; damaged or leaking radiation packages or devices; transportation accidents; fires or explosions that impact radiation sources; radiation monitor alarms at scrap, solid waste, and recycling facilities; overexposures; and misadministrations.

July 1999, rev. 1

Section 12: Chemical Agents

Table of Contents **Page**

Introduction

Chemical agents are classified into categories according to their effect on the body. Categories of chemical agents include neurotoxins (nerve agents), chemical asphyxiants (blood agents), pulmonary agents (choking agents), vesicants (blister agents), and antipersonnel agents (riot control agents). The agents are used to incapacitate and in some cases, to kill. There is considerable variability in properties of chemicals. Chemical agents can be weaponized by adding stabilizers to the agents to prevent degradation, adding thickeners to increase viscosity and persistency, and through developing effective means of dispersal. Temperature, volatility, vapor pressure, vapor density, wind speed, physical properties of the compound, are factors that impact the effect a chemical could have on people and would have to be taken into account for use in a terrorist attack. One should be aware that a chemical terrorist attack may occur with toxic gases and poisons that are common in industry, not just with military chemicals.

Neurotoxin Chemicals (Nerve Agents)

Nerve agents are one of the most common and toxic war chemicals because they cause severe incapacitation and death. Nerve agents work by binding with the enzyme, acetylcholinerase, which results in overstimulation of nerve pathways. Primarily, the parasympathetic nervous system is affected, but the central and somatic systems may be too. They are appealing weapons because they can enter the body through almost any route. In addition, often two less toxic chemicals can be safely transported and then mixed together at the delivery point to make a more toxic nerve chemical. People often use organophosphates for pest control, which are very similar to nerve agents. Nerve agents disable enzymes that are responsible for the transmission of nerve impulses. Most nerve agents display the same signs and symptoms and are clear, colorless, and odorless.. If nerve agents were used in a terrorism attack, the route of exposure would most likely be through inhalation or direct skin contact.

Sarin (GB), Soman (GD), Tabun (GA), Cyclosarin (GF), and VX

The nerve agents sarin (GB), soman (GD), tabun (GA), and cyclosarin (GF) act rapidly and may be absorbed through the skin or the respiratory tract. If disseminated through aerosol the onset of symptoms will begin within minutes. If inhaled, the onset symptoms will begin within 2 hours. Using a heat source with these chemicals can increase volatility. Both sarin and tabun can be easily synthesized making it a common choice of terrorist. Soman is not easy to formulate, but is very deadly. Sarin, soman, and tabun are volatile and evaporate quicker than water, which makes them dangerous inhalation hazards. Cyclosarin takes 20 times as long as water to evaporate. For VX, the primary route of exposure to the body is through skin absorption, although it can be developed into a respiratory agent. It is less volatile than sarin, soman, and tabun and evaporates only as fast as motor oil. The effects of sarin last longer than other nerve agents causing injury and death days later because of its viscosity. VX is more toxic and more persistent

than the other nerve agents and presents a greater skin hazard. It can cause long term contamination to an area. If VX is inhaled, the onset of symptoms will occur within minutes. If it is absorbed by the skin the symptoms may not appear until up to 18 hours later.

Signs and symptoms of Nerve Agents (GB, GD, GA, GF, VX)	
Cardiovascular System	Early transient rapid heart rate, hypotension, slowness of heart rate
Eyes	Constricted pupils, tearing, dim/blurred vision and pain, conjunctivitis, redness, miosis
Skin	Sweating
Nose	Rhinorrhea
Respiratory Tract	Excessive body secretion production, dyspnea and cough, respiratory depression
Gastrointestinal Tract	Cramps, salivation, diarrhea, vomiting, anorexia, involuntary defecation
Central Nervous System	Anxiety, restlessness, drowsiness, poor memory, slurred speech, difficulty concentrating, headache, coma, circulatory depression
Other	Salivation, weakness, muscle twitches, seizures

Chemical Asphyxiants (Blood Agents)

Asphyxiants, or blood agents, can be easily obtained, making them a significant terrorism threat. They are primarily absorbed into the body through inhalation. Blood agents interfere with absorption of oxygen into the bloodstream. Chemical asphyxiants are highly volatile and dissipate rapidly in air in a gaseous state. If a chemical asphyxiant were used in a terrorism attack, the route of exposure would most likely be through inhalation.

Hydrogen Sulfide

Hydrogen sulfide causes paralysis of the cell's aerobic metabolism. This in turn results in decreased cellular energy production, metabolic acidosis, cellular suffocation, and death. Exposure can occur through inhalation, ingestion or absorption. Hydrogen sulfide appears as a colorless gas, has a sweet taste, but smells like rotten eggs in larger concentrations.

Signs and symptoms for hydrogen sulfide poisoning	
Respiratory system	Shortness of breath, deep breathing, rapid breathing, decreased respiratory rate, respiratory depression, apnea
Cardiovascular system	Hypertension, slow heart rate, hypotension, abnormal increase in blood acidity

Cyanogen Chloride (CK)

Cyanogen chloride acts as a lung irritant. Exposure to CK can occur through ingestion, inhalation, or absorption and results in immediate symptoms. CK appears as a colorless liquid or gas and has pepper-like odor, similar to tear gases. It is more irritating to the skin and lungs than other cyanides.

Signs and symptoms of Cyanogen Chloride (CK)	
Respiratory tract	Coughing, choking, chest tightness, rales, dyspnea, pulmonary edema may develop rapidly
Gastrointestinal Tract	Retching, vomiting, involuntary defecation
Other	Cyanosis, irritation and tearing of the eyes, loss of appetite, dizziness, convulsions

Hydrogen Cyanide (AC)

Hydrogen cyanide causes illness by interfering with the use of oxygen at the cellular level in the body. Exposure to hydrogen cyanide through vapor or ingestion results in symptoms within seconds. Hydrogen cyanide has a bitter, burning taste. It appears colorless or pale-blue in liquid form, and has an almond-like odor.

Signs and symptoms of Hydrogen Cyanide (AC)	
Cardiovascular	Rapid pulse, profound hypotension
Skin	Initially pink, may develop into cyanosis
Respiratory Tract	Deep respiration to dyspnea, develops into gasping and then cessation of respiration
Gastrointestinal tract	Nausea, vomiting
Central nervous system	Initially excited, depression, giddiness, headache, irrational behavior, ataxia, convulsions, possible coma
Other	Weak and drowsy

Pulmonary Chemicals (Choking Agents)

Choking agents cause destruction to the respiratory system, which causes the lungs to fill with fluids from the blood stream. Upper respiratory injuries are usually a result of water soluble choking agents that dissolve quickly into moist airways. Lower respiratory tract injuries are usually caused by choking agents that are not water soluble, are high in concentration, and are inhaled over an extended period of time. In severe cases the victim literally chokes and drowns in his own fluids. For those victims that recover, they are often faced with lifelong respiratory diseases such as chronic pneumonia or chronic obstructed pulmonary disease. Choking agents are the oldest chemical weapon agents and include chlorine and phosgene, which were first used in World War I. These agents are delivered as heavy gases that remain near ground level and in low lying areas. They dissipate rapidly in a breeze and are among the least effective traditional agents. If pulmonary chemicals were used in a terrorism attack, the route of exposure would most likely be through inhalation.

Chlorine (Cl)

Chlorine is the most widely known water soluble chemical in this category and is easily available. Military use of chlorine is usually stored as a liquid, but becomes a gas that expands large areas when released. There is no contamination of objects when in gas form. Chlorine in the upper respiratory area results in the production of hydrochloric acid and chemical burns at the site. Chlorine was abandoned as a warfare agent when the use of gas masks were introduced along with the development of more effective compounds.

Signs and symptoms of chlorine	
Respiratory tract	Irritation, sneezing, dyspnea, violent cough, chest pain, decreased breath sounds, wheezing, stridor, loss of voice, rhinorrhea, laryngeal or pulmonary edema, ulceration of the respiratory tract
Eyes	Irritation, tearing, spasmodic winking
Central nervous system	General excitement or restlessness, lightheadedness, headache
Gastrointestinal tract	Nausea, vomiting, abdominal pain
Cardiovascular system	Rapid heart rate, increased rate of respiration
Skin	Redness, erythema, and chemical burns to the skin from dose-dependent exposure to liquid, cyanosis, dermatitis
other	Excess salivation, muscle weakness, rales

Anhydrous ammonia (NH3)

Anhydrous ammonia is used in blueprinting, industrial refrigerant, and is a common source of nitrogen for fertilizer. It can cause illness through absorption, inhalation, or ingestion. The extent of illness depends on exposure, depth of inhalation, and concentration of exposure. It is a colorless gas, which has a pungent, suffocating odor.

Signs and symptoms of anhydrous ammonia	
Respiratory tract	Irritation, accumulation of fluid in the lungs
Gastrointestinal tract	nausea, vomiting, abdominal pain
Eyes	Irritation, corneal scarring, potential blindness
Central nervous system	Altered mental status,
Skin	Burns, pain, blisters, necrosis, inflammation of skin, especially moist areas.

Phosgene (CG) and Diphosgene (DP)

Diphosgene and phosgene are lung damaging agents that cause illness by attacking lung tissue directly, resulting in pulmonary edema. Both are colorless liquids that smell like newly mown hay. Immediate signs and symptoms develop after exposure to phosgene and diphosgene. Phosgene is commonly found in industry and is used for insecticides and dyes, among other products. DP was created by combining phosgene with chloroform, which destroys gas filters. DP is a colorless gas that is not detoxified in the body

Signs and symptoms Phosgene (CG) and Diphosgene (DP)	
Cardiovascular system	Rapid heart rate, hypotension
Eyes	Irritation, tearing
Skin	Possible cyanosis
Respiratory tract	Coughing and choking, chest tightness, pulmonary edema, dyspnea, pneumonia and fever
Gastrointestinal tract	Nausea, vomiting occasionally
Other	Shock after severe exposure, anxiety and depression, chills, thirst, and dizziness

Vesicant Chemicals (Blister Agents)

Vesicants affect both exterior and interior parts of the body by causing tissue destruction. Upon being inhaled the vesicants form blisters on lung tissue. The blisters break open and provide an environment for the establishment of infections, which may become so severe that death eventually results. Blister agents can also affect the skin and eyes upon liquid exposure to the agents. The liquid blister agents slowly vaporize. All of the blister agents have vapor densities that are greater than air, which allows them to stay near the ground and dissipate slowly. If vesicants were used in a terrorism attack, the route of exposure would most likely be through inhalation or direct skin contact.

Impure Sulfur Mustard (H) Distilled Sulfur Mustard (HD), and Nitrogen Mustard (HN-1, HN-2, HN-3)

These agents cause illness through bone marrow depression and by damaging DNA. Mustard causes injury mainly through skin contact because it vaporizes slowly. After exposure to mustard there may be a latent period from 2 hours to 1 day before blisters on the skin appear. Sulfur mustard is considered by some as the ideal weapon, as it is apersistent respiratory and skin hazard. If HD is inhaled the symptoms begin in 4 to 6 hours, if absorbed by the skin, symptoms will begin within 2 to 48 hours. Nitrogen mustard has a slight odor, and appears colorless when pure, but can turn yellowish upon storage.

Signs and symptoms of impure sulfur mustard (H) and distilled sulfur mustard(HD), and Nitrogen Mustard (HN-1, HN-2, HN-3)	
Eyes	Irritation, sensitivity to light, spasmodic winking, pain, redness, edema of lids, tearing, corneal ulceration, possible scarring
Skin	Redness of skin, itching, burning, blisters within hours, necrosis within days, moist areas affected most
Nose	Nose, sinus, and pharynx burning, nosebleed
Respiratory tract	Hoarseness, irritation, and cough, dyspnea, rales, pulmonary edema, fever, and pneumonia in severe cases
Gastrointestinal Tract	Pain, nausea, vomiting, diarrhea
Other	Shock may occur after severe exposure**,** anxiety and depression

Phosgene oxime (CX)

Phosgene oxime vaporizes quickly enough to be a respiratory hazard. CX is not a true vesicant because it does not cause blisters, instead exposure results in corrosive lesions. Upon exposure, signs and symptoms occur immediately. The pain from CX contact with skin may persist for days.

Signs and symptoms of Phosgene oxime (CX)	
Eyes	Pain, redness, spasmodic winking, tearing, corneal damage with possible blindness
Skin	Blanching, red ring in 30 seconds, itchy swelling in 30 minutes, necrosis may occur
Respiratory tract	Immediate irritation, excessive fluids in the lungs, pulmonary edema
Other	Anxiety and depression

Lewisite (L)

Arsenic poisoning is the mechanism of action for lewisite. Lewisite vaporizes quickly enough to be a respiratory hazard, but can also be absorbed. Effects from both vapor and skin exposure occur immediately. It appears as a colorless liquid when in pure form and has a very slight odor. If impure, the color may vary from purple or brown and have a geranium-like odor.

Signs and symptoms of lewisite (L)	
Eyes	Pain, redness, spasmodic winking, tearing, iritis and corneal damage
Skin	Pain, redness, necrotic grayish epithelium, blisters within 2 days
Respiratory Tract	Extreme immediate irritation, hoarseness and cough, pulmonary edema, excessive fluids in the lungs
Gastrointestinal Tract	Diarrhea, nausea, vomiting, hepatic failure
Other	Shock may occur with severe exposures, hemolytic anemia, renal failure, anxiety and depression

Antipersonnel Agents (Riot Control Agents)

Riot control agents are not intended to cause significant injury or fatality. Chloracetephenone (CN), Bromobenzylcyanide (CA), and Dibenzoxapine (CR) cause tearing, intense eye pain, and irritation of the skin. The effects are immediate, and do not necessitate treatment because the symptoms relieve themselves. These agents are irritants that have a short duration of action. Riot control agents render individuals incapable of effective concerted actions. If riot control agents were used in a terrorism attack, the route of exposure would most likely be through inhalation or direct skin contact.

Chloracetephenone (CN), Bromobenzylcyanide (CA), Dibenzoxapine (CR), and O-Chlorobenzalidene Malonitrile (CS)

After skin or vapor exposure, to the riot control agents, the effects are seen immediately and recede in 10 to 30 minutes. Fresh air expedites the process. CN is more toxic than others, but is still in use by police in some countries. Deployed, CN appears as a white smoke smells like apple blossom. The severest of these symptoms is reached in a few minutes and then gradually decreases. After about 1 or 2 hours all symptoms disappear. CA is an older lachrymator, which is very toxic for use as riot control agent, and therefore is considered obsolete. CS is the most commonly used irritant for riot control purposes. CR is a newer riot control agent, which is minimally known.

Signs and symptoms of CN, CA, CR, and CS	
Eyes	Intense irritation, pain, spasmodic winking, tearing, sensitivity to light
Skin	Stinging, occasional dermatitis, blistering may occur
Respiratory Tract	Tightness in chest, difficulty breathing, choking, burning
Gastrointestinal tract	Nausea, vomiting rarely occurs
Other	Headache

Decontamination

Nuerotoxins (Nerve agents). The use of a mask and protective equipment should be used while decontaminating nerve agents. Early decontamination is vital. Household bleach works best to deactivate nerve agents. Water can decontaminate nerve agents, but if the nerve agent has been mixed with thickening substances it works more slowly. The addition of alkaline soap can expedite the process. Once decontaminated, there is no further risk of contamination.

Asphyxiants (Blood agents). For asphyxiants a mild bleach solution is suggested for the decontamination of liquid or solid chemical exposure. Decontamination should not be necessary for cyanogen chloride or hydrogen cyanide.

Pulmonary Agents (Choking agents). Decontamination for choking agents is usually not necessary because they are gases and will disperse into the environment. If skin exposure is significant, wash with a mild soap and water. Clothing removal for patient transport, such as a closed ambulance, is recommended.

Vesicants (Blister agents). For blister agents decontamination must occur immediately. The agent should be blotted off, not wiped off so the agent will not be spread furthering contamination. Mustards should not be decontaminated with water, except for the eyes, as it will spread the agent. Eyes and mucous membranes should be flushed with water, saline, or isotonic sodium bicarbonate. For phosgene oxide, alkalis are effective for chemical inactivation. Chlorination solution may also be used to inactivate mustard and lewisite, but is less effective for HN3, and is ineffective for phosgene oxime. For phosgene oxime, chemical inactivation by using alkalis, such as Fuller's earth, can be used.

Antipersonnel Agents (Riot control agents). Decontamination for riot control agents can be performed by removing clothing and washing exposed areas thoroughly with soap and water. Irrigation of the eyes is not necessary but may help with pain relief.

Treatment

Neurotoxins (Nerve agents). Removal of the victim from the environment and decontamination should occur first. Support ventilation and providing an open airway are the first steps in treatment of nerve agent patients. High flow oxygen should be administered to avoid an abnormal cardiac rhythm. Atropine, preferably through IV administration and pralidoxime chloride may be given when advanced treatment is warranted. Valium may be considered for the treatment of seizures and muscle twitches Diazepam, an anticonvulsant may also be provided.

Asphyxiants (Blood agents). Removal of the victim from the environment and decontamination should occur first. Treatment for asphyxiants is based primarily on providing rest, oxygen, and assisted ventilation and drugs that bind with cyanide. Inhaled Amyl nitrite, intravenous sodium nitrite, and intravenous sodium thiosulfate, may be used for the treatment of asphyxiants.

Pulmonary Agents (Choking agents). Removal of the victim from the environment and decontamination should occur first. The first step in treatment is to open the airway, if it is not already open. Second, treatment should focus on reducing the fluid in the alveoli. Providing oxygen to the alveoli is vital. Bronchodilators, such as alupent and albuterol, given in an updraft will provide some dilation of the airways. Further dilation of airways

may be accomplished by brethine or epinephrine subcutaneously. For lower airway injury that results in pulmonary edema positive pressure ventilations using a positive end expiratory pressure (PEEP) valve may be indicated. Corticosteroids given intravenously may be particularly helpful for the treatment of phosgene.

Vesicants (Blister agents). The victim should be decontaminated first. Treatment for impure and distilled sulfur mustard can be provided through phenargen for vomiting, itching, and edema. Local dressings and antibiotics can be used for the affected skin areas. Analgesics, cycloplegics, and antibiotics can be used to treat the eyes. IV fluids may also be helpful for treatment as well as antibiotics for respiratory infections. Treatment for phosgene oxime consists of sodium bicarbonate dressings, systemic analgesics, and standard necrotic skin lesion treatment. British anti-lewisite (BAL), in oil IM for systemic chelation and in ointment form for the eyes and skin can be given to treat lewisite.

Antipersonnel Agents (Riot control agents). There is no treatment for these agents and they usually do not cause enough injury to need medical care, with symptoms naturally subsiding within 30 minutes of exposure. Medical care that can be provided is focused on pain relief of the symptoms. Fresh air may help to expedite the disappearance of symptoms. For eye irritation, analgesic nose and eye drops may be used.

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Section 13: Extreme Cold Weather

Table of Contents **Page**

Introduction

Prolonged exposure to cold weather can result in serious health problems, such as frostbite and hypothermia. Infants and elderly are particularly at risk, but anyone can be affected by cold weather related health problems. Common high risk situations include limited access to medical care and the inability to pay for heat utilities. Cold weather related illnesses often result in medical emergencies that are completely preventable.

Public health prevention strategies for reducing cold weather related illnesses and deaths, particularly for hypothermia, include educating the public and health care providers about heat preservation strategies, and providing outreach programs that identify and protect persons at risk. Persons of high risk in particular include the elderly, young children, mentally and physically challenged persons, persons with psychiatric disorders, and homeless persons. Community outreach programs should check on these risk groups frequently to discourage prolonged exposure to cold and to ensure access to properly heated dwellings. Many cold weather related deaths could be prevented with improvement in overall medical and social support services for vulnerable populations. Public health prevention strategies for reducing cold related illnesses should be part of a broader social support program to provide services to at risk populations.

Wind Chill Chart

The wind chill chart is an indicator of extreme cold weather. It is used to describe the rate of heat loss on the human body resulting from the combined effect of low temperature and wind. As winds increase, heat is carried away from the body at a faster rate, which makes the skin temperature and eventually the internal body temperature decrease. For example, a wind chill index of -5 indicates that the affects of wind and temperature on exposed flesh are the same as if the air temperature were 5 degrees below zero even though the actual temperature is much higher. Exposure to low wind chills can be life threatening to both humans and animals. The only effect that wind chill has on inanimate objects, such as cars, is that it shortens the time that it takes the object to cool to the actual air temperature.

The wind chill chart provides a measure of the dangers from winter winds and freezing temperatures. The chart provides a consistent measure which can be to help the public protect itself against the dangers of frostbite and hypothermia. Wind chill values from 50 - 1° F are considered cold and unpleasant, but do not indicate cold weather related injuries are a danger. Temperatures ranging from -19°F to 0°F are considered bitter cold with occurrence of frostbite possible. Exposed skin may freeze within 5 minutes. Temperatures from -20° F to -69° F are considered extremely cold with the occurrence of frostbite considered likely. Exposed skin can freeze within 1 minute and outdoor activity becomes dangerous. Temperatures that are -70°F and lower are considered frigidly cold. Exposed skin can freeze in 30 seconds. ***See page 13-7 for the wind chill chart.***

Watches and Warnings

Winter storm watch. A winter storm watch means a winter storm is possible in the area. The following actions are recommended when a winter storm watch is issued:

- Listen to NOAA Weather Radio, local radio, and TV stations, or cable for further updates.
- Be alert to changing weather conditions.
- Avoid unnecessary travel.

Winter storm warning. A winter storm warning means a winter storm is headed for the area. The following actions are recommended when a winter storm watch is issued:

- Stay indoors during the storm.
- Listen to NOAA Weather Radio, local radio, and TV stations, or cable for further updates.
- If you must go outside, several layers of lightweight clothing will keep you warmer than a single heavy coat. Gloves and a hat will prevent loss of body heat. Cover your mouth to protect your lungs.
- Walk carefully on snowy, icy, sidewalks.
- After the storm, if you shovel snow, be extremely careful. It is physically strenuous work, so take frequent breaks. Avoid overexertion.
- Avoid traveling by car in a storm. If you must travel:
    - Carry a disaster supplies kit in the trunk.
    - Keep your car's gas tank full for emergency use and to help keep the fuel line from freezing.
    - Let someone know your destination, your route, and when you expect to arrive. If your car gets stuck along the way, help can be sent along your predetermined route

Blizzard warning. A blizzard warning means strong winds, blinding wind-driven snow, and dangerous wind chill are expected. Seek shelter immediately upon notification of a blizzard warning.

Cold Weather Related Illnesses

Frostbite

Frostbite is an injury to the body that is caused by freezing. Most often it affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite causes a loss of feeling and color in affected areas. Permanent damage to the body and in severe cases amputation can result from frostbite. People with reduced blood circulation and those who are not dressed properly for extremely cold temperatures are at increased risk for frostbite. A victim is often unaware of frostbite until someone else points it out because the frozen tissues are numb.

Warning signs and symptoms of frostbite include the following:

- Redness or pain in any skin area
- A white or grayish yellow skin area

- Skin that feels unusually firm or waxy
- Numbness

Treatment. If you detect symptoms of frostbite, seek medical care. While waiting for medical assistance:

- At the first sign of redness or pain in any skin area, get out of the cold or protect any exposed skin.
- Immerse the affected area in warm water or warm the affected area using body heat.
- Unless absolutely necessary, do not walk on frostbitten feet or toes
- Do not rub the frostbitten area with snow or massage it at all.
- Do not use a heating pad, heat lamp, or the heat of a stove, fireplace, or radiator for warming. Affected areas are numb and can be easily burned.

Hypothermia

Hypothermia is an abnormally low body temperature. The body begins to lose heat faster than it can be produced when exposed to cold temperatures. Prolonged exposure to cold will eventually use up your body's stored energy. The brain is affected by low body temperature, making the victim unable to think clearly or move well. This makes hypothermia particularly dangerous because a person may not know it is happening and won't be able to do anything about it. Hypothermia is most likely to occur at very cold temperatures, but can occur even at cool temperatures above 40°F, if a person becomes chilled from rain, sweat, or submersion in cold water. Each year, more than 700 people die of hypothermia. About half of the deaths are among persons age 65 and older and men in this age group are more likely than women to die as a result of it. Victims of hypothermia are most often elderly people with inadequate food, clothing, or heating, babies sleeping in cold bedrooms, and people who remain outdoors for long periods, such as the homeless, hikers, and hunters. Risk factors for hypothermia include older age, alcohol abuse, poverty, mental illness, hypothyroidism, dehydration, and malnutrition.

Signs and symptoms of hypothermia include the following for adults:

- shivering
- exhaustion
- confusion
- fumbling hands
- memory loss
- slurred speech
- drowsiness

Signs and symptoms of hypothermia include the following for infants:

- bright red, cold skin
- very low energy

Treatment. If there are any signs of hypothermia present, take the person's temperature. If it is below 95°, the situation is an emergency and medical attention should be sought immediately. Until medical assistance arrives:

- Get the victim into a warm room or shelter.

- If the victim has on any wet clothing, remove it.
- Warm the center of the body first (chest, neck, head, and groin) dry layers of blankets, clothing, towels, or sheets may be used.
- Warm beverages can help increase the body temperature, but do not give alcoholic beverages. Do not try to give beverages to an unconscious person.
- After body temperature has increased, keep the person dry and wrapped in a warm blanket, including the head and neck.
- CPR should be provided if necessary and should continue while the victim is being warmed, until the victim responds or medical aid becomes available.

Prevention of Cold Weather Related Illnesses

To prevent cold weather related illnesses follow these safety tips during a snow or ice storm:

- Be prepared. Before cold weather hits, make sure you have a way to heat your home during a power failure. Keep a multipurpose, dry-chemical fire extinguisher nearby when using alternative heating sources.
- Keep extra blankets, flashlights with extra batteries, matches, a first aid kit, manual can opener, snow shovel and rock salt, and special needs items (e.g., diapers) on hand.
- Stock a few days' supply of water, required medications, and food that does not need to be refrigerated or cooked.
- Monitor the temperature of your home. Infants and persons over age 65 are especially susceptible to cold. If it's not possible to keep your home warm, stay with friends or family or in a shelter.
- Dress in several layers to maintain body heat. Covering up with blankets can also conserve heat.

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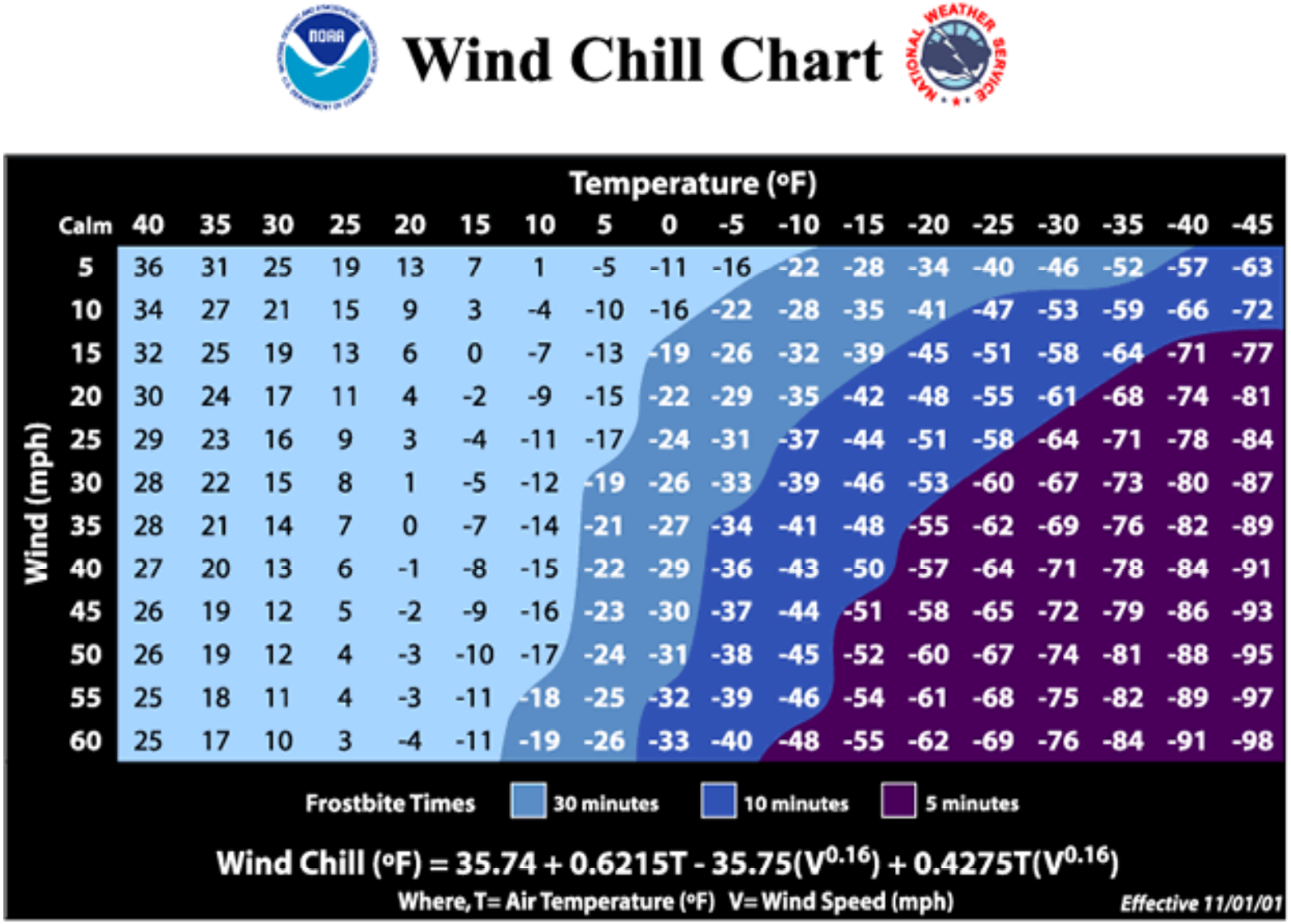
Wind Chill Chart
Temperature (°F)
Wind (mph)
Calm 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45
5 36 31 25 19 13 7 1 -5 -11 -16 -22 -28 -34 -40 -46 -52 -57 -63
10 34 27 21 15 9 3 -4 -10 -16 -22 -28 -35 -41 -47 -53 -59 -66 -72
15 32 25 19 13 6 0 -7 -13 -19 -26 -32 -39 -45 -51 -58 -64 -71 -77
20 30 24 17 11 4 -2 -9 -15 -22 -29 -35 -42 -48 -55 -61 -68 -74 -81
25 29 23 16 9 3 -4 -11 -17 -24 -31 -37 -44 -51 -58 -64 -71 -78 -84
30 28 22 15 8 1 -5 -12 -19 -26 -33 -39 -46 -53 -60 -67 -73 -80 -87
35 28 21 14 7 0 -7 -14 -21 -27 -34 -41 -48 -55 -62 -69 -76 -82 -89
40 27 20 13 6 -1 -8 -15 -22 -29 -36 -43 -50 -57 -64 -71 -78 -84 -91
45 26 19 12 5 -2 -9 -16 -23 -30 -37 -44 -51 -58 -65 -72 -79 -86 -93
50 26 19 12 4 -3 -10 -17 -24 -31 -38 -45 -52 -60 -67 -74 -81 -88 -95
55 25 18 11 4 -3 -11 -18 -25 -32 -39 -46 -54 -61 -68 -75 -82 -89 -97
60 25 17 10 3 -4 -11 -19 -26 -33 -40 -48 -55 -62 -69 -76 -84 -91 -98
Frostbite Times
30 minutes
10 minutes
5 minutes
Wind Chill (°F) = 35.74 + 0.6215T - 35.75(V^0.16) + 0.4275T(V^0.16)
Where, T= Air Temperature (°F) V= Wind Speed (mph)
Effective 11/01/01

Section 14: Extreme Heat

Table of Contents **Page**

Introduction

According the CDC, approximately 300 people a year, on average, die from exposure to extreme heat. Heat related illness occurs when someone is exposed to heat and unable to compensate by properly cooling themselves off. Usually, people exposed to heat naturally sweat to cool themselves off. However, with exposure to extreme heat, sweating is not enough to provide relief. In such circumstances, the body's temperature rises rapidly, which can result in damage to the brain and other vital organs.

Many factors affect the body's ability to cope with extreme heat. When there is high humidity, sweat does not evaporate as fast, which prevents the release of heat from the body quickly. In addition, old age, youth, obesity, fever, dehydration, heart disease, mental illness, sunburn, poor circulation, alcohol use, and prescription drug use can all hinder the body's ability to cool off.

Many situations can cause a person or a population to be at risk. Air conditioning is the number one way to prevent heat related illnesses and death. Often there is a high risk situation created when people feel they can not afford a higher utility bill and therefore lower or turn off the air conditioning. Contradicting most thought, short brownouts lasting only a few hours will usually not have as large affect on people's health. During heat waves, alerts including detailed information on heat disorders and how to reduce risk, as well as names and telephone numbers to contact for help should be provided to the community.

Heat Index Chart

The heat index is the number in degrees in Fahrenheit that tells the apparent temperature. It is derived by adding relative humidity to the actual air temperature. In simple terms it is a measure of how hot the air feels. The heat index can be used to alert the public to the dangers of extremely hot and humid weather. The National Weather Service alerts the public when it expects the heat index to be higher than 105 to 110 °F for at least two successive days. The higher the heat index, the greater the likelihood that people will develop heat-related illnesses. Exposure to full sunshine can increase the heat index by 15° F. A heat index of 100° F and higher indicates that heat stroke, heat cramps, or heat exhaustion likely and temperatures of 130° F or higher indicates that heat stroke is imminent. ***See page 14-7 for the heat index chart.***

Heat Related Illnesses

Heat stroke

Heat strokes are also known as a sunstroke, or hyperthermia. It is life-threatening condition in which the body is unable to regulate its temperature. Within 10 to 15 minutes the body temperature may rise to 106° F or higher after the sweating mechanism fails and the body cannot cool itself down. The body temperature can rise so high that severe disability and death may result if the body is not quickly cooled down.

Warning signs and symptoms of heat stroke include:

- Extremely high body temperature (105° F or higher orally)
- Red, hot and dry skin, with no sweating
- Rapid weak pulse
- Rapid shallow breathing
- Throbbing headache
- Dizziness
- Confusion
- Unconsciousness
- Muscle twitching may occur

Treatment. If someone is experiencing the signs and symptoms, call for immediate medical assistance and begin cooling the victim. While waiting for medical assistance, get the victim to a shady or cool area, have the victim lie down, cool the victim any way possible, monitor the body temperature, and continue to cool the victim until the temperature drops 101-102° F. If the victim refuses water, is vomiting, or there are changes in the level of consciousness, do not give anything to eat or drink. If the victim experiences muscle twitching, keep him or her from injuring himself, do not place any objects in the mouth, and do not give him or her fluids. If there is vomiting, make sure the airway remains open by turning the victim on his or her side.

Heat Exhaustion

Heat exhaustion can result after days of exposure to high temperatures and inadequate fluid intake. It is a milder form of heat related illnesses, but can still be dangerous. Blood flow to the skin increases, causing blood flow to decrease to the vital organs. This results in a form of mild shock. If untreated, it may result in heat stroke. The elderly, people working or exercising in a hot environment, and people with high blood pressure are at a higher risk for heat exhaustion.

Signs and Symptoms

- Heavy sweating
- Paleness, cool and moist skin
- Muscle cramps
- Tired and weak
- Headache
- Dizziness with nausea or vomiting
- Fainting
- Fast and weak pulse rate
- Fast and shallow breathing

- Near normal body temperature

Treatment. If you see someone with these signs and symptoms help the victim cool off by having them drink cool nonalcoholic beverages, rest, take a cool shower or bath, stay in an air conditioned environment, or wear lightweight clothing. Seek medical attention if the signs and symptoms worsen, last more than an hour, or if the victim has heart problems or high blood pressure.

Heat Cramps

Heat cramps are muscular pains and spasms that usually occur in the abdomen, arms, and legs, due to strenuous activity. It usually affects people who sweat because by sweating, your body depletes its stores of moisture and salt. Low levels of salt in the muscles cause painful cramping. Although heat cramps are the least severe, they may indicate heat exhaustion.

Treatment. Get the person to a cooler place and have him or her rest in a comfortable position. Lightly stretch the affected muscle and replenish fluids. Give a half glass of cool water every 15 minutes. Do not give liquids with alcohol or caffeine in them, as they can make conditions worse.

Prevention of Heat Related Illnesses

If a heat wave is predicted or occurring follow these tips:

- Slow down. Avoid strenuous activity. If you must do strenuous activity, do it during the coolest part of the day, which is usually in the early morning.
- Stay indoors as much as possible. If air conditioning is not available, stay on the lowest floor, out of the sun. Try to go to a public building with air conditioning each day for several hours.
- The use of fans may increase comfort at temperatures less than 90° F, but are not protective against heatstroke when temperatures reach greater than 90° F and humidity exceeds 35%. Although fans do not cool the air, they do help sweat evaporate, which cools your body.
- Wear lightweight, light-colored clothing. Light colors will reflect away some of the sun's heat.
- Drink plenty of water regularly and often. Your body needs water to keep cool.
- Drink plenty of fluids even if you do not feel thirsty.
- Water is the safest liquid to drink during heat emergencies. Avoid drinks with alcohol or caffeine in them. They can make you feel good briefly, but make the heat's effect on your body worse. This is especially true about beer, which dehydrates the body.
- Eat small meals and eat more often. Avoid foods that are high in protein, which increase metabolic heat.
- Avoid using salt tablets unless directed to do so by a physician.

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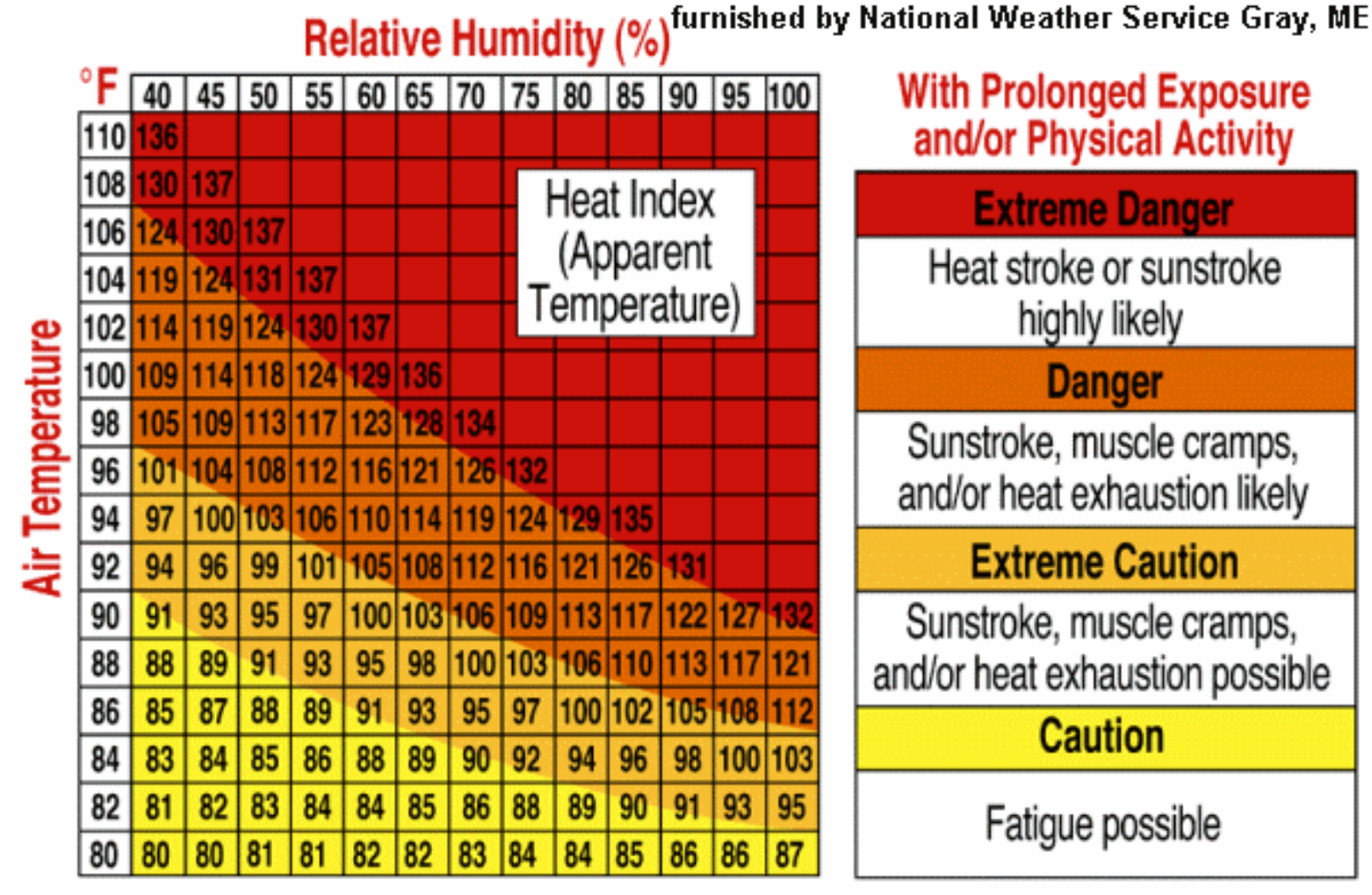
furnished by National Weather Service Gray, ME



Section 15: Tornadoes

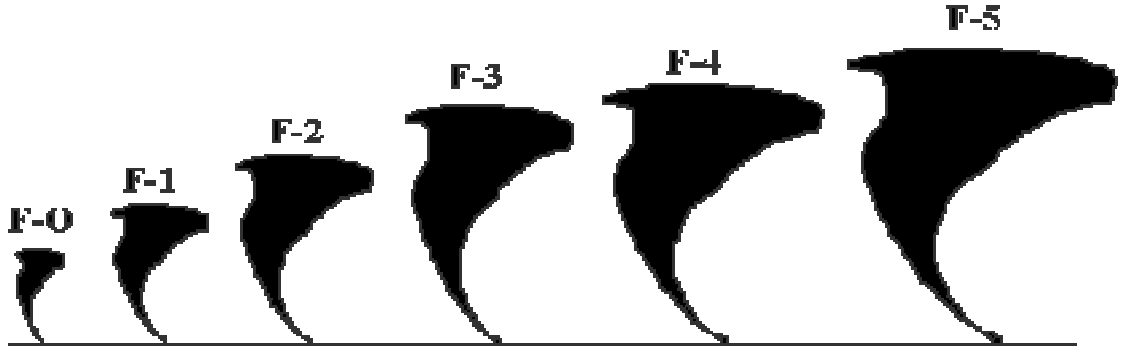
Table of Contents **Page**

Introduction

Tornadoes are one of the most lethal and violent of all natural disasters. A tornado is a rotating funnel of air that extends from a cloud to the ground that usually accompanies severe thunderstorms. Tornadoes can travel at different speeds and change direction without warning. The most destructive force in a tornado is the updraft in the funnel. As this unstable air moves upward at high speed, it can suction up houses and trees and move them hundreds of feet. The path of damage left behind by a tornado averages 9 miles long by 200 yards wide, but a severe tornado can damage an area up to 50 miles long and a mile wide. Tornadoes have occurred in every state and during every month of the year. In the United States, tornadoes cause an average of 51 deaths and approximately 1000 injuries each year.

Tornadoes that occur over oceans and lakes are called waterspouts. These are usually not as destructive as tornadoes because they rotate less vigorously and affect less-populated areas. However, waterspouts can move inland and become tornadoes. Waterspouts are more common in the southeast, particularly along the Gulf Coast, but can form over any body of warm water.

The Fujita tornado intensity scale ranks tornadoes according to their speed, path length, and path width. Most tornadoes are weak, F-0 and F-1, and have limited injury or destruction potential. Although violent tornadoes, F-4 and F-5, are rare, they cause severe damage and account for approximately half of tornado-related deaths. During 1990-1996, only five tornadoes in the United States were assigned an F-5 rating.



F-0: 40-72 mph, chimney damage, tree branches broken
F-1: 73-112 mph, mobile homes pushed off foundation or overturned
F-2: 113-157 mph, considerable damage, mobile homes demolished, trees uprooted
F-3: 158-205 mph, roofs and walls torn down, trains overturned, cars thrown
F-4: 207-260 mph, well-constructed walls leveled
F-5: 261-318 mph, homes lifted off foundation and carried considerable distances, autos thrown as far as 100 meters

Watches and Warnings

Tornado watches and warnings are issued by the National Weather Service and are the primary method of alerting communities of an approaching tornado and are disseminated through public safety organizations, sirens, television, radio, or other electronic media.

***Tornado watch*.** A tornado watch is issued by the National Weather Service when weather conditions favor the formation of tornadoes in the area. Remain alert for approaching storms.

Tornado warning. A tornado warning is issued when a tornado has been sighted or indicated by weather radar. Take shelter immediately.

Safety and Injury Prevention

Before a tornado

- Conduct tornado drills each tornado season.
- Designate an area in the home as a shelter, and practice having everyone in the family go there in response to a tornado threat.
- Know how to distinguish between the siren's warnings for a tornado watch and a tornado warning.
- Have disaster supplies on hand:
  - First aid kit and essential medications.
  - Canned food and can opener.
  - Protective clothing, bedding, or sleeping bags.
  - Battery-powered radio, flashlight, and extra batteries.
  - Emergency food and water (At least three gallons of water per person)
  - Cash and credit cards
  - Sturdy shoes and gloves
- Develop an emergency communication plan. Ask an out-of-state relative or friend to serve as the "family contact."
- Learn these tornado danger signs:
  - Before a tornado hits, the wind may die down and the air may become very still.
  - Tornadoes generally occur near the trailing edge of a thunderstorm. It is not uncommon to see clear, sunlit skies behind a tornado.

During a Tornado

If at home:

- Go to a windowless, interior room; storm cellar, basement, or lowest level of the building. If there is no basement, go to an inner hallway or a smaller inner room without windows, such as a bathroom or closet.
- Get away from the windows.

- Go to the center of the room. Stay away from corners because they tend to attract debris.
- Get under a piece of sturdy furniture such as a workbench or heavy table or desk and hold on to it.
- Use arms to protect head and neck.
- If in a mobile home, get out and find shelter elsewhere.

If at work or school:
- Go to the basement or to an inside hallway at the lowest level.
- Avoid places with wide-span roofs such as auditoriums, cafeterias, large hallways, or shopping malls.
- Get under a piece of sturdy furniture such as a workbench or heavy table or desk and hold on to it.
- Use arms to protect head and neck.

If outdoors:
- If possible, get inside a building.
- If shelter is not available or there is no time to get indoors, lie in a ditch or low-lying area or crouch near a strong building. Be aware of the potential for flooding.
- Use arms to protect head and neck.

If in a car:
- Never try to out drive a tornado in a car or truck because persons who attempt to outrun tornadoes in vehicles are at high risk for injury or death. Tornadoes can change direction quickly and can lift up a car or truck and toss it through the air.
- Get out of the car immediately and take shelter in a nearby building.
- If there is no time to get indoors, get out of the car and lie in a ditch or low-lying area away from the vehicle. Be aware of the potential for flooding.

<u>After a tornado</u>

- Check for injuries and call for medical assistance.
- Do not attempt to move seriously injured people unless they are in immediate danger of further injury.
- Injury may result from the direct impact of a tornado, or it may occur afterward.
- Because tornadoes often damage power lines, gas lines, or electrical systems, there is a risk of fire, electrocution, or an explosion.
- Protecting yourself and your family requires promptly treating any injuries suffered during the storm and using extreme care to avoid further hazards.
- Turn on radio or television to get the latest emergency information.
- Stay out of damaged buildings. Return home only when authorities say it is safe.
- Clean up spilled medicines, bleaches, or other liquids immediately. Leave the buildings if you smell gas or chemical fumes.
- Take pictures of the damage for insurance purposes.
- Inspecting the Damage

- Be aware of possible structural, electrical, or gas-leak hazards in your home. Contact your local city or county building inspectors for information on structural safety codes and standards.
- In general, if you suspect any damage to your home, shut off electrical power, natural gas, and propane tanks to avoid fire, electrocution, or explosions.
- If it is dark when you are inspecting your home, use a flashlight rather than a candle or torch to avoid the risk of fire or explosion in a damaged home.
- If you see frayed wiring or sparks, or if there is an odor of something burning, you should immediately shut off the electrical system at the main circuit breaker if you have not done so already.
- If you smell gas or suspect a leak, turn off the main gas valve, open all windows, and leave the house immediately. Notify the gas company, the police or fire departments, or State Fire Marshal's office, and do not turn on the lights, light matches, smoke, or do anything that could cause a spark. Do not return to your house until you are told it is safe to do so.

- Identify and get help for anxiety.
  - Symptoms of anxiety may not appear for weeks or even months after a tornado.
  - Anxiety can affect people of any age.
  - If anxiety disrupts daily activities for any member of your family, seek professional assistance.

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Section 16: Floods

Table of Contents **Page**

Introduction

Floods are the most widespread natural disaster worldwide, accounting for nearly 40% of all natural disasters. Usually floods result from intense storms of heavy rain, repeated rains, or snowmelt, within a brief time period. Flash floods occur with little or no warning and can peak in only minutes. Typically, flash floods move at very fast speeds and are capable of widespread destruction. The force of just six inches of swift water current can pull a person off their feet. For a car to get swept away it only takes 2 feet of strong water current. According to the Centers for Disease Control and Prevention (CDC), flash flooding is the leading cause of weather related mortality in the United States, resulting in deaths of approximately 200 persons each year.

The initial public health impact of a flood may be followed by secondary effects. Access to medical care or medical facilities may be affected by the flood, potentially leaving patients without needed attention. In addition, the occurrence of injuries may increase during the recovery and clean up process following the flood.

Public health can diminish the injury and threat of floods to the population by addressing these issues. While floods are not preventable there are preparation steps that can help limit injuries and damage. The major factors leading to human injury and threat during a flood are inadequate knowledge of risks and hazards, limited resources, and little opportunity to escape the situation safely, and not knowing how to react to the situation. In addition to the physical danger, there are many other public health risks involved with floods such as water quality and food safety. This information should be made available to the public.

Public health surveillance related to floods is important in assessing the needs and planning for public health intervention measures. Routine surveillance, including communicable, environmental, and occupational diseases, and flood related injuries can serve to identify disease outbreaks and clusters of adverse public health events that were initially caused by the flood.

Watches and Warnings

Flash flood watch. Flash flooding is possible within the designated watch area, be alert. Those in the affected area are urged to be ready to take action if a flash flood warning is issued or flooding is observed. These watches are issued for flooding that is expected to occur within 6 hours after the heavy rains have ended.

Flood watch. Flooding is possible within the designated watch area be alert. Those in the affected area are urged to be ready to take action if a flood warning is issued or flooding is observed.

Flash flood warning. Flash flooding or flooding has been reported and will occur within 6 hours. Take necessary precautions at once. Very heavy rain in a short period of time

can lead to flash flooding, depending on local terrain, ground cover, initial ground or river conditions, among other factors.

Flood warning. Flooding has been reported or is imminent. Take necessary precautions at once.

Urban and small stream advisory. Flooding of small streams, streets, and low-lying areas, such as railroad underpasses and urban storm drains, is occurring.

Public Health Flooding Concerns

Water Quality

Safety of the community water supply could be at risk during a flood. Public announcements should be made notifying the community as to the safety of the water. Safe drinking water sources should be identified, such as specific instructions for boiling or treating the water supply for consumption. Basic rules include the following:

- Only drink safe water that has been bottled, boiled or treated until there is confirmation that the community water supply is safe for consumption.
- Water should be brought to a rolling boil for at five minutes, this process kills most organisms.
- Do not use contaminated water to wash and prepare food, brush your teeth, wash dishes or make ice.

For information on how to treat contaminated drinking water, see the Indiana State Department of Health, Sanitary Engineering guidance: *Directions for Treating Drinking Water in Small Quantities* on page 16-6.

Disinfecting Wells

For information on disinfecting wells, see the Indiana State Department of Health, Sanitary Engineering *Directions for Disinfecting Wells and Water Sources* on page 16-7.

Food Safety

For information on how to salvage food, see the Indiana State Department of Health Food Protection guidance: *Salvaging Flood Damaged Food in the Home* on page 16-10.

For further information see Chapter 17 on Food Safety.

Sanitation, Hygiene, and Cleanup

Washing hands with soap and water that has been boiled or disinfected should be done before preparing or eating foods, before eating, after bathroom use, participating in flood cleanup activities, and after handling contaminated articles that came into contact with flood waters. In addition, children should not be allowed to play in flood waters or with toys that have been in contact with flood waters. Toys should be disinfected.

For information on how to salvage flooded materials, see the Indiana State Department of Health, Sanitary Engineering guidance: and *Rehabilitation of Buildings, Furnaces, Furniture, Rugs and Clothing* on page 16-11.

Disease and Immunization

Rates of diseases may increase when flooding occurs because of sanitation and living conditions, outbreaks of communicable diseases are unusual. However, the potential exists for waterborne diseases to be transmitted, such as shigellosis, salmonella, and hepatitis A among others. Often false rumors circulate of disease epidemics. If a community has not had a problem with a communicable disease prior to flood it is not likely to become a problem after the flood. These rumors add to the reason and justification for public health surveillance, because it allows for scientific methods to provide factual information.

Mass immunizations for victims of floods are generally not recommended, as scientific studies prove them to be unnecessary under most circumstances. Often mass immunizations are counterproductive in that they limit manpower of the relief efforts and resources. In addition, mass immunizations may provide a false sense of security to flood victims. In such situations, the immunized flood victims may feel a false sense of security that neglecting basic sanitation and hygiene will not result in negative repercussions.

Because epidemic typhoid has clearly been absent from natural disasters occurring in the US mass vaccinations are not recommended, despite public demand when natural disasters occur. In addition, the antibodies to the immunization take several weeks to develop and there is only moderate protection against the disease. Also, adverse reactions, such as fever, headache, malaise, pain and swelling at the injection site from the vaccine are common, making immunizations even less desirable.

Mass tetanus immunizations are not recommended either, because floods do not impose any additional risk for tetanus to the population affected. However, wounds received that are associated with a flood should be evaluated for risk. In these instances it may prove appropriate for tetanus immunization according to the evaluation of a physician.

Large pools of standing or stagnate water remaining will invite mosquito populations. If possible, all standing water should be drained. This may increase the risk for some mosquito borne diseases. Protection from mosquitoes includes wearing long sleeves, pants and insect repellants.

Other Hazards

Extreme caution should be used for potential chemical and electric hazards, as they have great potential for fires and explosions. Floods have the strength to move and or bury hazardous and chemical containers from their normal storage places, creating a risk for those who come into contact with them. Any chemical hazards, such as a propane tank should be dealt with by the fire department or police.

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Sanitary Engineering
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AC 317/233-7811

DIRECTIONS FOR TREATING DRINKING WATER IN SMALL QUANTITIES

1. In emergencies, or as a temporary measure, water from contaminated or suspect sources can be disinfected by either chlorination or boiling.

   a. Secure safe drinking water from an approved or emergency source if possible. If not possible, treat all water before drinking.

   b. If tap water is not clear, it should not be used. If a less turbid water source cannot be located, allow the water to stand in a container until the sediment settles and pour off (decant) the clear water into a clean vessel.

2. Chlorination - Add six (6) drops of a liquid chlorine laundry bleach to one gallon of water and mix.Chlorine bleaches are inexpensive and can be secured from most grocery, discount, or drug stores.

   a. Wait thirty (30) minutes after adding the chlorine before using the water for drinking or cooking purposes.

   b. If this treatment does not give the water a taste of chlorine, the above quantities should be doubled. Repeat the addition of chlorine until a slight taste of chlorine is present and use this amount for future treatments.

   c. The taste of chlorine is not particularly unpleasant and it will be evidence that the water is safe to drink.

3. Boiling -The water may also be purified by boiling. In this method, bring the water to a full boil for at least five (5) minutes. Cool and aerate the boiled water by pouring it through the air from one clean container to another, or mixing rapidly with a clean utensil. Aeration will reduce the flat taste cause by boiling.

4. One of the above treatments should be continued until water of unquestioned quality can be secured. Remember that the safety of water cannot be judged by color, odor, or taste. The organisms that cause water-borne disease cannot be seen.

5. Contact your local health department or Sanitary Engineering for assistance or advice.

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DIRECTIONS FOR DISINFECTING WELLS AND WATER SOURCES

The following instructions are for the disinfection or treatment of wells and private water sources which have been subjected to flood, storm water, or other possible sources of contamination. **If the well casing is submerged in flood water, DO NOT USE THE WATER.** Water from submerged wells can not be safely sanitized. When flood waters recede, small quantities may be disinfected until the well can be properly chlorinated. (See Directions for Treating Small Quantities of Drinking Water.)

After flood waters recede, or the cause of contamination is eliminated, wells can be disinfected with chlorine. A convenient form to use is sold commercially in grocery or other stores as liquid chlorine laundry bleach. Most of these products contain 5.25 percent solution or more of sodium hypochlorite when fresh, and is equivalent to 5 percent available chlorine.

1. Determine the Amount and Add the Chlorine Disinfecting Solution.

The quantity of chlorine solution needed to disinfect a well is based upon 100 parts of chlorine to a million parts of water. To eliminate mathematical calculations, it is safe to use the following quantities and methods to disinfect the different types, sizes, and depths of wells and water sources:

A. **Drilled or Driven Wells** - Use one quart of the commercial 5 percent chlorine solution for each 100 feet of well depth in a drilled well which is four inches in diameter. For two-inch driven wells, or smaller, add one cup for each 25 feet of water.

1. The measured solution should be diluted with water to make about three (3) gallons. Water drawn from the contaminated well is suitable for this purpose.

2. Pour the diluted chlorine solution directly into the casing of a single tubular well, or into the annular space between the outer casing and the drop pipe, of a double tubular well.

3. If the well is sealed and the pump drop pipe is not equipped with a foot valve at the bottom, and does not have a cylinder in the way, it is also possible to pour the solution down through the pump and drop pipe.

B. **Dug Wells** - Dug wells which have become contaminated should first be pumped dry, cleaned, and the walls scrubbed down. If it is not possible to pump the well dry, the pumping should be continued until the water becomes clear. The well should then be allowed to fill, and, if the water is still not clear, it should be pumped out again.

When the water is clear, the well should be disinfected using the following quantities of 5 percent chlorine solution for each foot of depth of water in the well:

Directions for Disinfecting Wells And Water Sources

Diameter of Well	Quantity 5 Percent Chlorine Bleach
1 to 3 feet	1.5 Cups
4 feet	3 Cups
5 feet	4.5 Cups
6 feet	6 Cups
8 feet	12 Cups
10 feet	18 Cups

Add this quantity of chlorine bleach directly into the well interior.

C. **Cisterns** Cisterns, spring collection basins, or drinking water storage tanks should be disinfected in the same manner as dug wells. Pump out, or drain the water in the cistern; scrub down the interior walls; fill or allow the tank to refill with clear water; and, if it is not known, calculate the capacity of the tank or containment by using one of the following formulas:

a. Square or Rectangular Tank measure in feet:
Capacity (gallons) = Length x Width x Depth x 7.5

b. Cylindrical Tank measure in feet:
Capacity (gallons) = Diameter x Diameter x Length x 5.9

c. Add the amount of 5 percent chlorine solution indicated in the following table:

Capacity (Gallons)	Quantity of 5 % Chlorine Bleach
500	5 Quarts
750	7.5 Quarts
1,000	10 Quarts
2,000	20 Quarts
4,000	40 Quarts

This amount of chlorine bleach should be poured directly into the cistern or storage tank.

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2. Allow Time for Disinfection of the Water Source and Distribution System.

After the well, cistern, or storage tank has been dosed with the appropriate amount of chlorine, it should be pumped just long enough to bring the treated water through the pump to all faucets on the distribution system. The odor at the faucets will be a good test to indicate chlorine presence.

If the above dosages do not produce an obvious chlorine odor in the water, add more chlorine bleach solution until a distinct odor is noticed.

Let the chlorinated well and distribution system stand for 12 to 24 hours. This will allow time for the chlorine solution to disinfect the well, or water source, and distribution system.

After at least 12 hours, the system should be pumped to waste until no further trace of chlorine is noticeable in the water.

If you have public or municipal sewers, run each tap until the disinfectant odor disappears, while allowing the water to go down the fixture drain. If you have a septic system, it is preferable to first connect a garden hose to an outside faucet or hydrant and run the water into a roadside ditch or drainage swale, until the disinfectant odor disappears. Then, turn on each water faucet to discharge the chlorine residual in the immediate vicinity of the faucet.

3. Sample the Water for Bacteriological Analysis Before Use

Following disinfection of the water supply system, the water should be sampled for bacteriological analysis. Remember that no water should be used for drinking or food preparation, unless it is first boiled or treated, until a satisfactory report is obtained from a laboratory. The safety of water cannot be judged by color, odor, or taste. The organisms that cause water-borne disease cannot be seen.

Contact your local health department or Sanitary Engineering for assistance or advice.

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SALVAGING FLOOD DAMAGED FOOD IN THE HOME

As a result of flooded conditions in homes, large quantities of foodstuffs may be submerged in flood water or sewerage backflow. While efforts may be made to salvage certain of these foods which have been contaminated, many items cannot be safely salvaged and should be destroyed. The following precautions are offered as a guide in the salvaging of flood-contaminated foods and containers.

1. Food in Sealed Metal Cans: Remove labels. Thoroughly wash in soapy water by scrubbing with a brush. Immerse containers in strong chlorine solution (100ppm chlorine) for 15 minutes. Make the solution by adding an ounce of chlorine-type laundry bleach to a gallon of clean water. Dry containers thoroughly to prevent rusting\

2. Bottled Foods: (Carbonated beverages, milk, catsup, olives, and similar foods.) These foods will usually contain contaminated water if submerged. Even if contaminated water has not entered the containers, they cannot be safely cleaned because all filth cannot be removed from under the edge of the closure. Such foods should be destroyed.

3. Fresh Fruits and Vegetables: Do not salvage. Destroy. Note--foods listed in this and Items 4, 5, 6, and 7, are easily contaminated and may contain dangerous disease causing organisms.

4. Meats, Poultry, Fish: Do not salvage. Destroy. Note-this does not apply to canned meats, fish, and poultry which may be salvaged as any other "canned food" (#1 above).

5. Lard, Butter, Oleo: Do not salvage. Destroy. Fats in undamaged hermetically sealed cans may be salvaged as outlined in "canned food" instructions (#1 above).

6. Sugar, Coffee, Tea, Eggs: Do not salvage. Destroy. If these foods are in hermetically sealed cans, they may be salvaged as outlined in "canned food" instructions (#1 above).

7. Cereals, Flour, Corn Meal, Etc: Do not salvage. Destroy.

As a general rule, food should not be salvaged unless it is in a container that protects it and is one which can be thoroughly cleaned with soap and water and sterilized with boiling water or chlorine. Since paper, cardboard, wood, and most plastic food containers are not waterproof; foods in such containers which have been under flood water should be destroyed.

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AC 317/233-7811

REHABILITATION OF BUILDINGS, FURNACES, FURNITURE, RUGS AND CLOTHING

Buildings Subjected to Floods:

Buildings which have been flooded should be examined carefully before being used for living quarters to make sure that they are safe and will not collapse. Loose plaster should be removed from the wails and ceilings so that it will not fall on occupants. Swollen doors and window sashes should be removed and allowed to thoroughly dry.

If water remains in the basement, it should be drained or pumped out as soon as possible. As the water is being removed, the mud should be stirred and carried away with it. After the basement has been allowed to thoroughly dry, floors and walls should be washed down with a solution of one pound of chloride of lime to six gallons of water or with a solution prepared from a commercial laundry bleach containing chlorine. Laundry bleaches, having 5.25% sodium hypochlorite, are good for this purpose. For use in basements as mentioned above, add one part of liquid chlorine laundry bleach to nine parts of water. Keep windows open for ventilation. Chlorine solutions are corrosive and should be mixed in plastic containers, enamel-lined metal pails or pans, or stoneware crocks. Do not apply solution to metal surfaces. Follow precautions printed on the chlorine container.

Walls, Woodwork, and Floors:

Walls and woodwork, while still damp, should be thoroughly scrubbed with a stiff fiber brush and water to remove all mud and silt. Particular attention should be given to ail corners, cracks, and crevices which should receive careful scrubbing. Floors should be cleaned of all mud and dirt and allowed to thoroughly dry. Artificial heat may be used with caution, however the temperature should not get high enough to cause steam (vapor) to rise from the floor and cause buckling or warping.

Redecorating should not be attempted for some time as it is useless to try to paint damp surfaces. Three or four months' drying time may be necessary before redecorating can be done satisfactorily.

Furnaces:

All parts of the heating system exposed to flood water should be thoroughly cleaned and dried. The smoke pipe and chimney should be inspected and cleaned, if necessary, and furnace doors or covers left open to ventilate the system. Burners should be removed if possible; cleaned, and allowed to dry to prevent rust and clogging of orifices.

Furniture should be moved to the sunshine and fresh air. Drawer-slides and other working parts should be stacked separately and allowed to air dry. All mud and silt should then be removed. Remove the furniture from the direct rays of the sun before it is subject to warping. Stoves and other metal fixtures should first have all the mud and silt removed and wiped with an oiled rag, polished or painted. Books should be allowed to dry carefully and slowly with alternate exposing to air and pressing. Toward the end of this treatment, books may be subjected to small amounts of artificial heat.

Rugs and Carpets:

Rugs and carpets should be stretched out on a flat surface and allowed to thoroughly dry with alternate turning to prevent mold; followed by beating, sweeping or vacuum cleaning. Rugs that require shampooing should be washed with commercial rug shampoo products or with a soap jelly, and then wiped off, rinsed with clean water, and allowed to thoroughly dry. Soap jelly may be prepared by mixing one pint of mild soap powder or flakes with five parts of hot water and beat with an egg beater until a stiff lather is formed. Resizing may be done with a commercial or home-made material. Home made sizing may be prepared by mixing one-half pound of granulated glue to one gallon of boiling water. Stretch the rug out flat where it will not be disturbed, apply with a wide brush and allow to thoroughly dry. When practical, upholstery may be cleaned by following the procedures outlined for rugs.

Clothing and Bedding:

Flood-soiled clothing and bedding require considerable care to obtain satisfactory results. All loose dirt should be brushed off, followed by thorough cleaning.

Revised 2/98

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Section 17: Food Safety and Sanitation

Table of Contents **Page**

Introduction

Although public health emergencies certainly have a direct human impact, they also may threaten other aspects of public health, such as safe food, water supplies, and sanitation. For example, a flood may overwhelm crops, food processing sites, or may result in sewage being deposited in water supplies. A bioterrorist event may be directed at agricultural or water supply targets just as easily (or even more so) as human targets.

Consumers are the final judges of the safety of the food they buy. The essential step for their protection is to check whether the food package or can is intact before opening it. If it has been damaged, dented or opened prior to purchase, the contents should not be used. Consumers need to be alert also to abnormal odor, taste and appearance of a food item. If there is any doubt about its safety, don't eat it.

Role of the Local Health Department

The local health department has the primary responsibility to ensure adequate food and water safety and sanitation. It may be necessary to conduct surveillance for foodborne or waterborne diseases and to respond to possible outbreaks. Surveillance may also be needed for environmental diseases, such as those contracted from exposure to raw sewage or insect vectors. Control measures to remove contaminated food and water, or raw sewage from the environment must be instituted as soon as possible.

The LHD also plays a key role in the investigation of disease and prevention efforts. The LHD may be notified of a suspected outbreak of illness by noting increased reports from local health care providers or by direct notification from the public. To aid in the investigation of suspected foodborne outbreaks, the ISDH has developed the *Foodborne Illness Investigation Reference Manual*. Each LHD should have at least one copy of this manual. In cases of suspected waterborne outbreaks or raw sewage exposure, it may be necessary for the LHD to collect water samples or conduct testing to determine the presence of sewage.

Outbreak Investigation

Outbreak investigations and subsequent control measures can be overwhelming for a single person or agency; these should be collaborative efforts. When an incident occurs requiring disease investigation, the ISDH will provide any necessary collaboration and support. Since the Communicable Disease Reporting Rule for Physicians, Hospitals and Laboratories (410 IAC 1-2.3) requires LHDs to report any outbreak or unusual disease occurrence immediately, this first report would be an excellent opportunity to begin collaboration and determine what assistance may be necessary. If the ISDH receives notification of an outbreak of illness, the LHD will likewise be notified immediately.

To report a suspected foodborne or waterborne outbreak, please call the ISDH Epidemiology Resource Center at 317-233-7009. To report a possible raw sewage deposit, please call the ISDH Sanitary Engineering Program at 317-233-7183.

Food Safety during Public Health Emergencies

For general information on emergency food and water safety, see Reference Library-Fact Sheets by the Federal Emergency Management Agency *Emergency Food and Water* on page 17-4.

Floods

See Indiana State Department of Health, Food Protection guidance *Salvaging Flood Damaged Food in the Home on page 17-7.*

Terrorism

The U.S. Department of Agriculture has a biosecurity system designed to prevent the harmful introduction of plant and animal pathogens into agriculture and food production starting at the farm and ending at the table. USDA biosecurity threats objectives are to first, to have systems in place to prevent the entry of plant or animal diseases and second, have resources and response mechanisms in place to contain and eradicate should we face an emergency.

Truck Wrecks involving food

See Indiana State Department of Health, Food Protection guidance *Procedures for Investigating Truck Wrecks Involving Food Products* on page *17-8.*

Food Establishments and Food Safety

See Guidelines for *Food Service Establishments During Boil Water Orders and Advisories* on page 17-9.

See Indiana State Department of Health, Food Protection guidelines *Recommendations for Equipment Subjected to Flood Water* on page 17-12.

See Indiana State Department of Health, Food Protection guidelines *Water Supply Emergency Procedures Guidelines for Food Establishments* on page 17-13.

Reference Library-Fact Sheets
Federal Emergency Management Agency

EMERGENCY FOOD AND WATER

Following a disaster, some people may not have access to food and water for days and perhaps even weeks. Taking steps to prepare and maintain a food and water emergency kit can prevent a difficult situation from becoming a life- -threatening one.

THINGS TO THINK ABOUT.

- What foods are nonperishable and do not need cooking and refrigeration?
- What foods are easily prepared?
- What foods are high in calories and protein that will help build energy?
- What foods appeal to family members?
- What foods are needed to meet the dietary needs of family members such as babies, toddlers, diabetics, and elderly people?

FOOD OPTIONS TO CONSIDER.

Compressed food bars. They store well, are lightweight, taste good, and are nutritious and high in calories.

Trail mix. Blends of granola, nuts, seeds, and dried fruits are available prepackaged, or assemble your own.

Dried foods. Dried foods are nutritious and satisfying, but they have salt content, which promotes thirst.

Freeze dried foods. Freeze dried foods are tasty and lightweight but need water for reconstitution.

Instant meals. Instant meals such as cups of noodles or cups of soup are also a good addition to kits, although they too need water for reconstitution.

Snack-sized canned goods. Snack-sized canned goods are good because they generally have pull-top lids or twist-open keys.

Prepackaged beverages. Beverages packaged in foil packets and foil-lined boxes are suitable for disaster supplies kits because they are tightly sealed and will keep for a long time.

FOOD OPTIONS TO AVOID.

Commercially dehydrated foods. Commercially dehydrated foods require a great deal of water for reconstitution and require extra effort in preparation. They also are inedible unless they are reconstituted

Bottled foods. Bottled foods are too heavy and bulky and break easily.

Meal-sized canned foods. Meal-sized commercially canned foods are also bulky and heavy.

Whole grains, beans, and pasta. Preparations of these foods could be complicated under the circumstance of a disaster.

PURCHASING FOODS.

Most of the foods appropriate for a Disaster Supplies Kit are available at local supermarkets. Specialty food stores such as health food stores or food storage supply houses as well as sporting goods stores may have foods prepared especially for this purpose.

FOOD STORAGE TIPS

- Keep food in the driest and coolest spot in the house - a dark area if possible.
- Keep food covered at all times
- Seal cookies and crackers in plastic bags and keep in tight containers.
- Open food boxes and cans carefully so that they can be closed tightly after each use.
- Store packages susceptible to pests, e.g., opened packages of sugar, dried fruits, and nuts in screw-top jars or airtight cans.
- Store wheat, corn, and beans in sealed cans or sealed plastic buckets.
- Buy powdered milk in nitrogen -packed cans for long term storage.
- Keep salt and vitamins in their original packages.
- Inspect all items periodically to make sure there are no broken seals or dented containers.

EMERGENCY COOKING.

In an emergency, food can be cooked using a fireplace, or a charcoal grill or camp stove, outdoors only. Food can also be heated with candle warmers, chafing dishes, and fondue pots. Canned foods can be heated and eaten directly out of the can. Completely remove the lid and label before heating the can to prevent internal combustion or the label catching fire.

3-DAY WATER SUPPLY

Stocking water reserves. Store a 3 day supply of water for each family member. The needs of each person will differ depending upon age, physical condition, activity, diet, and climate. A normally active person needs to drink at least 2 quarts of water daily. Children, nursing mothers, and ill people need more. Additional water is necessary for food preparation and hygiene. At least 2 gallons per person per day should be stored.

Storing water. Water should be stored in clean and sanitary containers. Plastic containers are good because they are lightweight and unbreakable. Glass containers are non-permeable but they are also breakable and heavy. Metal containers should be considered as a last resort because they may corrode and tend to give water an unpleasant taste.

Purifying contaminated water. In addition to having a bad odor and taste, contaminated water contain micro-organisms that cause diseases such as dysentery, cholera, typhoid, and hepatitis. All water of uncertain purity should be purified prior to use. The best method of purifying water is boiling for 10 minutes. If circumstances prevent this option, an alternate method is to mix water with a sterilizing agent to kill any microorganisms.

Purifying Agents. Your emergency food and water supply should include a liquid chlorine bleach that contains 5.25 percent sodium hypochlorite and no soap or fragrances. (Purification tablets and iodine are not effective purifying agents and are no longer recommended by the U.S. Department of Agriculture or the Centers for Disease Control.)

GENERAL TIPS

- The kit should be assembled based on the idea of providing each family member with at least one well-balanced meal per day.
- The food supplies should be rotated every 6 months to keep them fresh.
- A non-electric can opener and disposable utensils are essential additions to the kit.
- Include only dry food for pets.
- Provide enough calories to retain the strength to work.
- Include vitamins, minerals and protein supplements in your stockpile to ensure adequate nutrition.
- By reducing activity and staying cool, the amount of water a body requires can be minimized

Updated: February 20, 1997

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SALVAGING FLOOD DAMAGED FOOD IN THE HOME

As a result of flooded conditions in homes, large quantities of foodstuffs may be submerged in flood water or sewerage backflow. While efforts may be made to salvage certain of these foods which have been contaminated, many items cannot be safely salvaged and should be destroyed. The following precautions are offered as a guide in the salvaging of flood-contaminated foods and containers.

1. Food in Sealed Metal Cans. Remove labels. Thoroughly wash in soapy water by scrubbing with a brush. Immerse containers in strong chlorine solution (100ppm chlorine) for 15 minutes. Make the solution by adding an ounce of chlorine-type laundry bleach to a gallon of clean water. Dry containers thoroughly to prevent rusting.

2. Bottled Foods. (Carbonated beverages, milk, catsup, olives, and similar foods.) These foods will usually contain contaminated water if submerged. Even if contaminated water has not entered the containers, they cannot be safely cleaned because all filth cannot be removed from under the edge of the closure. Such foods should be destroyed.

3. Fresh Fruits and Vegetables. Do not salvage. Destroy. Note--foods listed in this and Items 4, 5, 6, and 7, are easily contaminated and may contain dangerous disease causing organisms.

4. Meats, Poultry. Fish. Do not salvage. Destroy. Note-this does not apply to canned meats, fish, and poultry which may be salvaged as any other "canned food" (#1 above).

5. Lard. Butter. Oleo. Do not salvage. Destroy. Fats in undamaged hermetically sealed cans may be salvaged as outlined in "canned food" instructions (#1 above).

6. Sugar, Coffee, Tea, Eggs. Do not salvage. Destroy. If these foods are in hermetically sealed cans, they may be salvaged as outlined in "canned food" instructions (#1 above).

7. Cereals. Flour, Corn Meal, Etc. Do not salvage. Destroy.

As a general rule, food should not be salvaged unless it is in a container that protects it and is one which can be thoroughly cleaned with soap and water and sterilized with boiling water or chlorine. Since paper, cardboard, wood, and most plastic food containers are not waterproof; foods in such containers which have been under flood water should be destroyed.

Revised 2/98

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PROCEDURES FOR INVESTIGATING TRUCK WRECKS INVOLVING FOOD PRODUCTS

1. If contacted by law enforcement agencies or other sources, advise ISDH Food Protection Program.
   - The food program will coordinated with other affected agencies, such as, FDA and USDA.
2. Obtain all essential information (type of product, if potentially hazardous, origination of load, destination, trucking company, manufacturer or distributor of products).

3. Assess the extend of product damage:
   - Is there contamination from road dirt, grass, toxic chemicals, truck fuel?
   - Are cases that are intact contaminated?
   - If perishable products such as meat, milk, etc. are on the load, evaluate if temperature abuse has occurred.

4. Determine if products can be salvaged or require disposition.
   - Work with the salvage dealer and/or insurance company.
   - Know destination of salvaged products and advise ISDH Food Protection.
   - If disposition is necessary: complete a disposition form, and send a copy to the ISDH. denature products if necessary.
   - Witness disposition at a sanitary landfill.
   - If products can be used for animal feed, document where and how to be used.

9/97

Guidelines for Food Service Establishments During Boil Water Orders and Advisories

A boil water advisory or interrupted water service is issued when some type of event has created the potential for contamination to enter the water supply and no direct sample evidence contamination is present. A boil water order or notice is issued when there is direct sample evidence that the system is contaminated. To continue operating under an advisory or notice, all food establishments must secure and use potable water from an approved source. Disinfection of water from suspect sources may be an alternative.

The following points of use should be considered in an emergency:

- All water used in beverages such as coffee, tea, or fountain drink dispenser
- All water used as an ingredient in any food products (i.e.: condiments, sauces, dressings, desserts, etc.)
- All water used to make consumable ice
- All water used for handwashing
- All water used for washing and sanitizing of food contact surfaces
- All water used for washing of produce
- All water used for sanitizing solution for wiping cloths
- All water used in 3-compartment sinks (unless sanitized with heat booster or chemical)

The following equipment is plumbed directly into the municipal water supply; therefore, it should not be used during a boil advisory or notice:

- Carbonated fountain drink machines
- Beverage "gun" dispensers
- Ice machines that manufacture ice
- Product misters in grocery stores and markets
- Low-temperature/chemical sanitizing dishmachines
- Self-serve bulk water dispensers

Acceptable Methods of Disinfection:

Chlorination: Add six (6) drops of liquid chlorine household bleach to one gallon of water and mix. Chlorine bleaches are inexpensive and can be secured from most grocery, discount, or drug stores. However, check the label to ensure that the active ingredient, sodium hypochlorite, is 5.25 percent.

1. Wait thirty (30) minutes after adding chlorine before using the water for drinking or cooking purposes.

2. If this treatment does not give the water a taste of chlorine, the above instructions should be repeated. Continue adding chlorine until a slight taste of chlorine is present and use this amount for future treatments.

3. The taste of chlorine is not particularly unpleasant and it will be evidence that the water is safe to drink.

Boiling: The water may also be purified by boiling. In this method, bring the water to a full boil for at least five (5) minutes. Cool and aerate the boiled water by pouring it through the air from one clean container to another, or mixing rapidly with a clean utensil. Aeration will reduce the flat taste caused by boiling.

NOTE: Water filtering or treatment units may not remove all of the contaminants that the advisory or notice is targeting. Do not use an in-place unit unless it has been approved by the local health department or the Indiana State Department of Health

Acceptable Equipment/Alternatives to use:

- Hot water sanitizing dishmachines can be used once checked to ensure 180 degrees F minimum final rinse temperature.
- Direct plumbed coffee makers are allowable, once checked to ensure brewing temperatures of 180 degrees F or above.
- Instead of using low-temperature/chemical dishmachines, use 3-bay sink with a heat booster set at 170 degrees F OR a chemical sanitizer at 100 ppm of chlorine.
- Food establishments may consider the following alternative procedures to minimize water usage:
- Commercially packaged ice may be substituted for ice made on-site.
- Single-serve items or disposable utensils may be substituted for reusable dishes and utensils.
- Prepared foods from approved sources may be used in place of foods requiring complex preparation.
- Restrict menu choices or hours of operation.
- Portable toilets may be utilized for sanitary purposes (units should include handsinks with own water source).

Monitor news reports to determine the status of the water supply and to determine if the advisory or notice has been lifted. Once the notice is rescinded, these precautionary measures *must* be followed:

1. Flush the building water lines and clean faucet screens, water line strainers on mechanical dishwashing machines and similar equipment

2. Flush and sanitize all water-using fixtures and appliances of standing water such as ice machines, beverage dispensers, hot water heaters, etc.

3. Run one batch of ice from machines that manufacture ice and discard

4. Clean and sanitize all fixtures, sinks, and equipment connected to water lines

NOTES:

In case of *chemical* contamination of the municipal water supply for a food establishment, the establishment shall immediately cease use of the water supply and contact the local health department. There must be water pressure before resuming operations in a food establishment and the water should be sampled for bacteriological quality. **The safety of water cannot be judged by color, odor or taste.**

Should there be any questions during water emergency orders regarding appropriate operations at a food establishment, contact your local health department or the Indiana State Department of Health Food Program at (317) 233-7360:

A health department representative does not need to be present at the establishment for these guidelines to be implemented. It is management's responsibility to ensure the establishment is operating in a safe manner so as to protect the health of the public.

INDIANA STATE DEPARTMENT OF HEALTH
Food Protection
2 North Meridian Section 5E
Indianapolis, Indiana 46204
AC 317/233-7360

RECOMMENDATIONS FOR EQUIPMENT SUBJECTED TO FLOOD WATER

- Determine the extent of the contamination, length of exposure and the type and age of the equipment.

- Domestic equipment subject to a significant flood water exposure should be considered no longer in good repair and replaced with NSF or similar equipment.

- Wood walk-in refrigerators and freezers should be removed and replaced with NSF or similar units.

- Commercial approved walk-in refrigerators and freezers can be cleaned by dismantling the panels and cleaning and sanitizing exposed areas. This would require a qualified manufacturer technician.

- Reach in refrigerators and freezers should be evaluated. If flooding was minimal, reconditioning may be possible. If flooding involved several feet of water for an extended time period, the insulation would be exposed which will make reconditioning diff~cult if not impossible. Foam insulation should be less absorbent than fiber insulation. The insulation value of fiber insulation may also be adversely affected by water exposure

- Interior an exterior surfaces of reconditioned reach-in refrigerators and freezers should be thoroughly cleaned and sanitized. Interior panels should be free of cracks or other damage. There should be no odor after reconditioning, and the units should be tested for temperature maintenance prior to being placed into service.

- Refrigerator and freezer compressors should be water tight. An appliance repair technician should verify that no electrical hazards exist for all electrical appliances.

- Most other commercial equipment including stoves, steam tables, preparation tables, fryer etc. should be capable of being cleaned and sanitized.

- Equipment can also be evaluated by the equipment manufacturer of an appliance repair service in your area.

9/97

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WATER SUPPLY EMERGENCY PROCEDURES GUIDELINES FOR FOOD ESTABLISHMENTS

To continue operating under ***"boil* water *advisories/notices"*** or ***"interrupted water service"*** from all water supplies, all food establishments must secure and use potable water from an approved source, e.g., from tank trucks, or bottled water. In emergencies, or as a temporary measure, water from contaminated or suspect sources can be disinfected by either chlorination or boiling.

Chlorination - add six (6) drops of liquid chlorine household bleach to one gallon of water and mix. Chlorine bleaches are inexpensive and can be secured from most grocery, discount, or drug stores. However, check the label to ensure that the active ingredient, sodium hypochlorite, is 5.25 percent.

a. Wait thirty (30) minutes after adding chlorine before using the water for drinking or cooking purposes.
b. If this treatment does not give the water a taste of chlorine, the above quantities should be doubled. Repeat the addition of chlorine until a slight taste of chlorine is present and use this amount for future treatments.
c. The taste of chlorine is not particularly unpleasant and it will be evidence that the water is safe to drink.

Boiling - the water may also be purified by boiling. In this method, bring the water to a full boil for at least five (5) minutes. Cool and aerate the boiled water by pouring it through the air from one clean container to another, or mixing rapidly with a clean utensil. Aeration will reduce the flat taste caused by boiling.

The following are water uses that should be considered, but not limited to:
- coffee, tea, other beverages made in the food establishments
- direct feed coffee urns piumbed directly into the water system
- post-mix soda or beverage machines
- ice machines that manufacture ice on-site
- washing produce or thawing frozen foods
- employees hand washing
- washing of cooking equipment and utensils
- water used in 3-compartment sinks
- water for sanitizing solution for wiping cloths
- water for mechanical dishwashers
- washing of fruits and vegetables

Food establishments may consider the following alternative procedures to minimize water usage:

- commercially packaged ice may be substituted for ice made on-site
- single-service items or disposable utensils may be substituted for reusable dishes and utensils
- prepared foods from approved sources in place of complex preparations on-site
- restrict menu choices or hours of operation
- portable toilets may be utilized for sanitary purposes

After the "water emergency" is officially lifted or water service resumes, these precautionary measures ***must*** be followed:

1) Flush the building water lines and clean faucet screens, water line strainers on mechanical dishwashing machines and similar equipment.

2) Flush and sanitize all water-using fixtures and appliances of standing water such as ice machines, beverage dispensers, hot water heaters, etc.

3) Clean and sanitize all fixtures, sinks, and equipment connected to water lines.

There must be water pressure before resuming operations in a food establishment and the water should be sampled for bacteriological quality. The safety of water cannot be judged by color, odor, or taste.

NOTE: In case of ***chemical*** contamination of the municipal water supply for a food establishment, the establishment shall ***immediately cease use*** of the water supply and contact the local health department.

Should there be any questions during water emergency orders regarding appropriate operations at a food establishment, contact your local health department or the Indiana State Department of Health Food Program at (317) 233-7360.

References

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FEMA. (2002*). Emergency Food and Water.* Available: http://www.fema.gov/fema/foodf.html

USDA (2002). *Gateway to Government Food Safety Information.* Available: http://www.foodsafety.gov/~fsg/bioterr.html

USDA. (2002). *Keep America's Food and Agriculture Safe.* Available: http://www.usda.gov/homelandsecurity/homeland.html

Section 18: Mass Prophylaxis

Certain public health situations may necessitate prophylaxis of large numbers of people in a short time frame to prevent the transmission of illness. Examples of such events include, but are not limited to:

- case of hepatitis A in a food handler
- influenza pandemic
- case of bacterial meningitis within a crowded setting
- mass exposure to a rabid animal
- bioterrorism event

Mass prophylaxis requires collaboration and communication among several entities to provide rapid, effective intervention. Local health departments and community health care providers will often be the first to observe a public health crisis developing; therefore, immediate notification of the ISDH of a potential public health crisis is critical. The decision to provide mass prophylaxis does not rest upon one agency alone, and several factors will influence the decision to provide intervention.

The ISDH has developed the *Protocol for Mass Prophylaxis* in cooperation with various intra-agency programs and local health departments to provide a consistent response for mass immunization or prophylaxis. This protocol is organized into three phases: the decision process to provide mass intervention, the procedure for conducting a mass prophylaxis clinic, and resolution of the crisis. This protocol also lists key ISDH contacts for quick notification and the responsibilities of various agencies.

Each local health department should have a copy of the *Protocol for Mass Prophylaxis* available. For questions pertaining to the protocol, please call the ISDH Epidemiology Resource Center at 317-233-7009. Additional copies of the protocol are available at http://www.in.gov/isdh/publications/prophylaxis/mpmain.htm

MASS PROPHYLAXIS PLANS NEED TO BE MADE BY EACH COUNTY.

INSERT COUNTY MASS PROPHYLAXIS PLAN HERE.

Section 19: National Pharmaceutical Stockpile

The National Pharmaceutical Stockpile (NPS) contains medical supplies that are designed for the use of health departments whose jurisdictions are the target of a chemical or biological terrorism attack, major natural disaster, or technological accident. The NPS was created on the assumption that if a large scale attack on the United States occurred, local medical supplies could be quickly depleted by an influx of victims needing care. Because most local medical care facilities do not keep large stockpiles, there is a credible need for a national stockpile.

The mission of the NPS is to ensure the availability of life saving supplies. In the event it is requested, the NPS would be accessible anywhere in the United States. The resources provided by the NPS have the ability to supplement the initial response of local and state emergency, medical, and public health personnel to an incident of biological or chemical terrorism.

The Centers for Disease Control and Prevention (CDC) is responsible for and in control of the NPS. The governor or designated individual has to request NPS deployment on behalf of the state in need. To deploy the stockpile, there must be strong epidemiological, laboratory, and public health information justifying its need. For example, the NPS was deployed in New York City to help aid the victims for the September 11th terrorism attacks at the world trade centers. Upon request and approval, the NPS is deployed. Upon arrival, the NPS becomes the responsibility and control of the residing authority.

Contents within the NPS contain various medical supplies and materials. Pharmaceuticals, antibiotics, chemical interventions, medical supplies, and other medical equipment are included. The CDC has developed relationships with various national security agencies so there can be continuous updates and threat analyses. This allows the CDC to ensure that the NPS contains supplies that are reflective of the current needs based on the current threats.

There are two components to the NPS, the 12 hour push package and the Vendor Managed Inventory (VMI). The 12-hour push packages are secured at twelve confidential locations throughout the United States. Locations of the confidential packages are positioned strategically nationwide so they are easily accessible by air or ground transportation methods.

The 12 hour push package is designed for immediate response. They are called 12 hour push packages, because they can be obtained by any city and most United States Territories within 12 hours of approved request to deploy. Each 12 hour push packages consists of 50 tons of preassembled medical supplies. The packages contain a broad variety of supplies that will enable care givers and emergency medical staff to treat various agents. More than 90 product categories are included in the push packages. One 12 hour push package will fill an entire wide body cargo aircraft, such as a Boeing 747 or

up to seven 48 foot semi-tractor trailers. The cost of a single 12 hour push package is roughly valued at three million dollars.

The second component, the VMI is designed for use when there is an incident that requires a greater response than what the 12 hour push package can provide. After the VMI request has been approved, it will arrive within 24 to 36 hours. These VMI materials contain pharmaceutical and medical supplies like the 12 hour push package does, but are more specific. The supplies included, such as pharmaceuticals, can be tailored to provide pharmaceuticals for a specific agent or even a combination of agents.

ISDH is working with the State Emergency Management Agency (SEMA), the Pharmaceutical Board, and the Indiana State Police (ISP) and others to create a complete plan for the use of the NPS in the event that it is needed. The plan is comprehensive in that contains detailed information with policies and standard operating procedures for every aspect of the NPS. This includes receiving, organizing, repackaging, and distributing the NPS. Within these categories, issues include but are not limited to request, security, temperature controlled storage, transportation, and tracking of the NPS in the event that it is deployed to the state of Indiana. The residing authority in Indiana for the NPS will be the Indiana State Department of Health.

COUNTIES NEED TO PLAN HOW TO DISPENSE THE NPS, IF IT IS REQUESTED.

INSERT COUNTY PLAN HERE.

Section 20: Laboratory Procedures for Environmental Sampling

Table of Contents **Page**

Laboratory Procedures for Environmental Sampling

Introduction

Environmental sampling can be used to help determine the extent and degree of contamination, to support decisions regarding the need for cleanup, and to provide guidance regarding when cleanup is adequate to permit re-entry into an area. The use of experienced investigators to conduct the environmental sampling will provide the best probability of locating and identifying *B. anthracis* spores if present.

Laboratory procedures for environmental sampling are also available via the Health Alert Network. For updated procedures and new information regarding laboratory sampling visit the Health Alert Network website at http://www.phppo.cdc.gov/han

The decision to collect environmental samples for culturing *s*hould be made by medical, environmental, and other relevant professionals and be based on the nature and location of the suspected contamination, the medical diagnoses and opinions, the potential for the contaminant to migrate, and the activity for which the facility is used. Representatives from local, state, and federal agencies should be consulted during the decision-making process.

Before sampling is begun, airflow patterns, heating, ventilating, and air-conditioning systems should be considered. The ventilation system serving the contaminated area should be shut off to prevent further airborne spread of the agent. If the contaminated area is small, discrete, and only lightly contaminated, cordoning off the area may provide adequate protection. If the contaminated area is large, the affected area should be sealed off using an interim dust barrier made from impervious lightweight plastic (e.g., 6 mil polypropylene) sheeting. Tight seals should be maintained at the full perimeter of temporary walls and sealed by tape at ceiling height in the same way that areas are sealed off for asbestos abatement or dust control during building renovation. Air vents in the area should also be sealed with plastic sheeting and tape to control the risk of dust dispersal and recirculation.

The sampling method and number of samples collected will be determined by the circumstances and setting of the potential contamination. A sufficient number of samples must be taken to increase the probability that the sampling is representative. Obtaining samples from additional locations may provide more specific information on the source of the contamination. More samples are preferred over larger individual sampling areas. If larger areas are suspected as contaminated, then more samples should be taken. For each sample collected, the usual, non-forensic chain-of-custody procedures should be followed and documented as designated by the local state health laboratory reporting requirements. A diagram of the area should be made to track and identify sample locations. Taking photographs of the location where the samples are collected is often helpful.

The first priority should be to collect samples in locations that are near suspected release source. Samples should be collected by moving inward in concentric circles toward the suspected release source, following the path over which spores may have dispersed. If there is an aerosol contamination that has an aerodynamic size of less than 10 microns, such as *B. anthracis* spores, the particles will remain suspended in the air for extended periods of time. In such cases, the spores can quickly spread throughout an air space and into adjacent areas. Spores can also be carried if they attach to clothing, shoes, or other objects; thus, more distant sampling may be needed.

A kit containing items for sampling of laboratory specimens is suggested to include a variety of items for sampling of biological weapon agents. Collection package kits for sampling are also commercially available for purchase.

Recommended Collection Package Contents
Package: 4 G class 6.2/97 USA / + AX 2067
Cardboard Box: (Outside cardboard container labeled, as above)
Styrofoam container
Instructions
Three culturette swabs. Instructions are on the sleeve of each culturette
Plastic, Coleman type container, with handles
Three premoistened sponges
Three disposable forceps (tweezers)
1 box self-sealing 1 gallon bags
1 box nitrile gloves (medium) and 1 box nitrile gloves (large)
Diaper padding or equivalent absorbent material
One plastic container with a biohazard label
Biohazard bags (several of various sizes ranging from 8"x12" to 25"
Disposable gowns (as needed and requested)
Evidence Tape

Bulk Sampling

Bulk samples can help investigators characterize the presence of contamination on building materials such as carpets, office equipment, and supplies. However, because extracting spores from bulk samples can pose exposure concerns for laboratory personnel; appropriate precautions (such as double-bagging of samples) should be taken. The results of bulk sample analyses are qualitative.

Collecting Bulk Samples

Bulk samples are not acceptable for all laboratories. All submitted samples must be opened in a biological safety cabinet (BSC) which has a limited protected working space. Please contact the Indiana State Department of Health laboratories prior to collection to determine whether the sample will be accepted.

1. Don sterile, non-powdered nitrile or vinyl examination gloves over the gloves that are part of standard PPE and clothing.
2. Collect and bag the item; seal the bag.
3. Thoroughly clean gloves and the outside of the sealed bag with a 0.5-0.6% (5,000-6,000 ppm) sodium hypochlorite solution just prior to leaving the contaminated area. Typical household bleach sold in the United States contains approximately 5.25-6% (52,500-60,000 ppm) sodium hypochlorite. The disinfection solution is made by adding 1 part household bleach to 9 parts water (a 1:10 dilution). Final solutions should be in a pH range of ~6-8. Clorox® bleach* diluted 1:10 meets these requirements. When using other brands, one should confirm the buffering capacity and sodium hypochlorite concentrations.
4. Record the following items:
   Measured size of the area sampled
   Type of sample
   Time and date of sample
   Name of person collecting sample
5. Submit the samples to the laboratory for culture.
6. Transport samples to the laboratory at ambient temperature.
7. Maintain appropriate chain-of-custody documentation and procedure.

To collect another sample, change gloves to prevent cross-contamination and repeat steps 1-5.

Surface Sampling

Surface samples are collected by wiping non-porous surfaces with an absorptive medium from which spores can be extracted in the laboratory. The absorptive media, wetting agent, and bags used to transport samples should be selected with input from the laboratory personnel who will be analyzing the samples so that collection procedures will be compatible with the laboratory's analytical procedures. There are several absorptive media available, but noncotton swabs are preferred. These swabs must be sterile and used with a sterile wetting agent such as sterile water, a sterile saline solution, or a sterile phosphate-buffer solution. The results of surface sample analyses are qualitative.

Collecting Sterile Swab Samples

The following steps are used to collect samples for laboratory culture from small non-porous surfaces or objects.

1. Don sterile, non-powdered nitrile or vinyl examination gloves over the gloves that are part of standard PPE and clothing.
2. Remove a sterile, non-cotton swab from the package.
3. Moisten the swab with 100-200µl (or 1-2 drops) of a sterile water, sterile saline, or sterile phosphate-buffered saline (PBS) solution. This can be done by using a disposable Pasteur pipette and aseptic technique. Note: Check with the laboratory that will do the analysis to determine which type of swab or solution is preferred.
4. Wipe the surface. Recommended wipe area is 10x10 cm. Avoid letting the swab dry completely.
5. Place the sampled swab into a sterile conical vial, and cap the vial.
6. Record the following items:
   Measured size of the area sampled
   Type of sample
   Time and date of sample
   Name of person collecting sample
7. Label the vial, and place it in a self-sealing bag (such as a Ziploc® bag or Whirlpak®).*
8. Thoroughly clean gloves and the sealed bag with a 0.5-0.6% (5,000-6,000 ppm) sodium hypochlorite solution just prior to leaving the contaminated area. Typical household bleach sold in the United States contains about 5.25-6% (52,500-60,000 ppm) sodium hypochlorite. The disinfection solution is made by adding 1 part household bleach to 9 parts water (a 1:10 dilution). Final solutions should be in a pH.range of ~6-8. Clorox® bleach diluted 1:10 meets these requirements. When using other brands, one should confirm the buffering capacity and sodium hypochlorite concentrations.
9. Place the cleaned, sealed bag in another unused similar bag.
10. Transport samples to the laboratory at ambient temperature.
11. Maintain appropriate chain-of-custody documentation and procedure.

To collect another sample, change gloves to prevent cross-contamination and repeat steps 1-9.

Vacuum Samples

Although collecting samples by vacuuming offers the advantages of covering large surfaces and collecting material from porous areas such as carpets, only high-efficiency particulate air (HEPA) vacuum cleaners must be used. Any conventional home or industrial vacuum cleaners will only further disperse spores. A hose or diffuser can be retrofitted to the vacuum cleaner exhaust so that the HEPA-filtered exhaust can be vented outside the contaminated zone to prevent reaerosolization of spores within the

contaminated area. There are several methods for collecting vacuum samples. One option is to connect a filtering Alsock® (dust collection trap manufactured by Healthy Home Air or equivalent)* to the inlet nozzle of a HEPA vacuum cleaner. A second option is to collect a sample on a 37-millimeter (mm) diameter mixed cellulose ester (MCE) filter contained in a plastic sampling cassette. The analytical results from this type of sampling are qualitative. Finally, when selecting sampling equipment, consideration should be given to whether and how it can be decontaminated.

Collecting Samples with a HEPA Vacuum Cleaner

The following steps should be used to collect samples for laboratory culture from large porous or non-porous surfaces such as carpeting, ceiling tiles, ventilation systems, and papers.

1. Don sterile non-powdered nitrile or vinyl examination gloves over the gloves that are part of the standard PPE and clothing.
2. Insert a cone-shaped filtering Alsock® (dust collection trap manufactured by Healthy Home Air or equivalent)* into the vacuum cleaner nozzle.
3. Fold the plastic sleeve over the outside of the nozzle, and secure it with tape or an elastic band.
4. HEPA-vacuum the surface. Note: 1-2 tablespoons of vacuumed debris are needed. *Technique: Make one pass of the entire sampling area at a slow rate (12 inches per 5 seconds).*
5. Record the following items:
    - Measured size of the area sampled
    - Type of sample
    - Time and date of sample
    - Name of person collecting sample
6. After collecting the sample, remove the tape or elastic band and discard these items as contaminated waste.
7. Remove the cone-shaped dust collection trap, and place it in a self-sealing bag (such as a Ziploc® bag or Whirlpak®),* or roll the filter and place it in a sterile conical vial with a screw cap lid.
8. Place the sample in a clean self-sealing bag and label it.
9. Thoroughly clean gloves and the sealed bag with a 0.5-0.6% (5,000-6,000 ppm) sodium hypochlorite solution just prior to leaving the contaminated area. Typical household bleach sold in the United States contains about 5.25-6% (52,500-60,000 ppm) sodium hypochlorite. The disinfection solution is made by adding 1 part household bleach to 9 parts water (a 1:10 dilution). Final solutions should be in a pH range of ~6-8. Clorox® bleach diluted 1:10 meets these requirements. When using other brands, one should confirm the buffering capacity and sodium hypochlorite concentrations.
10. Place the cleaned sealed bag in another unused self-sealing bag.
11. Transport samples to the laboratory at ambient temperature.

12. Maintain appropriate chain-of-custody documentation and procedure.

To collect another sample, change gloves and clean the nozzle with the bleach solution followed by alcohol to prevent cross-contamination, and repeat steps 1-10.

Letters/Packages

Follow the protocol described above for bulk samples. Consult with the ISDH Laboratory before delivering samples that exceed the size of a five gallon bucket. All submitted samples must be opened in a biological safety cabinet (BSC) which has a limited protected working space. Wipe or swab samples of the item could be an acceptable substitute.

Disposal of Collection Gear

Unless proper disposal of the collection gear (e.g. gloves, gowns, etc) is available in the field, double bag these items in biohazard bags separately from the specimens and seal with tape and clearly identify the contents as collection gear. Submit with the samples but do not include in the sample description section of the submission form.

Transport

All environmental samples, possibly excluding some swab samples, should be submitted to the Indiana State Department of Health Laboratories. Generally, a representative of law enforcement (Local, State, or Federal) or Public Health (Local or State) will supervise the transport to ensure proper chain of custody.

Completion of Required Sample Submission Form

In addition to any investigative forms that may be required by the individual submitter, the ISDH Laboratories requires submission of interim forms to also be completed. ***See Appendix C for the Bioterrorism Environmental Sample Submission Form and Chain of Custody Form.***

Most of the fields on the form are self-explanatory. The key fields are those which clearly identify the investigative authority to whom the final results are to be reported. Also, by providing 24/7 contact information, the results and/or questions can be communicated rapidly. Contact the ISDH Laboratories at 317-233-8000 during normal

business hours (8:15 PM to 4:45 PM) M-F. The ISDH Emergency Duty Officer can be contacted at 317-233-1325 during non-business hours including weekends and holidays.

Personal Protective Equipment:

Protective personal equipment should be worn when workers are at risk for exposure to biological agents of high concern. Powered air-purifying respirator with full face piece and High-Efficiency Particulate Air (HEPA) Filters, disposable protective clothing with integral hood and booties, and disposable gloves should be worn during environmental sampling. Additional information can be found at http://www.bt.cdc.gov/DocumentsApp/Anthrax/Protective/Protective.asp

References:

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National Institute for Occupational Safety and Health. (2002). *Procedures for Collecting Surface Environmental Samples for Culturing Bacillus anthracis.* Available: http://www.cdc.gov/niosh/unp-envsamp.html

Section 21: Laboratory Procedures for Clinical Sampling

Table of Contents **Page**

Laboratory Procedures for Clinical Sampling

Introduction

Evaluation should be performed through standard laboratory tests following the Laboratory Response Network (LRN) guidelines, which are available under the laboratory information link at http://www.bt.cdc.gov

All culture isolates that cannot be ruled out and are therefore presumptively positive should be referred to an LRN State Public Health Laboratory for confirmatory testing by the LRN Level B protocol and standardized algorithm for identification.

Only use ziplcok bags that close using pressure type sealing. Slide-lock bags leak and are unacceptable.

Level A Laboratory Procedures for Identification of Various Agents updates can be found at http://www.bt.cdc.gov/LabIssues/index.asp

Section 22: Additional Resources:

- Centers for Disease Control and Prevention (CDC). *Public Health Emergency Preparedness and Response.* http://www.bt.cdc.gov

- Indiana Counter-Terrorism and Security Council (C-TASC)
  http://www.in.gov/c-tasc/

- Indiana State Department of Health. *Bioterrorism Questions & Answers.*
  http://www.in.gov/isdh/bioterrorism/index.html

- Indiana State Emergency Management Agency (SEMA)
  http://www.in.gov/sema/

- John Hopkins University School of Public Health and Medicine. *Center for Civilian Biodefense Strategies.*
  http://www.hopkins-biodefense.org/

- Monterey Institute of International Studies. Center for Nonproliferation Studies. *Chemical & Biological Weapons*. http://www.cns.miis.edu/

- The Office of Homeland Security
  http://www.whitehouse.gov/homeland/

- UCLA School of Public Health, Department of Epidemiology. *Epidemiologic Information on Bioterrorism.*
  http://www.ph.ucla.edu/epi/bioter/bioterrorism.html

- US Army Medical Research Institute of Chemical Defense.
  http://chemdef.apgea.army.mil/

- US Department of Health and Human Services. *Public Health Preparedness.*
  http://www.hhs.gov/hottopics/healing/

- Radiation Emergency Assistance Center/Training Site. *Basics of Radiation.*
  http://www.orau.gov/reacts/define.htm

Antibiotic Treatment Dosing Guidelines

for

National Pharmaceutical Stockpile Components

Centers for Disease Control and Prevention
Department of Health and Human Services

CENTERS FOR DISEASE CONTROL AND PREVENTION

May 2001

Inhalational Anthrax Treatment Protocol

	Initial therapy	Duration
Adults: ***Intravenous***	Ciprofloxacin 400 mg BID[1] **OR**	**Estimated for 7 days**. (Switch to oral antibiotic therapy when clinically appropriate to complete 60-da regimen.)
	Doxycycline 100 mg BID **OR**	
	Erythromycin 15-20 mg/kg/day in divided doses	
	Penicillin G 20 MU/day in divided doses	
Oral	Ciprofloxacin 500 mg BID **OR**	Estimated for 60 days[2]
	Doxycycline 100 mg BID	
Children[3] ***Intravenous***	Ciprofloxacin 15 mg/kg IV Q12hrs [1,4] **OR**	**Estimated for 7 days**. (Switch to oral antibiotic therapy when clinically appropriate to complete **60-day**[2] regimen.)
	Doxycycline[5]: **> 8 yrs and > 45 kg**: 100 mg BID **> 8 yrs and ≤ 45 kg**: 2.2 mg/kg/day in 2 divided doses ≤ 8 yrs: (same as **> 8 yrs and ≤ 45 kg)** **OR**	
	Erythromycin 15-20 mg/kg/day IV in divided doses	
	Penicillin G 400,000 Units/kg/day in divided doses	
Oral	Ciprofloxacin 15-20 mg/kg Q12 hrs[4] **OR**	**Estimated for 60 days**[2]
	Doxycycline[5]: **> 8 yrs and > 45 kg**: 100 mg BID **> 8 yrs and ≤ 45 kg**: 2.2 mg/kg BID **≤ 8 yrs**: same as above	

Inhalational Anthrax Treatment Protocol, cont'd

Pregnancy[3,6]	Same as for non-pregnant adults (the high mortality rate from the infection outweighs the risk posed by the antibiotic)
	Doxycycline oral not recommended for more than 14 days of therapy.
Immuno-compromised	Same as for non-immunocompromised adults and children

1. Therapy with ciprofloxacin may be initiated either as intravenous or oral dosage form. The pharmacokinetics are such that oral ciprofloxacin is rapidly and well absorbed from the GI tract with no substantial loss by first-pass metabolism. Maximum serum concentrations are attained I-2 hours after oral dosing.
2. Because the potential persistence of spores following a possible aerosol exposure, antibiotic therapy should be continued for at least 30 days if used alone, and although supporting data are less definitive, longer antibiotic therapy (up to 42-60 days) might be indicated.
3. If susceptibility testing allows, therapy should be changed to N penicillin for treatment or oral amoxicillin for post-exposure prophylaxis to continue therapy out 60 days.
4. Ciprofloxacin dose should not exceed 1 gram/day in children.
5. In 1991, the American Academy of Pediatrics amended their recommendation to allow treatment of young children with tetracyclines for serious infections, such as, Rocky Mountain Spotted Fever, for which doxycycline may be indicated. Doxycycline is preferred for its twice-a-day dosing low incidence of gastrointestinal side effects.
6. Although tetracyclines are not recommended during pregnancy, their use may be indicated for life-threatening illness. Adverse affects on developing teeth and bones are dose related, therefore, doxycycline might be used for a short course of therapy (7-14 days) prior to the 6th month of gestation. Please consult physician after the 6'" month of gestation for recommendations.

Tularemia (pneumonic, pleuropulmonary, typhoidal) Treatment Protocol

	Initial Therapy	Duration
Adults	Gentamicin 3-5 mg/kg/day (or in 3 divided doses, Q8 hrs) (IV or IM) [1,2] **OR**	**7 -14 days** (If switching to oral doxycycline, duration of therapy should continue for a total of **21 days**)
	Doxycycline 100 mg IV BID **OR**	Estimated for **21 days** (May switch to oral doxycycline when clinically appropriate)[3]
	Ciprofloxacin 400 mg IV BID	Estimated for 10-14 days (May switch to oral therapy when clinically appropriate)
Children	Gentamicin 6.0-7.5 mg/kg/day (or in 3 divided doses) (IV or IM) [1,2] **OR**	**7 -14 days** (If switching to oral doxycycline, duration of therapy should continue for a total of **21 days**)
	Doxycycline[4]: **> 8 yrs and > 45 kg**: 100 mg IV BID **> 8 yrs and ≤ 45 kg**: 2.2 mg/kg/day in 2 divided doses **≤ 8 yrs**: (same as **> 8 yrs and ≤ 45 kg)** **OR**	Estimated for **21 days** (May switch to oral doxycycline when clinically appropriate)[3]
	Ciprofloxacin[5] 15 mg/kg Q12hrs	Estimated for **10-14 days** (May switch to oral therapy when clinically appropriate)
Pregnancy [6,7]	Same as for non-pregnant adults	
Immuno-compromised	Same as for non-immunosuppressed adults and children	

1. Treatment of choice for tularemia is streptomycin. Streptomycin can be difficult to obtain; therefore gentamicin is often used and appears to be equally effective. Doxycycline is approved for the treatment of tularemia and is 90-100% absorbed after oral administration. This complete absorption may allow for its use in patients who can tolerate oral administration to complete the duration of therapy that is designated above.
2. The frequency of administration is left up to the discretion of the clinician, however, it should be noted that once-daily dosing of aminoglycosides is investigational. The manufacturers usually recommend that the daily dose be given in equally divided doses at 8-hour intervals; however, current evidence suggests that once-daily (single-daily) dosing of aminoglycosides is at least as effective as, and may be less toxic than, conventional dosing regimens employing multiple daily doses of the drugs.
3. To avoid relapses with shorter courses of therapy, longer courses of therapy are required when using oral doxycycline in F. tularensis due to doxycycline's bacteriostatic mechanism of action.
4. In 1991, the American Academy of Pediatrics amended their recommendation to allow treatment of young children with tetracyclines for serious infections, such as, Rocky Mountain Spotted Fever, for which doxycycline may be indicated. Doxycycline is preferred for its twice-a-day dosing low incidence of gastrointestinal side effects.
5. Ciprofloxacin dose should not exceed 1 grarn/day in children.
6. Aminoglycosides can cause fetal toxicity when administered to pregnant women, but **potential benefits from use of the** drug may be acceptable in certain conditions despite the possible risks to the fetus.
7. Although tetracyclines are not recommended during pregnancy, its use may be indicated for life-threatening illness. Adverse affects on developing teeth and bones are dose related, therefore, doxycycline might be used for a short course of therapy (7-14 days) prior to the 6t^{h} month of gestation. Please consult physician after the 6`^{h} month of gestation for recommendations.

May 2001

Plague Treatment Protocol

	Initial Therapy	Duration
Adults ***Intravenous***	Gentamicin 3-5 mg/kg/day (or in 3 divided doses, Q8 hrs) (IV or IM) [1,2] **OR** Doxycycline 100 mg BID **OR**	**Estimated for 10 Days** (Switch to oral Doxy when clinically appropriate to complete 10 day therapy)
Oral	Doxycycline 100 mg BID	**Estimated for 10 Days**
Children[4] ***Intravenous***	Gentamicin 6-7.5 mg/kg/day or in 3 divided doses (Q 8 hrs)[2] **OR** Doxycycline[3]: **> 8 yrs and > 45 kg**: 100 mg BID **> 8 yrs and ≤ 45 kg**: 2.2 mg/kg/day in 2 divided doses **≤ 8 yrs**: (same as **> 8 yrs and ≤ 45 kg)** **OR**	**Estimated for 10 Days** (Switch to oral Doxy when clinically appropriate to complete 10 day therapy)
Oral	Doxycycline[3]: **> 8 yrs and > 45 kg**: 100 mg BID **> 8 yrs and ≤ 45 kg**: 2.2 mg/kg BID **≤ 8 yrs**: 2.2 mg/kg BID	**Estimated for 10 Days**
Pregnancy [4, 5]	Same as for non-pregnant adults	
Immuno-compromised	Same as for non-immunosuppressed adults and children	

1. Treatment of choice for plague is streptomycin. Streptomycin can be difficult to obtain; therefore gentamicin is often used as the drug of choice and appears to be effective.
2. The frequency of administration is left up to the discretion of the clinician, however, it should be noted that once-daily dosing of aminoglycosides is investigational. The manufacturers usually recommend that the daily dose be given in equally divided doses at 8-hour intervals; however, current evidence suggests that once-daily (single-daily) dosing of aminoglycosides is at least as effective as, and may be less toxic than, conventional dosing regimens employing multiple daily doses of the drugs.
3. In 1991, the American Academy of Pediatrics amended their recommendation to allow treatment of young children with tetracyclines for serious infections, such as, Rocky Mountain Spotted Fever, for which doxycycline may be indicated. Doxycycline is preferred for its twice-a-day dosing low incidence of gastrointestinal side effects.
4. Aminoglycosides can cause fetal toxicity when administered to pregnant women, but potential benefits from use of the drug may be acceptable in certain conditions despite the possible risks to the fetus.
5. Although tetracyclines are not recommended during pregnancy, its use may be indicated for life-threatening illness. Adverse affects on developing teeth and bones are dose related, therefore, doxycycline might be used for a short course of therapy (7-14 days) prior to the 6,h month of gestation. Please consult physician after the 6th month of gestation for recommendations.

References:

1. Bacterial Zoonoses Branch, DVBID, NCID, CDC: (December 14, 1999)
2. Emerging Bacterial and Mycotic Disease Branch, DBMD, NCID, CDC: (February 12, 1999)
3. AHFS Drug Information® 1999
4. Drugs Facts and Comparisons® 2000
5. 1997 Red Book, Report of Committee on Infectious Diseases, 20 Edition, American Academy of Pediatricians
6. Mandell, Douglas, and Bennett's, Principles and Practices of Infectious Diseases, 5th Edition
7. Control of Communicable Diseases Manual, 16th Edition, 1995
8. Inglesby TV, Henderson DA, Bartlett JG, et al. Anthrax as a Biological weapon, Medical and Public Health Management. JAMA 1999; 281(18):1735-1745.
9. Red Book 2000, American Academy of Pediatrics, 25th Edition.
10. Blaser J, Konig C. Once-Daily Dosing of Aminoglycosides. Eur J Microbiol Infect Dis., 1995, 14:1029-1038.
11. Abramson J, Jon S, Givner LB. Rocky Mountain Spotted Fever. [Review] Ped Inf Dis J. 18(6):539-540, June 1999.
12. Inglesby TV, Dennis DT, Henderson DA, et al. Plague as a Biological Weapon, Medical and Public Health Management. JAMA 2000;283(17):2281-2290.
13. Use of Anthrax Vaccine in the United States: Recommendations of the Immunization Practices Advisory Committee (ACID), MMWR, December 15 2000/Vol. 49/No. RR-15.
14. Inglesby TV, Dennis DT, Henderson DA, et al. Tularemia as a Biological Weapon, Medical and Public Health Management. JAMA 2001, In Press.

Antibiotic Post-Exposure Prophylaxis Dosing Guidelines

for

National Pharmaceutical Stockpile Components

Centers for Disease Control and Prevention
Department of Health and Human Services

CENTERS FOR DISEASE CONTROL AND PREVENTION

May 2001

Anthrax Post-Exposure Prophylaxis Protocol

	Initial therapy	Duration
Adults, including pregnant women[1,2] and Immuno-compromised	Ciprofloxacin 500 mg po BID **OR**	60 days
	Doxycycline 100 mg BID	
Children[1, 3]	Ciprofloxacin 15-20 mg/kg po Q12hrs[4] **OR**	60 days
	Doxycycline[5]: **> 8 yrs and > 45 kg**: 100 mg po BID **> 8 yrs and ≤ 45 kg**: 2.2 mg/kg po BID ≤ **8 yrs**: (same as **> 8 yrs and ≤ 45 kg**)	

1. If susceptibility testing allows, therapy should be changed oral amoxicillin for post-exposure prophylaxis to continue therapy out to 60 days.
2. Although tetracyclines are not recommended during pregnancy, their use may be indicated for life-threatening illness. Adverse affects on developing teeth and bones are dose related, therefore, doxycycline might be used for a short course of therapy (7-14 days) prior to the 6th month of gestation. Please consult physician after the 6th month of gestation for recommendations.
3. Use of tetracyclines and fluoroquinolones in children has adverse effects. These risks must be weighed carefully against the risk for developing life-threatening disease. If a release of *B. anthracis* is confirmed, children should be treated initially with ciprofloxacin or doxycycline as prophylaxis but therapy should be changed to oral amoxicillin 40 mg per kg of body mass per day divided every 8 hours (not to exceed 500 mg three times daily) as soon as penicillin susceptibility of the organism has been confirmed.
4. Ciprofloxacin dose should not exceed 1 gram/day in children.
5. In 1991, the American Academy of Pediatrics amended their recommendation to allow treatment of young children with tetracyclines for serious infections, such as, Rocky Mountain Spotted Fever, for which doxycycline may be indicated. Doxycycline is preferred for its twice-a-day dosing and low incidence of gastrointestinal side effects.

Tularemia Post-Exposure Prophylaxis Protocol[1]

	Initial therapy	Duration
Adults, including pregnant women[1,2] and Immuno-compromised	Doxycycline 100 mg po BID **OR**	14 days
	Ciprofloxacin 500 mg po BID	
Children	Doxycycline[3]: **> 8 yrs and > 45 kg**: 100 mg po BID **> 8 yrs and ≤ 45 kg**: 2.2 mg/kg po BID ≤ **8 yrs**: 2.2 mg/kg po BID **OR**	14 days
	Ciprofloxacin[4] 15-20 mg/kg BID	

1. Antimicrobial prophylaxis against possible aerosol exposure to Francisella tularensis is controversial. Since no human to human transmission of F. tularensis has been confirmed, close fever watch is the most appropriate course for persons exposed to F. tularensis. Tetracycline has been used with success to prevent tularemia in adult volunteers exposed to experimentally aerosolized F. tularensis when treatment (2 gm daily) was begun 24 hours after exposure and continued daily for 14 days. Tetracyclines are recommended for treating persons who have been exposed to a laboratory accident potentially resulting in aerosolized F. *tularensis*.
2. In 1991, the American Academy of Pediatrics amended their recommendation to allow treatment of young children with tetracyclines for serious infections, such as, Rocky Mountain Spotted Fever, for which doxycycline may be indicated. Doxycycline is preferred for its twice-a-day dosing low incidence of gastrointestinal side effects.
3. Ciprofloxacin dose should not exceed 1 gram/day in children.
4. Although tetracyclines are not recommended during pregnancy, its use may be indicated for life-threatening illness. Adverse affects on developing teeth and bones are dose related, therefore, doxycycline might be used for a short course of therapy (7-14 days) prior to the 6th month of gestation. Please consult physician after the 6th month of gestation for recommendations.

Plague Post-Exposure Prophylaxis Protocol

	Initial therapy	Duration
Adults, including pregnant women[1] and Immuno-compromised	Doxycycline 100 mg po BID	7 days (after contact with plague case)
Children	Doxycycline[2]: **> 8 yrs and > 45 kg**: 100 mg po BID **> 8 yrs and ≤ 45 kg**: 2.2 mg/kg po BID **≤ 8 yrs**: 2.2 mg/kg po BID	

1. Although tetracyclines are not recommended during pregnancy, its use may be indicated for life-threatening illness. Adverse affects on developing teeth and bones are dose related, therefore, doxycycline might be used for a short course of therapy (7-14 days) prior to the 6th month of gestation. Please consult physician after the 6th month of gestation for recommendations.
2. In 1991, the American Academy of Pediatrics amended their recommendation to allow treatment of young children with tetracyclines for serious infections, such as, Rocky Mountain Spotted Fever, for which doxycycline may be indicated. Doxycycline is preferred for its twice-a-day dosing low incidence of gastrointestinal side effects.

References:

1. Bacterial Zoonoses Branch, DVBID, NCID, CDC: (December 14, 1999)
2. Emerging Bacterial and Mycotic Disease Branch, DBMD, NCID, CDC: (February 12, 1999)
3. AHFS Drug Information® 1999
4. Drugs Facts and Comparisons® 2000
5. 1997 Red Book, Report of Committee on Infectious Diseases, 20 Edition, American Academy of Pediatricians
6. Mandell, Douglas, and Bennett's, Principles and Practices of Infectious Diseases, 5th Edition
7. Control of Communicable Diseases Manual, 16th Edition, 1995
8. Inglesby TV, Henderson DA, Bartlett JG, et al. Anthrax as a Biological weapon, Medical and Public Health Management. JAMA 1999; 281(18):1735-1745.
9. Red Book 2000, American Academy of Pediatrics, 25th Edition.
10. Blaser J, Konig C. Once-Daily Dosing of Aminoglycosides. Eur J Microbiol Infect Dis., 1995, 14:1029-1038.
11. Abramson J, Jon S, Givner LB. Rocky Mountain Spotted Fever. [Review] Ped Inf Dis J. 18(6):539-540, June 1999.
12. Inglesby TV, Dennis DT, Henderson DA, et al. Plague as a Biological Weapon, Medical and Public Health Management. JAMA 2000;283(17):2281-2290.
13. Use of Anthrax Vaccine in the United States: Recommendations of the Immunization Practices Advisory Committee (ACID), MMWR, December 15 2000/Vol. 49/No. RR-15.
14. Inglesby TV, Dennis DT, Henderson DA, et al. Tularemia as a Biological Weapon, Medical and Public Health Management. JAMA 2001, In Press.

Once the sample(s) has been collected and properly packaged according to the CDC recommended protocols, the Sample Submission Form and Chain of Custody Form must be completed. This is only for Environmental Samples (i.e. unknown or suspicious powders suspected of containing B. anthracis).

Guidance for Completion of Bioterrorism Sample Submission Form

❶ The Case ID is the unique identifier that the investigative authority assigns to the sample. It links the sample to any paperwork such as police incident reports. This unique identifier should also be present on the outside of the secured packaging for each sample.

❷ This is the name of the person heading the investigation. The report and any future correspondence concerning the sample in question will be sent to this person. The individual delivering the sample may be someone different.

❸ This is organization that is the investigative authority. Provide all information.

❹ Provide phone number(s) to contact the organization at anytime (24/7). Identify as cell phone or pager if appropriate.

❺ Provide secure Fax number for rapid transmittal of the finished reports. The report will only be faxed to this number unless prior arrangements were made in advance with the ISDH Lab.

❻ Provide thorough description of the sample and circumstances under which it was collected. Make reference to an attached incident report when possible. Our description of the contents of the submitted package should match that of the submitter as documented on the form. If that does not occur, there will be future problems if the case goes to court at some later time.

❼ This is the signature of the individual physically delivering the sample to the ISDH Laboratory. It may be the same as in ❷, but not always.

❽ This is for the signature of the ISDH Laboratories staff who officially receives the sample and logs in the sample. This person will provide the submitter with a copy of the completed submission form and chain of custody form for your records and future reference.

Guidance for Completion of Chain of Custody Form

Every person who has custody of the sample must complete the accompanying Chain of Custody form for tracking purposes. At minimum, the chain of custody begins with the submitter of the sample to the laboratory, and is followed by a laboratory representative. The chain of custody form may be used for own use (i.e. record keeping) prior to the submittal to the lab if desired.

Case ID: Same as ❶

Received By (print/sign). Each person who receives the sample is to print/sign their name on the form.

Organization: This is for the organization information of who received the sample.

Reason: Provide the reason for having custody of the sample. An example would be for delivery to the laboratory.

BIOTERRORISM ENVIRONMENTAL SAMPLE SUBMISSION FORM

Indiana State Department of Health Laboratories
Microbiology Laboratory
635 N. Barnhill Drive, Room ms2031
Indianapolis, IN 46202
(317) 233-8000 Email (labques@labs.isdh.state.in.us)

Lab Use Only
Lab #:
Date:

❶ **Case ID:**				
❷ **Name (print)**				
	Title	First	Middle	Last
❸ **Organization**				
Street Address				
	City		State	Zip
❹ **Phone Number**	( )			

Provide a FAX number for results. We will send results only to this number.
❺ **Fax Number** ( )

❻ **Description of Property** (please be as descriptive as possible and include an identifier, the number/quantity, and the type or description of the items being submitted.)

❼ **Received from:**	**Date:**

❽ **Received by:**	**Date:**

Attach Chain of Custody form; refer to Guidance for Proper Use of Chain of Custody Forms. Attach additional pages as required

CHAIN OF CUSTODY FORM

Indiana State Department of Health Laboratories
Microbiology Laboratory
635 N. Barnhill Drive, Room ms2031
Indianapolis, IN 46202
(317) 233-8000 Email (labques@labs.isdh.state.in.us)

Case ID: ____

Received By (print/sign):	Date:	Time:
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Page _____ of ______

May 25, 2002

Quick Facts

ISDH has developed quick fact sheets, which describe the agent, transmission, symptoms, diagnosis, treatment, vaccination, and prevention of several high priority diseases that have potential to be used as biological weapons. Written in clear, easy-to-understand language, these quick fact sheets are useful for dissemination to the public or for the use of educational tools. The quick fact sheets in this manual, as well as many other fact sheets on various topics, are accessible through the ISDH website at http://www.in.gov/isdh/healthinfo/quick_faqs.htm

Quick fact sheets about the following topics are included:

- Anthrax
- Botulism
- Plague
- Smallpox
- Tularemia
- Immunizations for Flood Victims

Quick Facts

About... *Anthrax (Bacillus Anthracis)*

What is anthrax?

Anthrax is a disease that commonly occurs in warm-blooded animals, such as goats, sheep, cattle, pigs, but can also occur in humans.

It is most common in regions where these animals are raised, especially in South and Central America, Asia, Africa, the Caribbean, the Middle East, parts of Europe, and rarely in the United States.

How can humans get anthrax?

There are three ways humans can get anthrax:

- through cuts or breaks in the skin from touching an infected animal or animal parts;
- by breathing or inhaling anthrax; or
- by eating undercooked meat from an animal infected with anthrax (this is very uncommon).

Humans are not very susceptible to infection, and person to person transmission of anthrax is very rare.

What are the symptoms of anthrax?

Symptoms depend on how a person was exposed to anthrax:

- If infected through the skin, the symptoms include an itchy rash that turns into a painless sore that appears black in the center. Lymph nodes in the area of the rash may swell. This type of exposure is very treatable, but if not treated, one in five people infected through the skin die.
- If infected by breathing anthrax, cold-like symptoms appear one to six days after exposure (most often within 48 hours), but then more severe breathing problems develop. Shock follows, and death usually occurs in one to two days after cold-like symptoms begin.
- If infected by eating contaminated meat, the symptoms include nausea, loss of appetite, vomiting and fever. More severe symptoms follow including: abdominal pain, vomiting of blood, and severe diarrhea. Death occurs in 25% to 60% of people exposed to anthrax by eating infected meat.

Can anthrax be treated?

Anthrax can be treated with certain antibiotics, but treatment must begin very soon after exposure. Inhalation anthrax should be treated prior to symptom onset to be most effective.

If not treated, anthrax can cause death.

Is there a vaccine to prevent anthrax?

There is an approved vaccine, and it is recommended for the following people:

- healthy people aged 18 to 65 years, who have been exposed to anthrax;
- people who investigate anthrax cases;
- United States military personnel.

What if I may have been exposed to anthrax?

Persons with possible exposure will be evaluated by public health officials to determine if antibiotic treatment should be started.

References:

Centers for Disease Control and Prevention

United States Department of Defense

For more information, call (317) 233-7665

Quick Facts

About... *Botulism*

What is Botulism?

Botulism is a very serious disease caused by a toxin (poison) made by *Clostridium botulinum* bacteria, which live in the soil and grow best with very little air. These bacteria form spores, which allow them to survive harsh environments. The toxin causes paralysis which can make a person stop breathing. Botulism can cause death and is a medical emergency.

How is Botulism spread?

You can get botulism three different ways:

- Eating foods that contain botulism toxin (especially improperly home-canned foods);
- Babies who eat certain foods such as honey or natural syrups that contain spores of botulism bacteria, which grow in the body and produce toxin; and
- Wounds infected with botulism bacteria.

Botulism is not spread from person-to-person.

What are the symptoms of Botulism?

- Double vision or blurred vision
- Drooping eyelids
- Difficulty speaking or swallowing
- Dry mouth
- Weakness
- Paralyzed arms, legs, and chest

Symptoms of botulism begin six hours to ten days after exposure to contaminated food or after a wound is infected with the bacteria. Babies with botulism appear tired, don't feed well, are constipated, and have a weak cry and limp muscles. These are symptoms of the muscle paralysis caused by the bacterial toxin**.**

How do I know if I have Botulism?

You cannot tell without seeing your doctor. Your doctor may order tests to rule out other diseases, and may collect a stool (bowel movement) or blood sample.

How is Botulism treated?

A person who has breathing failure or is paralyzed needs intensive medical care in a hospital. The paralysis slowly improves after several weeks. If discovered early, botulism obtained from food and wound botulism can be treated with an antitoxin. The antitoxin keeps the illness from becoming worse but does not speed recovery. Antitoxin is not used to treat babies with botulism.

Are there complications from Botulism?

People can die from botulism poisoning because of breathing failure. Someone with severe botulism may need a breathing machine and medical care for several months. Those who survive botulism poisoning may have tiredness and shortness of breath for years.

How can Botulism be prevented?

- People who do home canning should follow very clean methods to reduce contamination of food and carefully follow home-canning instructions. Instructions for safe home canning are available from county extension services or the United States Department of Agriculture (USDA).
- Since the bacterial toxin is destroyed by heat, people who eat home canned foods should boil the food for 10 minutes before eating it.
- Never eat foods in cans or jars that are bulging, discolored, or have swollen lids or caps.
- If the can or jar looks normal but the food has a bad taste or smell, do not eat it.
- Potatoes that have been baked wrapped in aluminum foil should be kept hot until they are eaten or refrigerated. If leftovers are kept overnight, remove the foil from the potatoes before storing.
- Oils with garlic or herbs in them should be refrigerated.
- Do not feed honey to babies less than twelve months old. Honey can contain spores of the bacteria, which can easily grow in infants.
- Carefully clean and disinfect all cuts and wounds, especially if they are dirty. See your doctor immediately if the injury is infected.
- Do not use injectable street drugs.

Quick Facts

About … *Plague*

What is Plague?

Plague is a bacterial infection of rats, ground squirrels, prairie dogs and other rodents on every continent except Australia and Antarctica. There are two kinds of plague infection, bubonic (boo-bahn-ick) and pneumonic (new-mahn-ick).

How is Plague Spread?

Bubonic plague is spread through bites from plague-infected fleas or insects. Typically, human populations become infected after a large number of rats have died from plague, which forces the movement of the flea population from its natural rat reservoir to humans. Bubonic plague is NOT transmitted from person to person.

Pneumonic plague is spread through having close contact with a person or animal infected with pneumonic plague. Typically, it is spread from person to person or animal to person, primarily from the mouth and throat droplets or aerosols from the infected person. Pneumonic plague IS transmitted from person to person.

What are the symptoms of Plague?

Patients develop symptoms of bubonic plague 1-8 days after being bitten by an infected flea. Symptoms present as a sudden onset of fever, chills, weakness, and a swollen or tender lymph node called a bubo, which usually develops within one day. Buboes typically are found in the groin, armpits, or neck regions and can be very painful. Occasionally some people infected with bubonic plague will develop blood infections.

Patients typically develop symptoms of pneumonic plague 1-4 days after infection. Symptoms of pneumonic plague include severe pneumonia, chest pain, difficulty breathing, cough and coughing up blood.

How do I know if I have Plague?

Physician's complete a thorough physical examination and laboratory testing to confirm whether or not you have bubonic or pneumonic plague.

How is Plague treated?

Bubonic and pneumonic plague can be treated with antibiotics. Pneumonic plague can be more serious and may require advanced supportive medical care and isolation as it IS spread from person to person.

How is plague prevented?

Currently there is no vaccine available to the general public.

You can minimize your risk for infection of bubonic plague through good rodent control efforts and limiting your exposure to rodents and wild animals.

While pneumonic plague is extremely rare, you can limit your risk of exposure by limiting your contact with infected persons and washing your hands frequently.

Quick Facts

About... *Smallpox*

What is smallpox?

Smallpox is a serious disease caused by the Variola virus that was announced as eradicated, or wiped out, by the World Health Organization in 1980. However, smallpox remains a serious threat due to the possibility that some of the remaining stock, if in the wrong hands, could be grown and adapted for bioterrorism purposes. Smallpox has a fatality rate of 30% or more.

How is smallpox spread?

Smallpox spreads directly from person to person, primarily from the mouth and throat droplets or aerosols from the infected person. In addition, contaminated clothes or linens can also spread the virus. Transmission is highest during the onset of rash through the 7^{th} to 10^{th} days of the rash. As the scabs form the infectivity of smallpox declines. Because of changes temperature and humidity, there is more occurrence of smallpox in the winter and early spring. There are no known animal or insect reservoirs or carriers to transmit smallpox.

What are the symptoms of smallpox?

- After the incubation period, 10-12 days on average, high fever, malaise, headache, and backache develops
- Abdominal pain and delirium or disorientation occur sometimes
- Small colored bumpy rash begins on the mouth, pharynx, face, and forearms, spreading to the trunk and legs
- Within 1-2 days the rash becomes blisters and then round and deeply set pimples with pus form in the skin
- Within 8-9 days the pimples with pus become crusted
- Scabs separate leaving pigment free skin and eventually pitted scars form

Can smallpox be treated?

Treatment of smallpox is limited to supportive therapy and antibiotics for secondary bacterial infections. There are no antivirals, treatments to kill or suppress the virus, which has proven to be effective.

Is there a smallpox vaccine?

There is a vaccination for smallpox. However, routine vaccination stopped in the United States in 1972 and production of the vaccine had ceased by 1980 due to the eradication of smallpox. Those who received the vaccinations before 1972 do not have lifelong immunity because it declines within a 5-10 year period after the vaccination. A limited supply of vaccine still exists in the United States under Center for Disease Control and Prevention authority. Vaccines administered within 4 days of the first exposure have shown to offer some protection against getting infection and significant protection from mortality.

What precautions should be taken with smallpox?

Patients should be isolated or confined in rooms with high air filtration. Standard precautions (gloves, mask, and gown) should be worn. All laundry and waste should be sterilized with steam under pressure before being laundered or destroyed. Standard hospital disinfectants should be used for surface decontamination.

Quick Facts

About … *Tularemia*

What is Tularemia?

Tularemia is a bacterial infection usually found in small mammals such as mice, rats, squirrels, rabbits and hares. Occasionally, water may also be contaminated. People are more likely to be exposed in rural settings, although urban and suburban exposures occasionally occur.

How is Tularemia Spread?

Humans become infected through environmental exposures and can develop severe, sometimes fatal illness. Infection typically occurs from:

- Bites by infected insects, and ticks
- Handling infectious animal tissues or fluids
- Direct contact with or ingestion of contaminated water, food or soil
- Inhalation of infective aerosols.

Tularemia is NOT spread from person to person.

What are the symptoms of Tularemia?

Onset of tularemia is usually sudden, with fever, headache, chills, generalized body aches (often in lower back), runny nose, and sore throat. Sweats, fever and chills, progressive weakness, loss of appetite, and weight loss characterize the continuing illness. If untreated, symptoms often persist for several weeks or months usually with progressive debility.

How is Tularemia diagnosed?

Physician's complete a thorough physical examination and laboratory testing to confirm whether or not you have Tularemia. Once diagnosed, Tularemia can be treated with appropriate antibiotics. Treatment typically lasts at least 14 days to prevent relapse. As tularemia is not transmitted person to person, there is not a need for isolation.

Are there complications from Tularemia?

In untreated tularemia, symptoms often persist for several weeks and sometimes, for months, usually with progressive debility. Any form of tularemia may be complicated by blood infection, and rarely, meningitis.

How can Tularemia be prevented?

- Educate yourself on the proper handling of sick or dead animals, particularly when hunting, camping, or butchering; and avoid handling them if at all possible.
- Take personal protective measures against biting insects while engaging in outdoor activities.

Is there a vaccine for tularemia?

Currently, there is no vaccine available

Quick Facts

About... *Immunizations for Flood Victims and Workers*

What do I need to know?

Outbreaks of communicable diseases after floods are unusual.

However, diseases may increase because of problems with sanitation or crowded living conditions.

Flood victims and workers may be exposed to tetanus by wounds received from varying circumstances.

If you receive a puncture wound, laceration or abrasion, see your doctor or check with your health department about any special health needs.

Do I need any special vaccinations?

- A tetanus-diphtheria (Td) booster is recommended for all adults every 10 years.
- Any adult who has not had the primary series of Td doses, should complete the series.
- Children should have completed their recommended immunization doses.
- Vaccinations for conditions such as hepatitis A or B, cholera, malaria, or typhoid fever are not recommended.

What should I do if I or a member of my family needs immunizations or vaccinations?

Call your doctor or clinic. You may also call the health department for assistance.

The articles listed below are from the American Journal of Public Health.

These articles can be purchased for viewing at the following website:
http://www.ajph.org/

- *Hospital Preparedness for Victims of Chemical or Biological Terrorism*.
- *Good Intentions and the Road to Bioterrorism Preparedness*.
- *Biological and Chemical Terrorism Defense: A view from the "Front Lines" of Public Health.*
- *Preemptive Biopreparedness: Can we Learn Anything from History*

Tele-forms for the biological agents have been developed and are currently being assigned state form numbers. Once state form numbers are assigned, the tele-forms will be mailed to you to be placed in this section.