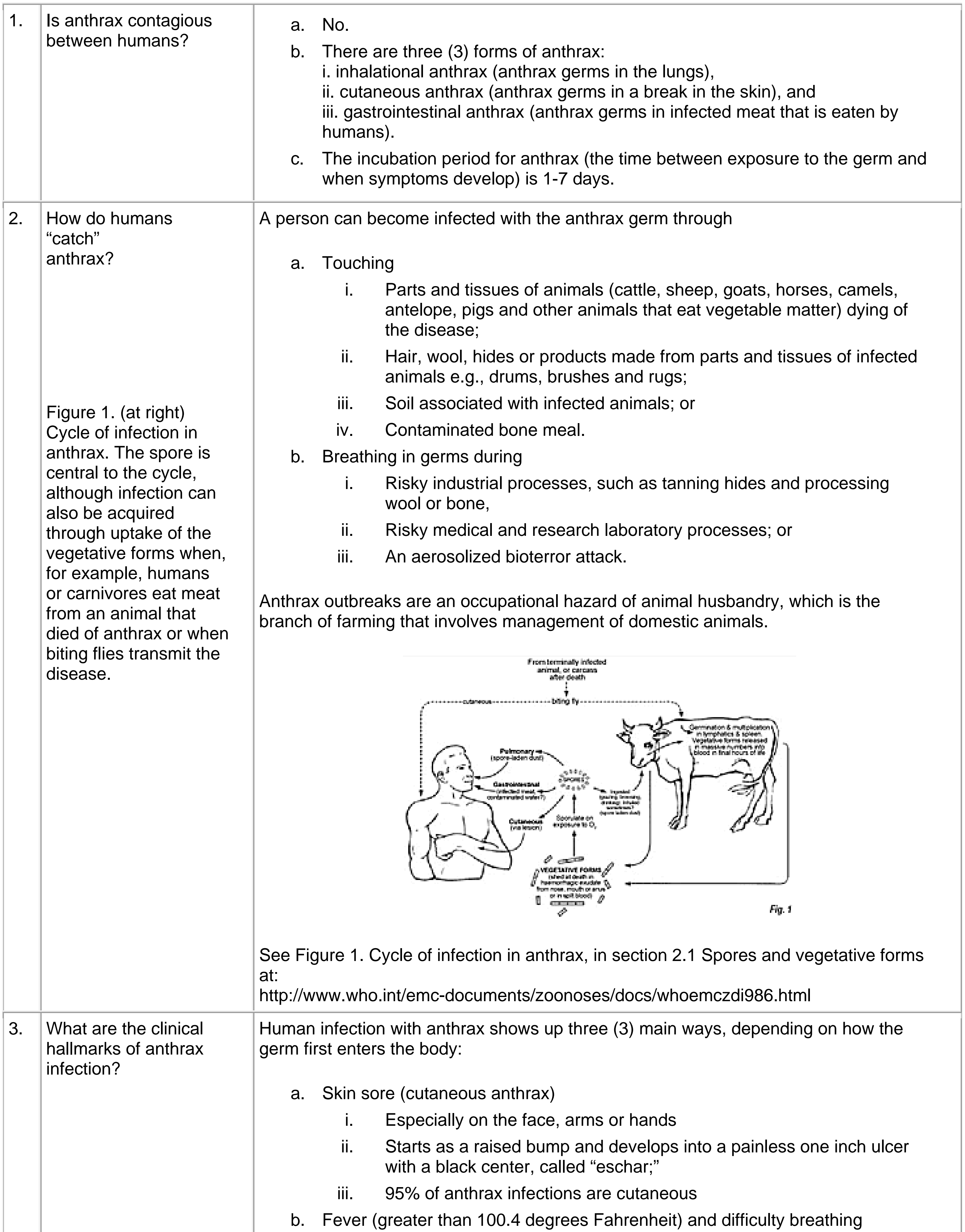
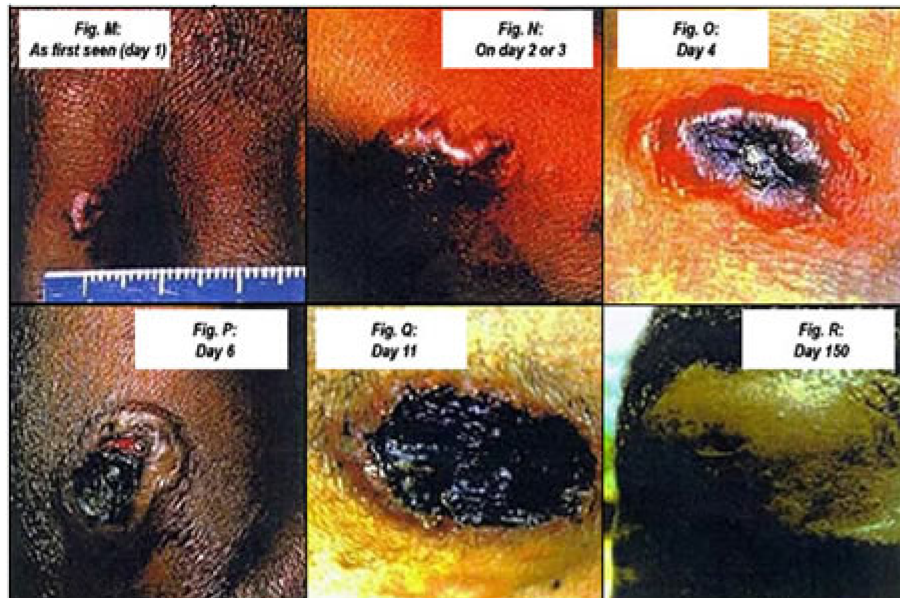
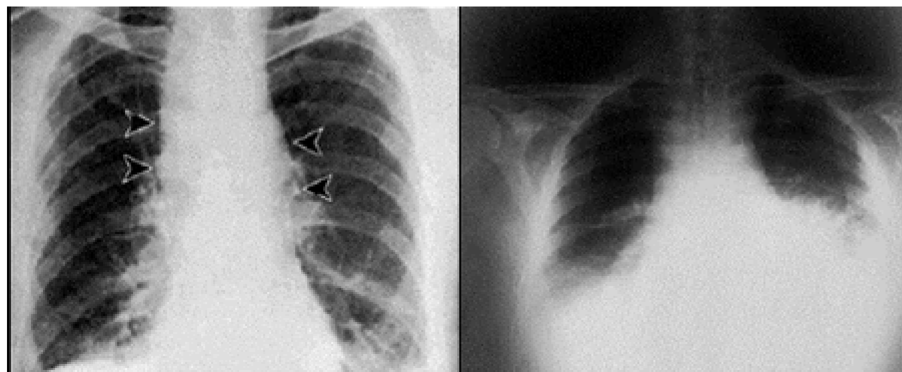


1.	Is anthrax contagious between humans?	a. No. b. There are three (3) forms of anthrax: i. inhalational anthrax (anthrax germs in the lungs), ii. cutaneous anthrax (anthrax germs in a break in the skin), and iii. gastrointestinal anthrax (anthrax germs in infected meat that is eaten by humans). c. The incubation period for anthrax (the time between exposure to the germ and when symptoms develop) is 1-7 days.
2.	How do humans "catch" anthrax? Figure 1. (at right) Cycle of infection in anthrax. The spore is central to the cycle, although infection can also be acquired through uptake of the vegetative forms when, for example, humans or carnivores eat meat from an animal that died of anthrax or when biting flies transmit the disease.	A person can become infected with the anthrax germ through a. Touching i. Parts and tissues of animals (cattle, sheep, goats, horses, camels, antelope, pigs and other animals that eat vegetable matter) dying of the disease; ii. Hair, wool, hides or products made from parts and tissues of infected animals e.g., drums, brushes and rugs; iii. Soil associated with infected animals; or iv. Contaminated bone meal. b. Breathing in germs during i. Risky industrial processes, such as tanning hides and processing wool or bone, ii. Risky medical and research laboratory processes; or iii. An aerosolized bioterror attack. Anthrax outbreaks are an occupational hazard of animal husbandry, which is the branch of farming that involves management of domestic animals. See Figure 1. Cycle of infection in anthrax, in section 2.1 Spores and vegetative forms at: http://www.who.int/emc-documents/zoonoses/docs/whoemczdi986.html
3.	What are the clinical hallmarks of anthrax infection?	Human infection with anthrax shows up three (3) main ways, depending on how the germ first enters the body: a. Skin sore (cutaneous anthrax) i. Especially on the face, arms or hands ii. Starts as a raised bump and develops into a painless one inch ulcer with a black center, called "eschar;" iii. 95% of anthrax infections are cutaneous b. Fever (greater than 100.4 degrees Fahrenheit) and difficulty breathing

		(inhalational anthrax) c. Fever (greater than 100.4 degrees Fahrenheit) and stomach pains (gastrointestinal anthrax)  Figures: M–R Stages in the development and resolution of cutaneous anthrax lesions (see Section 4.4.1). http://www.who.int/emc-documents/zoonoses/docs/whoemczdi986.html#figs (Appendix VII). Resolution of all but the most severe lesions is usually complete without surgical intervention, leaving only light scarring. Sensitive areas, such as the eyelid, may need surgical attention. Not visible in these pictures is the extensive accompanying oedema which is an important diagnostic sign, and can be life threatening from the risk of asphyxiation when the lesions are on the face or neck. Figures M, N, P, R by Dr W.E. Kobuch, 07–Gynecologie Obstetrique, Toulouse, France. Figure P reproduced from Figure 15–1 of Medical Microbiology, 4th ed, University of Texas Medical Branch, Galveston, USA.  Mediastinal widening with inhalational anthrax. (JAMA 1999:281::1735-1745) Mediastinal widening and pleural effusion on chest x-ray in inhalational anthrax. http://www.bt.cdc.gov/agent/anthrax/anthrax-images/inhalational.asp
4.	What else could the	a. Inhalational anthrax: Any influenza-like illness.

	illness be?	b. Cutaneous anthrax: A boil, orf, vaccinia, glanders, syphilitic chancre, erysipelas, ulcer (especially tropical). These lack the characteristic edema of anthrax. The absence of pus, the lack of pain, and the patient's occupation may provide further diagnostic pointers.
5.	When is an infected person most contagious to other humans?	Anthrax is not contagious between humans.
6.	How can a person keep from catching anthrax?	a. a. Always wash skin scratches with soap and water, and attend to personal cleanliness. b. Control dust and properly ventilate work areas in hazardous industries, especially those that handle raw animal materials. i. Monitor and treat employees with suspicious skin lesions. ii. Require workers to wear protective clothing and provide adequate facilities for washing and changing clothes after work. iii. Locate eating facilities away from places of work. iv. Consider using vaporized formaldehyde for terminal disinfection of textile mills contaminated with the anthrax germ. c. Sterilize all international bone meal before using it as animal feed. d. Thoroughly wash, disinfect or sterilize hair, wool and bone meal or other feed of animal origin prior to processing. e. Do not sell the hides of animals exposed to anthrax or use their carcasses as food or feed supplements (i.e., as bone or blood meal) f. If anthrax is suspected, do not necropsy the animal (necropsy is an after death or post mortem examination); i. Instead, aseptically collect a blood sample for culture in the laboratory (aseptically means preventing germ contamination of living tissues or sterile materials by excluding, removing or killing germs), ii. Avoid contamination of the area, and iii. If a necropsy is inadvertently performed, autoclave, incinerate or chemically disinfect/fumigate all instruments or materials. g. Anthrax spores may survive in soil for many decades, so i. Incinerate (burn) carcasses (corpse) at the site of animal death or remove it to a rendering plant, ensuring no contamination en route. (A rendering plant is a place where raw animal material is cooked to remove the moisture and fat before disposal.) ii. If these options are not possible, bury the carcasses deeply and cover with quicklime. Do not burn carcasses on open fields. iii. Decontaminate soil seeded by carcasses or discharges with 5% lye or quicklime.

Figures: G–L (see Section 8.1.3 and Appendix III [A.III.3]):
http://www.who.int/emc-documents/zoonoses/docs/whoemczdi986.html#figs
G to J: show incineration of an anthrax carcass using a commercial incinerator. Note in G the bag to prevent further spillage of blood from the nose and mouth and that, in H, incineration is from underneath the carcass. Note also in J that the ground underneath the carcass has been well–scorched.
K and L: show an alternative approach to on–site incineration using down–directed blow–torches.
Figures G–J by Mr Nigel Durnford, Trading Standards Department, Gloucestershire County Council, Gloucester, UK;
Figures K–L by the Notifiable Diseases Section, Ministry of Agriculture, Fisheries and Food, Tolworth, UK.

h. Control effluents (wastewater--treated or untreated--that flows out of a treatment plant, sewer, or industrial outfall) and trade wastes from rendering plants that handle potentially infected animals and factories that manufacture products from hair, wool, bones or hides likely to be contaminated.
i. Promptly immunize and annually reimmunize all animals at risk for anthrax.
    i. Treat symptomatic animals with penicillin or tetracyclines; immunize these animals after therapy is completed.
    ii. They cannot be used for food until a few months have passed
    iii. Treatment with antibiotics in lieu of immunization may be used for animals exposed to a discrete source of infection, such as contaminated commercial feed.
j. All human articles and instruments soiled with anthrax require fumigation and chemical disinfection. Fumigation means to apply a gas or vapor to disinfect or destroy pests, such as insects or germs.
k. Responders to an anthrax biological hazard are protected from anthrax spores by donning splash protection, gloves and a full face respirator with high-efficiency particle air (HEPA) filters or self-contained breathing apparatus.
l. Persons who have been exposed to anthrax spores should be decontaminated by removing their clothing and placing it into a sealed bag, and then showering themselves with soap and water.
m. Sealed envelopes or packages associated with an anthrax threat should be packaged as evidence. The F.B.I. should be notified. Evacuation, decontamination and prophylaxis with antibiotics are NOT indicated if the envelope or package remains sealed.
n. Anthrax patient care:
    i. Always wear disposable vinyl or latex gloves when entering an anthraxinfected person's care space. Sterile gloves are not necessary. Change gloves often and always when leaving the infected person's care space. Always wash your hands after

		removing gloves. Dispose of gloves in special container in infected person's care space. ii. Gown: Not required for anthrax-infected patients. iii. Mask/Eye Protection/Facemask: Not required. iv. Shoe covers: Not required. v. Lockdown procedures: Not required to prevent the spread of illness among humans.
7.	Where should infected patients receive care?	a. Patients with inhalational and gastrointestinal anthrax require immediate hospitalization in a critical care unit. b. Patients with cutaneous anthrax can be initially treated at home as outpatients, and admitted to the hospital only if outpatient treatment with antibiotics fails. c. Home care instructions should include specific directions on: i. Hand washing and use of gloves, and ii. Housekeeping tasks, such as how to handle contaminated waste and clean and disinfect the infected person's care space and personal care items.
8.	Who should be told of a suspected, probable or confirmed case of anthrax?	Immediately notify the following: a. State and local public health department: IDPH: 217-782-4977; DuPage County Public Health: 630-682-7800 b. Illinois Region VIII POD Hospital (Loyola): 708-216-8705 c. Illinois Emergency Management Agency: 800-782-7860
9.	Who besides the infected person should be isolated because of possible infection with anthrax?	a. No isolation is required because anthrax is not contagious between people b. However, investigation of contacts and source of infection is very important and begins with a history of exposure to infected animals or animal products, which must be traced to the place of origin c. In a manufacturing plant, inspect for adequacy of preventive measures. d. A potential bioterror attack must be ruled out for all human cases of anthrax, especially for cases with no obvious occupational source of infection.
10.	What laboratory studies need to be performed?	a. There is no screening test for anthrax, which means there is no test that a doctor can perform to determine whether an individual has been exposed to or carries the anthrax germ. b. The only way exposure can be determined is through a public health investigation. c. There are many kinds of laboratory tests for anthrax, and the reliability of each has not been determined. In general, findings from culturing blood and other samples are specific. This means that a positive result reflects the true presence of anthrax, and a negative result likely means that no anthrax is present. d. Nasal swabs and environmental tests are not tests to determine whether an individual should be treated. These kinds of tests are used only to determine the extent of exposure in a given building or workplace. e. A nasal swab involves placing a swab inside the nostrils and taking a culture. The Centers for Disease Control and the U.S. Department of Health and Human Services do not recommend the use of nasal swab testing by clinicians to determine whether a person has been exposed to anthrax or as a means of diagnosing anthrax. At best, a positive result may be interpreted only to indicate exposure; a negative result does not exclude the possibility of exposure. f. The presence of spores in the nose does not mean that the person has inhalational anthrax! The nose naturally filters out many things that a person breathes, including bacterial spores. To have inhalational anthrax, a person

		must have the bacteria deep in the lungs, and also have symptoms of the disease. g. Another reason not to use nasal swabs is that most hospital laboratories cannot fully identify anthrax spores from nasal swabs. They are able to tell only that bacteria that resemble anthrax bacteria are present.
11.	What can be done to help infected persons get better?	a. Inhalational anthrax i. Early administration of intravenous and oral antibiotics is critical for increasing the probability for patient survival. Delay of antibiotics may substantially lessen chances for survival. ii. Any person suspected of having inhalational anthrax should receive antibiotics as soon as possible while awaiting the results of laboratory studies. iii. Ciprofloxacin and doxycycline antibiotics are used for inhalational anthrax in the "contained casualty setting" (a situation in which a modest number of patients require therapy) (see Henderson, et al, p 82 for drug regimens). iv. In a mass casualty situation (a situation in which very large numbers of patients require therapy) when hospital resources may run out, treat people with oral ciprofloxacin or doxycycline (see Henderson, et al. p 84 for drug regimens). v. In the setting of a possible bioterror attack, caregivers should consider the possibility of antibiotic-resistant reengineered anthrax germs when patients on antibiotics fail to get better as expected. b. Cutaneous anthrax: treat with ciprofloxacin, doxycycline or ampicillin pills. Follow closely for development of spread of disease. c. Gastrointestinal anthrax: same as inhalational anthrax. d. Post-exposure prophylaxis: treat with ciprofloxacin, doxycycline or penicillin for 60 days. e. It is unknown how long anthrax spores can survive in humans. Spores are hardy encapsulated germs that can lay dormant for a long time. As a result, persons who have completed 60 days of antibiotics should seek medical care if they develop flulike symptoms or fever.
12.	Is anthrax vaccination available?	Yes. A protective vaccine has been developed for anthrax; The Advisory Committee on Immunization Practices (ACIP) has recommended anthrax vaccination for the following groups: a. Persons who work directly with the organism in the laboratory. b. Persons who work with imported animal hides or furs in areas where standards are insufficient to prevent exposure to anthrax spores. c. Persons who handle potentially infected animal products in high-incidence areas; while incidence is low in the United States, veterinarians who travel to work in other countries where incidence is higher should consider being vaccinated. d. Military personnel deployed to areas with high risk for exposure to the organism.
13.	How many people die from anthrax?	***Cutaneous:*** 20% of untreated infected people will die. Deaths are rare with proper antibiotic treatment. ***Inhalational***: 75% of infected people will die with proper antibiotic treatment. ***Gastrointestinal:*** 25-60% of infected people will die with proper antibiotic treatment.
14.	What is important to know about housekeeping for an infected person?	a. If possibility exists that patient was dusted with or otherwise exposed to aerosolized anthrax spores, package his or her clothing in a sealed plastic bag and decontaminate the patient with soap and water. b. Responders to a person exposed to aerosolized anthrax spores are protected

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<td>from anthrax spores by donning splash protection, gloves and a full face respirator with high-efficiency particle air (HEPA) filters or self-contained breathing apparatus.
c. Hand washing is important.
d. Wear gloves when caring for the infected patient.
e. Disinfect room in standard fashion.</td>
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<td>15.</td>
<td>How should the bodies of infected persons be handled?</td>
<td>a. Cadavers require careful handling because they can cause anthrax infection in handlers.
b. Rapid burial or cremation should be carried out.
c. Pathologists and mortuary personnel require notification of anthrax infection in a cadaver, and should use all infection precautions listed in Question 6.</td>
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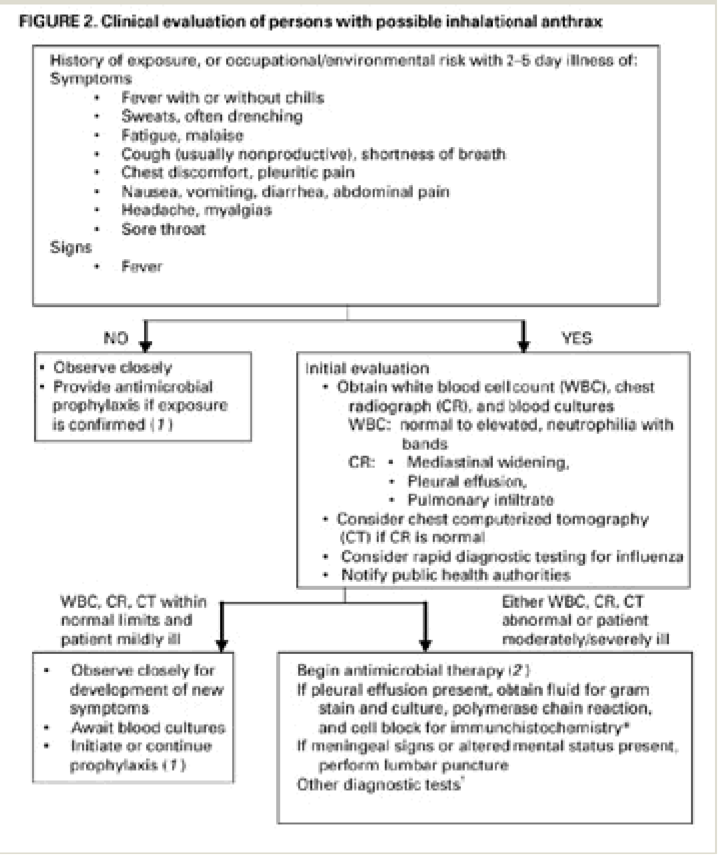
<td>16.</td>
<td>Where can I get more quality information on anthrax?

Figure 2 (shown at right:) http://www.cdc.gov/mmwr//preview/mmwrhtml/mm5043a1.htm</td>
<td>1. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5044a5.htm
2. http://www.who.int/health_topics/anthrax/en/
3. Henderson DA, Inglesby TV, O'Toole T: Bioterrorism: Guidelines for Medical and Public Health Management. AMA Press 2002, pp 11-97.
4. Chin, James. Editor: Control of Communicable Diseases Manual 17th edition (2000). American Public Health Association 2000, pp 20-25.
5. http://www.who.int/csr/resources/publications/anthrax/WHO_EMC_ZDI_98_6/en/
6. http://www.who.int/emc-documents/zoonoses/docs/whoemczdi986.html#_ Hlk436063876
7. http://www.cdc.gov/mmwr//preview/mmwrhtml/mm5043a1.htm (Update: Investigation of Bioterrorism-Related Anthrax and Interim Guidelines for Clinical Evaluation of Persons with Possible Anthrax)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