USACHPPM
Readiness thru Health

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Just the Facts... Handling of Human Remains from Natural Disasters

1. BACKGROUND. Victims of natural disasters usually die from trauma as a direct result of the type of disaster and are unlikely to have acute or "epidemic-causing" infections. The reason human remains pose such a limited health threat is that after death the body temperature can rapidly drop, resulting in the corresponding death of most bacteria and viruses. This makes it extremely difficult for microorganisms to transfer from dead bodies to vectors, and from vectors to human populations, such that the risk that dead bodies pose for the public is usually small. However, persons who are involved in close contact with the deceased, such as military personnel, rescue workers, volunteers, and others, may be exposed to chronic infectious hazards, including hepatitis B virus, hepatitis C virus, human immunodeficiency virus (HIV), enteric pathogens, and *Mycobacterium tuberculosis*. Appropriate precautions for these persons include training, use of body bags and disposable gloves, good hygiene practice, and vaccinations for hepatitis B and tuberculosis.

2. HAZARDS ASSOCIATED WITH HUMAN REMAINS.

Direct Contact. Personnel such as pathologists, mortuary staff, and body retrieval teams handling human remains have a potential risk of exposure to hepatitis B virus (HBV) and HIV. For all others, blood and body fluid exposures are minimal, and the risk of contracting HBV is very low; the risk of contracting hepatitis C virus or HIV approaches zero. Transmission is relatively inefficient for these diseases, requiring percutaneous exposure (from a needle stick or exposure from a sharp penetrating object); direct contact with mucous membranes (such as eyes, nose, or mouth); or direct contact with non-intact skin (abraded, chapped, inflamed, or with visible wounds or traumas). Exposures on intact skin are not a risk for these blood-borne infections.

Because a corpse will commonly leak feces, persons handling the deceased are more likely to be exposed to gastrointestinal organisms than to blood borne viruses. Workers may be exposed through direct contact with the victim's body and soiled clothes, and transmission can occur via the fecal-oral route. Contamination of other equipment, such as stretchers and vehicles used for transportation or storage, is also possible. However, common gastrointestinal organisms do not survive long in the environment and present little risk of infection where the body has been decaying for some time, or has been in the water.

Water Supply Contamination. Human remains in contact with local potable water systems have rarely been associated with transmission of bacterial or viral gastrointestinal diseases. Water supplies in affected regions are much more likely to be contaminated due to extensive damage to sanitation systems.

Insect-borne Diseases. Filth flies (including the house fly, blow fly, little house fly, and false stable fly) feeding on contaminated material such as feces, refuse and rotting corpses can mechanically transfer contaminated material directly to humans and human food supplies. An increased density of filth flies, serving as mechanical vectors, could increase the risk of acquiring bacterial diarrheal such as shigellosis.

Common mosquito-borne diseases in humans such as malaria and dengue fever are not efficiently spread from dead bodies. Additionally, mosquito vectors are attracted to the carbon dioxide produced by living humans; therefore, corpses would not attract these vectors.

3. PROTECTIVE EQUIPEMENT AND OTHER PRECAUTIONS. A number of simple measures, such as the use of personnel protective equipment (PPE), can be taken to reduce the risk of infection associated with handling human remains. Considering that some of the personnel performing this work may not have experience in handling the dead, some basic instruction about the risks and precautions may be required. Universal precautions (for potential exposure to blood and body fluids) and enteric precautions (to control gastrointestinal infections and the adverse effects of bacterial intestinal toxins) should be followed.

Gloves. When handling human remains, workers should wear gloves (fluid proof – polyvinyl chloride (PVC), vinyl, rubber, latex), especially if the bodies are badly damaged. Wear structural fire-fighting gloves that meet the requirements of 29 CFR 1910.156, *Fire Brigades*, for situations where broken glass and sharp edges may be encountered, such as when extricating bodies from wreckages. Select gloves that fit tightly around the wrists to prevent contamination of the hands for situations where large amounts of blood are likely to be encountered.

Used gloves should be removed and kept in a suitable bag and disposed of appropriately. Where non-disposable gloves are used, they should be cleaned and disinfected. To avoid cross-contamination, personal items, such as pens or combs, should not be handled while wearing soiled gloves, and a new pair is recommended after each body or group of bodies is handled.

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Masks and Eyewear. Other PPE, such as surgical masks and eyewear, are only required where large quantities or splashes of blood are anticipated and are probably not necessary when handling bodies following a natural disaster. The use of a face mask is rarely considered to be necessary. Since masks limit ventilation and the workers tire more easily, using them can slow down the tasks of moving, storing, and preparing corpses. It should be noted that the mask does not filter or provide protection over a reasonable period of time. Generally, there is no danger of contamination through the respiratory tract since there is no respiratory function in dead bodies and they do not present a danger for those handling them. Gases and strong odors are the most unsettling aspect, and when necessary, covering the nose and mouth is sufficient.

Outer Clothing. Disposable clothing is available and is recommended for many situations. In other cases, traditional fabrics are preferable owing to their strength especially when lifting bodies. Gowns or aprons should be worn during procedures that are likely to generate splashes of blood or other body fluids. Closed, boot-style shoes are also recommended in these instances. Wear rubber boots or appropriate shoe covers where there is potential for footwear to become grossly contaminated. Rain gear is also useful in case of storms.

Body Bags. Body bags will further reduce the risk of infection and are useful for the transport of cadavers that have been badly damaged. However, body bags reduce the rate of cooling of the cadaver, thus increasing the rate of decomposition, especially in hot climates.

Washing/Cleansing. Hands should be washed with soap and clean, potable water after handling cadavers, before and after smoking, and before eating.

All equipment, including clothes, stretchers, and vehicles used for transportation, should be washed carefully with an EPA-approved disinfectant after use and before reuse. Place contaminated reusable PPE and clothing into leak-resistant bags or containers immediately upon removing the articles. Never wash contaminated PPE and clothing with personal laundry. Wash and dry reusable PPE and clothing according to the instructions on their labels, in hot water at least 160°F and detergent for 25 minutes, or with chemicals at the proper concentration for low temperature washing. Use an EPA-approved disinfectant to decontaminate reusable gloves, protective eyewear, face shields, and similar PPE. Follow the manufacturer's recommendations for disinfectant concentrations and contact times. Brush scrub contaminated boots and leather goods with soap and hot water.
Place contaminated disposable PPE and clothing that is saturated, dripping, or caked with dried blood into a regulated medical waste container for appropriate disposal.

Vaccinations. Hepatitis B vaccination will help prevent infection and will be 70% to 80% effective within one week of exposure. Those with a prior bacille Calmette-Guérin (BCG) vaccination may have some protection against tuberculosis, and tuberculin testing may be an appropriate follow-up measure.

4. ANIMAL REMAINS. In most cases, the bodies of dead animals pose as little risk to humans as human remains. That is, animal corpses constitute a public health hazard only in specific conditions. Disposal of animal bodies involves special processes in accordance with their number and size. Generally, disposal of large animals (cattle or horses) is difficult. A temporary, initial measure is to spray them with oil and cover them with dirt until the necessary conditions for final burial exist. Smaller animals may be sealed in thick plastic bags; subsequently these should be taken to the area designated for final disposal, which might include incineration or direct disposal in a landfill. Ashes are buried or deposited in a secured landfill. It is recommended that animal corpses be moved with either a shovel or gloves in order to avoid the potential transmission of infectious diseases.

5. SUMMARY. In general, personnel involved in the recovery and handling of human remains from a natural disaster can limit risk from potential exposure by following the guidelines below.

- Vinyl or Latex gloves should be worn.
- Masks and protective eyewear or face shields should be worn during procedures that are likely to generate droplets of blood or other body fluids to prevent exposure of mucous membranes of the mouth, nose, and eyes.
- Gowns or aprons should be worn during procedures that are likely to generate splashes of blood or other body fluids.
- Hands and other skin surfaces should be washed immediately and thoroughly if contaminated with blood or other body fluids. Hands should be washed immediately after gloves are removed.
- Ensure universal precautions for blood and body fluids.
- Ensure use of body bags.
- Ensure disinfection of vehicles and equipment.
- Bodies do not need to be disinfected before disposal (except in case of cholera).
- Vaccinate workers against hepatitis B.

6. REFERENCES. Technical and consultative assistance may be requested from on-site morgues and/or mortuary affairs teams that may be assigned to the area of the natural disaster. The following references were reviewed and incorporated into this fact sheet, and may prove useful for further review.

- Healing, T.D., P. N. Hoffman, and S. E. J. Young. 28 April 1995. *The Infection Hazards of Human Cadavers*. Communicable Disease Report, Volume 5, Review Number 5.
- Morgan, Oliver. 2004. *Infectious Disease Risks from Dead Bodies Following Natural Disasters*. Revista Panamericana de Salud Publica/Pan American Journal of Public Health 15(5): 307-12.
- Pan American Health Organization. Disaster Manuals and Guidelines Series, Nº 5. 2004. *Management of Dead Bodies in Disaster Situations*. Washington, D.C.
- Robertson, Lauren, and Sharon Sanders. 2005. *Southern Asia Earthquake and Tsunami Public Health and Infection Control Issues*. Wild Iris Medical Education.
- United Kingdom Defense Medical Services Department. 4 Jan 05. *MEDINTSUM – SOUTH EAST ASIAN TSUNAMI POTENTIAL HEALTH IMPACTS*.
- U. S. Army. 28 August 1996. *Joint Publication 4-06 Joint Tactics, Techniques, and Procedures for Mortuary Affairs in Joint Operations*.
- U.S. Army Center for Health Promotion and Preventive Medicine. October 2001. *Technical Guide 195 Guidelines for Protecting Mortuary Affairs Personnel from Potentially Infectious Materials*.