Virginia Tech

VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

January 2014

INFECTION PREVENTION PLAN:

A Safety Manual Regarding Occupational Exposure to Potentially Infectious material: Human Pathogens, Zoonotic Diseases, Potentially infectious tissues or other material from Humans or Animals

Environmental Health and Safety (EHS)
540-231-4034

ENVIRONMENTAL, HEALTH AND SAFETY

Infection Prevention Plan

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Revision Status

Contact(s)	Implementation Date	Revision Number	Comments
Sarah P. Owen	September 2008	1.0	Initial written program
Sarah P. Owen	June 2012	2.0	Review/update written program and add new fact sheets to human and zoonotic disease appendices
Sarah P. Owen	January 2014	3.0	Update information and revise program name

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Introduction

Purpose

The purpose of the Infection Prevention Plan (IPP) is to:

- Provide safety policies for the protection of Virginia Tech employees who have a potential for occupational exposure to infectious material.
- Establish a program which provides Virginia Tech employees with the following services:
    - Information relative to their potential exposures,
    - Training on safe work practices, engineering controls, and university policies related to occupational exposure, and
    - Preventative vaccinations and titers (when available) and infection prevention services following an exposure incident

Application

The Infection Prevention Plan (IPP) is intended for distribution university-wide. Each department having employees at risk for exposure to infectious materials shall develop specific policies and procedures as outlined in this plan. Departmental-specific materials shall be inserted in the document where required. This plan describes engineering controls, work practices, and personal protective equipment that, when used correctly, reduces on–the-job exposure to infectious material. Also described are the university's training, vaccination, and incident reporting programs.

Scope

The Infection prevention program is designed to provide service to employees with occupational exposure to potentially infectious material including tissues from humans and animals or contact with an infectious microorganism (see Appendices B and C). This program mirrors the Occupational Safety and Health Administration (OSHA) mandated Exposure Control Plan for Bloodborne Pathogens (BBP) while also addressing infection prevention policies for employees working with animals, disease causing microorganisms, and human pathogens other than those specifically addressed by OSHA's BBP program.

Virginia Tech, through its missions of research, has the potential to house a number of different types of biological agents that are associated with specific types of hazards (see Table 1). In addition, Virginia Tech has employees with potential for exposure to infectious disease while working in human and veterinary medical settings, housekeeping, maintenance, and child/elder care (see Table 2).

Table 1. Types of Biological Agents Potentially Found at Virginia Tech

Type of Agent	Associated Hazard
Microorganisms and other toxins (certain bacteria, fungi, rickettsia, viruses [other than arboviruses], and their products)	Infection, exposure, or allergic reaction
Prions (proteinaceous infectious particles lacking nucleic acids)	Neurodegenerative disease (e.g., Creutzfeldt-Jakob disease)
Vertebrate animals and their protein allergens (i.e., urine, feces, hair, saliva and dander)	Zoonotic diseases, allergic reactions
Invertebrate animals • Arthopods (crustaceans, arachnids, insects) • Parasites (protozoa, flatworms, roundworms)	Bites or stings resulting in skin inflammation, system intoxication, transmission of infectious agents (i.e., arboviruses), or allergic reaction
Higher plants and their allergens/toxins	Dermatitis from skin contact or rhinitis or asthma from inhalation
Lower plants (lichens, liverworts, and ferns)	Allergic reactions; systemic infections; skin inflammation

Source: Fundamentals of Industrial Hygiene, Plog (Ed.), 4th ed., 1996

Table 2. "At Risk" Occupations and Tasks

Occupations	Job Tasks
Medical Staff (Physicians, Nurses, Athletic Trainers)	• Patient care • Cleaning operations where potentially infectious materials may be present • Cleaning blood or other body fluid spills
First Responders (Police, Rescue Squad)	• Patient care • Contact with victims or perpetrators • Employees with designated first aid or medical assistance duties
Housekeepers	• Laundry sorting and cleaning • Cleaning operations where potentially infectious materials may be present • Response to blood spills and similar events
Plumbers and utility workers	Work involving sanitary sewer systems
Regulated Medical Waste Operations	Waste collection, handling and disposal
Animal Care	• Patient care • Cleaning operations where potentially infectious materials may be present • Animal husbandry
Research and Clinical Laboratory Operations	• Diagnostic or other screening procedures performed on blood or other potentially infectious materials • Phlebotomy • Research involving organisms identified in Table 1, above

Responsibilities

EHS

EHS is responsible for coordinating the following program elements:

- Identification of "at risk" employees.
- Conducting introductory training classes.
- Conducting infection prevention classes before beginning work that has potential for exposure, conducting classes when the work changes (such as a new organism is being handled, or duties change), or verifying that such training has been administered.
- Conduct yearly BBP training for those who must comply with OSHA's BBP standard.
- Maintaining records of training and vaccination for all program participants.
- Funding the available Infectious Agent vaccinations of at risk employees. (See Appendix D for diseases for which a vaccine is available and provided by EHS to at-risk employees per OSHA or CDC recommendation)
- Creating, distributing, and revising (as regulations or recommendations change) the university-wide Infection Prevention Plan.
- Operating a Regulated Medical Waste disposal program, in compliance with Virginia Department of Environmental Quality regulations.
- Oversight of departmental compliance.

Departments

Each department with employees at risk of occupational exposure to infectious disease has the following compliance responsibilities and functions:

- Assigning accountability for program implementation to departmental coordinators and/or supervisory personnel. Supervisors of employees with occupational exposure to potentially infectious material or microorganisms should have this responsibility listed in their P-112's, the Personnel Performance Plan and Evaluation forms.
- Compliance with Virginia Tech's Health and Safety policy: http://www.policies.vt.edu/1005.pdf
- Circulating, to appropriate staff, the appendices of the Infection Prevention Plan that have been customized by the Department to document policies and procedures addressing exposures that exist in departmental worksites.
- Assuring that a personal protective equipment (PPE) hazard assessment has been performed for workplace exposures . Please refer to the link below for assistance: http://www.ehss.vt.edu/programs/personal_protective_equipment.php
- Funding and providing personal protective equipment, as needed.
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- Submit a medical surveillance form: https://secure.hosting.vt.edu/www.ehss.vt.edu/med_survey/
- Notifying EHS before establishing research endeavors involving infectious material or infectious agents.
- Notifying EHS of employee turnover. Contacting EHS to enroll new hires in the program as soon as possible.
- Ensuring that new hires do not engage in activities with potential exposure until they have had the introductory training.
- Assuring all "at risk" employees attend required training sessions, are familiar with the Infection Prevention Plan, and follow safe work practices at all times. Please see Table 2 for information on at risk categories.

Departmental Coordinators/Supervisors

Designated departmental coordinators and/or supervisors of "at risk" employees are responsible for ensuring that the Infection Prevention Plan (IPP) is complete and accessible. Completion of the IPP involves inserting department-specific policies and procedures where indicated. Accessibility means that all at-risk employees must be informed of the location of the departmental IPP and encouraged to read its contents. The departmental coordinator and/or supervisor is responsible for:

- Receiving the university IPP
- Completing department-specific sections of the IPP
- Storing the IPP in accessible location
- Communicating the IPP location to all at-risk employees
- Reviewing and updating department-specific sections annually or earlier if work processes change
- Conducting annual review sessions with employees
- Notifying EHS immediately after an employee is hired or assigned to an at-risk occupation
- Assuring that employees receive introductory training prior to exposure to the hazard
- Allowing employees to attend training and vaccinations during normal work hours
- Providing gloves and other protective equipment for use by employees
- Reporting exposure incidents to EHS and assist with report paperwork.

At-risk Employees

Every employee that can reasonably anticipate exposure to infectious material or infectious agents has certain compliance responsibilities. These include:

- Attending training sessions
- Complying with procedures outlined in this plan

- Adhering to Universal Precautions
- Reporting exposure incidents to supervisors and EHS

Employees who work with potentially infectious material in research labs at Virginia Tech must be familiar with, and closely follow, the policies and procedures described in "Biosafety for Laboratory Workers" http://www.ehss.vt.edu/programs/biological_safety.php

Employees with occupational exposure to human tissue, blood, fluids or other potentially infectious material (OPIM) of human origin must be familiar with, and closely follow, the requirements in OSHA's BBP standard 29 CFR Part 1910.130. Please go to http://www.ehss.vt.edu/programs/blood_borne_pathogens.php to review Virginia Tech's Exposure Control Plan for guidance on compliance with OSHA's BBP standard.

Contractors

Contractors must follow procedures outlined in the "Virginia Tech's Safety Guide for Contractors and Subcontractors" document. For more information please go to http://www.ehss.vt.edu/programs/contractor_safety.php

Routes of Exposure

It is important to understand how infectious microorganisms get into the body in order to choose the proper engineering controls, administrative controls, or PPE when there is the potential for exposure to disease. The routes of disease transmission, with definitions, are listed below.

1. **Injection**: Introduction of material directly into the bloodstream. Injection exposure may be from needle stick, or cut/puncture from any sharp object
2. **Inhalation**: Introduction of material into the respiratory tract via aerosolization or spray of the material near the breathing zone.
3. **Ingestion**: Introduction of material into the gastrointestinal tract via aerosolization or spray of material near the face, or any activity that brings dirty or gloved hands near the face. Such activity can include eating, smoking, applying makeup or lip balm, scratching the face, chewing on pens or pencils.
4. **Absorption**: Introduction of material through intact skin or through mucous membranes. This route of exposure is more common with a chemical exposure since infectious microorganisms are typically too large to pass through intact skin. These organisms CAN pass through the mucous membranes lining the nose, mouth, eye lids.

Methods of Exposure Control

Certain procedures and tools must be used to keep employees safe from exposure to infectious diseases found in biological material (such as human/animal tissues or fluids) or laboratory stocks of infectious microorganisms. These procedures and tools include universal precautions, engineering controls, work practice controls, use of personal protective equipment, housekeeping, laundering, and use of signs and labels as described in the following sections.

Universal Precautions/Standard Precautions

"Universal precautions," as defined by the Centers for Disease Control (CDC), are a set of precautions designed to prevent transmission of human immunodeficiency virus (HIV), hepatitis B virus (HBV), and other bloodborne pathogens when providing first aid or health care. Under universal precautions, blood and certain body fluids of all patients are considered potentially infectious for HIV, HBV and other bloodborne pathogens. **Universal precautions should also be followed when working with <u>any</u> biological material that has the potential to infect an employee with a disease whether it is a cultured microorganism, or blood/tissues/other body fluids from human or animal sources.**

The terms 'universal precautions' and 'standard precautions' are interchangeable. Universal Precautions include:

- Assume that ALL human blood is positive for HIV, HBV, and HCV or other human pathogen
- Assume that ALL other human fluids/tissues are also positive for infectious disease

- Use Personal Protective Equipment to avoid skin contact with potentially infectious materials
- Use Personal Protective Equipment to avoid eye, nose, & mouth contact with potentially infectious materials
- Avoid punctures/sticks with contaminated sharp objects.

Engineering Controls

Engineering controls are devices and tools that prevent exposure to health hazards. These sorts of safety controls must be used, in conjunction with Work Practice Controls, to eliminate or minimize employee exposure.

These devices/equipment must be inspected and maintained on a regular basis by the Departmental Coordinator, supervisor, or his or her designee. Worn parts and equipment shall be replaced as soon as indicated through the inspection process.

Some common engineering controls used to protect employees from infectious agents include:

Handwashing Facilities: Each department shall provide readily accessible handwashing facilities. This means that there must be a facility to supply adequate running water, soap, and single-use towels or hot-air drying machines.

Alternate Handwashing Devices: When running water handwashing facilities are not feasible, the department shall provide either an appropriate antiseptic hand cleanser with clean cloth/paper towels OR antiseptic towelettes.

Needle Safety Devices: Departments using medical sharps must make all reasonable attempts to implement the use of these safety devices instead of traditional sharps. There are many products on the market that are designed to prevent needle-stick-injuries. Some examples include:

- Needle-less connectors for IV delivery systems (e.g., blunt cannula for use with pre-pierced ports and valved connectors that accept tapered or luer ends of IV tubing)
- Protected needle IV connectors (e.g., the IV connector needle is permanently recessed in a rigid plastic housing that fits over IV ports)
- Needles that retract into a syringe or vacuum tube holder
- Hinged or sliding shields attached to phlebotomy needles, winged-steel needles, and blood gas needles
- Protective encasements to receive an IV stylet as it is withdrawn from the catheter
- Sliding needle shields attached to disposable syringes and vacuum tube holders
- Self-blunting phlebotomy and winged-steel needles (a blunt cannula seated inside the phlebotomy needle is advanced beyond the needle tip before the needle is withdrawn from the vein)
- Retractable finger/heel-stick lancets

Desirable features in Needle Safety Devices:

- The device is needleless
- The safety feature is an integral part of the device
- The device preferably works passively (requires no activation by user)
- The user can easily tell whether the safety feature is activated
- The safety feature cannot be deactivated and remains protective through disposal.
- The device is easy to use and practical

Sharps Containers: Proper containers for storage of contaminated sharps shall be provided by the departments. They shall meet the following description:

- Puncture resistant,
- Closeable,
- Leakproof, and
- Labeled (Biohazard) or color-coded (orange/red).

Picture 1 – Examples of Sharps Containers

Splash Guards: Laboratory equipment that can potentially vaporize or splash infectious material should be equipped with a splashguard (Picture 2) or similar protective device.

Picture 2 - Splashguard

Biosafety Cabinets: Are in use in biological laboratories across campus whenever the possibility of exposure to air-borne pathogens is present.

Work Practice Controls

Work practice controls are procedures that employees need to follow in order to keep themselves safe. These required procedures are to be followed by all "at risk" employees and shall be enforced by all departments.

Hand/Skin Washing: It is extremely important that all at-risk employees follow strict hand/skin washing procedures at the following times:

- After removing gloves or other Personal Protective Equipment
- Following contact with potentially infectious material

If an exposure occurs, hands and other skin areas must be washed with soap and water OR alcohol based antiseptic cleanser (in the absence of water). Mucous membranes shall be flushed with copious amounts of water for at least 15 minutes. DO NOT use soap or alcohol based antiseptic cleansers for infectious agent exposures to eyes or nose/mouth.

When an antiseptic cleanser or towlette is used, washing with water and soap should follow as soon as possible.

Sharps Handling: Whenever a needle or other sharp device is exposed, injuries can occur. In addition to risks related to device characteristics, needlestick injuries have been related to certain work practices such as:

- Recapping,
- Transferring a potentially infectious fluid between containers, and
- Failing to properly dispose of used needles in puncture-resistant sharps containers.

If recapping cannot be avoided, it must be accomplished through the use of a mechanical device, such as forceps. Also, the one-hand scoop method is allowed, if done safely.

Minimize Splashing: All procedures involving potentially infectious materials shall be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets.

Avoid Ingestion: Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are strictly prohibited in work areas where there is a reasonable likelihood of occupational exposure to infectious material.

- Food and drink shall not be kept where potentially infectious materials are present.
- Mouth pipetting/suctioning of potentially infectious materials is prohibited.

Dealing with Contaminated Equipment: The following procedures shall be followed when having potentially contaminated equipment serviced:

- Look for evidence of contamination.
- Decontaminate if necessary and feasible.
- If NOT feasible, label equipment with BIOHAZARD label.
- Include on the label which parts are contaminated.
- Convey information to affected employees and servicing representative prior to shipping, so that precautions can be taken.

Personal Protective Equipment

Where occupational exposure remains after the implementation of Engineering and Work Practice Controls, Personal Protective Equipment shall also be used. Departments shall provide, at no cost to the employee, appropriate PPE including, but not limited to:

- Gloves
- Gowns
- Lab coats
- Face shields
- Masks

- Respirators
- Eye protection
- Mouthpieces
- Resuscitation bags
- Pocket masks
- Mechanical respiratory devices

PPE is considered appropriate if it is needed for, and is capable of preventing, blood or other fluids from passing through to the employee's clothing, skin or mucous membranes. PPE selection shall be made after completing a PPE Hazard Assessment as outlined in Virginia Tech's Personal Protective Equipment Program. For assistance please go to:

http://www.ehss.vt.edu/programs/personal_protective_equipment.php

Departments shall ensure proper use, accessibility, cleaning, disposal, repair and replacement of PPE.

Employees must remove PPE before leaving the work area or whenever the PPE has become saturated with blood or other potentially infectious materials. Disposable PPE must NOT be reused. Used PPE must be placed in an appropriately designated area or container for storage, washing, decontamination, or disposal.

Employees are not permitted to take their protective equipment home and launder it. It is the responsibility of the department to provide, launder, repair, replace, and dispose of personal protective equipment as needed.

Gloves: Gloves shall be worn when it can be reasonably anticipated that the employee may have hand contact with potentially infectious biological material, when performing vascular access procedures on humans, or when handling contaminated equipment or surfaces.

Guidelines for Glove Use

Glove Type:	Washable?	Decontaminate?	When To Discard:
Disposable	NO	NO	Torn, punctured, contaminated, when removed for any reason
Utility	YES	YES	Cracked, peeling, torn, punctured, deteriorating

Face and Eye Protection: Masks, respirators, goggles, glasses, and/or face shields are to be worn whenever splashes, spray, spatter, or droplets of potentially infectious materials may be generated, when eye, nose or mouth contamination can be reasonably anticipated, or when the pathogenic organism's mode of transmission is via aerosol. Masks and other respiratory protection devices may only be purchased after consultation with EHS personnel.

Body Protection: Gowns, aprons, lab coats, clinic jackets, coveralls, and other protective body clothing are to be worn in occupational exposure situations when appropriate. The type and characteristics of the PPE will depend upon the task and degree of exposure anticipated.

Housekeeping

All worksites are to be maintained in clean and sanitary conditions at all times. Each work area must establish a written cleaning schedule. All such schedules should be included in this manual, following this section.

Decontamination/Cleaning of surfaces and equipment shall be performed at the following times:

- At the frequency determined in the written schedule
- Following a contamination incident
- Following routine procedures that may cause contamination
- At the end of work shifts, if contamination may have occurred since the last cleaning

The following are surfaces that are likely to need decontamination:

- Lab equipment
- Bench/Counter tops
- Re-useable receptacles that may store biological material
- Environmental surfaces such as patient examination tables
- Large areas such as an ambulance interior, animal holding room, entire lab room, etc.

Protective coverings should be removed and replaced as soon as feasible when they become obviously contaminated or at the end of the work shift if they may have become contaminated during that shift. Coverings include:

- Plastic wrap
- Aluminum Foil
- Imperviously-backed absorbent paper

Broken glass shall not be picked up directly with the hands. It shall be cleaned up mechanically. Use a brush and dust pan, tongs, or forceps.

Employees must never reach into containers of contaminated sharps.

Chemical Decontamination

Acceptable methods of chemical decontamination

Method	Acceptable for…	How?	Special Precautions	Comments
Sodium Hypochlorite	General use; not recommended for skin disinfection. Will corrode metals.	Common household bleach diluted to a 1/10 to 1/100 with water	1. Strong oxidizer 2. Corrosive Note: May discolor certain materials.	At high concentrations and extended contact time, considered cold sterilants
Alcohols	General use	70-90% ethyl or isopropyl alcohol for 10-30 minutes contact time	1. They evaporate fast and have limited exposure time 2. Can cause contact dermatitis	1. Less active against non-lipid viruses 2. Ineffective against bacterial spores 3. Concentrations above 90% are less effective
Iodophores	Most often used as antiseptics and in surgical soaps	0.47% concentration for 10-30 minutes	Can cause skin irritations	
Formaldehyde	Used for the same applications as glutaraldehyde; can be sporacidal	4-8% concentration for 10-30 minutes	Formaldehyde is a human carcinogen and creates respiratory problems	
Glutaraldehyde	Glassware and instruments; items that can be submerged and soaked in a covered container; considered a sporacidal	2% concentration for 10-600 minutes; rinse with sterile water to remove residuals	Sensitivity problems developed in workers using it at high levels	
Phenolic Compounds	General use on walls, floors, bench tops; bacteria; fungi; and lipid-containing viruses	0.2-3% concentration for 10-30 minutes	Can cause depigmentation; occupational leukoderma; idiopathic neonatal hyperbilirubinema	Not active against spores or non-lipid viruses
Quaternary Ammonium Compounds (Quats)	General use; active against gram-positive bacteria and lipid-containing viruses	0.1-2% concentration for 10-30 minutes	Can cause minor skin dermatitis	1. Least effective against gram-negative bacteria and not active against non-lipid-containing viruses 2. Easily inactivated by organic materials, are corrosive, and not sporicidal

Laundry—Proper Practices

Contaminated laundry—laundry that has been soiled with blood or other potentially infectious materials—must be handled, stored and transported in accordance with very specific requirements as follows:

- Contaminated laundry must be handled as little as possible.
- Employees that have contact with contaminated laundry must wear protective gloves and other appropriate personal protective equipment.
- Contaminated laundry must be bagged or containerized at the location where it was used and may not be sorted or rinsed in the location of use.
- Contaminated laundry containers must be labeled with the Biohazard symbol, or color-coded fluorescent orange or orange-red.
- If laundry is wet and presents reasonable likelihood of leakage to the exterior of the container, the container must be capable of preventing soak-through.
- Contaminated laundry must be handled following Universal Precautions. Contaminated laundry should not be taken home to be laundered by staff. EHS strongly recommends that Departments arrange to have contaminated items laundered on site (in an area separate from where the contaminated laundry is generated) or via an appropriate vendor.

Labels and Signs

LABELS

The OSHA Bloodborne Pathogens Standard requires labels to be placed on items that may be contaminated by human material that may contain bloodborne pathogens. This may include:

- Equipment (e.g., refrigerators, freezers, and incubators);
- Shipping containers;
- Primary and secondary agent containers;
- Regulated medical waste containers; and
- Sharps containers.

SIGNS

All access doors to labs or animal rooms where biologicals are present must be posted with biohazard information in addition to the emergency contact information required by Virginia Tech's Chemical Management Program: http://www.ehss.vt.edu/programs/hazardous_chemical_management.php. For additional information on required signage, go to http://www.ehss.vt.edu/programs/biological_safety.php. This biohazard information must include:

- The universal biohazard symbol which is red/orange in color with black lettering (see right);
- Name of the agent(s) present in the lab;

- Required biosafety level for working with these agents;
- Required immunizations for entering room;
- Personal protective equipment that must be worn in room;
- Special procedures for exiting the lab; and
- Name and telephone number of the Principal Investigator, other responsible person(s), and EHS emergency personnel.

TRAINING PROGRAM

Bloodborne Pathogens (BBP)

Training is required yearly for all employees who work with, or may be exposed to, human blood, fluids, tissues, or other potentially infectious materials (OPIM) of human origin. Training for employees exposed to bloodborne pathogens must be arranged through EHS.

BBP training is offered several time a month by EHS. Please see www.ehss.vt.edu or contact EHS at 231-4034 for information on the course schedule. Refresher training for large workgroups that cannot be accommodated during a standing BBP class will be arranged upon request.

Laboratory and Animal Handling Involving Other Infectious Agents

Training is required for all employees and personnel working in laboratories or animal rooms where biological agents are in use. It is the responsibility of the Principal Investigator, lab director, or animal facility director to ensure that adequate instruction is provided. This training may be given by a responsible person in the lab or arranged by contacting EHS or the Institutional Animal Care and Use committee (IACUC). Laboratory personnel training should include, at a minimum, the following topics:

- Principles of Biosafety;
- Hazards in the lab (biological, chemical, and radiological) including pathogen transmission and epidemiology;
- Infection Prevention Plan requirements and policies;
- Completion of the pre-contact medical surveillance questionnaire;
- The Infectious Agent Vaccination Program;
- Acceptable laboratory and animal practices;
- Personal protective equipment requirements;
- Proper use of specific equipment used in the lab;
- Signs and labeling requirements;
- How to decontaminate, disinfect, and sterilize;
- Proper waste handling, packaging, and disposal;
- Packaging/shipping etiologic agents; and
- Emergency procedures.

The Occupational Health and Safety Program for Animal Handlers can be used as a resource in training.

Farm Animal Handlers

Training is required for all employees and personnel working with farm animals. It is the responsibility of the Principal Investigator, station director, or farm manager to ensure that adequate instruction is provided. This training may be given by the aforementioned individuals or arranged by contacting EHS or IACUC. Training should include, at a minimum, the following topics:

- Special education on large animal diseases;
- Infection Prevention Plan requirements and policies;
- Completion of the pre-contact medical surveillance questionnaire;
- The Infectious Agent Vaccination Program;
- Personal protective equipment requirements;
- Signs and labeling requirements; and
- Emergency procedures.

The Occupational Health and Safety Program for Animal Handlers can be used as a resource in training.

Departmental Responsibilities

The Department Coordinator or supervisor of 'at risk' employees must ensure that department-specific training is performed annually, or as needed, on the following subjects:

- New tasks that present occupational exposure
- Department-specific sections of the IPP
- Available Engineering Controls
- Required Work Practice Controls
- Location and use of Personal Protective Equipment

OCCUPATIONAL HEALTH ASSURANCE PROGRAM

University employees who are identified as being "at risk" for work related exposure to infectious agents will be offered vaccinations if they are available for the agent in question. See Appendix D for the list of vaccinations offered by Virginia Tech. If employees have an exposure incident, the employee will be offered testing, evaluation and counseling as needed. Employees may, in certain situation, decline vaccinations. The following bullets summarize this program:

- EHS administers this program, and will maintain documentation of all vaccinations, titers, declination of vaccinations, and all other medical records. Please contact EHS at 231-4034 or sowen@vt.edu if additional information is needed.
- All medical services are provided at no cost to the employee.
- All medical services will be made available at a reasonable time and place.
- Vaccines (if available for the agent in question) must be offered to all known "at-risk" personnel. Vaccinations must be offered to the employee prior to exposure to the hazard. See Appendix D for a list of vaccinations that are currently being offered.
- Hepatitis B vaccinations must be offered to all personnel identified as "at-risk" for exposure to human blood. See the university's *Exposure Control Plan* for a detailed explanation.
- Routine titer checks are provided for individuals working with BSL2 and BSL3 organisms, if such tests are available.
- Medical exams will be provided for individuals following an exposure incident to blood, potentially infectious material, or to a specific agent.
- A medical surveillance questionnaire is to be completed by all persons having "substantial animal contact".
- It is the responsibility of the Principal Investigator, researcher, lab director/supervisor, or animal facility director to identify "at-risk" personnel and personnel with "substantial animal contact". This information must be communicated to EHS. See forms in appendix A.

EXPOSURE REPORTING PROGRAM

Following an exposure incident, EHS will consult with the Occupational Health Physician to determine appropriate services. The Occupational Health Physician will determine the appropriate testing and treatment based on standard medical practice and Centers for Disease Control (CDC) recommendations.

Individuals working with known pathogenic material should be aware of the signs and symptoms of the disease in question in case of an exposure that was not obvious at the time of exposure. Anyone with suspicious signs and symptoms should report this information to his/her supervisor and EHS as soon as possible. In addition, when seeking medical care from a Primary Care Physician (PCP), individuals with suspicious signs and symptoms should tell their PCP about their work for Virginia Tech so that the PCP can consider the possibility of a work related infection or Laboratory Acquired Infection (LAI).

Employees who travel overseas on Virginia Tech business should be aware of signs and symptoms of diseases endemic to the area visited, especially if the reason for travel will involve working closely with animals or the local population. See CDC website (www.cdc.gov) for information on staying healthy while traveling. If signs and symptoms of travel related infectious disease develop, individuals should alert their PCP to the fact of recent travel.

Post-exposure services can include:

- Documenting the route(s) of exposure, and the circumstances under which the exposure incident occurred.
- Identifying and documenting of the source of the exposure (an individual, an animal, or microorganism culture).
- When necessary, and the individual is known, testing the source individual's blood to determine infectious disease status. Consent of the source individual must be obtained prior to testing.
- Collecting and testing of the exposed employee's blood to determine serological status for the infectious agent in question (Rabies is an exception, where post-exposure prophylaxis will be administered as soon as possible without testing the exposed individual's titer). This collection should be accomplished as soon as possible after exposure.
- Administering of post-exposure prophylaxis, when medically indicated, as recommended by the Occupational Health Physician.
- Counseling.
- Evaluating reported illnesses.
- Conducting follow-up testing of exposed employee's blood when recommended by the Occupational Health Physician.

STEPS TO TAKE FOLLOWING AN EXPOSURE INCIDENT

1. Immediately inform your direct supervisor.
2. Rinse the injured area thoroughly with soap and water
3. Seek medical attention immediately if necessary. Employees should seek medical attention before contacting EHS if:

- The exposure is affecting your ability to breath properly
- Bleeding is excessive and difficult to control
- The injury clearly needs sutures
- Loss of consciousness is associated with the exposure

4. Contact EHS at 231-3600 or 231-4034 to notify us of the incident. After normal working hours, contact the Virginia Tech Police Department at 231-6411 and ask that they contact EHS personnel for assistance with an exposure incident.
5. Receive instructions from EHS regarding the medical services recommended by the Occupational Health Physician.
6. Complete the Exposure to Infectious Agents Form (Appendix E) and return it to EHS (mail code 0423) as soon as possible after the incident.
7. Employee or his/her supervisor must complete the Employers' Accident Report, available from www.hr.vt.edu, and submit it to Human Resources (email it to Teresa Lyons at tlyons@vt.edu).

REPORTING REQUIREMENTS FOR ANYONE WORKING WITH rDNA, SELECT AGENTS OR OTHER SIGNIFICANT BIOLOGICAL MATERIAL:

INCIDENT / ACCIDENT REPORTING

1. As soon as any initial response is complete and the incident is stable: Incident/Accident Response Procedures, ***immediately notify*** the Lab Director and/or Lab Manager, the Animal Facility or Greenhouse Manager (if applicable), and the University Biosafety Officer (UBO).
2. The UBO will acknowledge receipt of notification via email (to document notification) to the reporting person, the Lab Director, Lab Manager, and the Animal Facility or Greenhouse Manager (as needed).
    - **NOTE: If UBO does not acknowledge receipt of notification within two (2) hours, notify the Assistant Biosafety Officer (ABO).**
    - If email is not available, the UBO/ABO will acknowledge receipt via phone call to reporting person, the Lab Director and/or Lab Manager, and the Animal Facility Manager or Greenhouse Manager (as needed).
3. The UBO/ABO must immediately report to the NIH and/or CDC via phone or email, as required. In the case of a potential exposure, the Virginia Department of Health may also be notified.
4. Reporting person and Lab Director/Lab Manager/Animal Facility Manager/Greenhouse Manager complete **VT Lab Incident Report** and submit it to the UBO/ABO via email **within 24 hours of the incident.**
    - NOTE: For incidents involving an injury or potential exposure to a pathogen or other hazardous material, Worker's Compensation requires that an **Employer's Accident Report** be submitted within 24 hours.
5. UBO/ABO acknowledges receipt of incident report via email or phone.
6. UBO/ABO completes appropriate state and/or federal reporting forms and submits to the NIH (within 30 days) and/or CDC (within seven calendar days) of the incident.

Contact	Primary Method (cell phone)	Secondary Method (email)
UBO – Charlotte Waggoner	540-320-5864	ren@vt.edu
ABO – Chris Wakley	540-320-2089	cwakley@vt.edu
ABO – Anna Kroner	540-525-8574	acastigl@vt.edu

- **Virginia Tech Lab Incident Report**: http://www.ehss.vt.edu/detail_pages/document_details.php?category_id=18&document_id=320
- **Employer's Accident Report (EAR):** http://www.apps.hr.vt.edu/hr/download.php?id=18

online reporting and instructions: http://www.hr.vt.edu/benefits/workerscomp/index.html

RECORDKEEPING

EHS maintains records on each Virginia Tech employee with occupational exposure to potentially infectious organisms. Records will be maintained for the duration of the individual's employment at Virginia Tech, plus 30 years. These records are reviewed by the university's Occupational Health Physician and representatives of EHS to determine medical and other services needed by an employee based on his or her work exposures.

EHS will obtain your written consent prior to release of any confidential medical information. However, records will be made available to representatives of the Occupational Safety and Health Administration upon request.

Information maintained by EHS includes:

1. Name of employee
2. VT ID Number of the employee
3. A copy of the employee's work related vaccination/exposure records, including:
   - Occupational Vaccination Records
   - Titer Results
   - Declination Forms
   - Attachments to Declination Forms
4. Exposure to Infectious Agents form and Physician's Written Opinion forms, if applicable
5. Copies of evaluation and testing results associated with an exposure incident
6. Training records

DEFINITIONS

Biological Material Tissue, fluid, blood, OPIM from human or animal sources. Also, cultures of microorganisms and cell lines.

Bloodborne Pathogen Pathogenic organisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), and human immunodeficiency virus (HIV).

Clinical Laboratory A workplace where diagnostic or other screening procedures are performed on blood or other potentially infectious materials.

Contaminated Sharps Any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, and exposed ends of dental wires.

Decontamination The chemical or physical destruction or removal of microorganisms to a lower level, not necessarily zero.

Disinfection The chemical or physical treatment that destroys most vegetative microbes (or viruses), but not spores, in or on inanimate objects/substances.

Engineering Controls Equipment or devices that isolate or remove the pathogenic hazard from the workplace. Examples include: sharps disposal containers, self-sheathing needles, equipment slash guards, biosafety cabinets, etc.

Exposure Incident A specific incident in which potentially infectious material contacts the employee in one of the following ways:

- eye
- mouth
- other mucous membrane
- non-intact skin surface
- puncture/stick/cut with sharp contaminated object

Human Pathogens Pathogenic microorganisms that are present in human blood, tissues, fluids, or OPIM and can cause disease in humans. See Appendix B for pathogens that employees of Virginia Tech may be exposed to. The listed pathogens are either common in a university setting, endemic to SWVA or being manipulated in a research lab on campus

Infectious Agent A viable microorganism, such as a bacterium, virus, rickettsia, parasite, or fungus, that is known or reasonably believed to cause disease in humans or animals.

Laboratory Acquired Infection Any infection acquired through laboratory or laboratory-related activities regardless whether the infection is symptomatic or asymptomatic in nature.

Occupational Exposure Reasonably anticipated skin, eye, mucous membrane, or parenteral contact with potentially infectious materials that may result from the performance of an employee's duties.

Other Potentially Infectious Materials (OPIM)

The following body fluids:

- semen
- vaginal secretions
- cerebrospinal fluid
- synovial fluid
- pleural fluid
- pericardial fluid
- peritoneal fluid
- amniotic fluid
- saliva in dental procedures
- any fluid mixed with blood
- any unknown body fluid

The following tissues:

- unfixed tissue
- unfixed organs

The following research media:

- Pathogen containing cell culture
- Pathogen containing tissue/organ culture
- Pathogen containing culture media

Principal Investigator

A Virginia Tech employee responsible for the operations and associated researchers of a laboratory or group of laboratories.

Regulated Medical Waste

A waste stream which is regulated by the Department of Environmental Quality and must be disposed of through EHS, even if it has been autoclaved or treated with another form of decontamination. The particulars of the waste stream are:

- **Cultures and stock of microorganisms and biologicals**. Discarded cultures, stocks, specimens, vaccines and associated items likely to contain organisms likely to be pathogenic to healthy humans.
- **Blood and blood products**. Wastes consisting of human blood, human blood products and items contaminated by human blood.
- **Human tissues and other anatomical wastes**. All human anatomical wastes and all wastes that are human tissues, organs, body parts, or body fluids.
- **Sharps**. It is university protocol to include all sharps in the regulated medical waste stream. That is, ALL hollow-bore needles, pipettes, and glassware from biological labs or medical settings.
- **Some animal carcasses, body parts, bedding, and related wastes**. Animal carcasses, body parts, bedding, and related wastes if the animal has been intentionally infected with pathogenic organisms and are *likely* to be contaminated.

Regulated Medical Waste ***EXEMPTIONS***	The following waste streams are **not** subject to the requirements of regulated medical waste regulations when dispersed among other solid wastes and not accumulated separately: • Used products for personal hygiene, such as diapers, facial tissues and sanitary napkins. Material, not including sharps, containing small amounts of blood or body fluids, but containing no free flowing or unabsorbed liquid(Band-Aids).
Sanitization	The reduction of microbial load on an inanimate surface to a "safe" public health level.
Sterilization	The total destruction of all living organisms.
Universal Precautions	A method of infection control—recommended by the CDC—in which all human blood, certain body fluids, as well as fresh tissues and cells of human origin are handled as if they are known to be infected with HIV, HBV, and/or other blood-borne pathogens Universal precautions (or standard precautions) must be utilized when working with any potentially infectious material whether from human, animal, or microorganism culture sources.
Work Practice Controls	Procedures that reduce the likelihood of exposure through the manner in which tasks are performed.
Zoonotic Diseases	Diseases caused by infectious agents that can be transmitted between (*or are shared by*) animals and humans. See Appendix C for the list of diseases of concern for Virginia Tech employees.

References

Published Sources

29 CFR Part 1910.1030, Occupational Exposure to Bloodborne Pathogens; Final Rule, Federal Register/Vol.56, No.235/ December 6, 1991.

OSHA Instruction CPL 2-2.44D, Enforcement Procedures for the Occupational Exposure to Bloodborne Pathogens, November 05, 1999.

NIOSH, "Preventing Needlestick Injuries in Health Care Settings", DHHS (NIOSH) Publication No. 2000-108.

Safer Needle Devices: Protecting Health Car Workers, Directorate of Technical Support, Office of Occupational Health Nursing, October 1997.

CDC Fact sheet: Universal Precautions for Prevention of Transmission of HIV and Other Bloodborne Infections. Updated 1996

CDC A-Z index of infectious diseases, infectious disease fact sheets. www.cdc.gov

CDC Healthy Pets, Healthy People http://www.cdc.gov/healthypets/browse_by_diseases.htm

People to Contact

University Biosafety Officer, Charlotte Waggoner at 231-5864 or ren@vt.edu

Industrial Hygienist, Sarah P. Owen at 231-4034 or sowen@vt.edu

Medical Services Coordinator, Lisa St Clair at (540) 231-3919 or lckenny@vt.edu

On-line Information

Visit EHS on the web at http://www.ehss.vt.edu.

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Appendix A: Department-Specific Information Sheets

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Instructions: Use a separate Department Specific Work Sheet for each animal species or infectious organism if necessary. Also include in this section any Departmental Infection prevention SOP's.

Department-Specific Information Sheet: Engineering Controls

Department Name: _____

Departmental Coordinator: _____

Animal Species and/ or Infectious Organisms: _____

_____

Place a checkmark by those engineering controls that your department uses to protect employees. In the blanks that follow, write a brief description and the location where employees can find the control device.

☐ Handwashing (water or alternate) facilities

Description: _____

Location:_____

☐ Needle Safety Devices

Description: _____

Location:_____

☐ Sharps Containers

Description: _____

Location:_____

☐ Splash guards

Description: _____

Location:_____

☐ Resuscitation masks

Description: _____

Location:_____

☐ Biosafety cabinets

Description: _____

Location:_____

Department-Specific Information Sheet: Work Practice Controls

Department Name: _____

Departmental Coordinator: _____

Animal Species and/ or Infectious Organisms: _____

_____

Place a checkmark by those work practice controls that your department uses to protect employees. In the blanks that follow, write any special instructions your employees might need to follow.

☐ Hand and skin washing

_____

_____

_____

☐ Sharps Handling

_____

_____

_____

☐ Avoiding aerosol generation

_____

_____

_____

☐ Dealing with Contaminated Equipment

_____

_____

_____

☐ Other

_____

_____

_____

Department-Specific Information Sheet: Training and Medical Surveillance

Department Name: _____

Departmental Coordinator: _____

Animal Species and/ or Infectious Organisms: _____

_____

List the employees and the training and medical surveillance services each should receive. Each employee should sign the appropriate line indicating that they have received training and medical surveillance listed.

Employee name (please print):_____

VT ID #: _____

Training [attached roster(s) with employee names listed will fulfill this requirement]:

_____

_____

_____

Medical Surveillance (please check all that apply):

- ☐ Questionnaire filled out
- ☐ Infectious agent vaccination (if available)
- ☐ Infectious agent titer
- ☐ Pulmonary function test
- ☐ Respirator fit test
- ☐ Other blood work
- ☐ Hearing test
- ☐ Examination by Occupational Health Physician
- ☐ Other medical surveillance service (please specify): _____

Signature of employee: _____

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Appendix B: Human Diseases

Adenovirus

African Trypanosomaniasis

Amebiasis

B virus

Botulism

Burkholderia

Candida

Chagas disease

Chickenpox

Chikungunya

Cholera

Clostridium difficile

Dengue

Diphtheria

E. coli

Encephalitis, arboviral origin

Erlichia

Glanders

Guinea Worm disease

Hansen's disease

Hepatitis A

Hepatitis B

Herpes Zoster

histoplasmosis

HIV

Influenza

Klebsiella

La Crosse Encephalitis

LCMV

Listeriosis

Lyme disease

Malaria

Measles

Meningitis

Mycobacteria infections other than tuberculosis

MRSA

Mumps

Nipah and hendra virus encephalitis

Norovirus

Onchoceriasis (river blindness)

Plague

Prion Diseases

Psittacosis

Reubella

Rift Valley fever

Ringworm

Rotavirus

Salmonella other than s.typhi

Schistosomaniasis

Shigellosis

Streptococcal disease

Tetanus

Typhoid Fever

Tuberculosis

West Nile virus

Yellow fever

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Adenovirus

Where adenovirus is commonly found:

This virus is found worldwide in humans. Adenoviruses are medium-sized (90-100 nm), nonenveloped icosohedral viruses containing double-stranded DNA. There are at least 52 immunologically distinct types that can cause human infections. Adenoviruses are unusually stable to chemical and physical agents and to adverse pH conditions, thus allowing for prolonged survival outside of the body. Some types can establish persistent asymptomatic infections in tonsils, adenoids, and intestines of infected hosts, and shedding can occur for months or years. Some adenoviruses (e.g., serotypes 1, 2, 5, and 6) have been shown to be endemic in parts of the world where they have been studied, and infection is usually acquired during childhood. Other types cause sporadic infection and occasional outbreaks; for example, epidemic keratoconjunctivitis is associated with adenovirus serotypes 8, 19, and 37. Epidemics of febrile disease with conjunctivitis are associated with waterborne transmission of some adenovirus types, often centering around inadequately chlorinated swimming pools and small lakes. ARD is most often associated with adenovirus types 4 and 7, and more recently adenovirus 14, in the United States. Enteric adenoviruses 40 and 41 cause gastroenteritis, usually in children. For some adenovirus serotypes, the clinical spectrum of disease associated with infection varies depending on the site of infection; for example, infection with adenovirus 7 acquired by inhalation is associated with severe lower respiratory tract disease, whereas oral transmission of the virus typically causes no or mild disease.

Common routes of transmission:

Although epidemiologic characteristics of the adenoviruses vary by type, all are transmitted by direct contact, fecal-oral transmission, and occasionally waterborne transmission. The viruses can be spread from person to person via coughing or sneezing. People may also become infected by touching something with adenovirus on it and then touching their mouth, nose, or eyes. Some types can establish persistent asymptomatic infections in tonsils, adenoids, and intestines of infected hosts, and shedding can occur for months or years. The typical incubation period for gastroenteritis is 3-10 days; for respiratory tract infections it is between 2 and 14 days Outbreaks of adenovirus-associated respiratory disease have been more common in the late winter, spring, and early summer; however, adenovirus infections can occur throughout the year.

Signs and symptoms:

The viruses are a common cause of infection in humans, but they rarely cause serious or fatal illness. Adenoviruses cause a wide range of illnesses and symptoms, including

- Colds
- Pharyngitis (sore throat)
- Bronchitis
- Pneumonia
- Diarrhea
- Conjunctivitis (eye infection)
- Fever

- Cystitis (bladder inflammation or infection)
- Rash illness
- Neurologic disease

Since Ad14 infections are not common and most Ad14 infections are not serious, the emergence of Ad14 should not be a concern to the general population. During the winter, many other common viral and bacterial infections, including influenza, can present with very similar symptoms. You should not change the criteria you use to decide when to consult your healthcare provider. As with any illness, you should check with your healthcare provider if you are concerned about the seriousness of your illness. For example, you may want to consult your doctor if you have an unusually high fever or fever that lasts more than a few days, have shortness of breath, or are feeling worse over time.

Protective measures:

1. Vaccination:

Vaccines were developed for adenovirus serotypes 4 and 7, but were available only for preventing ARD among military recruits, however, vaccine production was stopped in 1999. Strict attention to infection prevention practices, including contact and droplet precautions, is effective for stopping nosocomial outbreaks of adenovirus-associated disease, such as epidemic keratoconjunctivitis. Maintaining adequate levels of chlorination is necessary for preventing swimming pool-associated outbreaks of adenovirus conjunctivitis, and frequent hand hygiene is recommended in group child care settings. Laboratorians should follow Biosafety guidelines and use appropriate PPE and work practices when studying this organism.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with adenovirus. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to adenovirus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.

3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

African Trypanosomaniasis

Where African Trypanosomaniasis is commonly found:

There are two types of African trypanosomiasis (also called sleeping sickness); each is named for the region of Africa in which they were found historically. East African trypanosomiasis is caused by the parasite *Trypanosoma brucei rhodesiense* (tri-PAN-o-SO-ma BREW-see-eye rho-DEE-see-ense), which is carried by the tsetse fly. Each year, 500 to 1,000 cases of East African trypanosomiasis are reported to the World Health Organization. However, many cases are not recognized or reported due to a lack of infrastructure and the true number of new cases is higher. Since 1967, thirty-seven cases of East African trypanosomiasis have been diagnosed in the United States, all among individuals who had traveled to eastern Africa.

Individuals can become infected with West African trypanosomiasis if they receive a bite from an infected tsetse fly, which is only found in Africa. West African trypanosomiasis, also called Gambian sleeping sickness, is caused by a parasite called Trypanosoma brucei gambiense carried by the tsetse fly. Approximately 10,000 new cases of West African trypanosomiasis are reported to the World Health Organization each year. However, many cases are not recognized or reported and the true number of annual cases is likely to be higher. Cases of West African trypanosomiasis imported into the United States are extremely rare.

Common routes of transmission:

A person will get African trypanosomiasis if he or she is bitten by a tsetse fly infected with the *Trypanosoma brucei rhodesiense* or Trypanosoma brucei gambiense parasite. The proportion of tsetse flies that are infected with either parasite is low. The tsetse fly is found only in rural Africa. Travelers to urban areas are not at risk. The persons most likely to be exposed to the infection are tourists, hunters, and others working in or visiting game parks. Individuals doing field work in rural Africa should be aware: the flies bite during daylight hours and inhabit forests and areas of thick vegetation along rivers and waterholes. Even in areas where the disease is present, most flies are not infected with this parasite, so the risk of infection increases with the number of times a person is bitten by the tsetse fly.

Signs and symptoms:

Symptoms usually within 1 to 3 weeks after an infective bite. Occasionally, within 1 to 3 weeks, the infective bite develops into a red sore, also called a chancre. Several weeks to months later, other symptoms of sleeping sickness occur. These include fever, rash, swelling of the face and hands, headaches, fatigue, aching muscles and joints, itching skin, and swollen lymph nodes. Weight loss occurs as the illness progresses. Progressive confusion, personality changes, daytime sleepiness with nighttime sleep disturbances, and other neurologic problems occur after the infection has invaded the central nervous system. These symptoms become worse as the illness progresses. If left untreated, death will eventually occur after several years of infection.

Protective measures:

1. **Vaccination:**

There is no vaccination available for this disease.

2. PPE

Clinical setting: Standard recommendations for Universal Precautions should be followed when treating a patient with sleeping sickness

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

Field setting:

1. Wear protective clothing, including long-sleeved shirts and pants. The tsetse fly can bite through thin fabrics, so clothing should be made of medium-weight material.

2. Wear neutral-colored clothing. The tsetse fly is attracted to bright colors and very dark colors.

3. Inspect vehicles for tsetse flies before entering. The flies are attracted to moving vehicles.

4. Avoid bushes. The tsetse fly is less active during the hottest period of the day. It rests in bushes but will bite if disturbed.

5. Use insect repellant. Though insect repellants have not proven effective in preventing tsetse fly bites, they are effective in preventing other insects from biting and causing illness.

3. Other Protective measures:

Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to African Trypanosomaniasis at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Amebiasis

Where Amebiasis is commonly found:

Amebiasis (am-e-BI-a-sis) is caused by the parasite Entamoeba histolytica. It can affect anyone, although it is more common in people who live in tropical areas with poor sanitary conditions. In the United States, amebiasis is most often found in travelers to and immigrants from these areas, as well as in people who live in institutions that have poor sanitary conditions. Diagnosis can be difficult because other parasites can look very similar to E. histolytica when seen under a microscope. Infected people do not always become sick. If your doctor determines that you are infected and need treatment, medication is available.

Common routes of transmission:

Transmission occurs via the fecal oral route. Risky activities are consuming food or water that is contaminated with *E. histolytica* faces or touching and bringing to your mouth *E. histolytica* cysts (eggs) picked up from surfaces that are contaminated with *E. histolytica*

Signs and symptoms:

Only about 10% to 20% of people who are infected with *E. histolytica* become sick from the infection. Those people who do become sick usually develop symptoms within 2 to 4 weeks, although this may range from several weeks or longer. The symptoms often are quite mild and can include loose stools, stomach pain, and stomach cramping. Amebic dysentery is a severe form of amebiasis associated with stomach pain, bloody stools, and fever. Rarely, *E. histolytica* invades the liver and forms an abscess. Even less commonly, it spreads to other parts of the body, such as the lungs or brain.

Protective measures:

1. Vaccination:

There is no vaccination available for this organism.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with amebiasis. Face protection should be worn when the activity presents a chance of splash or aerosolization of fecal material

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Travelers to areas where this organism is endemic should adhere to the following precautions:

- Drink only bottled or boiled (for 1 minute) water or carbonated (bubbly) drinks in cans or bottles. Do **not** drink fountain drinks or any drinks with ice cubes. Another way to make water safe is by filtering it through an "absolute 1 micron or less" filter **and** dissolving chlorine, chlorine dioxide,

or iodine tablets in the filtered water. "Absolute 1 micron" filters can be found in camping/outdoor supply stores.

- Do **not** eat fresh fruit or vegetables that you did not peel yourself.
- Do **not** eat or drink milk, cheese, or dairy products that may not have been pasteurized.
- Do **not** eat or drink anything sold by street vendors.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Amebiasis at work:

7. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
8. Notify your supervisor.
9. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
10. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
11. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Aspergillosis

Where Aspergillus is commonly found:

Aspergillus is a fungus that is very common in the environment. It is found in soil, on plants and in decaying plant matter. It is also found in household dust, building materials, and even in spices and some food items. There are lots of different types of Aspergillus, but the most common ones are Aspergillus fumigatus and Aspergillus flavus. Some others are Aspergillus terreus, Aspergillus nidulans, and Aspergillus niger.

Aspergillosis is disease cause by Aspergillus. There are many different kinds of aspergillosis. One kind is allergic bronchopulmonary aspergillosis (also called ABPA), a condition where the fungus causes allergic respiratory symptoms, such as wheezing and coughing, but does not actually invade and destroy tissue. Another kind of aspergillosis is invasive aspergillosis, a disease that usually affects people with immune system problems. In this condition, the fungus invades and damages tissues in the body. Invasive aspergillosis most commonly affects the lungs, but can also cause infection in many other organs and can spread throughout the body.

ABPA can affect people who are otherwise healthy, but it is most common in people with asthma or cystic fibrosis. Invasive aspergillosis generally affects people who have compromised immune systems, such as people who have had a bone marrow transplant or solid organ transplant, people who are taking high doses of corticosteroids, and people getting chemotherapy for cancers such as leukemia. Rarely, persons with advanced HIV infection can acquire the infection.

Common routes of transmission:

Since Aspergillus is so common in the environment, most people breathe in Aspergillus spores every day. It is probably impossible to completely avoid breathing in some Aspergillus spores. For people with healthy immune systems, this does not cause harm, and the immune system is able to get rid of the spores. But for people with compromised immune systems, breathing in Aspergillus spores, especially breathing in a lot of spores (such as in a very dusty environment) can lead to infection. Studies have shown that invasive aspergillosis can occur during building renovation or construction. Outbreaks of Aspergillus skin infections have been traced to contaminated biomedical devices.

Signs and symptoms:

There are many different kinds of aspergillosis, causing different symptoms. Incubation time varies depending on host factors and exposure characteristics. As mentioned above, ABPA can cause respiratory symptoms like wheezing, coughing and even fever in people with asthma or cystic fibrosis, and occasionally in people who are otherwise healthy. Aspergillus can also cause allergic sinusitis, and it can cause aspergilloma, or a "fungus ball" in the lung or other organs. Lung aspergillomas usually occur in people with other forms of lung disease, like emphysema or a history of tuberculosis. People with an aspergilloma in the lung may have no symptoms at all. Sometimes they may cough up bloody mucus. People who have invasive aspergillosis in the lung may have symptoms such as fever, chest pain, cough, and shortness of breath. Other symptoms may develop if the infection spreads beyond the lungs. When invasive aspergillosis spreads outside of the lungs, it can affect almost any organ in the body, including the brain.

Protective measures:

1. Vaccination:

There is no vaccination against this disease.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with aspergillosis. Face protection should be worn when the activity presents a chance of splash or aerosolization of contaminated body fluids.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to high levels of Aspergillus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

B virus infection (Herpes B, Monkey B virus)

Where B virus infection is commonly found:

B virus infection is caused by *Macacine herpesvirus* 1 (formerly *Cercopithecine herpesvirus* 1 [CHV-1]), an alphaherpesvirus closely related to herpes simplex virus. B virus is also commonly referred to as herpes B, monkey B virus, herpesvirus simiae, and herpesvirus B. The virus is commonly found among macaque monkeys, including rhesus macaques, pig-tailed macaques, and cynomolgus monkeys (also called crab-eating or long-tailed macaques), any of which can harbor latent B virus infection and appear to be natural hosts for the virus. Monkeys infected with B virus usually have no or only mild symptoms. In addition, rabbits, guinea pigs, and mice can be experimentally infected with B virus.

Infection with B virus is extremely rare in humans; however, when it does occur, the infection can result in severe neurologic impairment or fatal encephalomyelitis if the patient was not treated soon after exposure.

Common routes of transmission:

B virus infection in humans usually occurs as a result of bites or scratches from macaques—a genus of Old World monkeys that serve as the natural host—or from direct or indirect contact of broken skin or mucous membranes with infected monkey tissues or fluids. The virus can be present in the saliva, feces, urine, or nervous tissue of infected monkeys and may be harbored in cell cultures derived from infected monkeys.

Possible routes of transmission to humans include

- Bite or scratch from an infected animal
- Needlestick from contaminated syringe
- Scratch or cut from contaminated cage or other sharp-edged surface
- Exposure to nervous tissue or skull of infected animal (especially brain)
- Splash to eyes or face

B virus may survive for hours on the surface of objects, particularly on surfaces that are moist. The injury need not be severe for infection to occur, although non-penetrating wounds are thought to carry a lower risk of transmission.

Transmission risks of B virus to humans should be considered in the context of the rarity of observed transmission, even among broadly infected populations of animals. Hundreds of macaque bites and scratches occur annually in primate facilities in the United States, but B virus infection in humans occurs only rarely. In a study of more than 300 animal care workers, among whom, 166 reported possible transmission risk exposures to macaques, none of the workers was considered to be B virus positive.

Only one case of human-to-human transmission has been documented; the case, which was reported in a study of a B virus outbreak involving 4 persons in Florida, resulted from direct physical contact with lesions (see Epidemiologic Notes and Reports B-virus Infection in Humans -- Pensacola, Florida. Morbidity and Mortality Weekly Report 1987). Among the 4 case patients, 3 were animal handlers (2 suffered bite wounds and 1 had close contact with the sick macaque but was not injured or exposed to other bodily fluids and did not develop symptoms). The fourth patient was the wife of 1 of the animal handlers. She used an ointment to treat her husband's lesions and subsequently used it on herself to treat contact dermatitis. She seroconverted to B virus but never developed symptoms. The study found no

evidence of B virus infection among 130 close contacts of the 4 patients, healthcare workers, or primate workers. Moreover, even though B virus seroprevalence among adult macaques is >70%, only a few people in the study developed laboratory evidence of B virus exposure. Thus, transmission of this virus, both human-to-human and primate-to-human, is quite rare.

Persons at greatest risk for B virus infection are veterinarians, laboratory workers, and others who have close contact with Old World macaques or monkey cell cultures. Infection is typically caused by animal bites or scratches, by exposure to the tissues or secretions of macaques, or by mucosal contact with body fluid or tissue. Human infection can also result from indirect contact via, for example, a needlestick injury from a contaminated needle.

Macaques housed in primate facilities usually become B virus positive by the time they reach adulthood. B virus establishes latent infection in macaques and can only be transmitted during active viral shedding into mucosal surfaces. This happens only on reactivation from the latent state, which occurs rarely—most commonly in animals that have been stressed or immunosuppressed.

In late 1997, a worker at a primate center died from B virus infection that developed after biologic material from a monkey was splashed into the worker's eye. In response to this case, CDC formed a working group to reassess the existing recommendations for the prevention, evaluation, and treatment of B virus infection in humans. The group's report, Recommendations for Prevention of and Therapy for Exposure to B virus (Cercopithecine Herpesvirus 1), was published in Clinical Infectious Diseases in 2002. The 2002 report updates previous recommendations and describes the use of newer antiviral agents in post-exposure prophylaxis.

Other considerations:

1. **Type and physical condition of the implicated animal.** Only monkeys of the macaque family serve as the natural reservoir for B virus infection. No other primates carry any risk of B virus transmission unless they have had the opportunity to become infected by a macaque. Infected macaques will not ordinarily be shedding B virus. Animals with lesions consistent with B virus infection (fluid-filled blisters on the skin) and animals that are immunocompromised or stressed are far likelier to be excreting virus.

2. **Thoroughness and timeliness of wound cleansing procedure.** Wounds that have been cleansed within 5 minutes of exposure and that have been cleansed for at least 15 full minutes are less likely to lead to B virus infection. Delay in cleansing or inadequate cleansing of the wound increases the risk of infection.

3. **Nature of the wound.** Bites or scratches that penetrate the skin, and particularly deep puncture wounds, are considered higher risk than wounds that are superficial and thus more easily cleansed. Wounds to the head, neck, or torso provide potentially rapid access to the CNS and thus should be considered higher risk. Prophylaxis is recommended for this type of wound regardless of its severity. Superficial wounds to the extremities are less likely to lead to fatal disease, and antiviral treatment is considered less urgent in such exposures.

4. **Exposure to materials that have come into contact with macaques.** Accidental needlesticks with syringes that have come into contact with the CNS, eyelids, or mucosa of macaques are considered to carry a high risk of infection. Punctures from needles exposed to the peripheral blood of macaques are considered relatively low risk. Scratches resulting from contact with possibly contaminated objects, such as animal cages, are considered to carry a lower risk for infection.

Signs and symptoms:

Monkeys infected with B virus usually have no or only mild symptoms. In humans, however, B virus infection can result in acute ascending encephalomyelitis, resulting in death or severe neurologic impairment.

Disease onset in B virus–infected humans typically occurs within 1 month of exposure, although the actual incubation period can be a little as 3 to 7 days. Symptoms associated with B virus infection include

- Vesicular (small blister) skin lesions at or near the site of exposure
- Localized neurologic symptoms (pain, numbness, itching) near the wound site
- Flu-like aches and pains
- Fever and chills
- Headaches lasting more than 24 hours
- Fatigue
- Muscular incoordination
- Shortness of breath

Initial symptoms include fever, headache, and vesicular skin lesions at the site of exposure. Neurologic symptoms vary. Respiratory involvement and death can occur 1 day to 3 weeks after symptom onset.

Disease progression depends on the location of the exposure (usually a bite or scratch) and on the number of infectious virus particles that get delivered by the exposure. Although vesicular lesions have sometimes been observed at the exposure site, they are not invariably observed. The first signs of disease typically include the onset of flu-like symptoms (e.g., fever, muscle ache, fatigue, and headache). Lymphadenitis, lymphangities, nausea and vomiting, abdominal pain, and hiccups have also been observed in patients. Once the virus spreads to the central nervous system (CNS), a variety of neurologic signs develop, including hyperesthesias, ataxia, diplopia, agitation, and ascending flaccid paralysis. CNS involvement generally heralds grave consequences. Most patients with CNS complications will die despite antiviral therapy and supportive care, and those who survive usually suffer serious neurologic sequelae. Respiratory failure associated with ascending paralysis is the most common cause of death.

Given the number of potential exposures for animal care workers, asymptomatic or mild human B virus infection has been postulated to occur, but no evidence for asymptomatic B virus infection or for latent infection has been observed in humans at elevated risk of infection. Antibodies produced in response to the human herpesviruses HSV-1 and HSV-2 (present in >80% of adults) are capable of neutralizing B virus in vitro but are not protective against B virus infection. Moreover, such antibodies complicate diagnostic testing for B virus due to their high level of cross-reactivity (i.e., they increase the potential for both false-positive and false-negative results).

Protective measures:

1. Vaccination:

There is currently no vaccination for this organism.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with B virus infection. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of culture material, fluids from an infectious non-human primate or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to B virus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index**.**

Botulism

Where Botulism is commonly found:

Botulism is a rare but serious paralytic illness caused by a nerve toxin that is produced by the bacterium *Clostridium botulinum*. There are three main kinds of botulism. Foodborne botulism is caused by eating foods that contain the botulism toxin. Wound botulism is caused by toxin produced from a wound infected with *Clostridium botulinum*. Infant botulism is caused by consuming the spores of the botulinum bacteria, which then grow in the intestines and release toxin. All forms of botulism can be fatal and are considered medical emergencies. Foodborne botulism can be especially dangerous because many people can be poisoned by eating a contaminated food.

Clostridium botulinum is the name of a group of bacteria commonly found in soil. These rod-shaped organisms grow best in low oxygen conditions. The bacteria form spores which allow them to survive in a dormant state until exposed to conditions that can support their growth. There are seven types of botulism toxin designated by the letters A through G; only types A, B, E and F cause illness in humans.

In the United States, an average of 145 cases are reported each year. Of these, approximately 15% are foodborne, 65% are infant botulism, and 20% are from infected wounds. Adult intestinal colonization and iatrogenic botulism also occur, but rarely. Outbreaks of foodborne botulism involving two or more persons occur most years and usually caused by eating contaminated home-canned foods. The number of cases of foodborne and infant botulism has changed little in recent years, but wound botulism has increased because of the use of black-tar heroin, especially in California.

Common routes of transmission:

Foodborne botulism follows ingestion of toxin produced in food by *C. botulinum*. The most frequent source is home-canned foods, prepared in an unsafe manner. Wound botulism occurs when *C. botulinum* spores germinate within wounds. Infant botulism occurs when *C. botulinum* spores germinate and produce toxin in the gastrointestinal tract of infants.

Signs and symptoms:

The classic symptoms of botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. Infants with botulism appear lethargic, feed poorly, are constipated, and have a weak cry and poor muscle tone. These are all symptoms of the muscle paralysis caused by the bacterial toxin. If untreated, these symptoms may progress to cause paralysis of the arms, legs, trunk and respiratory muscles. In foodborne botulism, symptoms generally begin 18 to 36 hours after eating a contaminated food, but they can occur as early as 6 hours or as late as 10 days.

Protective measures:

1. Vaccination:

There is a vaccination available for this organism.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with Botulism. Face protection should be worn when the activity presents a chance of splash or aerosolization of infectious secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially

contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Foodborne botulism has often been from home-canned foods with low acid content, such as asparagus, green beans, beets and corn. However, outbreaks of botulism have resulted from more unusual sources such as chopped garlic in oil, chile peppers, tomatoes, carrot juice, improperly handled baked potatoes wrapped in aluminum foil, and home-canned or fermented fish. Persons who do home canning should follow strict hygienic procedures to reduce contamination of foods. Oils infused with garlic or herbs should be refrigerated. Potatoes which have been baked while wrapped in aluminum foil should be kept hot until served or refrigerated. Because the botulism toxin is destroyed by high temperatures, persons who eat home-canned foods should consider boiling the food for 10 minutes before eating it to ensure safety. Instructions on safe home canning can be obtained from county extension services or from the US Department of Agriculture. Because honey can contain spores of Clostridium botulinum and this has been a source of infection for infants, children less than 12 months old should not be fed honey. Honey is safe for persons 1 year of age and older. Wound botulism can be prevented by promptly seeking medical care for infected wounds.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Botulism at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Burkholderia pseudomallei (Melioidosis)

Where Burkholderia pseudomallei is commonly found:

Melioidosis, also called Whitmore's disease, is an infectious disease caused by the bacterium Burkholderia pseudomallei that may infect humans or animals. Melioidosis is predominately a disease of tropical climates, especially in Southeast Asia and northern Australia where it is endemic. The bacteria causing melioidosis are found in contaminated water and soil and are spread to humans and animals through direct contact with the contaminated source.

Southeast Asia and northern Australia are the main endemic foci for melioidosis; recent publications report that it is now considered endemic in Papua New Guinea, most of the Indian subcontinent and southern China, Hong Kong, and Taiwan as well. The greatest numbers of cases are reported in Thailand, Malaysia, Singapore, and northern Australia. Though rarely reported, cases are thought to frequently occur in Vietnam, Indonesia, Cambodia, Laos, and Myanmar (Burma). Additionally, cases have been reported from the South Pacific (New Caledonia), India and Sri Lanka, Africa, and the Middle East. In many of these countries, Burkholderia pseudomallei is so prevalent that it is a common contaminate found on laboratory cultures. Moreover, it has been a common pathogen isolated from troops of all nationalities that have served in areas with endemic disease. A few isolated cases of melioidosis have occurred in the Western Hemisphere in Mexico, El Salvador, Panama, Ecuador, Peru, Guyana, Puerto Rico, Martinique, Guadeloupe, and most frequently, Brazil. In the United States, confirmed cases reported in previous years have ranged from none to five and have occurred among travelers and immigrants coming from places where the disease is endemic.

Common routes of transmission:

Transmission occurs through direct contact with contaminated soil and surface waters. In Southeast Asia, the organism has been repeatedly isolated from agricultural fields, with infections occurring primarily during the rainy season. Humans and animals are believed to acquire the infection by inhalation of contaminated dust or water droplets, ingestion of contaminated water, and contact with contaminated soil especially through skin abrasions (inoculation), and for military troops, by contamination of war wounds.

Person-to-person transmission is very rare, with one report of transmission from a brother who had chronic melioidosis to a sister with diabetes who was his caretaker, and two reports of sexual transmission; transmission in both of these latter cases was preceded by a clinical history of chronic prostatitis in the source patient. Vertical transmission may occur, with one documented instance of transplacental transmission from an infected mother to her neonate. Nosocomial transmission through contaminated blood-drawing equipment has also been documented.

Signs and symptoms:

Illness from melioidosis can be categorized as an acute or localized infection, acute pulmonary infection, acute bloodstream infection, or disseminated infection. Sub-clinical infections are also possible. The incubation period (time between exposure and appearance of clinical symptoms) is not clearly defined, but may range from one day to many years; generally symptoms appear two to four weeks after exposure. Although healthy people may get melioidosis, the major risk factors are diabetes, liver disease, renal disease, thalassemia, and/or cancer or another immune-suppressing condition not related to HIV. It is important to note that melioidosis is often called "The Great Mimicker" since it has a wide range of clinical presentations and can be mistaken for other diseases such as tuberculosis or more common forms of pneumonia.

Acute, localized infection

This form of infection is generally localized as an ulcer, nodule, or skin abscess and may result from inoculation through a break in the skin. The acute form of melioidosis can produce fever and general muscle aches. The infection may remain localized, or may progress rapidly to infect the bloodstream.

Pulmonary infection

This form of the disease is the most common form of presentation and can produce a clinical picture of mild bronchitis to severe pneumonia. The onset of pulmonary melioidosis is typically accompanied by a high fever, headache, anorexia, and general muscle soreness. Chest pain is common, but a nonproductive or productive cough with normal sputum is the hallmark of this form of melioidosis. Cavitary lesions may be seen on chest X-ray, similar to those seen in pulmonary tuberculosis.

Acute bloodstream infection

Patients with underlying risk factors such diabetes and renal insufficiency are more likely to develop this form of the disease, which usually results in septic shock. The symptoms of bloodstream infection may include fever, headache, respiratory distress, abdominal discomfort, joint pain, muscle tenderness, and disorientation. This is typically an infection with rapid onset, and abscesses may be found throughout the body, most notably in the liver, spleen, or prostate.

Disseminated infection

Disseminated melioidosis is an infection that presents with abscess formation in various organs of the body, and may or may not be associated with sepsis. Organs involved typically include the liver, lung, spleen, and prostate; involvement of joints, bones, viscera, lymph nodes, skin, or brain may also occur. Disseminated infection may be seen in acute or chronic melioidosis. Signs and symptoms, in addition to fever, may include weight loss, stomach or chest pain, muscle or joint pain, and headache or seizure.

In rare instances, person-to-person transmission of melioidosis has occurred through contact with blood or body fluids of an infected person.

Protective measures:

1. Vaccination:

There is no vaccine for melioidosis.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with melioidosis. Face protection should be worn when the activity presents a chance of splash or aerosolization of body fluids.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Prevention of the infection in areas where the disease is endemic can be difficult since contact with contaminated soil is common. Persons with open skin wounds and those with diabetes or chronic renal disease should avoid contact with soil and standing water in these areas as they are at increased risk for acquiring melioidosis. Wearing boots during agricultural work can prevent infection through the feet and

lower legs. In health care settings, using standard contact precautions (mask, gloves, and gown) can prevent transmission.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Burkholderia pseudomallei at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Candida (Oropharangeal Candidiasis)

Where Candida is commonly found:

Candidiasis of the mouth and throat, also known as a "thrush" or oropharyngeal candidiasis (OPC), is a fungal infection that occurs when there is overgrowth of fungus called Candida. Candida is normally found on skin or mucous membranes. However, if the environment inside the mouth or throat becomes imbalanced, Candida can multiply. When this happens, symptoms of thrush appear. Candida overgrowth can also develop in the esophagus, and is called Candida esophagitis, or esophageal candidiasis.

OPC can affect normal newborns, persons with dentures, and people who use inhaled corticosteroids. It occurs more frequently and more severely in people with weakened immune systems, particularly in persons with AIDS and people undergoing treatment for cancer. Candida esophagitis usually occurs in people with weakened immune systems. It is very unusual in otherwise healthy people.

Common routes of transmission:

Most cases of OPC are caused by the person's own *Candida* organisms which normally live in the mouth or digestive tract. A person has symptoms when overgrowth of *Candida* organisms occurs.

Signs and symptoms:

People with OPC infection usually have painless, white patches in the mouth. Others may have redness and soreness of the inside of the mouth. Cracking at the corners of the mouth, known as angular cheilitis, may occur. Symptoms of Candida esophagitis may include pain and difficulty swallowing.

Protective measures:

1. Vaccination:

There is no vaccination for candida.

2. PPE

Clinical setting: Standard precautions should be used when caring for a patient with Candida.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Candida at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Chagas Disease

Where Chagas Disease is commonly found:

Chagas disease is caused by the parasite Trypanosoma cruzi, which is transmitted to animals and people by insect vectors that are found only in the Americas (mainly, in rural areas of Latin America where poverty is widespread). Chagas disease (T. cruzi infection) is also referred to as American trypanosomiasis.

People who have Chagas disease can be found anywhere in the world. However, vectorborne transmission is confined to the Americas, principally rural areas in parts of Mexico, Central America, and South America. In some regions of Latin America, vector-control programs have succeeded in stopping this type of disease spread. Chagas disease is not endemic in the Caribbean (for example, in Puerto Rico or Cuba). Rare vectorborne cases of Chagas disease have been noted in the southern United States.

Common routes of transmission:

In Chagas-endemic areas, the main route of transmission is through vectorborne transmission. The insect vectors are called triatomine bugs. These blood-sucking bugs get infected by biting an infected animal or person. Once infected, the bugs pass T. cruzi parasites in their feces. The bugs are found in houses made from materials such as mud, adobe, straw, and palm thatch. During the day, the bugs hide in crevices in the walls and roofs. During the night, when the inhabitants are sleeping, the bugs emerge. Because they tend to feed on people's faces, triatomine bugs are also known as "kissing bugs." After they bite and ingest blood, they defecate on the person. The person can become infected if T. cruzi parasites in the bug feces enter the body through mucous membranes or breaks in the skin. The unsuspecting, sleeping person may accidentally scratch or rub the feces into the bite wound, eyes, or mouth.

People also can become infected through:

- consumption of uncooked food contaminated with feces from infected bugs;
- congenital transmission (from a pregnant woman to her baby);
- blood transfusion;
- organ transplantation; and
- accidental laboratory exposure.

Chagas disease is not transmitted from person-to-person like a cold or the flu or through casual contact.

Signs and symptoms:

There are two phases of Chagas disease: the acute phase and the chronic phase. Both phases can be symptom free or life threatening.

The **acute phase** lasts for the first few weeks or months of infection. It usually occurs unnoticed because it is symptom free or exhibits only mild symptoms and signs that are not unique to Chagas disease. The symptoms noted by the patient can include fever, fatigue, body aches, headache, rash, loss of appetite, diarrhea, and vomiting. The signs on physical examination can include mild enlargement of the liver or spleen, swollen glands, and local swelling (a chagoma) where the parasite entered the body. The most recognized marker of acute Chagas disease is called Romaña's sign, which includes swelling of the eyelids on the side of the face near the bite wound or where the bug feces were deposited or accidentally rubbed into the eye. Even if symptoms develop during the acute phase, they usually resolve on their own, within a few weeks or months. Although the symptoms resolve, the infection, if untreated, persists.

Rarely, young children (<5%) die from severe inflammation/infection of the heart muscle (myocarditis) or brain (meningoencephalitis). The acute phase also can be severe in people with weakened immune systems. if untreated, the infection is lifelong.

During the **chronic phase**, the infection may remain silent for decades or even for life. However, some people develop:

- **cardiac complications**, which can include an enlarged heart (cardiomyopathy), heart failure, altered heart rate or rhythm, and cardiac arrest (sudden death); and/or
- **intestinal complications**, which can include an enlarged esophagus (megaesophagus) or colon (megacolon) and can lead to difficulties with eating or with passing stool.

The average life-time risk of developing one or more of these complications is about 30%. In people who have suppressed immune systems (for example, due to AIDS or chemotherapy), Chagas disease can reactivate with parasites found in the circulating blood. This occurrence can potentially cause severe disease.

Protective measures:

1. Vaccination:

There is no vaccine for this disease.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with Chagas disease. Face protection should be worn when the activity presents a chance of splash or aerosolization of body fliuds.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Travelers who sleep indoors, in well-constructed facilities (for example, air-conditioned or screened hotel rooms), are at low risk for exposure to infected triatomine bugs, which infest poor-quality dwellings and are most active at night. Preventive measures include spraying infested dwellings with residual-action insecticides, using bed nets treated with long-lasting insecticides, wearing protective clothing, and applying insect repellent to exposed skin. In addition, travelers should be aware of other possible routes of transmission, including bloodborne and foodborne.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Chagas Disease at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.

3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Chickenpox

Where Chickenpox is commonly found:

Chickenpox is a disease caused by infection with the varicella zoster virus. this organism is found in humans worldwide.

Common routes of transmission:

Chickenpox is highly infectious and spreads from person to person by direct contact or through the air from an infected person's coughing or sneezing or from aerosolization of virus from skin lesions. A person with chickenpox is contagious 1-2 days before the rash appears and until all blisters have formed scabs. It takes from 10-21 days after exposure for someone to develop chickenpox.

Signs and symptoms:

A skin rash of blister-like lesions, covering the body but usually more concentrated on the face, scalp, and trunk. Most, but not all, infected individuals have fever, which develops just before or when the rash appears. If exposed, persons who have been vaccinated against the disease may get a milder illness, with less severe rash (sometimes involving only a few red bumps that look similar to insect bites) and mild or no fever.

Complications can include: bacterial infection of the skin, swelling of the brain, and pneumonia. Adolescents and adults are more at risk for severe disease.

Protective measures:

1. Vaccination:

All employees who could potentially be exposed to chickenpox due to providing care for individuals in a group setting, patient care duties, or research with the varicella organism should be vaccinated against chickenpox if they **do not** meet the criteria below:

- Documentation of two doses of varicella vaccine
- Blood tests that show you are immune to varicella or laboratory confirmation of prior disease
- Born in the United States before 1980, excluding health-care workers, pregnant women, and immunocompromised persons. These individuals need to meet one of the other criteria for evidence of immunity.
- Receipt from a healthcare provider of a) a diagnosis of chickenpox or b) verification of a history of chickenpox
- Receipt from a healthcare provider of a) a diagnosis of herpes zoster (shingles), or b) verification of a history of herpes zoster (shingles).

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with chickenpox. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory or skin lesion secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Chickenpox at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Chikungunya

Where Chikungunya is commonly found:

The geographic range of the virus is primarily in Africa and Asia. For information on current outbreaks, consult CDC's Travelers' Health website (http://wwwn.cdc.gov/travel/default.aspx). Given the current large chikungunya virus epidemics and the world wide distribution of Aedes aegypti and Aedes albopictus, there is a risk of importation of chikungunya virus into new areas by infected travelers.

Mosquitoes become infected with chikungunya virus when they feed on an infected person. Infected mosquitoes can then spread the virus to other humans when they bite them. Monkeys, and possibly other wild animals, may also serve as reservoirs of the virus. Aedes aegypti, a household container breeder and aggressive daytime biter which is attracted to humans, is the primary vector of chikungunya virus to humans. Aedes albopictus (the Asian tiger mosquito) has also played a role in human transmission is Asia, Africa, and Europe. Various forest-dwelling mosquito species in Africa have been found to be infected with the virus.

Common routes of transmission:

Chikungunya fever is a viral disease transmitted to humans by the bite of infected mosquitoes. Mosquitoes become infected when they feed on a person infected with chikungunya virus. Infected mosquitoes can then spread the virus to other humans when they bite. Monkeys, and possibly other wild animals, may also serve as reservoirs of the virus.

Signs and symptoms:

Chikungunya virus infection can cause a debilitating illness, most often characterized by fever, headache, fatigue, nausea, vomiting, muscle pain, rash, and joint pain. The term 'chikungunya' means 'that which bends up' in the Kimakonde language of Mozambique.

Acute chikungunya fever typically lasts a few days to a few weeks, but as with dengue, West Nile fever and other arboviral fevers, some patients have prolonged fatigue lasting several weeks. Additionally, some patients have reported incapacitating joint pain, or arthritis which may last for weeks or months. The prolonged joint pain associated with chikungunya virus is not typical of dengue. No hemorrhagic cases related to chikungunya virus infection have been conclusively documented in the scientific literature. Co-circulation of dengue fever in many areas may mean that chikungunya fever cases are sometimes clinically misdiagnosed as dengue infections, therefore the incidence of chikungunya fever could be much higher than what has been previously reported.

The incubation period (time from infection to illness) can be 2-12 days, but is usually 3-7 days. "Silent" chikungunya virus infections (infections without illness) do occur; but how commonly this happens is not yet known. Chikungunya virus infection (whether clinically apparent or silent) is thought to confer life-long immunity. Fatalities related to chikungunya virus are rare.

Pregnant women can become infected with chikungunya virus during all stages of pregnancy and have symptoms similar to other individuals. Most infections occurring during pregnancy will not result in the virus being transmitted to the fetus. The highest risk for infection of the fetus/child occurs when a woman has virus in her blood (viremic) at the time of delivery. There are also rare reports of first trimester abortions occurring after chikungunya infection. Pregnant women should take precautions to avoid mosquito bites. Products containing DEET can be used in pregnancy without adverse effects. Currently, there is no evidence that the virus is transmitted through breast milk.

Treatment is symptomatic and can include rest, fluids, and medicines to relieve symptoms of fever and aching such as ibuprofen, naproxen, acetaminophen, or paracetamol. Aspirin should be avoided. Infected persons should be protected from further mosquito exposure (staying indoors in areas with screens

and/or under a mosquito net) during the first few days of the illness so they can not contribute to the transmission cycle.

Protective measures:

1. Vaccination:

There is no vaccine or preventive drug currently available.

2. PPE

Clinical setting: Routine standard precautions should be used when caring for a patient with chikungunya.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection may be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

The best way to prevent chikungunya virus infection is to avoid mosquito bites. Prevention tips are similar to those for other viral diseases transmitted by mosquitoes, such as dengue or West Nile.

- Use insect repellent containing DEET, Picaridin, oil of lemon eucalyptus, or IR3535 on exposed skin. Always follow the directions on the package.
- Wear long sleeves and pants (ideally treat clothes with permethrin or another repellent).
- Have secure screens on windows and doors to keep mosquitoes out.
- Get rid of mosquito sources in your yard by emptying standing water from flower pots, buckets and barrels. Change the water in pet dishes and replace the water in bird baths weekly. Drill holes in tire swings so water drains out. Keep children's wading pools empty and on their sides when they aren't being used.
- Additionally, a person with chikungunya fever should limit their exposure to mosquito bites to avoid further spreading the infection. The person should use repellents when outdoors exposed to mosquito bites or stay indoors in areas with screens or under a mosquito net.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Chikungunya at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.

4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Cholera

Where Cholera is commonly found:

Cholera has been very rare in industrialized nations for the last 100 years; however, the disease is still common today in other parts of the world, including the Indian subcontinent and sub-Saharan Africa. In January 1991, epidemic cholera appeared in South America and quickly spread to several countries. A few cases have occurred in the United States among persons who traveled to South America or ate contaminated food brought back by travelers.

Brackish and marine waters are a natural environment for the etiologic agents of cholera, Vibrio cholerae O1 or O139. There are no known animal hosts for Vibrio cholerae, however, the bacteria attach themselves easily to the chitin-containing shells of crabs, shrimps, and other shellfish, which can be a source for human infections when eaten raw or undercooked. A few persons in the United States have contracted cholera after eating raw or undercooked shellfish from the Gulf of Mexico.

Common routes of transmission:

A person may get cholera by drinking water or eating food contaminated with the cholera bacterium. In an epidemic, the source of the contamination is usually the feces of an infected person. The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water. Large epidemics often related to fecal contamination of water supplies or street vended foods. Occasionally transmitted through eating raw or undercooked shellfish that are naturally contaminated.

Although cholera can be life-threatening, it is easily prevented and treated. In the United States, because of advanced water and sanitation systems, cholera is not a major threat; however, everyone, especially travelers, should be aware of how the disease is transmitted and what can be done to prevent it.

Signs and symptoms:

Cholera is an acute, diarrheal illness caused by infection of the intestine with the bacterium *Vibrio cholerae*. The infection is often mild or without symptoms, but sometimes it can be severe. Approximately one in 20 infected persons has severe disease characterized by profuse watery diarrhea, vomiting, and leg cramps. In these persons, rapid loss of body fluids leads to dehydration and shock. Without treatment, death can occur within hours.

Protective measures:

1. Vaccination:

No vaccine is available in the US. A recently developed oral vaccine for cholera is licensed and available in other countries (Dukoral from SBL Vaccines). The vaccine appears to provide somewhat better immunity and have fewer adverse effects than the previously available vaccine. However, CDC does not recommend cholera vaccines for most travelers, nor is the vaccine available in the United States.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with cholera. Face protection should be worn when the activity presents a chance of splash or aerosolization of body fluids.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

The risk for cholera is very low for U.S. travelers visiting areas with epidemic cholera. When simple precautions are observed, contracting the disease is unlikely. All travelers to areas where cholera has occured should observe the following recommendations:

- Drink only water that you have boiled or treated with chlorine or iodine. Other safe beverages include tea and coffee made with boiled water and carbonated, bottled beverages with no ice.
- Eat only foods that have been thoroughly cooked and are still hot, or fruit that you have peeled yourself.
- Avoid undercooked or raw fish or shellfish, including ceviche.
- Make sure all vegetables are cooked avoid salads.
- Avoid foods and beverages from street vendors.
- Do not bring perishable seafood back to the United States.

A simple rule of thumb is "*Boil it, cook it, peel it, or forget it*."

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to cholera at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Clostridium difficile

Where Clostridium difficile is commonly found:

Clostridium difficile is a bacterium that causes diarrhea and more serious intestinal conditions such as colitis. The bacteria are found in the feces.

Common routes of transmission:

People in good health usually don't get *C. difficile* disease. People who have other illnesses or conditions requiring prolonged use of antibiotics and the elderly are at greater risk of acquiring this disease. People can become infected if they touch items or surfaces that are contaminated with feces and then touch their mouth or mucous membranes. Healthcare workers can spread the bacteria to other patients or contaminate surfaces through hand contact.

Signs and symptoms:

Individuals may carry c. difficile and not have any symptoms (*C. difficile* colonization). Symptoms of *C. difficile*-associated disease include:

- watery diarrhea (at least three bowel movements per day for two or more days)
- fever
- loss of appetite
- nausea
- abdominal pain/tenderness

Protective measures:

1. **Vaccination:**

There is no vaccination for this disease.

2. **PPE**

Clinical setting: Gloves should be worn when caring for a patient with Clostridium difficile. Face protection should be worn when the activity presents a chance of splash or aerosolization of body fliuds.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. **Other Protective measures:**

Good hand hygiene is the best way to prevent this and many other diseases. If you are infected you can spread the disease to others. However, only people that are hospitalized or on antibiotics are likely to become ill. For safety precautions you may do the following to reduce the chance of spread to others:

- wash hands with soap and water, especially after using the restroom and before eating;
- clean surfaces in bathrooms, kitchens and other areas on a regular basis with household detergent/disinfectants.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Clostridium difficile at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Dengue

Where Dengue is commonly found:

Dengue infection is a leading cause of illness and death in the tropics and subtropics. As many as 100 million people are infected yearly. Dengue is a disease caused by any one of four closely related dengue viruses (DENV 1, DENV 2, DENV 3, or DENV 4). The viruses are transmitted to humans by the bite of an infected mosquito. In the Western Hemisphere, the Aedes aegypti mosquito is the most important

transmitter or vector of dengue viruses, although a 2001 outbreak in Hawaii was transmitted by Aedes albopictus.

Dengue hemorrhagic fever, DHF, is a more severe form of dengue infection. It can be fatal if unrecognized and not properly treated in a timely manner. DHF is caused by infection with the same viruses that cause dengue fever.

Although dengue rarely occurs in the continental United States, it is endemic in Puerto Rico, and in many popular tourist destinations in Latin America and Southeast Asia; periodic outbreaks occur in Samoa and Guam.

Common routes of transmission:

Dengue is transmitted to people by the bite of an Aedes mosquito that is infected with a dengue virus. The mosquito becomes infected with dengue virus when it bites a person who has dengue virus in their blood. The person can either have symptoms of dengue fever or DHF, or they may have no symptoms. After about one week, the mosquito can then transmit the virus while biting a healthy person.

Dengue cannot be spread directly from person to person.

Signs and symptoms:

Symptoms of dengue fever are high fever, severe headache, severe pain behind the eyes, joint pain, muscle and bone pain, rash, and mild bleeding (e.g., nose or gums bleed, easy bruising). Generally, younger children and those with their first dengue infection have a milder illness than older children and adults.

Dengue hemorrhagic fever is characterized by a fever that lasts from 2 to 7 days, with general signs and symptoms consistent with dengue fever. When the fever declines, symptoms including persistent vomiting, severe abdominal pain, and difficulty breathing, may develop. This marks the beginning of a 24- to 48-hour period when the smallest blood vessels (capillaries) become excessively permeable allowing the fluid component to escape from the blood vessels into the peritoneum (causing ascites) and pleural cavity (leading to pleural effusions). This may lead to failure of the circulatory system and shock, followed by death, if circulatory failure is not corrected. In addition, the patient with DHF has a low platelet count and hemorrhagic manifestations, tendency to bruise easily or other types of skin hemorrhages, bleeding nose or gums, and possibly internal bleeding.

Protective measures:

1. **Vaccination:**

There are not yet any vaccines to prevent infection with dengue virus (DENV).

2. **PPE**

Clinical setting: Routine universal precautions should be used when treating a patient with dengue.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

1. **Other Protective measures:**

The risk of dengue infection for international travelers appears to be small. There is increased risk if an epidemic is in progress or visitors are in housing without air conditioning or screened windows and doors.

The most effective protective measures are those that prevent mosquito bites. When infected, early recognition and prompt supportive treatment can substantially lower the risk of developing severe disease.

Residents living in areas infested with Ae. aegypti should eliminate the places where the mosquito lays her eggs, primarily artificial containers that hold water. Items that collect rainwater or to store water (for example, plastic containers, 55-gallon drums, buckets, or used automobile tires) should be covered or properly discarded. Pet and animal watering containers and vases with fresh flowers should be emptied and cleaned (to remove eggs) at least once a week. This will eliminate the mosquito eggs and larvae and reduce the number of mosquitoes present in these areas. Using air conditioning or window and door screens reduces the risk of mosquitoes coming indoors. Proper application of mosquito repellents containing 20% to 30% DEET as the active ingredient on exposed skin and clothing decreases the risk of being bitten by mosquitoes.

When infected, early recognition and prompt supportive treatment can substantially lower the risk of developing severe disease. There is no specific medication for treatment of a dengue infection. Persons who think they have dengue should use analgesics (pain relievers) with acetaminophen and avoid those containing aspirin. They should also rest, drink plenty of fluids, and consult a physician. If they feel worse (e.g., develop vomiting and severe abdominal pain) in the first 24 hours after the fever declines, they should go immediately to the hospital for evaluation.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to dengue at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with VA Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Diphtheria

Where Diphtheria is commonly found:

Diphtheria is caused by toxigenic strains of Corynebacterium diphtheriae biotype mitis, gravis, intermedius, or belfanti. The bacteria produce an exotoxin which, if absorbed in the bloodstream, may damage organs such as the heart, kidneys, and nerves.

Humans are the only known reservoir of C. diphtheriae.

Diphtheria is found worldwide but it is uncommon in industrialized countries because of long-standing routine use of DTP (diphtheria and tetanus toxoids and pertussis vaccine). Countries where diphtheria is endemic include:

Regions	Countries
Africa	Algeria, Angola, Egypt, Niger, Nigeria, Sudan, and sub-Saharan countries
Americas	Bolivia, Brazil, Colombia, Dominican Republic, Ecuador, Haiti, and Paraguay
Asia/South Pacific	Afghanistan, Bangladesh, Bhutan, Burma (Myanmar), Cambodia, China, India, Indonesia, Laos, Malaysia, Mongolia, Nepal, Pakistan, Papua New Guinea, Philippines, Thailand, and Vietnam
Middle East	Iran, Iraq, Saudi Arabia, Syria, Turkey, and Yemen
Europe	Albania, Russia, and countries of the former Soviet Union

Common routes of transmission:

Person-to-person transmission occurs through oral or respiratory droplets, close physical contact, and rarely by fomites.

Cutaneous diphtheria is common in tropical countries, and contact with discharge from skin lesions may play an important role in transmission of infection in these environments.

Signs and symptoms:

Respiratory diphtheria presents as a sore throat with low-grade fever and an adherent membrane of the tonsils, pharynx, or nose. Neck swelling is usually present in severe disease. Nasal diphtheria can be asymptomatic or mild, with a blood-tinged discharge. Cutaneous diphtheria presents as infected skin lesions which lack a characteristic appearance.

The incubation period is 2–5 days (range 1–10 days). Affected anatomic sites include the mucous membrane of the upper respiratory tract (nose, pharynx, tonsils, larynx, and trachea [respiratory diphtheria]), skin (cutaneous diphtheria), or rarely, mucous membranes at other sites (eye, ear, vulva). Systemic complications, including myocarditis, and polyneuropathies, can result from absorption of diphtheria toxin from the infection site. However, cutaneous and nasal diphtheria are localized and rarely associated with systemic toxicity.

Respiratory diphtheria has a gradual onset and is characterized by a mild fever (rarely >101° F or >38.3° C), sore throat, difficulty in swallowing, malaise, loss of appetite, and if the larynx is involved, hoarseness may occur. The hallmark of respiratory diphtheria is the presence of a membrane that appears within 2–3 days of illness over the mucous membrane of the tonsils, pharynx, larynx, or nares, and which can extend into the trachea. The membrane is firm, fleshy, grey, and adherent, and bleeds following attempts to remove or dislodge it. Local complications such as life-threatening or fatal airway obstruction can result from extension of the membrane or dislodgement of a piece of the membrane into the larynx or trachea.

In severe respiratory diphtheria, cervical lymphadenopathy and soft-tissue swelling in the neck give rise to a "bull-neck" appearance. The case–fatality rate of respiratory diphtheria is 5%–10%.

Protective measures:

1. **Vaccination:**

There is a vaccine for Diphtheria.

2. **PPE**

Clinical setting: Gloves should be worn when caring for a patient with diphtheria. Face protection should be worn when the activity presents a chance of splash or aerosolization of body fluids.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. **Other Protective measures:**

Travelers to endemic areas should have a current diphtheria vaccination.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Diphtheria at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Escherichia coli

Where E. coli is commonly found:

Escherichia coli (E. coli) are a large and diverse group of bacteria. Although most strains of E. coli are harmless, others can cause illness. Some kinds of E. coli can cause diarrhea, while others cause urinary tract infections, respiratory illness and pneumonia, and other illnesses. Still other kinds of E. coli are used as markers for water contamination. The strain found in the water supply may not be harmful, but indicates the water is contaminated.

Some kinds of E. coli cause disease by making a toxin called Shiga toxin. The bacteria that make these toxins are called "Shiga toxin-producing" E. coli, or STEC. They are also referred to as verocytotoxic E. coli (VTEC) or enterohemorrhagic E. coli (EHEC); these all refer generally to the same group of bacteria.

The most commonly identified STEC in North America is E. coli O157:H7 (often shortened to E. coli O157 or even just "O157").

In addition to E. coli O157, many other serogroups of STEC cause disease. These other kinds are sometimes called "non-O157 STEC." E. coli. *S*erogroups O26, O111, and O103 are the non-O157 serogroups that most often cause illness in people in the United States.

Common routes of transmission:

STEC live in the guts of ruminant animals, including cattle, goats, sheep, deer, and elk. The major source for human illnesses is cattle. STEC that cause human illness generally do not make animals sick. Other kinds of animals, including pigs and birds, sometimes pick up STEC from the environment and may spread it. Infection can occur after swallowing lake water while swimming, touching the environment in petting zoos and other animal exhibits, not washing hands properly after changing the diaper of an infected child, and by eating food prepared by people who did not wash their hands well after using the toilet.

Potential routes of transmission include: consumption of contaminated ground meat that has been under cooked, consumption of contaminated raw vegetables, consumption of unpasteurized (raw) milk, unpasteurized apple cider, and soft cheeses made from raw milk, consumption of water that has not been disinfected, contact with cattle, or contact with the feces of infected people.

Signs and symptoms:

The symptoms of STEC infections vary for each person but often include severe stomach cramps, diarrhea (often bloody), and vomiting. If there is fever, it usually is not very high (less than 101˚F/less than 38.5˚C). Most people get better within 5–7 days. Some infections are very mild, but others are severe or even life-threatening.

STEC typically disappear from the feces by the time the illiness is resolved, but may be shed for several weeks, even after symptoms go away. Young children tend to carry STEC longer than adults. A few people keep shedding these bacteria for several months.

Protective measures:

1. Vaccination:

There is no vaccine for this organism.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with an STEC infection. Face protection should be worn when the activity presents a chance of splash or aerosolization of body fluids.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

WASH YOUR HANDS thoroughly after using the bathroom or changing diapers and before preparing or eating food. WASH YOUR HANDS after contact with animals or their environments (at farms, petting zoos, fairs, even your own backyard).

COOK meats thoroughly. Ground beef and meat that has been needle-tenderized should be cooked to a temperature of at least 160°F/70˚C. It's best to use a thermometer, as color is not a very reliable indicator of "doneness."

AVOID raw milk, unpasteurized dairy products, and unpasteurized juices (like fresh apple cider).

AVOID swallowing water when swimming or playing in lakes, ponds, streams, swimming pools, and backyard "kiddie" pools.

PREVENT cross contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after they touch raw meat.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to E. coli at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department.
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Encephalitis

Where Encephalitis is commonly found:

Arboviruses that cause human encephalitis are members of three virus families: the *Togaviridae* (genus Alphavirus), *Flaviviridae*, and *Bunyaviridae*. These viruses are maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods (mosquitoes, psychodids, ceratopogonids, and ticks).

All arboviral encephalitides are zoonotic, being maintained in complex life cycles involving a nonhuman primary vertebrate host and a primary arthropod vector. These cycles usually remain undetected until humans encroach on a natural focus, or the virus escapes this focus via a secondary vector or vertebrate host as the result of some ecologic change. Humans and domestic animals can develop clinical illness but usually are "dead-end" hosts because they do not produce significant viremia, and do not contribute to the transmission cycle. Many arboviruses that cause encephalitis have a variety of different vertebrate

hosts and some are transmitted by more than one vector. Maintenance of the viruses in nature may be facilitated by vertical transmission (e.g., the virus is transmitted from the female through the eggs to the offspring).

Arboviral encephalitides have a global distribution, but there are four main virus agents of encephalitis in the United States: eastern equine encephalitis (EEE), western equine encephalitis (WEE), St. Louis encephalitis (SLE) and La Crosse (LAC) encephalitis, all of which are transmitted by mosquitoes. Another virus, Powassan, is a minor cause of encephalitis in the northern United States, and is transmitted by ticks. A new Powassan-like virus has recently been isolated from deer ticks. Its relatedness to Powassan virus and its ability to cause disease has not been well documented. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In milder (i.e., warmer) parts of the country, where arthropods are active late into the year, cases can occur into the winter months.

Common routes of transmission:

Vertebrate infection occurs when the infected arthropod takes a blood meal. Therefore these diseases are transmitted by a bite from the infected vector. Most cases of arboviral encephalitis occur from June through September, when arthropods are most active. In milder (i.e., warmer) parts of the country, where arthropods are active late into the year, cases can occur into the winter months.

Signs and symptoms:

The majority of human infections are asymptomatic or may result in a nonspecific flu-like syndrome. Onset may be insidious or sudden with fever, headache, myalgias, malaise and occasionally prostration. Infection may, however, lead to encephalitis, with a fatal outcome or permanent neurologic sequelae. Fortunately, only a small proportion of infected persons progress to frank encephalitis. There are no effective antivirals for these diseases, so treatment is supportive, attempting to deal with problems such as swelling of the brain, loss of the automatic breathing activity of the brain and other treatable complications like bacterial pneumonia.

Protective measures:

1. **Vaccination:**

There are no commercially available human vaccines for these diseases in the U.S.

2. **PPE**

Clinical setting: There is no human to human transmission of these diseases. Standard precautions should be implemented when caring for a patient with encephalitis.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. **Other Protective measures:**

Personal measures include reducing time outdoors particularly in early evening hours, wearing long pants and long sleeved shirts and applying mosquito repellent to exposed skin areas. Public health measures often require spraying of insecticides to kill juvenile (larvae) and adult mosquitoes.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with these organisms.

Steps to take if you think you were exposed to an Encephalitis organism at work:

2. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
3. Notify your supervisor.
4. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
5. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
6. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
7. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Erlichiosis

Where Erlichia is commonly found:

Ehrlichiosis is the general name used to describe several bacterial diseases that affect animals and humans. These diseases are caused by the organisms in the genus Ehrlichia. In the United States, there are currently two ehrlichial species that are known to cause disease in humans: Ehrlichia chaffeensis and Ehrlichia ewingii. Ehrlichia chaffeensis causes human ehrlichiosis also described as human monocytic ehrlichiosis (HME). In addition, human infections with Ehrlichia ewingii have also been documented

Most cases of ehrlichiosis are reported from the southern, eastern, and south-central United States, corresponding to the geographic distribution of the Lone Star tick. Cases may also be reported outside the expected range of this tick related to travel to endemic areas, or misclassification of cases that are more likely attributable to anaplasmosis. If you traveled to an ehrlichiosis-endemic area 2 weeks prior to becoming ill, you should tell your doctor where you traveled.

Common routes of transmission:

In the United States, ehrlichiae are transmitted by the bite of an infected tick. The lone star tick (Amblyomma americanum) is the primary vector of both Ehrlichia chaffeensis and Ehrlichia ewingii in the United States.

Signs and symptoms:

The symptoms of ehrlichiosis may resemble symptoms of various other infectious and non-infectious diseases. The initial signs and symptoms generally include:

- fever
- headache
- fatigue
- muscle aches

Other signs and symptoms may include:

- nausea
- vomiting
- diarrhea
- cough
- joint pains
- confusion
- occasionally rash

Symptoms typically appear after an incubation period of 5-10 days following the tick bite. It is possible that many individuals who become infected with ehrlichiae do not become ill or they develop only very mild symptoms.

The severity of TBRD may be related in part to the immune status of the patient. Persons with compromised immunity caused by immunosuppressive therapies (e.g., corticosteroids or cancer chemotherapy), HIV infection, or splenectomy appear to develop more severe disease, and case-fatality ratios for these individuals are characteristically higher than case-fatality ratios reported for the general population.

In contrast to Rocky Mountain spotted fever, rash is relatively uncommon in adult patients with ehrlichiosis, and is rarely reported with anaplasmosis. However, rash has been described in approximately 60% of pediatric patients infected with E. chaffeensis.

Protective measures:

1. Vaccination:

There is no vaccination available for Erlichiosis.

2. PPE

Clinical setting: This is a vectorborne disease so only standard precautions would apply.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Avoid exposure to ticks while working outdoors.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Erlichia at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Glanders

Where Glanders is commonly found:

Glanders is an infectious disease that is caused by the bacterium Burkholderia mallei. Glanders is primarily a disease affecting horses, but it also affects donkeys and mules and can be naturally contracted by other mammals such as goats, dogs, and cats. No naturally acquired cases of this disease have occurred in the U.S. in over 60 years. Sporadic cases have occurred from laboratory exposures. While United States has not seen any naturally occurring cases since the 1940s, it is still commonly seen among domestic animals in Africa, Asia, the Middle East, and Central and South America.

Burkholderia mallei is also a potential agent for biological warfare and of biological terrorism. It was used by Germany against Allied forces during World War I, and again in World War II by Japanese forces. It has also been suggested that B mallei was used on a limited basis against the mujahideen in Afghanistan in the 1980's.

Common routes of transmission:

The bacteria that cause glanders are transmitted to humans through contact with tissues or body fluids of infected animals. The bacteria enter the body through cuts or abrasions in the skin and through mucosal surfaces such as the eyes and nose. The organism may also be inhaled via infected aerosols or dust contaminated by infected animals. Sporadic cases have been documented in veterinarians, horse caretakers, and laboratorians.

Signs and symptoms:

The symptoms of glanders depend upon the route of infection with the organism. Generalized symptoms of glanders include fever with chills and sweating, muscle aches, chest pain, muscle tightness, and headache; mucopurulent nasal discharge and light sensitivity with excessive tearing of the eyes may be seen as well.

Localized infections

If there is a cut or scratch in the skin, a localized infection with ulceration may develop within 1 to 5 days at the site where the bacteria entered the body. Swollen lymph nodes may also be apparent. Infections involving the mucous membranes in the eyes, nose, and respiratory tract will cause increased mucus production from the affected sites. Dissemination to other locations in the body may occur 1-4 weeks after infection.

Pulmonary infections

The disease often manifests itself as pulmonary infection. In pulmonary infections, pneumonia, pulmonary abscesses, and pleural effusion can occur. Chest X-rays will show localized infection in the lobes of the lungs.

Bloodstream infections

Glanders bloodstream infections are usually fatal within 7 to 10 days.

Chronic infections

The chronic form of glanders involves multiple abscesses within the muscles and skin of the arms and legs or in the lungs, spleen, and/or liver.

Protective measures:

1. Vaccination:

There is no vaccine available for glanders. In countries where glanders is endemic in animals, prevention of the disease in humans involves identification and elimination of the infection in the animal population. Within the health care setting, transmission can be prevented by using standard contact precautions.

2. PPE

Clinical setting: Cases of human to human transmission has not been reported in the U.S. Standard precautions should be implemented when caring for a patient with Glanders.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Glanders at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Guinea Worm Disease (dracunculiasis)

Where Guinea Worm Disease (GWD) is commonly found:

Dracunculiasis, or Guinea worm disease, is caused by the parasite Dracunculus medinensis. The disease affects poor communities in remote parts of Africa that do not have safe water to drink. Anyone who drinks standing pond water contaminated by persons with GWD is at risk for infection. People who live in villages where the infection is common are at greatest risk.

There is no drug treatment for Guinea worm disease nor a vaccine to prevent it.

Currently, many organizations, including The Global 2000 program of The Carter Center of Emory University, UNICEF, the Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO) are helping the last 4 endemic countries in the world (Sudan, Ghana, Mali, and Ethiopia) to eradicate the disease. Since 1986, when an estimated 3.5 million people were infected annually, the campaign has eliminated much of the disease. In 2009, fewer than 4,000 cases of GWD were reported. Most of those cases were from Sudan.

Common routes of transmission:

Persons become infected by drinking water containing the water fleas harboring the Guinea worm larvae. Approximately 1 year after a person drinks contaminated water, the adult female Guinea worm emerges from the skin of the infected person. Persons with worms protruding through the skin may enter sources of drinking water and unwittingly allow the worm to release larvae into the water. These larvae are ingested by microscopic copepods (tiny "water fleas") that live in these water sources.

Once ingested, the stomach acid digests the water fleas, but not the Guinea worm larvae. These larvae find their way to the small intestine, where they penetrate the wall of the intestine and pass into the body cavity. During the next 10-14 months, the female Guinea worm larvae grow into full size adults, 60-100 centimeters (2-3 feet) long and as wide as a cooked spaghetti noodle. These adult female worms then migrate and emerge from the skin anywhere on the body, but usually on the lower limbs.

A blister develops on the skin at the site where the worm will emerge. This blister causes a very painful burning sensation and it ruptures within 24-72 hours. Immersion of the affected limb into water helps relieve the pain but it also triggers the Guinea worm to release a milky white liquid containing millions of immature larvae into the water, thus contaminating the water supply and starting the cycle over again. For several days after it has emerged from the ulcer, the female Guinea worm is capable of releasing more larvae whenever it comes in contact with water.

Signs and symptoms:

A few days to hours before the worm emerges, the person may develop a fever, swelling, and pain in the area. More than 90% of the worms appear on the legs and feet, but may occur anywhere on the body.

People, in remote, rural communities who are most commonly affected by Guinea worm disease (GWD) frequently do not have access to medical care. Emergence of the adult female worm can be very painful, slow, and disabling. Frequently, the skin lesions caused by the worm develop secondary bacterial infections, which exacerbate the pain, and extend the period of incapacitation to weeks or months. Sometimes permanent disability results if joints are infected and become locked.

Once the worm emerges from the wound, it can only be pulled out a few centimeters each day and wrapped around a piece of gauze or a small stick. Sometimes the worm can be pulled out completely within a few days, but this process usually takes weeks or months. Analgesics, such as aspirin or ibuprofen, can help reduce swelling; antibiotic ointment can help prevent bacterial infections. The worm can also be surgically removed by a trained doctor in a medical facility before an ulcer forms.

Protective measures:

1. Vaccination:

There is no vaccine for this organism.

2. PPE

Clinical setting: Routine universal precautions should be used when treating patients with GWD.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

GWD can only be transmitted by drinking contaminated water, travelers to endemic regions should follow these simple control measures:

- Drink only water from protected underground sources (such as from borehole or hand-dug wells) that are free from contamination.
- Always filter drinking water, using a cloth filter or a pipe filter, to remove the copepods (tiny "water fleas").

Additionally, unsafe sources of drinking water can be treated with an approved larvicide, such as ABATE®*, that kills copepods.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Guinea Worm Disease at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Hansen's Disease (Leprosy)

Where Hansen's Disease is commonly found:

A bacillus, Mycobacterium leprae, that multiplies very slowly and mainly affects the skin, nerves, and mucous membranes. The organism has never been grown in bacteriologic media or cell culture, but has been grown in mouse foot pads.

In 2002, the number of new cases detected worldwide was 763,917. In 2002, 96 cases occurring in the United States were reported to CDC. In 2002, WHO listed Brazil, Madagascar, Mozambique, Tanzania, and Nepal as having 90% of cases.

Common routes of transmission:

Although the mode of transmission of Hansen's disease remains uncertain, most investigators think that M. leprae is usually spread from person to person in respiratory droplets. Those at highest risk of contracting Hansen's disease are close contacts with patients with untreated, active, predominantly multibacillary disease, and persons living in countries with highly endemic disease.

Signs and symptoms:

This chronic infectious disease usually affects the skin and peripheral nerves but has a wide range of possible clinical manifestations. Patients are classified as having paucibacillary or multibacillary Hansen's disease. Paucibacillary Hansen's disease is milder and characterized by one or more hypopigmented skin macules. Multibacillary Hansen's disease is associated with symmetric skin lesions, nodules, plaques, thickened dermis, and frequent involvement of the nasal mucosa resulting in nasal congestion and epistaxis.

Protective measures:

1. Vaccination:

There is no vaccination for this disease.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with Hansen's disease. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Hansen's disease at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Hepatitis A

Where Hepatitis A is commonly found:

Hepatitis A (HAV) is a liver disease caused by the hepatitis A virus. Hepatitis A is found in the stool (feces) of persons with hepatitis A.

Common routes of transmission:

Hepatitis A virus is spread from person to person by putting something in the mouth that has been contaminated with the stool of a person with hepatitis A (i.e 'fecal-oral' transmission). For this reason, the virus is more easily spread in areas where there are poor sanitary conditions or where good personal hygiene is not observed. Individuals who work with raw sewage also have a small risk of being exposed to HAV.

Most infections result from contact with a household member or sex partner who has hepatitis A. Casual contact, as in the usual office, factory, or school setting, does not spread the virus. Individuals who travel to areas with a high rate of HAV or where poor sanitary conditions are likely should practice good hand hygiene, and thoroughly wash and cook any foods.

Signs and symptoms:

Adults will have signs and symptoms more often than children. These signs and symptoms include:

- jaundice
- fatigue
- abdominal pain
- loss of appetite
- nausea
- diarrhea
- fever

Protective measures:

1. Vaccination:

All employees who could potentially be exposed to Hepatitis A due to work related activity will be offered Hepatitis A vaccination at no cost to the employee.

2. PPE

Clinical setting: Gloves should be worn when caring for a HAV positive patient. Care should be taken when handling linens or clothing that has been soiled with the patient's feces. Face protection should be worn when the activity presents a chance of splash or aerosolization of feces. Wash hands immediately after removing PPE.

Research/Animal care setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated feces or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Hepatitis A at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.

5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Hepatitis A in the A-Z index.

Hepatitis B

Where Hepatitis B is commonly found:

Hepatitis B is a serious disease caused by a virus that attacks the liver. The virus, which is called hepatitis B virus (HBV), can cause lifelong infection, cirrhosis (scarring) of the liver, liver cancer, liver failure, and death. HBV is found in the blood of infected people.

Hepatitis B vaccine is available for all age groups to prevent hepatitis B virus infection.

Common routes of transmission:

HBV is spread when blood from an infected person enters the body of a person who is not infected. For example, HBV is spread through having sex with an infected person without using a condom (the efficacy of latex condoms in preventing infection with HBV is unknown, but their proper use might reduce transmission), by sharing drugs, needles, or "works" when "shooting" drugs, through needlesticks or sharps exposures on the job, or from an infected mother to her baby during birth.

Hepatitis B is not spread through food or water, sharing eating utensils, breastfeeding, hugging, kissing, coughing, sneezing or by casual contact.

Signs and symptoms:

About 30% of persons with HBV will have no signs or symptoms. Signs and symptoms are less common in children than adults. Signs and symptoms can include:

- jaundice
- fatigue
- abdominal pain
- loss of appetite
- nausea, vomiting
- joint pain

Protective measures:

1. Vaccination:

All employees who could potentially be exposed to human blood, tissue or other body fluids due to a work related activity will be offered Hepatitis B vaccination at no cost to the employee.

2. PPE

Clinical setting: Gloves should be worn when caring for a HBV positive patient. Face protection should be worn when the activity presents a chance of splash or aerosolization of blood.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated blood or

culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Hepatitis B at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Hepatitis B in the A-Z index.

Herpes Zoster (Shingles)

Where Herpes Zoster is commonly found:

Herpes zoster (also called Shingles), is a painful skin rash caused by the varicella zoster virus (VZV) which is the same virus that causes chickenpox. After a person recovers from chickenpox, the virus stays in the body. Usually the virus does not cause any problems; however, the virus can reappear years later, causing shingles. Herpes zoster is not caused by the same virus that causes genital herpes, a sexually transmitted disease.

In the United States, there are an estimated 1 million cases of shingles each year. Anyone who has recovered from chickenpox may develop shingles, including children. However, shingles most commonly occurs in people 50 years old and older. The risk of getting shingles increases as a person gets older. People who have medical conditions that keep the immune system from working properly, like cancer, leukemia, lymphoma, and human immunodeficiency virus (HIV), or people who receive immunosuppressive drugs, such as steroids and drugs given after organ transplantation are also at greater risk to get shingles.

Common routes of transmission:

Shingles cannot be passed from one person to another. However, the VZV virus can be spread from a person with active shingles to a person who has never had chickenpox through direct contact with the rash. The person exposed would develop chickenpox, not shingles. The virus is **not** spread through sneezing, coughing or casual contact. A person with shingles can spread the disease when the rash is in the blister-phase. Once the rash has developed crusts, the person is no longer contagious. A person is not infectious before blisters appear or with post-herpetic neuralgia (pain after the rash is gone).

The risk of spreading shingles is low if the rash is covered. People with shingles should keep the rash covered, not touch or scratch the rash, and wash their hands often to prevent the spread of VZV. Once the rash has developed crusts, the person is no longer contagious.

Signs and symptoms:

Shingles usually starts as a rash on one side of the face or body. The rash starts as blisters that scab after 3 to 5 days. The rash usually clears within 2 to 4 weeks. Before the rash develops, there is often pain, itching, or tingling in the area where the rash will develop. Other symptoms of shingles can include fever, headache, chills, and upset stomach.

Very rarely, shingles can lead to pneumonia, hearing problems, blindness, brain inflammation (encephalitis) or death. For about 1 person in 5, severe pain can continue even after the rash clears up. This pain is called post-herpetic neuralgia. As people get older, they are more likely to develop post-herpetic neuralgia, and it is more likely to be severe.

Protective measures:

1. Vaccination:

There is no vaccination for this Herpes Zoster.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with Herpes Zoster lesions. Face protection should be worn when the activity presents a chance of splash or aerosolization of fliud from the lesions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Herpes Zoster at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Histoplasmosis

Where Histoplasmosis is commonly found:

H. capsulatum grows in soil and material contaminated with bat or bird droppings. *H. capsulatum* is found throughout the world and is endemic in certain areas of the United States, mostly the Mississippi and Ohio River valleys. The fungus has been found in poultry house litter, caves, areas harboring bats, and in bird roosts. Positive histoplasmin skin tests occur in as many as 80% of the people living in areas where *H. capsulatum* is common, such as the eastern and central United States.

Variants of this organism can also be found in Central and South America, Africa, India, and Southeast Asia.

Common routes of transmission:

Spores become airborne when contaminated soil is disturbed. The aerosolized spores can be inhaled by anyone nearby. The disease is not transmitted human to human.

Infants, young children, and older persons, in particular those with chronic lung disease are at increased risk for severe disease. Systemic disease is more frequently seen in people with cancer, AIDS or other forms of immunosuppression.

Signs and symptoms:

Histoplasmosis symptoms vary greatly, but the disease primarily affects the lungs. Occasionally, other organs are affected. Most infected persons have no apparent ill effects. The acute respiratory disease is characterized by respiratory symptoms, a general ill feeling, fever, chest pains, and a dry or nonproductive cough. Distinct patterns may be seen on a chest x-ray. Chronic lung disease resembles tuberculosis and can worsen over months or years.

If symptoms occur, they will start within 3 to 17 days after exposure; the average is 10 days. The systemic form of the disease is called disseminated histoplasmosis, and it can be fatal if untreated.

Protective measures:

1. Vaccination:

There is no vaccination for this organism.

2. PPE

Clinical setting: Standard precautions should be implemented when caring for a patient with Histoplasmosis.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

It is not practical to test or decontaminate most sites that may be contaminated with *H. capsulatum*, but the following precautions can be taken to reduce a person's risk of exposure:

- Avoid areas that may harbor the fungus, e.g., accumulations of bird or bat droppings.

- Before starting a job or activity having a risk for exposure to *H. capsulatum*, consult the NIOSH/NCID document **Histoplasmosis: Protecting Workers at Risk**. This document contains information on work practices and personal protective equipment that will reduce the risk of infection. A copy of this document can be found at this link: http://www.cdc.gov/niosh/docs/2005-109/ The document can also be obtained by requesting publication no. 2005-109 from the National Institute for Occupational Safety and Health. You can also request additional information by calling 1-800-CDC-INFO.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Histoplasmosis at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department.
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Human Immunodeficiency Virus (HIV)

Where HIV is commonly found:

HIV is found in varying concentrations or amounts in blood, semen, vaginal fluid, breast milk, saliva, and tears. Scientists and medical authorities agree that HIV does not survive well outside the body, making the possibility of environmental transmission remote.

Common routes of transmission:

HIV transmission can occur when blood, semen, pre-seminal fluid, vaginal fluid, or breast milk from an infected person enters the body of an uninfected person.

HIV can enter the body through a vein (e.g., injection drug use), the lining of the anus or rectum, the lining of the vagina and/or cervix, the opening to the penis, the mouth, other mucous membranes (e.g., eyes or inside of the nose), or cuts and sores. Intact, healthy skin is an excellent barrier against HIV and other viruses and bacteria.

These are the most common ways that HIV is transmitted from one person to another:

- by having sex (anal, vaginal, or oral) with an HIV-infected person;
- by sharing needles or injection equipment with an injection drug user who is infected with HIV; or
- from HIV-infected women to their babies before or during birth, or through breast feeding

HIV is not transmitted by day-to-day contact in the workplace, schools, or social settings. HIV is not transmitted through shaking hands, hugging, or a casual kiss. You cannot become infected from a toilet seat, a drinking fountain, a door knob, dishes, drinking glasses, food, or pets.

Signs and symptoms:

The only way to know if you are infected is to be tested for HIV infection. You cannot rely on symptoms to know whether or not you are infected. Many people who are infected with HIV do not have any symptoms at all for 10 years or more.

The following **may be** warning signs of advanced HIV infection:

- rapid weight loss
- dry cough
- recurring fever or profuse night sweats
- profound and unexplained fatigue
- swollen lymph glands in the armpits, groin, or neck
- diarrhea that lasts for more than a week
- white spots or unusual blemishes on the tongue, in the mouth, or in the throat
- pneumonia

- red, brown, pink, or purplish blotches on or under the skin or inside the mouth, nose, or eyelids
- memory loss, depression, and other neurological disorders

However, no one should assume they are infected if they have any of these symptoms. Each of these symptoms can be related to other illnesses.

Protective measures:

1. Vaccination:

There currently is no vaccination for HIV.

2. PPE

Clinical setting: Gloves should be worn when caring for a**n** HIV positive patient. Face protection should be worn when the activity presents a chance of splash or aerosolization of blood.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of contaminated blood or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to HIV at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for HIV in the A-Z index.

Influenza

Where seasonal influenza (flu) is commonly found:

Influenza, commonly called "the flu," is caused by the influenza virus, which infects the respiratory tract (nose, throat, lungs).

Common routes of transmission:

The main way that influenza viruses are spread is from person-to-person in respiratory droplets of coughs and sneezes (i.e. "droplet spread"). This can happen when droplets from a cough or sneeze of an infected person are propelled (generally up to 3 feet) through the air and deposited on the mouth or nose of people nearby. Though much less frequent, the viruses also can be spread when a person touches respiratory droplets on another person or an object and then touches their own mouth or nose (or someone else's mouth or nose) before washing their hands.

Signs and symptoms:

Influenza is a respiratory illness. Symptoms of flu include fever, headache, extreme tiredness, dry cough, sore throat, runny or stuffy nose, and muscle aches. Children can have additional gastrointestinal symptoms, such as nausea, vomiting, and diarrhea, but these symptoms are uncommon in adults.

Although the term "stomach flu" is sometimes used to describe vomiting, nausea, or diarrhea, these illnesses are caused by certain other viruses, bacteria, or possibly parasites, and are rarely related to influenza.

The flu and the common cold are both respiratory illnesses but they are caused by different viruses. Because these two types of illnesses have similar flu-like symptoms, it can be difficult to tell the difference between them based on symptoms alone. In general, the flu is worse than the common cold, and symptoms such as fever, body aches, extreme tiredness, and dry cough are more common and intense. Colds are usually milder than the flu. People with colds are more likely to have a runny or stuffy nose. Colds generally do not result in serious health problems, such as pneumonia, bacterial infections, or hospitalizations.

Protective measures:

1. Vaccination:

All employees who could potentially be exposed to seasonal flu due to providing care for individuals in a group setting, patients with upper respiratory illness, or research activities will be offered the Influenza vaccination at no cost to the employee.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with the flu. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated respiratory tract secretions or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Influenza at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Influenza in the A-Z index.

Klebsiella

Where Klebsiella is commonly found:

Klebsiella is a type of gram-negative bacteria that can cause infections in healthcare settings, including pneumoniae, bloodstream infections, wound or surgical site infections, and meningitis. Increasingly, Klebsiella bacteria have developed antibiotic resistance, most recently to the class of antibiotics known as carbapenems. When bacteria such as Klebsiella pneumoniae produce an enzyme known as a carbapenemase, they are referred to as KPC producing organisms or carbapenem-resistant Klebsiella pneumoniae (CRKP). This is considered a threat to patient safety because carbapenem antibiotics often are the last line of defense against gram-negative infections that are resistant to other antibiotics.

Klebsiella bacteria are normally found in the human intestines (where they do not cause disease). They are also found in human stool (feces). In healthcare settings (like hospitals and long-term care facilities), *Klebsiella* infections commonly occur among sick patients who are receiving treatment for other conditions. Patients who have devices like ventilators (breathing machines) or intravenous (vein) catheters, and patients who are taking long courses of certain antibiotics are most at risk for *Klebsiella* infections. Healthy people usually do not get *Klebsiella* infections.

Common routes of transmission:

Klebsiella bacteria can be spread through person-to-person contact and from patient-to-patient on the hands of healthcare personnel. The bacteria are not spread through the air.

Patients in healthcare settings may be exposed to *Klebsiella* when they are on ventilators, or have intravenous catheters or wounds caused by injury or surgery.

Signs and symptoms:

Signs and symptoms vary depending on the location of the klebsiella infection. High fever, chills, and flu-like symptoms can occur. Cough is common with klebsiella pneumonia.

Protective measures:

1. Vaccination:

There is no vaccination for this organism.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with klebsiella. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory or wound secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE. Surfaces touched by the patient should be thoroughly cleaned.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to klebsiella at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

La Crosse Encephalitis Virus (LACV)

Where LACV is commonly found:

La Crosse encephalitis is a rare disease that is caused by a virus spread by infected mosquitoes. La Crosse encephalitis virus (LACV) is one of a group of mosquito-transmitted viruses that can cause inflammation of the brain (encephalitis). Approximately 80-100 cases of LAC encephalitis are reported each year in the United States. Historically, most cases of LACV disease were reported from the upper Midwestern states. Recently, more cases have been reported from mid-Atlantic and southeastern states. LACV disease cases occur primarily from late spring through early fall, but in subtropical endemic areas (e.g., the Gulf states), rare cases can occur in winter.

Common routes of transmission:

LACV is transmitted to humans by the bite of an infected "treehole mosquito" (*Aedes triseriatus*). LACV is not transmitted directly from person to person. The virus has a complex life cycle involving *Ae. triseriatus* and small mammals such as chipmunks and squirrels. Humans are not thought to be involved in the transmission cycle as they develop only low levels of circulating virus in the bloodstream. *Ae. triseriatus* lays its eggs in treeholes and man-made containers; it typically bites during the day.

Humans can become infected with LACV from the bite of an infected mosquito, however humans rarely, if ever, develop high enough concentrations of LACV in their bloodstreams to infect feeding mosquitoes. Humans are therefore considered "dead-end" or incidental hosts for LACV.

Signs and symptoms:

Most persons infected with LACV have no apparent illness. The incubation period is 5 to 15 days to develop symptoms of LACV disease after the bite of an infected mosquito. Initial symptoms in those who become ill include fever, headache, nausea, vomiting, and tiredness. Severe disease (involving encephalitis, an inflammation of the brain) occurs most commonly in children under age 16, and is often accompanied by seizures. Coma and paralysis occur in some cases.

Protective measures:

1. Vaccination:

There is no vaccination for this disease.

2. PPE

Clinical setting: Standard precautions should be implemented when caring for a patient with LACV.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Preventing mosquito bites is very important in protecting people who spend time outdoors.

- Use insect repellent containing DEET, picaridin, IR3535 or oil of lemon eucalyptus on exposed skin and/or clothing. The repellent/insecticide permethrin can be used on clothing to protect through several washes. Always follow the directions on the package.

- Wear long sleeves and pants when weather permits.
- Have secure, intact screens on windows and doors to keep mosquitoes out.
- Eliminate mosquito breeding sites by emptying standing water from flower pots, buckets, barrels, and other containers. Drill holes in tire swings so water drains out. Empty children's wading pools and store on their side after use.
- LACV can survive the winter in the mosquito eggs that will hatch into infected mosquitoes in the spring. Cleaning potential breeding sites such as old tires or tin cans can reduce the number of infected eggs developing into infected mosquitoes. As the *Aedes triseriatus* mosquito prefers treeholes for breeding sites, you can reduce mosquitoes by filling treeholes in/around your yard with soil.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to LACV at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Lymphocytic Choriomenigitis (LCM or LCMV)

Where LCMV is commonly found:

Lymphocytic choriomeningitis, or LCM, is a rodent-borne viral infectious disease that presents as aseptic meningitis (inflammation of the membrane, or meninges, that surrounds the brain and spinal cord), encephalitis (inflammation of the brain), or meningoencephalitis (inflammation of both the brain and meninges). Its causative agent is the lymphocytic choriomeningitis virus (LCMV), a member of the family Arenaviridae.

The primary host is the common house mouse, *Mus musculus*. Infection in house mouse populations may vary by geographic location; about 5% of mice throughout the United States carry LCMV. The virus is found in the saliva, urine, and feces of infected mice. Infected mice carry LCMV and shed it for the duration of their lives without showing any sign of illness. Other types of rodents, such as hamsters, are not the natural reservoirs but can become infected with LCMV from wild mice at the breeder, in the pet store or home environment. Humans are more likely to contract LCMV from house mice, but infections from pet rodents have also been reported.

LCM and milder LCMV infections have been reported in Europe, the Americas, Australia, and Japan, and may occur wherever infected rodent hosts of the virus are found. However, the disease has historically been underreported, often making it difficult to determine incidence rates or estimates of prevalence by geographic region. Several serologic studies conducted in urban areas have shown that the prevalence of LCMV infection among humans ranges from 2% to 5%.

Common routes of transmission:

Individuals become infected with LCMV after exposure to fresh urine, droppings, saliva, or nesting materials. Transmission can also occur when these materials are directly introduced into broken skin, the nose, the eyes, or the mouth, or presumably, via the bite of an infected rodent. Person-to-person transmission has not been reported, with the exception of vertical transmission from infected mother to fetus. Recent investigations indicate that organ transplantation may also be a means of transmission.

Signs and symptoms:

Some people infected with LCMV will remain asymptomatic. Infected persons who do become ill, onset of symptoms usually occurs 8-13 days after being exposed to the virus. A characteristic biphasic febrile illness then follows. The initial phase, which may last as long as a week, typically begins with any or all of the following symptoms: fever, malaise, lack of appetite, muscle aches, headache, nausea, and vomiting. Other symptoms that appear less frequently include sore throat, cough, joint pain, chest pain, testicular pain, and parotid (salivary gland) pain.

Following a few days of recovery, the second phase of the disease occurs, consisting of symptoms of meningitis (for example, fever, headache, and a stiff neck) or characteristics of encephalitis (for example, drowsiness, confusion, sensory disturbances, and/or motor abnormalities, such as paralysis). LCMV has also been known to cause acute hydrocephalus (increased fluid on the brain), which often requires surgical shunting to relieve increased intracranial pressure. In rare instances, infection results in myelitis (inflammation of the spinal cord) and presents with symptoms such as muscle weakness, paralysis, or changes in body sensation. An association between LCMV infection and myocarditis (inflammation of the heart muscles) has been suggested.

Protective measures:

1. Vaccination:

There is no vaccination for this organism.

2. PPE

Clinical setting: Standard precautions should be used when caring for LCMV patients.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

LCMV infection can be prevented by avoiding contact with house mice and taking precautions when handling pet rodents (i.e. mice, hamsters, or guinea pigs).

Although rare, pet rodents may become infected with LCMV from wild rodents. Breeders, pet stores, and pet owners should take measures to prevent infestations of wild rodents. Pet rodents should not come into contact with wild rodents. If you have a pet rodent, wash your hands with soap and water (or waterless alcohol-based hand rubs when soap is not available and hands are not visibly soiled) after handling rodents or their cages and bedding.

If you have a rodent infestation, take the following precautions to reduce the risk of LCMV infection:

- Seal up rodent entry holes or gaps with steel wool, lath metal, or caulk.
- Trap rats and mice by using an appropriate snap trap.
- Clean up rodent food sources and nesting sites and take precautions when cleaning rodent-infected areas.

  Recommendations for cleaning rodent-infested areas:

  - Use cross-ventilation when entering a previously unventilated enclosed room or dwelling prior to cleanup.
  - Put on rubber, latex, vinyl or nitrile gloves.
  - Do not stir up dust by vacuuming, sweeping, or any other means.
  - Thoroughly wet contaminated areas with a bleach solution or household disinfectant.
  - Hypochlorite (bleach) solution: Mix 1 and ½ cups of household bleach in 1 gallon of water.
  - Once everything is wet, take up contaminated materials with damp towel and then mop or sponge the area with bleach solution or household disinfectant.
  - Spray dead rodents with disinfectant and then double-bag along with all cleaning materials and throw bag out in an appropriate waste disposal system.
  - Remove the gloves and thoroughly wash your hands with soap and water (or waterless alcohol-based hand rubs when soap is not available and hands are not visibly soiled).

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to LCMV at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Listeriosis

Where Listeriosis is commonly found:

Listeria monocytogenes is found in soil and water. Vegetables can become contaminated from the soil or from manure used as fertilizer. Animals can carry the bacterium without appearing ill and can contaminate foods of animal origin such as meats and dairy products. The bacterium has been found in a variety of raw foods, such as uncooked meats and vegetables, as well as in processed foods that become contaminated after processing, such as soft cheeses and cold cuts at the deli counter. Unpasteurized (raw) milk or foods made from unpasteurized milk may contain the bacterium.

Listeria is killed by pasteurization and cooking; however, in certain ready-to-eat foods such as hot dogs and deli meats, contamination may occur after cooking but before packaging.

Common routes of transmission:

Listeriosis is caused by eating food contaminated with the bacterium *Listeria monocytogenes*. Rare cases of nosocomial transmission have been reported.

Signs and symptoms:

A person with listeriosis has fever, muscle aches, and sometimes gastrointestinal symptoms such as nausea or diarrhea. If infection spreads to the nervous system, symptoms such as headache, stiff neck, confusion, loss of balance, or convulsions can occur.

In elderly and immunocompromised persons, sepsis and meningitis are the main presentations. Pregnant women may experience a mild, flu-like illness followed by fetal loss or bacteremia and meningitis in their newborns. Immunocompetent persons may experience acute febrile gastroenteritis.

Protective measures:

1. Vaccination:

There is no vaccination for this disease.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with Listeriosis. Face protection should be worn when the activity presents a chance of splash or aerosolization of feces.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Persons at risk can prevent *Listeria* infection by avoiding certain high-risk foods and by handling food properly:

- Thoroughly cook raw food from animal sources, such as beef, pork, or poultry.
- Wash raw vegetables thoroughly before eating.

- Keep uncooked meats separate from vegetables and from cooked foods and ready-to-eat foods.
- Avoid unpasteurized (raw) milk or foods made from unpasteurized milk.
- Wash hands, knives, and cutting boards after handling uncooked foods.
- Consume perishable and ready-to-eat foods as soon as possible.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Listeria at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Lyme Disease

Where Lyme Disease is commonly found:

The Lyme disease bacterium, *Borrelia burgdorferi*, normally lives in mice, squirrels and other small animals. It is transmitted among these animals – and to humans – through the bites of certain species of ticks. In the northeastern and north-central United States, the black-legged tick (or deer tick, *Ixodes scapularis*) transmits Lyme disease. In the Pacific coastal United States, the disease is spread by the western black-legged tick (*Ixodes pacificus*). Other major tick species found in the United States have not been shown to transmit *Borrelia burgdorferi*.

Common routes of transmission:

Bite from various species of ticks that carry *Borrelia burgdorferi*. The Lyme disease bacterium can infect several parts of the body, producing different symptoms at different times. Not all patients with Lyme disease will have all symptoms, and many of the symptoms can occur with other diseases as well.

Signs and symptoms:

The first sign of infection is usually a circular rash called erethyma migrans or EM. This rash occurs in approximately 70-80% of infected persons and begins at the site of a tick bite after a delay of 3-30 days. A distinctive feature of the rash is that it gradually expands over a period of several days, reaching up to 12 inches (30 cm) across. The center of the rash may clear as it enlarges, resulting in a bull's-eye appearance. It may be warm but is not usually painful. Some patients develop additional EM lesions in other areas of the body after several days. Patients also experience symptoms of fatigue, chills, fever, headache, and muscle and joint aches, and swollen lymph nodes. In some cases, these may be the only symptoms of infection.

Untreated, the infection may spread to other parts of the body within a few days to weeks, producing an array of discrete symptoms. These include loss of muscle tone on one or both sides of the face (called facial or "Bell's palsy), severe headaches and neck stiffness due to meningitis, shooting pains that may interfere with sleep, heart palpitations and dizziness due to changes in heartbeat, and pain that moves from joint to joint. Many of these symptoms will resolve, even without treatment.

After several months, approximately 60% of patients with untreated infection will begin to have intermittent bouts of arthritis, with severe joint pain and swelling. Large joints are most often affected, particularly the knees. In addition, up to 5% of untreated patients may develop chronic neurological complaints months to years after infection. These include shooting pains, numbness or tingling in the hands or feet, and problems with concentration and short term memory.

Most cases of Lyme disease can be cured with antibiotics, especially if treatment is begun early in the course of illness. However, a small percentage of patients with Lyme disease have symptoms that last months to years after treatment with antibiotics. These symptoms can include muscle and joint pains, arthritis, cognitive defects, sleep disturbance, or fatigue. The cause of these symptoms is not known. There is some evidence that they result from an autoimmune response, in which a person's immune system continues to respond even after the infection has been cleared.

Protective measures:

1. Vaccination:

There is no vaccination against this disease.

2. PPE

Clinical setting: There is no evidence that Lyme disease is transmitted from person-to-person. Therefore, standard precautions are sufficient when caring for a patient with Lyme Disease.

Research setting: Although no cases of Lyme disease have been linked to blood transfusion, scientists have found that the Lyme disease bacteria can live in blood that is stored for donation. PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Individuals who work outdoors should use PPE or insecticides to prevent exposure to ticks.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Lyme Disease at work:

1. Remove any ticks as soon as they are discovered.
2. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
3. Notify your supervisor.
4. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
5. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
6. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
7. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Malaria

Where malaria is commonly found:

Malaria is a serious and sometimes fatal disease caused by a parasite. Four kinds of malaria parasites can infect humans: Plasmodium falciparum, P. vivax, P. ovale, and P. malariae. Even though malaria was eradicated from the United States in the early 1950s, the disease still occurs in over 100 countries and territories. More than 40% of the world's population is at risk. Large areas of Central and South America, Hispaniola (the Caribbean island that is divided between Haiti and the Dominican Republic), Africa, the Indian subcontinent, Southeast Asia, the Middle East, and Oceania are considered malaria-risk areas. Travelers who visit these areas risk getting malaria. In addition, researchers who work with malaria infected blood are at small risk contracting the disease if they are exposed to the blood.

Infection with any of the malaria species can make a person feel very ill; infection with P. falciparum, if not promptly treated, may be fatal. Although malaria can be a fatal disease, illness and death from malaria are largely preventable. The vast majority of cases in the United States are in travelers and immigrants returning from malaria-risk areas, many from sub-Saharan Africa and the Indian subcontinent.

Common routes of transmission:

Usually, people get malaria by being bitten by an infected female Anopheles mosquito. Only Anopheles mosquitoes can transmit malaria and they must have been infected through a previous blood meal taken on an infected person.

Returning travelers and arriving immigrants could also reintroduce the disease in the United States if they are infected with malaria when they return. The mosquito that transmits malaria, Anopheles, is found throughout much of the United States. If local mosquitoes bite an infected person, those mosquitoes can, in turn, infect local residents (introduced malaria).

A few cases of malaria occur every year in the United States in people who have not left the country. Fortunately, these are very rare occurrences. Malaria may be transmitted through blood transfusions, organ transplants, shared use of needle or syringes, or by local transmission (see Introduced malaria above).

Signs and symptoms:

Patients with malaria typically are very sick with high fevers, shaking chills, and flu-like illness.

Protective measures:

1. **Vaccination:**

There is no vaccine for malaria. Individuals who travel to areas where malaria is endemic should follow CDC and Virginia Dept of Health recommendations regarding use of anti-malarial medications.

2. **PPE**

Clinical setting: Since Malaria is not commonly transmitted person-to-person, only PPE that would routinely be worn for various patient care activities is necessary.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face shield, goggles, or respiratory protection would be necessary if there is risk of aerosolization of contaminated blood or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin

exposure. Work with known infectious mosquitoes would require skin protection that would prevent employees from getting bitten by the infected mosquitoes.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Malaria at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Malaria in the A-Z index.

Measles

Where Measles is commonly found:

The Measles virus normally grows in the cells that line the back of the throat and in the mucus in the nose and throat of the infected person. When that person sneezes or coughs, droplets spray into the air. The infected mucus can land in other people's noses or throats when they breathe or put their fingers in their mouth or nose after touching a contaminated surface. The virus remains active and contagious on infected surfaces for up to 2 hours. Measles spreads so easily that anyone who is not immunized will probably get it, eventually.

Common routes of transmission:

This disease is easily spread by contact with an infected person, through coughing and sneezing.

The disease is highly contagious, and can be transmitted from 4 days prior to the onset of the rash to 4 days after the onset. If one person has it, 90% of their susceptible close contacts will also become infected with the measles virus.

Signs and symptoms:

Symptoms include: rash, high fever, cough, runny nose, and red, watery eyes. Approximately 20% of reported measles cases experience one or more complications. Complication can include: Diarrhea, ear infections, pneumonia, encephalitis, seizures, and death. These complications are more common among children under 5 years of age and adults over 20 years old.

Protective measures:

1. Vaccination:

Vaccination is typically done in childhood. However, some people may need a booster or may have not gotten this vaccine in childhood. Current CDC recommendations for measles vaccination are:

You do NOT need the measles, mumps, rubella vaccine (MMR) if:

- You had blood tests that show you are immune to measles, mumps, and rubella.
- You are a man born before 1957.
- You are a woman born before 1957 who is sure she is not having more children, has already had rubella vaccine, or has had a positive rubella test.
- You already had two doses of MMR or one dose of MMR plus a second dose of measles vaccine.
- You already had one dose of MMR and are not at high risk of measles exposure.

You SHOULD get the measles vaccine if you are not among the categories listed above, and:

- You are a college student, trade school student, or other student beyond high school.
- You work in a hospital or other medical facility.
- You travel internationally, or are a passenger on a cruise ship.
- You are a woman of childbearing age.

2. PPE

Clinical setting: Gloves should be worn as necessary for routine patient care activities. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated respiratory secretions or culture material.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Measles at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Measles in the A-Z index.

Meningitis: Aseptic (viral) and Bacterial

Where Meningitis is commonly found:

Meningitis is an inflammation of the membranes ("meninges") that cover the brain and spinal cord. Viral infections are the most common cause of meningitis; bacterial infections are the second most common cause. Viral meningitis is generally less severe and clears up without specific treatment. But bacterial meningitis can be quite severe and may result in brain damage, hearing loss, learning or physical disabilities or death. Often, the symptoms of viral meningitis and bacterial meningitis are the same.

Viral ("aseptic") meningitis is serious but rarely fatal in people with normal immune systems. Usually, the symptoms last from 7 to 10 days and the patient recovers completely. Bacterial meningitis, on the other hand, can be very serious and result in disability or death if not treated promptly. Often, the symptoms of viral meningitis and bacterial meningitis are the same.

Different viral infections can lead to viral meningitis. But most cases in the United States, particularly during the summer and fall months, are caused by enteroviruses (which include enteroviruses, coxsackieviruses, and echoviruses). Most people who are infected with enteroviruses either have no symptoms or only get a cold, rash, or mouth sores with low-grade fever. And, only a small number of people with enterovirus infections develop meningitis.

Other viral infections that can lead to meningitis include mumps, herpesvirus (such as Epstein-Barr virus, herpes simplex viruses, and varicella-zoster virus—the cause of chickenpox and shingles), measles, and influenza.

Arboviruses, which mosquitoes and other insects spread, can also cause infections that can lead to viral meningitis. And lymphocytic choriomeningitis virus, which is spread by rodents, is a rare cause of viral meningitis.

For bacterial meningitis, it is also important to know which type of bacteria is causing the meningitis because antibiotics can prevent some types from spreading and infecting other people. Before the 1990s, Haemophilus influenzae type b (Hib) was the leading cause of bacterial meningitis. Today, Streptococcus pneumoniae and Neisseria meningitidis are the leading causes of bacterial meningitis. Other, rarer causes of meningitis include fungi, parasites, and non-infectious causes, including those that are related to drugs.

Common routes of transmission:

Different viruses that cause viral meningitis are spread in different ways. Enteroviruses, the most common cause of viral meningitis, are most often spread through direct contact with an infected person's stool. The virus is spread through this route mainly among small children who are not yet toilet trained. It can also be spread this way to adults changing the diapers of an infected infant.

Enteroviruses and other viruses (such as mumps and varicella-zoster virus) can also be spread through direct or indirect contact with respiratory secretions (saliva, sputum, or nasal mucus) of an infected person. This usually happens through kissing or shaking hands with an infected person or by touching something they have handled and then rubbing your own nose or mouth. The viruses can also stay on surfaces for days and can be transferred from objects. Viruses also can spread directly when infected people cough or sneeze and send droplets containing the virus into the air we breathe.

Some forms of bacterial meningitis are also contagious. The bacteria can mainly be spread from person to person through the exchange of respiratory and throat secretions. This can occur through coughing, kissing, and sneezing. Fortunately, none of the bacteria that cause meningitis are as contagious as things

like the common cold or the flu. Also, the bacteria are not spread by casual contact or by simply breathing the air where a person with meningitis has been.

However, sometimes the bacteria that cause meningitis have spread to other people who have had close or prolonged contact with a patient with meningitis caused by Neisseria meningitidis (also called meningococcal meningitis) or Hib. People in the same household or daycare center, or anyone with direct contact with a patient's oral secretions (such as a boyfriend or girlfriend) would be considered at increased risk of getting the infection. People who qualify as close contacts of a person with meningitis caused by N. meningitidis should receive antibiotics to prevent them from getting the disease. This is known as prophylaxis. Prophylaxis for household contacts of someone with Hib disease is only recommended if there is 1 household contact younger than 48 months who has not been fully immunized against Hib or an immunocompromised child (a child with a weakened immune system) of any age is in the household. The entire household, regardless of age, should receive prophylaxis in these cases.

Signs and symptoms:

High fever, headache, and stiff neck are common symptoms of meningitis in anyone over the age of 2 years. These symptoms can develop over several hours, or they may take 1 to 2 days. Other symptoms may include nausea, vomiting, discomfort looking into bright lights, confusion, and sleepiness. In newborns and small infants, the classic symptoms of fever, headache, and neck stiffness may be absent or difficult to detect. Infants with meningitis may appear slow or inactive, have vomiting, be irritable, or be feeding poorly. As the disease progresses, patients of any age may have seizures.

Protective measures:

1. Vaccination:

There are vaccines against Hib, against some serogroups of N. meningitidis and many types of Streptococcus pneumonia (also called pneumococcal meningitis). The vaccines are safe and highly effective. College freshmen living in dormitories are at increased risk for meningococcal disease and should be vaccinated with meningococcal conjugate vaccine before college entry if they have not previously been vaccinated. The risk for meningococcal disease among nonfreshmen college students is similar to that for the general population of similar age (age 18-24 years).

Receiving vaccinations that are included in the childhood vaccination schedule (MMR and chickenpox) and avoid mosquito bites (to prevent exposure to West Nile virus) can prevent diseases that have viral meningitis as a complication.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with meningitis. Face protection should be worn when the activity presents a chance of splash or aerosolization of body fluids.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to meningitis at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

MRSA/VRSA/Other Antibiotic resistant Staphylococcus Aureus

Where Staph Aureus is commonly found:

Staphylococcus aureus, often simply referred to simply as "staph", are bacteria commonly found on the skin and in the noses of healthy people. Occasionally, staph can cause infection; staph bacteria are one of the most common causes of skin infections in the United States. Most of these infections are minor (such as pimples, boils, and other skin conditions) and most can be treated without antimicrobial agents (also known as antibiotics or antibacterial agents). However, staph bacteria can also cause serious and sometimes fatal infections (such as bloodstream infections, surgical wound infections, and pneumonia). In the past, most serious staph bacterial infections were treated with a type of antimicrobial agent related to penicillin. Over the past 50 years, treatment of these infections has become more difficult because staph bacteria have become resistant to various antimicrobial agents, including the commonly used penicillin-related antibiotics.

Methicillin-resistant Staphylococcus Aureus (MRSA) is a type of staph aureus that is resistant to certain antibiotics. These antibiotics include methicillin and other more common antibiotics such as oxacillin, penicillin and amoxicillin. Staph infections, including MRSA, occur most frequently among persons in hospitals and healthcare facilities (such as nursing homes and dialysis centers) who have weakened immune systems.

VISA and VRSA are specific types of antimicrobial-resistant staph bacteria. While most staph bacteria are susceptible to the antimicrobial agent vancomycin some have developed resistance. VISA and VRSA cannot be successfully treated with vancomycin because these organisms are no longer susceptibile to vancomycin. However, to date, all VISA and VRSA isolates have been susceptible to other Food and Drug Administration (FDA) approved drugs.

MRSA infections that are acquired by persons who have not been recently (within the past year) hospitalized or had a medical procedure (such as dialysis, surgery, catheters) are known as community acquired MRSA (CA-MRSA) infections. Staph or MRSA infections in the community are usually manifested as skin infections, such as pimples and boils, and occur in otherwise healthy people. MRSA can be a concern in settings such as schools, athletic competition, gyms, the workplace.

Common routes of transmission:

Staph is transmitted via direct contact with materials containing the organism. Such contact can include:

- colonized or infected patients
- colonized or infected body sites of the personnel themselves
- devices, items, or environmental surfaces contaminated with body fluids containing MRSA/VRSA

Although hospital personnel can serve as reservoirs for MRSA and may harbor the organism for many months, they have been more commonly identified as a link for transmission between colonized or infected patients.

Signs and symptoms:

Staph bacteria, including MRSA/VRSA, can cause skin infections that may look like a pimple or boil and can be red, swollen, painful, or have pus or other drainage. More serious infections may cause pneumonia, bloodstream infections, or surgical wound infections.

Protective measures:

1. Vaccination:

There is no vaccination for staphylococcus aureus.

2. PPE

Clinical setting: Since staph is known to be transmitted person-to-person, standard precautions must be closely followed and contact precautions may be necessary. Protection recommendations are the same for any of the antibiotic resistant strains of staph.

Standard Precautions include:

1. **Handwashing**

   Wash hands after touching blood, body fluids, secretions, excretions, and contaminated items, whether or not gloves are worn. Wash hands immediately after gloves are removed, between patient contacts, and when otherwise indicated to avoid transfer of microorganisms to other patients or environments. It may be necessary to wash hands between tasks and procedures on the same patient to prevent cross-contamination of different body sites.

2. **Gloving**

   Wear gloves (clean non-sterile gloves are adequate) when touching blood, body fluids, secretions, excretions, and contaminated items; put on clean gloves just before touching mucous membranes and non-intact skin. Remove gloves promptly after use, before touching non-contaminated items and environmental surfaces, and before going to another patient, and wash hands immediately to avoid transfer of microorganisms to other patients or environments.

3. **Masking**

   Wear a mask and eye protection or a face shield to protect mucous membranes of the eyes, nose, and mouth during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions.

4. **Gowning**

   Wear a gown (a clean non-sterile gown is adequate) to protect skin and prevent soiling of clothes during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions or cause soiling of clothing.

5. **Appropriate device handling**

   Handle used patient-care equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of microorganisms to other patients and environments. Ensure that reusable equipment is not used for the care of another patient until it has been appropriately cleaned and reprocessed and that single-use items are properly discarded.

6. **Appropriate handling of laundry**

   Handle, transport, and process used linen soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of microorganisms to other patients and environments.

If MRSA/VRSA is judged by the facility's infection prevention program to be of special clinical or epidemiologic significance, then Contact Precautions should be considered.

Contact precautions consist of:

1. Placing a patient with MRSA/VRSA in a private room. When a private room is not available, the patient may be placed in a room with a patient(s) who has active infection with MRSA/VRSA, but with no other infection (cohorting).
2. Wearing gloves (clean non-sterile gloves are adequate) when entering the room. During the course of providing care for a patient, change gloves after having contact with infective material that may contain high concentrations of microorganisms (e.g., fecal material and wound drainage). Remove gloves before leaving the patient's room and wash hands immediately with an antimicrobial agent. After glove removal and handwashing, ensure that hands do not touch potentially contaminated environmental surfaces or items in the patient's room to avoid transfer of microorganisms to other patients and environments.
3. Wearing a gown when entering the room if you anticipate that your clothing will have substantial contact with the patient, environmental surfaces, or items in the patient's room, or if the patient is incontinent, or has diarrhea, an ileostomy, a colostomy, or wound drainage not contained by a dressing. Remove the gown before leaving the patient's room. After gown removal, ensure that clothing does not contact potentially contaminated environmental surfaces to avoid transfer of microorganisms to other patients and environments.
4. Limiting the movement and transport of the patient from the room to essential purposes only. If the patient is transported out of the room, ensure that precautions are maintained to minimize the risk of transmission of microorganisms to other patients and contamination of environmental surfaces or equipment.
5. Ensuring that patient-care items, bedside equipment, and frequently touched surfaces receive daily cleaning.
6. When possible, dedicating the use of non-critical patient-care equipment and items such as stethoscope, sphygmomanometer, bedside commode, or electronic rectal thermometer to a single patient (or cohort of patients infected or colonized with MRSA) to avoid sharing between patients. If use of common equipment or items is unavoidable, then adequately clean and disinfect them before use on another patient.

Culturing of Personnel and Management of Personnel Carriers of MRSA

Unless the objective of the hospital is to eradicate all MRSA carriage and treat all personnel who are MRSA carriers, whether or not they disseminate MRSA, it may be prudent to culture only personnel who are implicated in MRSA transmission based on epidemiologic data. MRSA-carrier personnel who are epidemiologically linked to transmission should be removed from direct patient care until treatment of the MRSA-carrier status is successful. If the hospital elects to culture all personnel to identify MRSA carriers, a) surveillance cultures need to be done frequently, and b) it is likely that personnel colonized by MRSA who are not linked to transmission and/or who may not be MRSA disseminators will be identified, subjected to treatment, and/or removed from patient contact unnecessarily. Because of the high cost attendant to repeated surveillance cultures and the potential of repeated culturing to result in serious consequences to health care workers, hospitals should weigh the advantages and the adverse effects of routinely culturing personnel before doing so.

Control of MRSA Outbreaks

When an outbreak of MRSA infection occurs, an epidemiologic assessment should be initiated to identify risk factors for MRSA acquisition in the institution; clinical isolates of MRSA should be saved and submitted for strain typing. Colonized or infected patients should be identified as quickly as possible,

appropriate barrier precautions should be instituted, and handwashing by medical personnel before and after all patient contacts should be strictly adhered to.

All personnel should be reinstructed on appropriate precautions for patients colonized or infected with multiresistant microorganisms and on the importance of handwashing and barrier precautions in preventing contact transmission.

If additional help is needed by the hospital, a consultation with the local or state health department or CDC may be necessary.

Research/Animal care setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to antibiotic resistant Staph aureus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for MRSA or VRSA in the A-Z index.

Mumps

Where Mumps is commonly found:

The mumps virus replicates in the upper respiratory tract and is spread through direct contact with respiratory secretions or saliva or when contaminated surfaces, such as doorknobs or phones, are touched and the person transfers the virus to their eyes, nose or mouth.

Common routes of transmission:

This disease is easily spread by direct contact with an infected person, through an infected person's coughing and sneezing, or through contact with materials or surfaces that are contaminated with the mumps virus.

The infectious period (i.e. time that an infected person can transmit mumps to a non-infected person) is from 3 days before symptoms appear to about 9 days after the symptoms appear.

The incubation time, which is the period from when a person is exposed to virus to the onset of any symptoms, can vary from 16 to 18 days (range 12-25 days).

Signs and symptoms:

Fever, headache, muscle aches, tiredness, and loss of appetite; followed by swelling of salivary glands. The parotid salivary glands (which are located within your cheek, near your jaw line, below your ears) are most frequently affected.

Severe complications are rare. However, mumps can cause:

- inflammation of the brain and/or tissue covering the brain and spinal cord (encephalitis/meningitis)
- inflammation of the testicles (orchitis)
- inflammation of the ovaries and/or breasts (oophoritis and mastitis)
- spontaneous abortion
- deafness, usually permanent

Protective measures:

1. Vaccination:

Vaccination is typically done in childhood. However, some people may need a booster or may have not gotten this vaccine in childhood. Current CDC recommendations for mumps vaccination are:

You do NOT need the measles, mumps, rubella vaccine (MMR) if:

- You had blood tests that show you are immune to measles, mumps, and rubella.
- You are a man born before 1957.

- You are a woman born before 1957 who is sure she is not having more children, has already had rubella vaccine, or has had a positive rubella test.
- You already had two doses of MMR or one dose of MMR plus a second dose of measles vaccine.
- You already had one dose of MMR and are not at high risk of measles exposure.

You SHOULD get the MMR vaccine if you are not among the categories listed above, and:

- You are a college student, trade school student, or other student beyond high school.
- You work in a hospital or other medical facility.
- You travel internationally, or are a passenger on a cruise ship.
- You are a woman of childbearing age.

2. PPE

Clinical setting: Gloves should be worn as necessary for routine patient care activities. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated respiratory secretions or culture material.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Mumps at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Mumps in the A-Z index.

Mycobacterium avium complex and Mycobacterium abscessus

Where Mycobacterium sp. is commonly found:

Several different syndromes are caused by *Mycobacterium avium* complex (MAC, comprising *M. avium* and *M.intracellulare*). Disseminated infections are usually associated with HIV infection. Less commonly, pulmonary disease in nonimmunocompromised persons is a result of infection with MAC. In children, the most common syndrome is cervical lymphadenitis.

Mycobacterium abscessus is a bacterium distantly related to the ones that cause tuberculosis and leprosy. It is part of a group known as rapidly growing mycobacteria and is found in water, soil and dust. It has been known to contaminate medications and products, including medical devices. M. abscessus can cause a variety of serious infections that require medical attention. Infections due to this bacterium are usually of the skin and the soft tissues under the skin. It has been rarely known to cause lung infection in persons with various chronic lung diseases.

Common routes of transmission:

Although the mode of transmission is unclear, MAC is most likely environmentally acquired.

Infection with M. abscessus is usually caused by injections of substances contaminated with the bacterium or through invasive medical procedures employing contaminated equipment or material. Infection can also occur after accidental injury where the wound is contaminated by soil. It cannot be transmitted from person to person.

Signs and symptoms:

In HIV infected persons, MAC manifestations include night sweats, weight loss, abdominal pain, fatigue, diarrhea, and anemia.

A medical doctor should evaluate the infection to determine if it may be due to M. abscessus. Skin infected with M. abscessus, is usually red, warm, tender to the touch, swollen, and/or painful. Infected areas can also develop boils or pus-filled vesicles. Other signs of M. abscessus infection are fever, chills, muscle aches, and a general feeling of illness. However, for a definite diagnosis, the organism has to be cultured from the infection site.

Protective measures:

1. Vaccination:

There is no vaccination for mycobacteria organisms.

2. PPE

Clinical setting: Standard precautions should be utilized when treating someone with mycobacteria sp. infections.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Mycobacteria sp. at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Nipah and Hendra Virus Encephalitis

Where Nipah and Henda Virus Encephalitis is commonly found:

Hendra virus (formerly called equine morbillivirus) is a member of the family Paramyxoviridae. Nipah virus, also a member of the family Paramyxoviridae, is related but not identical to Hendra virus. The natural reservoir for Hendra virus is thought to be flying foxes (bats of the genus *Pteropus*) found in Australia. The natural reservoir for Nipah virus is still under investigation, but preliminary data suggest that bats of the genus *Pteropus* are also the reservoirs for Nipah virus in Malaysia.

Common routes of transmission:

Hendra virus caused disease in horses in Australia, and the human infections there were due to direct exposure to tissues and secretions from infected horses. Nipah virus caused a relatively mild disease in pigs in Malaysia and Singapore. Nipah virus was transmitted to humans, cats, and dogs through close contact with infected pigs.

Signs and symptoms:

Only three human cases of Hendra virus disease have been recognized. Two of the three individuals known to be infected had a respiratory illness with severe flu-like signs and symptoms. Infection with Nipah virus was associated with an encephalitis (inflammation of the brain) characterized by fever and drowsiness and more serious central nervous system disease, such as coma, seizures, and inability to maintain breathing.

Illness with Nipah virus begins with 3-14 days of fever and headache. This is followed by drowsiness and disorientation characterized by mental confusion. These signs and symptoms can progress to coma within 24-48 hours. Some patients have had a respiratory illness during the early part of their infections.

Two of the three human patients infected with Hendra virus died. During the Nipah virus disease outbreak in 1998-99, 257 patients were infected with the virus. About 40% of those patients who entered hospitals with serious nervous disease died from the illness.

Protective measures:

1. Vaccination:

There is no vaccination for these organisms.

2. PPE

Clinical setting: Standard precautions are sufficient when caring for a patient with Nipah or Hendra Virus disease.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

These diseases can be prevented by avoiding animals that are known to be infected and using appropriate personal protective equipment devices when it is necessary to come into contact with potentially infected animals.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Nipah or Hendra Virus Encephalitis at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Norovirus

Where Norovirus is commonly found:

Noroviruses are found in the stool or vomit of infected people. This is a group of viruses that cause gastroenteritis (commonly known as 'stomach flu'). The term norovirus was recently approved as the official name for this group of viruses. Several other names have been used for noroviruses, including:

- Norwalk-like viruses (NLVs)
- Caliciviruses (because they belong to the virus family Caliciviridae)
- Small round structured viruses.

Common routes of transmission:

People can become infected with the virus in several ways, including:

- eating food or drinking liquids that are contaminated with norovirus;
- touching surfaces or objects contaminated with norovirus, and then placing their hand in their mouth;
- having direct contact with another person who is infected and showing symptoms (for example, when caring for someone with illness, or sharing foods or eating utensils with someone who is ill).

Noroviruses are very contagious and can spread easily from person to person. Both stool and vomit are infectious. People infected with norovirus are contagious from the moment they begin feeling ill to at least 3 days after recovery. Some people may be contagious for as long as 2 weeks after recovery. Therefore, it is particularly important for people to use good handwashing and other hygienic practices after they have recently recovered from norovirus illness.

Persons working in day-care centers or nursing homes should pay special attention to children or residents who have norovirus illness. People who work in a food service industry should not handle food or utensils during the period that they are contagious. Contagious individuals should stay home during their infectious period.

Signs and symptoms:

The symptoms of norovirus illness usually include nausea, vomiting, diarrhea, and some stomach cramping. Sometimes people additionally have a low-grade fever, chills, headache, muscle aches, and a general sense of tiredness. The illness often begins suddenly, and the infected person may feel very sick. In most people the illness is self-limiting with symptoms lasting for about 1 or 2 days. In general, children experience more vomiting than adults. Most people with norovirus illness have both of these symptoms.

People may feel very sick and vomit many times a day, but most people get better within 1 or 2 days, and they have no long-term health effects related to their illness. However, sometimes people are unable to drink enough liquids to replace the liquids they lost because of vomiting and diarrhea. These persons can become dehydrated and may need special medical attention. This problem with dehydration is usually only seen among the very young, the elderly, and persons with weakened immune systems.

Protective measures:

1. Vaccination:

There is no vaccination for this group of viruses.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with norovirus. Face protection should be worn when the activity presents a chance of splash or aerosolization of contaminated material.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of contaminated feces, vomit, or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Norovirus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe dehydration, difficulty keeping food/fluids down for several days) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Norovirus in the A-Z index.

Onchocerciasis (River Blindness)

Where River Blindness is commonly found:

Onchocerciasis is an infection caused by the parasite *Onchocerca volvulus* (worm), spread by the bite of an infected blackfly. Also called River Blindness because the transmission is most intense in remote African rural agricultural villages, located near rapidly flowing streams. River Blindness is found in thirty African countries, in regions of six countries in the Americas, and Yemen. Most infected persons are in Africa, and the disease is found most frequently in rural agricultural villages that are located near rapidly flowing streams.

The World Health Organization's (WHO) expert committee on onchocerciasis estimates the global prevalence is 17.7 million, of whom about 270,000 are blind and another 500,000 have visual impairment. About 99% of infected persons are in Africa; the remainder is in Yemen and Mexico, Guatemala, Ecuador, Colombia, Venezuela, Brazil.

Common routes of transmission:

Multiple infectious bites are necessary for a person to get the disease. Infected persons may not have symptoms, but a skin rash, eye lesions and/or bumps under the skin can occur. Eye lesions can progress to blindness.

Unlike malaria, contracting onchocerciasis requires more than one infectious bite. Thus, risk of infection is greater in adventure travelers, missionaries, and Peace Corps volunteers who are likely to have intense and prolonged exposure to blackfly bites. Given the low rate of transmission in the Americas, the likelihood is very low that any travelers in this region (even missionaries and Peace Corps volunteers) would ever get infected.

Signs and symptoms:

Persons with heavy infections will usually have one or more of the three conditions: dermatitis, eye lesions, and/or subcutaneous nodules. Superficial skin biopsies will identify the parasite microscopically.

Protective measures:

1. Vaccination:

There is no vaccination for this disease.

2. PPE

Clinical setting: Standard precautions are suffiecient when treating patients with onchoceriasis infection.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Blackflies bite during the day. The best prevention is to avoid infective bites of the blackfly by:

- Using insecticides such as DEET, and

- Wearing long sleeve shirts and pants.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to River Blindness at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Plague

Where Plague is commonly found:

People usually get plague from being bitten by a rodent flea that is carrying the plague bacterium (yersinia pestis) or by handling an infected animal. Millions of people in Europe died from plague in the Middle Ages, when human homes and places of work were inhabited by flea-infested rats. Today, modern antibiotics are effective against plague, but if an infected person is not treated promptly, the disease is likely to cause illness or death.

Wild rodents in certain areas around the world are infected with plague. Outbreaks in people still occur in rural communities or in cities. They are usually associated with infected rats and rat fleas that live in the home. In the United States, the last urban plague epidemic occurred in Los Angeles in 1924-25. Since then, human plague in the United States has occurred as mostly scattered cases in rural areas (an average of 10 to 15 persons each year). Globally, the World Health Organization reports 1,000 to 3,000 cases of plague every year. In North America, plague is found in certain animals and their fleas from the Pacific Coast to the Great Plains, and from southwestern Canada to Mexico. Most human cases in the United States occur in two regions: 1) northern New Mexico, northern Arizona, and southern Colorado; and 2) California, southern Oregon, and far western Nevada. Plague also exists in Africa, Asia, and South America.

Rock squirrels and their fleas are the most frequent sources of human infection in the southwestern states. For the Pacific states, the California ground squirrel and its fleas are the most common source. Many other rodent species, for instance, prairie dogs, wood rats, chipmunks, and other ground squirrels and their fleas, suffer plague outbreaks and some of these occasionally serve as sources of human infection. Deer mice and voles are thought to maintain the disease in animal populations but are less important as sources of human infection. Other less frequent sources of infection include wild rabbits, and wild carnivores that pick up their infections from wild rodent outbreaks. Domestic cats (and sometimes dogs) are readily infected by fleas or from eating infected wild rodents. Cats may serve as a source of infection to persons exposed to them. Pets may also bring plague-infected fleas into the home.

Common routes of transmission:

Plague is transmitted from animal to animal and from animal to human by the bites of infective fleas. Less frequently, the organism enters through a break in the skin by direct contact with tissue or body fluids of a plague-infected animal, for instance, in the process of skinning a rabbit or other animal. Plague is also transmitted by inhaling infected droplets expelled by coughing, by a person or animal, especially domestic cats, with pneumonic plague. Transmission of plague from person to person is uncommon and has not been observed in the United States since 1924 but does occur as an important factor in plague epidemics in some developing countries.

This disease is characterized by periodic disease outbreaks in rodent populations, some of which have a high death rate. During these outbreaks, hungry infected fleas that have lost their normal hosts seek other sources of blood, thus increasing the increased risk to humans and other animals frequenting the area.

Epidemics of plague in humans usually involve house rats and their fleas. Rat-borne epidemics continue to occur in some developing countries, particularly in rural areas. The last rat-borne epidemic in the United States occurred in Los Angeles in 1924-25. Since then, all human plague cases in the U.S. have been sporadic cases acquired from wild rodents or their fleas or from direct contact with plague-infected animals. Between outbreaks, the plague bacterium is believed to circulate within populations of certain species of rodents without causing excessive mortality. Such groups of infected animals serve as silent, long-term reservoirs of infection.

Signs and symptoms:

- **Bubonic plague**: enlarged, tender lymph nodes, fever, chills and prostration
- **Septicemic plague**: fever, chills, prostration, abdominal pain, shock and bleeding into skin and other organs
- **Pneumonic plague**: fever, chills, cough and difficulty breathing; rapid shock and death if not treated early

Onset of bubonic plague is usually 2 to 6 days after a person is exposed. Initial manifestations include fever, headache, and general illness, followed by the development of painful, swollen regional lymph nodes. Occasionally, buboes cannot be detected for a day or so after the onset of other symptoms. The disease progresses rapidly and the bacteria can invade the bloodstream, producing severe illness, called plague septicemia.

Once a human is infected, a progressive and potentially fatal illness generally results unless specific antibiotic therapy is given. Progression leads to blood infection and, finally, to lung infection. The infection of the lung is termed *plague pneumonia*, and it can be transmitted to others through the expulsion of infective respiratory droplets by coughing.

The incubation period of primary pneumonic plague is 1 to 3 days and is characterized by development of an overwhelming pneumonia with high fever, cough, bloody sputum, and chills. For plague pneumonia patients, the death rate is over 50%.

Protective measures:

1. Vaccination:

There is no vaccination available for plague

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with plague. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Plague will probably continue to exist in its many localized geographic areas around the world, and plague outbreaks in wild rodent hosts will continue to occur. Attempts to eliminate wild rodent plague are costly and futile. Therefore, primary preventive measures are directed toward reducing the threat of infection in humans in high risk areas through three techniques -- environmental management, public health education, and preventive drug therapy.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Plague at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you ay have had an exposure to an infectious agent** before arriving at the clinic or Emergency Depatment**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Prion Diseases

Where Prion Diseases are commonly found:

Prion diseases or transmissible spongiform encephalopathies (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. They are distinguished by long incubation periods, characteristic spongiform changes associated with neuronal loss, and a failure to induce inflammatory response.

The causative agent of TSEs is believed to be a prion. A prion is an abnormal, transmissible agent that is able to induce abnormal folding of normal cellular prion proteins in the brain, leading to brain damage and the characteristics signs and symptoms of the disease. Prion diseases can have a long latent period (a decade or more in humans) but once symptoms occur, they are usually rapidly progressive and always fatal.

Prion diseases include:

Human Prion Diseases

- Creutzfeldt-Jakob Disease (CJD)
- Variant Creutzfeldt-Jakob Disease (vCJD)
- Gerstmann-Straussler-Scheinker Syndrome
- Fatal Familial Insomnia
- Kuru

Animal Prion Diseases

- Bovine Spongiform Encephalopathy (BSE)
- Chronic Wasting Disease (CWD)
- Scrapie
- Transmissible mink encephalopathy
- Feline spongiform encephalopathy
- Ungulate spongiform encephalopathy

Common routes of transmission:

The nature of the transmissible agent is not well understood. Current theory is that the agent is a modified form of a normal protein known as prion protein. For reasons that are not yet clear, the normal prion protein changes into a pathogenic form that then damages the central nervous system.

Classic CJD has been recognized since the early 1920s. The most common form of classic CJD is believed to occur sporadically, caused by the spontaneous transformation of normal prion proteins into abnormal prions. This sporadic disease occurs worldwide, including the United States, at a rate of approximately one case per 1 million population per year, although rates of up to two cases per million are not unusual.

The risk of CJD increases with age, and in persons aged over 50 years of age, the annual rate is approximately 3.4 cases per million. In recent years, the United States has reported fewer than 300 cases of CJD a year.

Whereas the majority of cases of CJD (about 85%) occur as sporadic disease, there are reports of transmission via corneal transplant (this is very rare), and a small proportion of patients (5-15%) develop CJD because of inherited mutations of the prion protein gene. These inherited forms include Gerstmann-Straussler-Scheinker syndrome and fatal familial insomnia.

There is also evidence of prion transmission via food: BSE possibly originated as a result of feeding cattle meat-and-bone meal that contained scrapie-infected sheep products. Scrapie is a prion disease of sheep. There is strong evidence and general agreement that the outbreak was then amplified and spread throughout the United Kingdom cattle industry by feeding rendered, prion-infected, bovine meat-and-bone meal to young calves.

In addition, there is strong epidemiologic and laboratory evidence for a causal association between a new human prion disease called variant Creutzfeldt-Jakob disease (vCJD) that was first reported from the United Kingdom in 1996 and the BSE outbreak in cattle. The interval between the most likely period for the initial extended exposure of the population to potentially BSE-contaminated food (1984-1986) and the onset of initial variant CJD cases (1994-1996) is consistent with known incubation periods for the human forms of prion disease.

Variant CJD (vCJD) is a rare, degenerative, fatal brain disorder in humans. Although experience with this new disease is limited, evidence to date indicates that there has never been a case of vCJD transmitted through direct contact of one person with another. However, a case of probable transmission of vCJD through transfusion of blood components from an asymptomatic donor who subsequently developed the disease has been reported.

Signs and symptoms:

Signs and symptoms of prion diseases can vary between the various forms and among the species affected by prion diseases. Typically changes in behavior and neurological function will be seen.

Protective measures:

1. **Vaccination:**

There is no vaccination for this organism.

2. **PPE:**

Clinical setting: Since prion diseases are rarely transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research/Animal care setting: PPE use would be based on the risk of exposure that an activity presents. Anyone working with human neurological material, eyes or corneas should assume that these tissues have the potential for harboring prions. Face protection would be necessary if there is risk of aerosolization of known or potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to prion disease at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for prion diseases in the A-Z index.

Psittacosis

Where Psittacosis is commonly found:

This disease is caused by *Chlamydia psittaci* which is found in a variety of pet bird species and some poultry (turkeys and ducks).

Common routes of transmission:

Infection is acquired by inhaling dried secretions from infected birds. The incubation period is 5 to 19 days. Although all birds are susceptible, pet birds (parrots, parakeets, macaws, and cockatiels) and poultry (turkeys and ducks) are most frequently involved in transmission to humans.

Bird owners, pet shop employees, and veterinariansare most at risk of contracting this. Outbreaks of psittacosis in poultry processing plants have also been reported.

Signs and symptoms:

In humans, fever, chills, headache, muscle aches, and a dry cough. Pneumonia is often evident on chest x-ray. Endocarditis, hepatitis, and neurologic complications may occasionally occur. Severe pneumonia requiring intensive-care support may also occur. Fatal cases have been reported.

Protective measures:

1. Vaccination:

There is no vaccination available for this disease.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with psittacosis. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Psittacosis at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Rift Valley Fever (RVF)

Where Rift Valley Fever is commonly found:

The disease is caused by the RVF virus, a member of the genus *Phlebovirus* in the family Bunyaviridae.

RVF is generally found in regions of eastern and southern Africa where sheep and cattle are raised, but the virus also exists in most countries of sub-Saharan Africa and in Madagascar. In September 2000, a RVF outbreak was reported in Saudi Arabia and subsequently Yemen. These cases represent the first Rift Valley fever cases identified outside Africa.

Common routes of transmission:

RVF is an acute, fever-causing viral disease that affects domestic animals (such as cattle, buffalo, sheep, goats, and camels) and humans. RVF is most commonly associated with mosquito-borne epidemics during years of unusually heavy rainfall. The excessive rainfall allows mosquito eggs, usually of the genus *Aedes*, to hatch. The mosquito eggs are naturally infected with the RVF virus, and the resulting mosquitoes transfer the virus to the livestock on which they feed. Once the livestock is infected, other species of mosquitoes can become infected from the animals and can spread the disease. In addition, it is possible that the virus can be transmitted by other biting insects.

Humans usually get RVF through bites from infected mosquitoes and possibly other biting insects that have virus-contaminated mouthparts. Humans can also get the disease if they are exposed to the blood, body fluids, or tissues of infected animals. Direct exposure to infected animals can occur during slaughter or through veterinary and obstetric procedures. Infection through aerosol transmission of RVF virus has occurred in the laboratory environment.

Studies have shown that sleeping outdoors at night in geographical regions where outbreaks occur could be a risk factor for exposure to mosquito and other insect vectors. Animal herdsmen, abattoir workers, and other individuals who work with animals in RVF-endemic areas (areas where the virus is present) have an increased risk for infection. Persons in high-risk professions, such as veterinarians and slaughterhouse workers, have an increased chance of contracting the virus from an infected animal. International travelers increase their chances of getting the disease when they visit RVF-endemic locations during periods when sporadic cases or epidemics are occurring.

Signs and symptoms:

People with RVF typically have either no symptoms or a mild illness associated with fever and liver abnormalities. However, in some patients the illness can progress to hemorrhagic fever (which can lead to shock or hemorrhage), encephalitis (inflammation of the brain, which can lead to headaches, coma, or seizures), or ocular disease (diseases affecting the eye). Patients who become ill usually experience fever, generalized weakness, back pain, dizziness, and extreme weight loss at the onset of the illness. Typically, patients recover within two days to one week after onset of illness.

The most common complication associated with RVF is inflammation of the retina (a structure connecting the nerves of the eye to the brain). As a result, approximately 1% - 10% of affected patients may have some permanent vision loss.

Protective measures:

1. Vaccination:

There is currently no approved vaccine for human use to prevent RVF.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with RVF. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

A person's chances of becoming infected can be reduced by taking measures to decrease contact with mosquitoes and other bloodsucking insects through the use of mosquito repellents and bednets. Avoiding exposure to blood or tissues of animals that may potentially be infected is an important protective measure for persons working with animals in RVF-endemic areas.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to RVF at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Ringworm

Where Ringworm is commonly found:

"Ringworm" is not caused by a worm, but rather by a type of fungus called a "dermatophyte." Dermatophytes are types of fungi that cause common skin, hair and nail infections. Infections caused by these fungi are also known by the names "tinea" and "ringworm." One example of a very common dermatophyte infection is athlete's foot, which is also called tinea pedis. Another common dermatophyte infection affecting the groin area is jock itch, also known as tinea cruris.

Trichophyton rubrum and *Trichophyton tonsurans* are two common dermatophytes. These two species are usually transmitted from person to person. Another common dermatophyte is *Microsporum canis*, which is transmitted from animals such as cats and dogs to people. Dermatophytes like to live on moist areas of the skin, such as places where there are skin folds. They can also contaminate items in the environment, such as clothing, towels and bedding.

Common routes of transmission:

Dermatophytes are usually spread through direct contact with an infected person or animal. Clothing, bedding and towels can also become contaminated and spread the infection.

Signs and symptoms:

Symptoms typically appear between 4 and 14 days following exposure.

Dermatophyte infections can affect the skin on almost any area of the body, such as the scalp, legs, arms, feet, groin and nails. These infections are usually itchy. Redness, scaling, or fissuring of the skin, or a ring with irregular borders and a cleared central area may occur. If the infection involves the scalp, an area of hair loss may result. More aggressive infections may lead to an abscess or cellulitis. Areas infected by dermatophytes may become secondarily infected by bacteria.

Protective measures:

1. Vaccination:

There is no vaccination for ringworm.

2. PPE

Clinical setting: Standard precautions are sufficient when caring for a patient with ringworm.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Good hygiene, such as regular handwashing, is important. People should avoid sharing hairbrushes, hats and other articles of clothing that may come into contact with infected areas. Pets with signs of skin disease should be evaluated by a veterinarian. Beauty salons and barbershops should disinfect instruments with approved disinfectants after each use.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Ringworm at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Rotavirus

Where Rotavirus is commonly found:

Rotavirus is the most common cause of severe diarrhea among children. Globally, rotavirus is estimated to cause 527,000 deaths in children annually. Because the virus is stable in the environment, transmission can occur through ingestion of contaminated water or food and contact with contaminated surfaces. In the United States and other countries with a temperate climate, the disease has a winter seasonal pattern, with annual epidemics occurring from November to April. The highest rates of illness occur among infants and young children, and most children in the United States are infected by 2 years of age. Adults can also be infected, though disease tends to be mild

Common routes of transmission:

The primary mode of transmission is fecal-oral, although some have reported low titers of virus in respiratory tract secretions and other body fluids.

Signs and symptoms:

The disease is characterized by vomiting and watery diarrhea for 3 - 8 days, and dehydration, fever and abdominal pain occur frequently. The incubation period for rotavirus disease is approximately 2 days. Immunity after infection is incomplete, but repeat infections tend to be less severe than the original infection. Babies and small children are at most risk.

For persons with healthy immune systems, rotavirus gastroenteritis is a self-limited illness, lasting for only a few days. Treatment is nonspecific and consists of oral rehydration therapy to prevent dehydration. About one in 40 children with rotavirus gastroenteritis will require hospitalization for intravenous fluids.

Protective measures:

1. Vaccination:

A vaccine is available for rotavirus. This vaccination should be administered in early childhood.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with rotavirus Face protection should be worn when the activity presents a chance of splash or aerosolization of body fluids.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to rotavirus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Rubella

Where Rubella is commonly found:

Rubella occurs worldwide. Although more than half of all the World Health Organization member countries now use rubella vaccine, rubella still remains a common disease in many parts of the world. The risk of exposure to rubella outside the United States can be high; thus, all travelers leaving the United States should be immune to rubella.

Common routes of transmission:

Rubella is an acute viral disease that can affect susceptible persons of any age. This disease is spread by contact with an infected person, through coughing and sneezing.

Although rubella is generally a mild rash illness, if contracted in the early months of pregnancy it is associated with a high rate of fetal loss or a constellation of birth defects known as congenital rubella syndrome (CRS).

Signs and symptoms:

Rubella usually presents as a rash and fever for two to three days. However, asymptomatic infections are common; up to 50% of infections occur without rash. In adults or adolescents, the rash may be preceded by early symptoms lasting 1- to 5-day and consisting of low-grade fever, headache, malaise, anorexia, mild conjunctivitis, acute inflammation of the mucous membrane of the nasal cavities, sore throat, and abnormal enlargement of the lymph nodes.

Birth defects can occur if this disease is acquired by a pregnant woman. These birth defects can include: deafness, cataracts, heart defects, mental retardation, and liver and spleen damage (there is at least a 20% chance of damage to the fetus if a woman is infected early in pregnancy).

Protective measures:

1. Vaccination:

Vaccination is typically done in childhood. However, some people may need a booster or may have not gotten this vaccine in childhood. Current CDC recommendations for rubella vaccination are:

You do NOT need the measles, mumps, rubella vaccine (MMR) if:

- You had blood tests that show you are immune to measles, mumps, and rubella.
- You are a man born before 1957.
- You are a woman born before 1957 who is sure she is not having more children, has already had rubella vaccine, or has had a positive rubella test.
- You already had two doses of MMR or one dose of MMR plus a second dose of measles vaccine.
- You already had one dose of MMR and are not at high risk of measles exposure.

You SHOULD get the MMR vaccine if you are not among the categories listed above, and:

- You are a college student, trade school student, or other student beyond high school.

- You work in a hospital or other medical facility.
- You travel internationally, or are a passenger on a cruise ship.
- You are a woman of childbearing age.

2. PPE

Clinical setting: Gloves should be worn as necessary for routine patient care activities. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated respiratory secretions or culture material.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Rubella at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Rubella in the A-Z index.

Salmonellosis
(S. typhimurium infection is addressed under Typhoid)

Where Salmonella is commonly found:

Salmonella is actually a group of bacteria that can cause diarrheal illness in humans. *Salmonella* live in the intestinal tracts of humans and other animals, including birds. The bacteria can be transmitted from the feces of people or animals to other people or other animals. There are many different kinds of *Salmonella* bacteria. *Salmonella* serotype Typhimurium and *Salmonella* serotype Enteritidis are the most common in the United States.

Common routes of transmission:

Salmonella are usually transmitted to humans by eating foods contaminated with animal feces. Contaminated foods usually look and smell normal. Contaminated foods are often of animal origin, such as beef, poultry, milk, or eggs, but any food, including vegetables, may become contaminated. Thorough cooking kills *Salmonella*. Food may also become contaminated by the hands of an infected food handler who did not wash hands with soap after using the bathroom.

Salmonella may also be found in the feces of some pets, especially those with diarrhea, and people can become infected if they do not wash their hands after contact with pets or pet feces. Reptiles, such as turtles, lizards, and snakes, are particularly likely to harbor *Salmonella*. Many chicks and young birds carry *Salmonella* in their feces. People should always wash their hands immediately after handling a reptile or bird, even if the animal is healthy. Adults should also assure that children wash their hands after handling a reptile or bird, or after touching its environment.

Signs and symptoms:

Most persons infected with *Salmonella* develop diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. The illness usually lasts 4 to 7 days, and most persons recover without treatment. However, in some people, the diarrhea may be so severe that the patient needs to be hospitalized. In these patients, the *Salmonella* infection may spread from the intestines to the blood stream, and then to other body sites and can cause death unless the person is treated promptly with antibiotics. The elderly, infants, and those with impaired immune systems are more likely to have a severe illness.

Protective measures:

1. Vaccination:

There is no vaccination for salmonellosis.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with salmonellosis. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Foods of animal origin may be contaminated with *Salmonella* so people should not eat raw or undercooked eggs, poultry, or meat. Raw eggs may be unrecognized in some foods, such as homemade Hollandaise sauce, Caesar and other homemade salad dressings, tiramisu, homemade ice cream, homemade mayonnaise, cookie dough, and frostings. Poultry and meat, including hamburgers, should be well-cooked, not pink in the middle. Persons also should not consume raw or unpasteurized milk or other dairy products. Produce should be thoroughly washed.

Cross-contamination of foods should be avoided. Uncooked meats should be kept separate from produce, cooked foods, and ready-to-eat foods. Hands, cutting boards, counters, knives, and other utensils should be washed thoroughly after touching uncooked foods. Hands should be washed before handling food, and between handling different food items.

People who have salmonellosis should not prepare food or pour water for others until their diarrhea has resolved. Many health departments require that restaurant workers with *Salmonella* infection have a stool test showing that they are no longer carrying the *Salmonella* bacterium before they return to work.

People should wash their hands after contact with animal feces. Reptiles are particularly likely to have *Salmonella*, and it can contaminate their skin, so anyone handling reptiles should immediately wash his/her hands after the activity is done. *Salmonella* is carried in the intestines of chicks and ducklings, it contaminates their environment and the entire surface of the animal. Everyone should immediately wash their hands after touching birds, including baby chicks and ducklings, or their environment.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to salmonella at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Schistosomiasis

Where Schistosomiasis is commonly found:

Schistosomiasis, also known as bilharzia (bill-HAR-zi-a), is a disease caused by parasitic worms. Infection with *Schistosoma mansoni, S. haematobium*, and *S. japonicum* causes illness in humans. Although schistosomiasis is not found in the United States, more than 200 million people are infected worldwide. If you live in or travel to areas where schistosomiasis occurs and your skin comes in contact with fresh water from canals, rivers, streams, or lakes, you are at risk of getting schistosomiasis.

Areas where *Schistosoma* organisms are endemic:

- Africa: all freshwater in southern and sub-Saharan Africa–including the great lakes and rivers as well as smaller bodies of water–is considered to be at risk for schistosomiasis transmission. Transmission also occurs in the Nile River valley in Egypt.
- South America: including Brazil, Suriname, Venezuela
- Caribbean: Antigua, Dominican Republic, Guadeloupe, Martinique, Montserrat, Saint Lucia (risk is low)
- The Middle East: Iran, Iraq, Saudi Arabia, Yemen
- Southern China
- Southeast Asia: Philippines, Laos, Cambodia, central Indonesia, Mekong delta

Common routes of transmission:

Freshwater becomes contaminated by *Schistosoma* eggs when infected people urinate or defecate in the water. The eggs hatch, and if certain types of snails are present in the water, the parasites grow and develop inside the snails. The parasite leaves the snail and enters the water where it can survive for about 48 hours. *Schistosoma* parasites can penetrate the skin of persons who are wading, swimming, bathing, or washing in contaminated water. Within several weeks, worms grow inside the blood vessels of the body and produce eggs. Some of these eggs travel to the bladder or intestines and are passed into the urine or stool.

Signs and symptoms:

Within days after becoming infected, you may develop a rash or itchy skin. Fever, chills, cough, and muscle aches can begin within 1-2 months of infection. Most people have no symptoms at this early phase of infection.

Eggs travel to the liver or pass into the intestine or bladder, causing inflammation or scarring. Children who are repeatedly infected can develop anemia, malnutrition, and learning difficulties. After years of infection, the parasite can also damage the liver, intestines, lungs, and bladder. Rarely, eggs are found in the brain or spinal cord and can cause seizures, paralysis, or spinal cord inflammation.

Symptoms of schistosomiasis are caused by the body's reaction to the eggs produced by worms, not by the worms themselves.

Protective measures:

1. **Vaccination:**

There is currently no vaccination for this organism.

2. PPE

Clinical setting: This organism is not transmitted person to person.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3.Other Protective measures:

- Avoid swimming or wading in freshwater when you are in countries in which schistosomiasis occurs. Swimming in the ocean and in chlorinated swimming pools is generally thought to be safe.
- Drink safe water. Because there is no way to make sure that water coming directly from canals, lakes, rivers, streams or springs is safe, you should either boil water for 1 minute or filter water before drinking it. Boiling water for at least 1 minute will kill any harmful parasites, bacteria, or viruses present. Iodine treatment alone WILL NOT GUARANTEE that water is safe and free of all parasites.
- Bath water should be heated for 5 minutes at 150°F. Water held in a storage tank for at least 48 hours should be safe for showering.
- Vigorous towel drying after an accidental, very brief water exposure may help to prevent the *Schistosoma* parasite from penetrating the skin. You should NOT rely on vigorous towel drying to prevent schistosomiasis.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to *Schistosoma* at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water. Vigorous towel drying may be effective as described above.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Shigellosis

Where Shigellosis is commonly found:

Shigella organisms are present in the diarrheal stools of infected persons while they are sick and for up to a week or two afterwards. There are several different kinds of *Shigella* bacteria: *Shigella sonnei*, also known as "Group D" *Shigella*, accounts for over two-thirds of shigellosis in the United States. *Shigella flexneri*, or "group B" *Shigella*, accounts for almost all of the rest. Other types of *Shigella* are rare in this country, though they continue to be important causes of disease in the developing world. One type found in the developing world, *Shigella dysenteriae* type 1, can cause deadly epidemics.

Every year, about 14,000 cases of shigellosis are reported in the United States. Because many milder cases are not diagnosed or reported, the actual number of infections may be twenty times greater. Shigellosis is particularly common and causes recurrent problems in settings where hygiene is poor and can sometimes sweep through entire communities. It is more common in summer than winter. Children, especially toddlers aged 2 to 4, are the most likely to get shigellosis. Many cases are related to the spread of illness in child-care settings, and many are the result of the spread of the illness in families with small children.

In the developing world, shigellosis is far more common and is present in most communities most of the time.

Common routes of transmission:

Shigella sp are transmittes via the fecal-oral route when individuals use poor hand hygiene after using the bathroom or changing diapers. People may also catch Shigellosis when infected adults or children contaminate shallow water in public swimming pools or daycare splash pools. Shigella infections can then be acquired by drinking, swimming in, or playing with the contaminated water.

Food may become contaminated by infected food handlers who do not wash their hands with soap after using the bathroom. Vegetables can become contaminated if they are harvested from a field with sewage in it. Flies can breed in infected feces and then contaminate food. Water may become contaminated with *Shigella* bacteria if sewage runs into it.

Signs and symptoms:

Symptoms include: watery or bloody diarrhea, abdominal pain, fever, and malaise. Persons with diarrhea usually recover completely, although it may be several months before their bowel habits are entirely normal. About 2% of persons who are infected with one type of *Shigella*, *Shigella flexneri*, later develop pains in their joints, irritation of the eyes, and painful urination. This is called post-infectious arthritis. It can last for months or years, and can lead to chronic arthritis. Post-infectious arthritis is caused by a reaction to *Shigella* infection that happens only in people who are genetically predisposed to it.

Once someone has had shigellosis, they are not likely to get infected with that specific type again for at least several years. However, they can still get infected with other types of *Shigella*.

Protective measures:

1. **Vaccination:**

Currently, there is no vaccine to prevent shigellosis.

2. **PPE**

Clinical setting: Gloves should be worn when caring for a patient with shigellosis. Face protection should be worn when the activity presents a chance of splash or aerosolization of feces.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

- Wash hands with soap carefully and frequently, especially after going to the bathroom, after changing diapers, and before preparing foods or beverages.
- Dispose of soiled diapers properly
- Disinfect diaper changing areas after using them.
- Keep children with diarrhea out of child care settings.
- Supervise handwashing of toddlers and small children after they use the toilet.
- Do not prepare food for others while ill with diarrhea
- Avoid swallowing water from ponds, lakes, or untreated pools.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Shigella at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Streptococcal Disease (Group A Streptococcal disease (GAS))

Where GAS is commonly found:

Group A *Streptococcus* is a bacterium often found in the throat and on the skin. People may carry group A streptococci in the throat or on the skin and have no symptoms of illness. Most GAS infections are relatively mild illnesses such as "strep throat," or impetigo.

Severe, sometimes life-threatening, GAS disease may occur when bacteria get into parts of the body where bacteria usually are not found, such as the blood, muscle, or the lungs. These infections are termed "invasive GAS disease." Two of the most severe, but least common, forms of invasive GAS disease are necrotizing fasciitis and streptococcal toxic shock syndrome, STSS (this is not related to toxic shock syndrome, TSS, which is related to tampon use and is caused by staph aureus).

About 9,000-11,500 cases of invasive GAS disease occur each year in the United States, resulting in 1,000-1,800 deaths annually. STSS and necrotizing fasciitis each comprise an average of about 6%-7% of these invasive cases. In contrast, there are several million cases of strep throat and impetigo each year.

Common routes of transmission:

Streptococcus are spread through direct contact with mucus from the nose or throat of persons who are infected or through contact with infected wounds or sores on the skin. Symptomatic individuals, such as those who have strep throat or skin infections, are most likely to spread the infection. People who carry the bacteria but have no symptoms are much less contagious. It is not likely that household items like plates, cups, or toys spread these bacteria.

Although healthy people can get invasive GAS disease, people with chronic illnesses like cancer, diabetes, and chronic heart or lung disease, and those who use medications such as steroids have a higher risk. Persons with skin lesions (such as cuts, chicken pox, surgical wounds), the elderly, and adults with a history of alcohol abuse or injection drug use also have a higher risk for disease.

Signs and symptoms:

Infection with GAS can result in a range of symptoms:

- No illness
- Mild illness (strep throat or a skin infection such as impetigo)
- Severe illness (necrotizing faciitis, streptococcal toxic shock syndrome)

Early signs and symptoms of necrotizing fasciitis;

- Severe pain and swelling, often rapidly increasing
- Fever
- Redness at a wound site

Early signs and symptoms of STSS;

- Fever
- Abrupt onset of generalized or localized severe pain, often in an arm or leg
- Dizziness
- Influenza-like syndrome
- Confusion
- A flat red rash over large areas of the body (only occurs in 10% of cases)

Protective measures:

1. Vaccination:

There is no vaccination against streptococcus organisms.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with GAS. Face protection should be worn when the activity presents a chance of splash or aerosolization of wound secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

The spread of all types of GAS infection can be reduced by good hand washing, especially after coughing and sneezing and before preparing foods or eating. Persons with sore throats should be seen by a doctor who can perform tests to find out whether the illness is strep throat. If the test result shows strep throat, the person should stay home from work, school, or day care until 24 hours after taking an antibiotic. All wounds should be kept clean and watched for possible signs of infection such as redness, swelling, drainage, and pain at the wound site. A person with signs of an infected wound, especially if fever occurs, should immediately seek medical care. It is not necessary for all persons exposed to someone with an invasive group A strep infection (i.e. necrotizing fasciitis or strep toxic shock syndrome) to receive antibiotic therapy to prevent infection. However, in certain circumstances, antibiotic therapy may be appropriate. That decision should be made after consulting with your doctor.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.
Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed GAS at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Tetanus

Where Tetanus is commonly found:

Tetanus is a global health problem because C. tetani spores are ubiquitous in the environment. A reservoir of tetanus bacteria exists in the intestines of horses and other animals, including humans, in which the organism is a harmless normal inhabitant. Soil or fomites contaminated with animal and human feces propagate transmission. Clinical disease is caused by a neurotoxin produced by anaerobic tetanus bacilli growing in contaminated wounds.

The disease occurs almost exclusively in persons who are inadequately immunized. Worldwide, the disease is more common in agricultural regions and in areas where contact with animal excreta is more likely and immunization is inadequate. In developing countries, tetanus in neonates born to unvaccinated mothers (neonatal tetanus) is the most common form of the disease.

In 2006, an estimated 290,000 people worldwide died of tetanus, most of them in Asia, Africa, and South America. In 10% of reported cases in the United States, no antecedent wound was identified.

Common routes of transmission:

Lesions that are considered "tetanus prone" are wounds contaminated with dirt, feces, or saliva, deep wounds, burns, crush injuries, or those with necrotic tissue. Tetanus has also been associated with apparently clean superficial wounds, surgical procedures, insect bites, dental infections, chronic sores and infections, and intravenous drug use.

Tetanus has no direct person-to-person transmission.

Signs and symptoms:

Acute manifestations of tetanus are characterized by muscle rigidity and painful spasms, often starting in the muscles of the jaw and neck. Severe tetanus can lead to respiratory failure and death.

The incubation period is usually 3–21 days (average 10 days), although it may range from 1 day to several months, depending on the character, extent, and location of the wound. Most cases occur within 14 days. In general, shorter incubation periods are associated with more heavily contaminated wounds, more severe disease, and a worse prognosis.

Generalized Tetanus

- Generalized tetanus is the most common form, accounting for more than 80% of cases.
- Neonatal tetanus is generalized tetanus in neonates, usually due to umbilical stump infections.
- The average incubation period from injury to symptom onset is 7–8 days (range 3 days–3 weeks).
- The most common initial sign is trismus (spasm of the muscles of mastication or "lockjaw"). Trismus may be followed by painful spasms in other muscle groups in the neck, trunk, and extremities and by generalized, tonic, seizure-like activity or frank convulsions in severe cases.
- Generalized tetanus can be accompanied by autonomic nervous system abnormalities, as well as a variety of complications related to severe spasm and prolonged hospitalization.
- The clinical course of generalized tetanus is variable and depends on the degree of prior immunity, the amount of toxin present, and the age and general health of the patient.
- Even with intensive care, generalized tetanus is associated with mortality rates of 10%–20%.

Localized Tetanus

- Localized tetanus is an unusual form of the disease consisting of spasm of muscles in a confined area close to the site of the injury.
- Although localized tetanus often occurs in persons with partial immunity and is usually mild, progression to generalized tetanus can occur.

Cephalic Tetanus

- The rarest form, cephalic tetanus, is associated with lesions of the head or face and has been described in association with ear infections (i.e., otitis media).
- The incubation period is short, usually 1–2 days.
- Unlike generalized and localized tetanus, cephalic tetanus results in flaccid cranial nerve palsies rather than spasm. Trismus may also be present. Like localized tetanus, cephalic tetanus can progress to the generalized form.

Protective measures:

1. Vaccination:

There is a vaccination for tetanus. Active protection should be maintained by administering booster doses of Td or Tdap (tetanus with pertussis to protect against whooping cough) every 10 years.

2. PPE

Clinical setting: Routine universal precautions should be implemented when caring for a patient with tetanus.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Travelers should ensure they have adequate immunity to tetanus.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Tetanus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Typhoid Fever

Where Typhoid fever is commonly found:

Typhoid fever is a life-threatening illness caused by the bacterium *Salmonella* Typhi. Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract. In addition, a small number of persons, called carriers, recover from typhoid fever but continue to carry the bacteria. Both ill persons and carriers shed *S.* Typhi in their feces (stool).

Typhoid fever is common in most parts of the world (where it affects about 21.5 million persons each year) except in industrialized regions such as the United States, Canada, western Europe, Australia, and Japan. Therefore, if you are traveling to the developing world, you should consider taking precautions. Over the past 10 years, travelers from the United States to Asia, Africa, and Latin America have been especially at risk. In the United States about 400 cases occur each year, and 75% of these are acquired while traveling internationally.

Common routes of transmission:

You can get typhoid fever if you eat food or drink beverages that have been handled by a person who is shedding *S.* Typhi or if sewage contaminated with *S.* Typhi bacteria gets into the water you use for drinking or washing food. Therefore, typhoid fever is more common in areas of the world where handwashing is less frequent and water is likely to be contaminated with sewage.

Signs and symptoms:

Persons with typhoid fever usually have a sustained fever as high as 103° to 104° F. They may also feel weak, or have stomach pains, headache, or loss of appetite. In some cases, patients have a rash of flat, rose-colored spots. The only way to know for sure if an illness is typhoid fever is to have samples of stool or blood tested for the presence of S. Typhi .

Protective measures:

1. Vaccination:

If you are working with this organism in the lab or traveling to a country where typhoid is common, you should consider being vaccinated against typhoid. You will need to complete your vaccination at least 1 week before working with the organism or traveling to an area of concern so that the vaccine has time to take effect.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with typhoid. Face protection should be worn when the activity presents a chance of splash or aerosolization of contaminated material.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of contaminated feces or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Typhoid fever at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe dehydration, difficulty keeping food/fluids down for several days) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Typhoid in the A-Z index.

Tuberculosis

Where Tuberculosis (TB) is commonly found:

Tuberculosis (TB) is a disease caused by Mycobacterium tuberculosis. The bacteria usually attack the lungs but can also attack any part of the body such as kidneys, spine, and brain. If not treated properly, TB can be fatal. TB was once the leading cause of death in the United States.

Documented places where transmission has occurred include crowded hospitals, prisons, homeless shelters, and other settings where susceptible persons come in contact with persons with TB disease. Travelers should be aware that certain areas of the world have high rates of TB in the population.

Air travel itself carries a relatively low risk of infection with TB of any kind. The risk of acquiring any type of TB depends on several factors, such as extent of disease in the patient with TB, duration of exposure, and ventilation. Most important, there must be someone with infectious TB disease on the same flight to present any risk. If someone on the flight does have TB disease, persons on flights lasting 8 hours or longer are at greater risk than persons on shorter flights.

Multidrug-resistant TB (MDR TB) is TB that is resistant to at least two of the best anti-TB drugs, isoniazid and rifampin. These drugs are considered first-line drugs and are used to treat all persons with TB disease.

Extensively drug resistant TB (XDR TB) is a rare type of MDR TB. XDR TB is defined as TB which is resistant to isoniazid and rifampin, plus resistant to any fluoroquinolone and at least one of three injectable second-line drugs (i.e., amikacin, kanamycin, or capreomycin). Because XDR TB is resistant to first-line and secondline drugs, patients are left with treatment options that are much less effective.

XDR TB is of special concern for persons with HIV infection or other conditions that can weaken the immune system. These persons are more likely to develop TB disease once they are infected, and also have a higher risk of death once they develop TB.

Common routes of transmission:

TB is spread through the air from one person to another. The bacteria are aerosolized when a person with active TB of the lungs or throat coughs or sneezes. People nearby may breathe in these bacteria and become infected.

However, not everyone infected with TB bacteria becomes sick. People who are not sick have 'latent TB infection'. People with latent TB infection do not feel sick, do not have any symptoms, and cannot spread TB to others. Some people with latent TB infection go on to get TB disease.

People with active TB can be successfully treated if they seek medical help. Most people with latent TB infection can be treated to prevent the development of active TB disease.

Signs and symptoms:

The general symptoms of TB include feelings of sickness or weakness, weight loss, fever, and night sweats. The symptoms of TB disease of the lungs also include coughing, chest pain, and the coughing up of blood. Symptoms of TB disease in other parts of the body depend on the area affected. If you have these symptoms, you should contact your doctor or local health department.

Protective measures:

1. Vaccination:

There is a vaccine for TB called Bacille Calmette-Guerin (BCG). It is used in some countries to prevent severe forms of TB in children. However, BCG is not generally recommended in the United States because it has limited effectiveness for preventing TB overall.

2. PPE

Clinical setting: Gloves and respiratory protection should be worn when caring for a patient with TB.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated respiratory tract secretions or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Refer to http://www.cdc.gov/tb/pubs/tbfactsheets/ichcs.htm for more detailed information on infection prevention in health care settings for patients with TB.

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to TB at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Tuberculosis in the A-Z index.

West Nile Virus (WNV)

Where West Nile Virus is commonly found:

West Nile Virus is a flavivirus commonly found in Africa, West Asia, and the Middle East. It is closely related to St. Louis encephalitis virus which is also found in the United States. The virus can infect humans, birds, mosquitoes, horses and some other mammals. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall.

Common routes of transmission:

Most often, WNV is spread by the bite of an infected mosquito. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite. In a very small number of cases, WNV also has been spread through blood transfusions, organ transplants, breastfeeding and even during pregnancy from mother to baby.

WNV is not spread through casual contact such as touching or kissing a person with the virus. Although WNV is most often transmitted by the bite of infected mosquitoes, the virus can also be transmitted through contact with infected animals, their blood, or other tissues.

Signs and symptoms:

People typically develop symptoms between 3 and 14 days after they are bitten by the infected mosquito. Approximately 80 percent of people who are infected with WNV will not show any symptoms at all.

About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

Up to 20 percent of the people who become infected have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms can last for as little as a few days, though even healthy people have become sick for several weeks.

Protective measures:

1. Vaccination:

There is no vaccination against West Nile Virus.

2. PPE

Clinical setting: Standard precautions are sufficient when caring for WNV infected patients.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

The easiest and best way to avoid WNV is to prevent mosquito bites.

- When you are outdoors, use insect repellent containing an EPA-registered active ingredient. Follow the directions on the package.
- Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.
- Make sure you have good screens on your windows and doors to keep mosquitoes out.
- Get rid of mosquito breeding sites by emptying standing water from flower pots, buckets and barrels. Change the water in pet dishes and replace the water in bird baths weekly. Drill holes in tire swings so water drains out. Keep children's wading pools empty and on their sides when they aren't being used.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to WNV at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for this disease in the A-Z index.

Yellow Fever

Where Yellow Fever is commonly found:

Yellow fever occurs in tropical regions of Africa and in parts of South America. Yellow fever is a very rare cause of illness in U.S. travelers. The last epidemic of yellow fever in North America occurred in New Orleans in 1905. Given the current yellow fever epidemics and the world wide distribution of Aedes aegypti, there is a risk of importation of yellow fever into new areas by infected travelers.

There are two kinds of yellow fever, spread by two different cycles of infection:

Jungle yellow fever is mainly a disease of monkeys. It is spread from infected mosquitoes to monkeys in the tropical rain forest. People get jungle yellow fever when they are bitten by mosquitoes that have been infected after feeding on infected monkeys. Jungle yellow fever is rare and occurs mainly in persons who live or work in tropical rain forests.

Urban yellow fever is a disease of humans. It is spread by mosquitoes that have been infected by other people. Aedes aegypti is the type of mosquito that usually carries yellow fever from human to human. These mosquitoes have adapted to living among humans in cities, towns, and villages. Their larvae grow in discarded tires, flower pots, oil drums, and water storage containers close to human dwellings. Urban yellow fever is the cause of most yellow fever outbreaks and epidemics.

Common routes of transmission:

Yellow fever virus, a flavivirus, is transmitted to humans through the bite of infected mosquitoes. Mosquitoes that spread yellow fever usually bite during the day, especially at dusk and dawn.

Signs and symptoms:

Illness ranges in severity from a self-limited febrile illness to severe hepatitis and hemorrhagic fever. Many yellow fever infections are mild, but the disease can cause severe, life-threatening illness.

Incubation period for yellow fever is 3-6 days with a fatality rate from 15% to more than 50%. Symptoms of severe infection are high fever, chills, headache, muscle aches, vomiting, and backache. After a brief recovery period, the infection can lead to shock, bleeding, and kidney and liver failure. Liver failure causes jaundice (yellowing of the skin and the whites of the eyes), which gives yellow fever its name.

Protective measures:

1. Vaccination:

There is a vaccination to protect against yellow fever. Employees who travel to Yellow Fever endemic regions or who work with the organism in a research lab should be vaccinated.

2. PPE

Clinical setting: Standard precautions are sufficient when caring for a patient with yellow fever.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Avoid mosquito bites when traveling in tropical areas. Mosquitoes that spread yellow fever usually bite during the day, especially at dusk and dawn.

- When outside:
    - Wear long-sleeved clothing and long pants. For extra protection, treat clothing with the insecticide permethrin.
    - Use insect repellent on exposed skin. Repellents containing DEET (N,N-diethylmetatoluamide), Picaridin (KBR 3023), IR 3535, p-Menthane 3,8-diole (PMD or oil of lemon eucalyptus) are effective. Follow application instructions carefully.
- When inside:
    - Stay in well-screened areas as much as possible.
    - Spray living and sleeping areas with insecticide.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Yellow Fever at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

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Appendix C: Zoonotic Diseases

Anthrax

Brucellosis

Camphylobacter

Cat Scratch disease

Cryptosporidium

Giardia

H5N1 Avian Influenza

Hantavirus

Leishmaniasis

Leptospirosis

Monkeypox

Orf

Prion Diseases

Q fever

Rabies

Rickettsial Diseases

Toxoplasmosis

Tularemia

Yersinia enterolitica

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Anthrax

Where Anthrax is commonly found:

Anthrax is an acute infectious disease caused by the spore-forming bacterium Bacillus anthracis. Anthrax most commonly occurs in wild and domestic lower vertebrates (cattle, sheep, goats, camels, antelopes, and other herbivores), but it can also occur in humans when they are exposed to infected animals or to tissue from infected animals or when anthrax spores are used as a bioterrorist weapon. Anthrax can also be found in research laboratories that are approved to work with Select Agents.

Common routes of transmission:

Anthrax is not known to spread from one person to another person. B. anthracis spores can live in the soil for many years, and humans can become infected with anthrax by handling products from infected animals or by inhaling anthrax spores from contaminated animal products. Anthrax can also be spread by eating undercooked meat from infected animals. It is rare to find infected animals in the United States. Anthrax spores can be used as a bioterrorist weapon, as was the case in 2001 when Bacillus anthracis spores were intentionally distributed through the postal system, causing 22 cases of anthrax including 5 deaths.

Signs and symptoms:

Anthrax infection can occur in three forms: cutaneous (skin), inhalation, and gastrointestinal.

- **Cutaneous:** Most (about 95%) anthrax infections occur when the bacterium enters a cut or abrasion on the skin, such as when handling contaminated wool, hides, leather or hair products (especially goat hair) of infected animals. Skin infection begins as a raised itchy bump that resembles an insect bite but within 1-2 days develops into a vesicle and then a painless ulcer, usually 1-3 cm in diameter, with a characteristic black necrotic (dying) area in the center. Lymph glands in the adjacent area may swell. About 20% of untreated cases of cutaneous anthrax will result in death. Deaths are rare with appropriate antimicrobial therapy.

- **Inhalation:** Initial symptoms may resemble a common cold – sore throat, mild fever, muscle aches and malaise. After several days, the symptoms may progress to severe breathing problems and shock. Inhalation anthrax is usually fatal.

- **Gastrointestinal:** The intestinal disease form of anthrax may follow the consumption of contaminated meat and is characterized by an acute inflammation of the intestinal tract. Initial signs of nausea, loss of appetite, vomiting, fever are followed by abdominal pain, vomiting of blood, and severe diarrhea. Intestinal anthrax results in death in 25% to 60% of cases.

Protective measures:

1. Vaccination:

A vaccine has been developed for anthrax that is protective against invasive disease, but it is currently only recommended for high-risk populations. The Advisory Committee on Immunization Practices (ACIP) has recommended anthrax vaccination for the following groups:

- Persons who work directly with the organism in the laboratory.

- Persons who work with imported animal hides or furs in areas where standards are insufficient to prevent exposure to anthrax spores.

- 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.

- Military personnel deployed to areas with high risk for exposure to the organism.

2. PPE

Clinical setting: Since Anthrax is unknown to be transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research/Animal care setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of spores; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Anthrax at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov look for Anthrax in the A-Z index.

Brucellosis

Where Brucellosis is commonly found:

Brucellosis is an infectious disease caused by the bacteria of the genus *Brucella*. These bacteria are primarily passed among animals, and they cause disease in many different vertebrates. Various *Brucella* species affect sheep, goats, cattle, deer, elk, pigs, dogs, and several other animals. Humans become infected by coming in contact with animals or animal products that are contaminated with these bacteria.

Brucellosis is not very common in the United States, with only 100 to 200 cases occurring each year. Brucellosis can be very common in countries where animal disease control programs have not reduced the amount of disease among animals.

Although brucellosis can be found worldwide, it is more common in countries that do not have good standardized and effective public health and domestic animal health programs. Areas currently listed as high risk are the Mediterranean Basin (Portugal, Spain, Southern France, Italy, Greece, Turkey, North Africa), South and Central America, Eastern Europe, Asia, Africa, the Caribbean, and the Middle East. Unpasteurized cheeses, sometimes called "village cheeses," from these areas may represent a particular risk for tourists.

Common routes of transmission:

Humans are generally infected in one of three ways:

1. eating or drinking something that is contaminated with *Brucella*,
2. inhalation of the organism
3. the bacteria entering the body through skin wounds.

The most common way to be infected is by eating or drinking contaminated milk products that have not been pasteurized. When sheep, goats, cows, or camels are infected, their milk is contaminated with the bacteria.

Inhalation of *Brucella* organisms is not a common route of infection, but it can be a significant hazard for people in certain occupations, such as those working in laboratories where the organism is cultured. Inhalation is often responsible for a significant percentage of cases in abattoir employees.

Contamination of skin wounds may be a problem for persons working in slaughterhouses or meat packing plants or for veterinarians. Hunters may be infected through skin wounds or by accidentally ingesting the bacteria after cleaning deer, elk, moose, or wild pigs that they have killed.

Direct person-to-person spread of brucellosis is extremely rare. Mothers who are breast-feeding may transmit the infection to their infants. Sexual transmission has also been reported. For both sexual and breast-feeding transmission, if the infant or person at risk is treated for brucellosis, their risk of becoming infected will probably be eliminated within 3 days. Although uncommon, transmission may also occur via contaminated tissue transplantation.

Signs and symptoms:

In humans brucellosis can cause a range of symptoms that are similar to the flu and may include fever, sweats, headaches, back pains, and physical weakness. Severe infections of the central nervous systems or lining of the heart may occur. Brucellosis can also cause long-lasting or chronic symptoms that include recurrent fevers, joint pain, and fatigue.

Protective measures:

1. Vaccination:

There is no vaccine available for humans.

2. PPE

Clinical setting: Since brucellosis is rarely transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research/Animal care setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of known or potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Brucellosis at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to: http://www.cdc.gov/healthypets/browse_by_diseases.htm look for this disease in the 'Browse by Disease' list.

Campylobacter

Where Campylobacter is commonly found:

Campylobacter organisms are spiral-shaped bacteria that can cause disease in humans and animals. Most human illness is caused by one species, called *Campylobacter jejuni*, but human illness can also be caused by other species. *Campylobacter jejuni* grows best at the body temperature of a bird, and seems to be well adapted to birds, who carry it without becoming ill. Animals that may carry *Campylobacter* in their feces include farm animals, cats, and dogs. Animals do not have to be ill to pass *Campylobacter* to humans. People with compromised immune systems, including those undergoing treatments for cancer, organ transplant patients, and people with HIV/AIDS, have a higher risk than others of getting *Campylobacter* infection from food and animals.

Common routes of transmission:

The organism is not usually spread person to person, but this can happen if the infected person is producing a large volume of diarrhea.

Most people get campylobacteriosis from contaminated food. However, animals can have *Campylobacter* in their feces. If people come into contact with contaminated feces and then do not wash hands before eating or touching their face they may become sick. Foodborne *Campylobacter* exposures occur when eating raw or undercooked poultry meat or from cross-contamination of other foods by these items. Infants may get the infection by contact with poultry packages in shopping carts.

Many chicken flocks are infected with *Campylobacter* but show no signs of illness. *Campylobacter* can be easily spread from bird to bird through a common water source or through contact with infected feces. When an infected bird is slaughtered, *Campylobacter* organisms can be transferred from the intestines to the meat. In 2005, *Campylobacter* was present on 47% of raw chicken breasts tested through the FDA-NARMS Retail Food program. *Campylobacter* is also present in the giblets, especially the liver.

Unpasteurized milk can become contaminated if the cow has an infection with *Campylobacter* in her udder or the milk is contaminated with manure. Surface water and mountain streams can become contaminated from infected feces from cows or wild birds. This infection is common in the developing world, and travelers to foreign countries are also at risk for becoming infected with *Campylobacter*.

Signs and symptoms:

Most people who become ill with campylobacteriosis get diarrhea, cramping, abdominal pain, and fever within two to five days after exposure to the organism. The diarrhea may be bloody and can be accompanied by nausea and vomiting. The illness typically lasts one week. Some infected persons do not have any symptoms. In persons with compromised immune systems, *Campylobacter* occasionally spreads to the bloodstream and causes a serious life-threatening infection.

Protective measures:

1. Vaccination:

There is no vaccination against Campylobacter.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with Campylobacteriosis. Face protection should be worn when the activity presents a chance of splash of fecal material.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

- After contact with animals and animal feces, wash your hands thoroughly with running water and soap.
- If you are immunocompromised and are getting a new pet, avoid farm animals, cats, and dogs with diarrhea.
- If your dog or cat has diarrhea, talk to your veterinarian.
- Wash hands with soap after contact with pet feces.
- If you develop symptoms, including diarrhea, vomiting, abdominal cramps, and/or nausea, contact your physician. Be sure to inform him or her of your pet and if it is ill.
- If you are immunocompromised, be extra cautious around farm animals and their environment.
- Cook all poultry products thoroughly. Make sure that the meat is cooked throughout (no longer pink) and any juices run clear. All poultry should be cooked to reach a minimum internal temperature of 165 °F.
- If you are served undercooked poultry in a restaurant, send it back for further cooking.
- Wash hands with soap before preparing food
- Wash hands with soap after handling raw foods of animal origin and before touching anything else.
- Prevent cross-contamination in the kitchen by using separate cutting boards for foods of animal origin and other foods and by carefully cleaning all cutting boards, countertops, and utensils with soap and hot water after preparing raw food of animal origin.
- Avoid consuming unpasteurized milk and untreated surface water.
- Make sure that persons with diarrhea, especially children, wash their hands carefully and frequently with soap to reduce the risk of spreading the infection.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Campylobacter at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to http://www.cdc.gov/healthypets/browse_by_diseases.htm, look for this disease in the alphabetical index.

Cat Scratch Disease

Where Cat Scratch Disease is commonly found:

Cat scratch disease (CSD) is a bacterial disease caused by *Bartonella henselae*. Kittens are more likely to be infected and to pass the bacterium to people. About 40% of cats carry *B. henselae* at some time in their lives. Cats that carry *B. henselae* do not show any signs of illness; therefore, you cannot tell which cats can spread the disease to you. People with immunocompromised conditions, such as those undergoing immunosuppressive treatments for cancer, organ transplant patients, and people with HIV/AIDS, are more likely than others to have complications of CSD. Although *B. henselae* has been found in fleas, so far there is no evidence that a bite from an infected flea can give you CSD.

Common routes of transmission:

Scratch of bite from an infected cat or kitten.

Signs and symptoms:

Most people with CSD have been bitten or scratched by a cat and developed a mild infection at the point of injury. Lymph nodes, especially those around the head, neck, and upper limbs, become swollen. Additionally, a person with CSD may experience fever, headache, fatigue, and a poor appetite. Rare complications of *B. henselae* infection are bacillary angiomatosis and Parinaud's oculolandular syndrome.

Protective measures:

1. Vaccination:

There is no vaccination or this organism.

2. PPE

Clinical setting: Standard precaustion should be used when treating a person with this disease.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Cat Scratch Disease at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.

4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Cryptococcus

Where Cryptococcus is commonly found:

Cryptococcus is a type of fungus that is found in the soil, usually in association with bird droppings. The major species of Cryptococcus that causes illness in human is Cryptococcus neoformans, which is found worldwide. Another less common species that can also cause disease in humans, Cryptococcus gattii, has been isolated from eucalyptus trees in tropical and sub-tropical regions. Since 1999, C. gattii has also been found in regions of the Pacific Northwest, particularly Vancouver Island in British Columbia, and Oregon and Washington in the United States.

Common routes of transmission:

When dried bird droppings or contaminated soils are stirred up, this can aerosolize dust containing Cryptococcus sp. People can stir up this dust and then inhale it when they work, play, or walk in areas where birds have been. Animals and humans can get it by inhaling it around areas where Cryptococcus sp. is found, but animals and humans cannot transmit the disease to each other.

Signs and symptoms:

C. neoformans typically infects immunocompromised persons. Most people in the United States who develop this infection are HIV-infected or have other conditions affecting their immune system. However, occasionally persons with no apparent immune system problems develop cryptococcosis. A wide range of animals can also develop C. neoformans cryptococcosis.

Infection with C. neoformans may cause a pneumonia-like illness, with shortness of breath, coughing and fever. Skin lesions may also occur. Another common form of cryptococcosis is central nervous system infection, such as meningoencephalitis. Symptoms may include fever, headache, or a change in mental status.

The incubation time for C. neoformans is not known.

Infections with C. gattii have occurred in both healthy persons without compromised immune systems and in persons with conditions affecting their immune system. A wide range of animals can also develop C. gattii cryptococcosis.

Infection with C. gattii may cause a pneumonia-like illness, with shortness of breath, coughing, nausea, and fever. Another common form of C. gattii infection is central nervous system infection, such as meningoencephalitis. Symptoms may include fever, headache, or a change in mental status.

Symptoms from C. gattii infection are estimated to begin anywhere from 2-14 months after exposure.

Protective measures:

1. Vaccination:

There is no vaccination for Cryptococcus sp.

2. PPE

Clinical setting: Standard precautions are sufficient for treating patients with Cryptococcus sp.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

To prevent C. neoformans infections, people who have weakened immune systems should avoid areas contaminated by bird droppings, and should avoid contact with birds. There are no formal recommendations for the prevention of C. gattii infection.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Cryptococcus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to http://www.cdc.gov/healthypets/browse_by_diseases.htm, look for this disease in the alphabetical index.

Cryptosporidia

Where Cryptosporidiais commonly found:

Cryptosporidiosis is a diarrheal disease caused by microscopic parasites, *Cryptosporidium*, that can live in the intestine of humans and animals and is passed in the stool of an infected person or animal. Both the disease and the parasite are commonly known as "Crypto." The parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very resistant to chlorine-based disinfectants. The parasite is found in every region of the United States and throughout the world.

Common routes of transmission:

Cryptosporidium lives in the intestine of infected humans or animals. An infected person or animal sheds Crypto parasites in the stool. Millions of Crypto germs can be released in a bowel movement from an infected human or animal. Shedding of Crypto in the stool begins when the symptoms begin and can last for weeks after the symptoms (e.g., diarrhea) stop. You can become infected after accidentally swallowing the parasite. *Cryptosporidium* may be found in soil, food, water, or surfaces that have been contaminated with the feces from infected humans or animals. Crypto is not spread by contact with blood.

Crypto can be spread:

- By putting something in your mouth or accidentally swallowing something that has come into contact with stool of a person or animal infected with Crypto.
- By swallowing recreational water contaminated with Crypto. Recreational water is water in swimming pools, hot tubs, Jacuzzis, fountains, lakes, rivers, springs, ponds, or streams. Recreational water can be contaminated with sewage or feces from humans or animals.
- By swallowing water or beverages contaminated with stool from infected humans or animals.
- By eating uncooked food contaminated with Crypto. Thoroughly wash with uncontaminated water all vegetables and fruits you plan to eat raw. See below for information on making water safe.
- By touching your mouth with contaminated hands. Hands can become contaminated through a variety of activities, such as touching surfaces (e.g., toys, bathroom fixtures, changing tables, diaper pails) that have been contaminated by stool from an infected person or, changing diapers, caring for an infected person, changing diapers, caring for an infected person.
- Handling an infected cow or calf or touching stalls or fence rails that have been contaminated with feces.

During the past 2 decades, Crypto has become recognized as one of the most common causes of waterborne disease (recreational water and drinking water) in humans in the United States. Most people get *Cryptosporidium* infection from contaminated food and water. However, sometimes animals (including farm animals, cats, and dogs) carry this parasite in their feces (stool) and pass it to people. Animals do not have to be ill to pass *Cryptosporidium* to humans. People with compromised immune systems, such as those undergoing immunosuppressive treatments for cancer, organ transplant patients, and people with HIV/AIDS, are more likely than others to get *Cryptosporidium* infection.

Signs and symptoms:

The most common symptom of cryptosporidiosis is watery diarrhea. Other symptoms include:

- Stomach cramps or pain
- Dehydration
- Nausea
- Vomiting
- Fever
- Weight loss

Some people with Crypto will have no symptoms at all. While the small intestine is the site most commonly affected, Crypto infections could possibly affect other areas of the digestive tract or the respiratory tract.

Symptoms of cryptosporidiosis generally begin 2 to 10 days (average 7 days) after becoming infected with the parasite.

In persons with healthy immune systems, symptoms usually last about 1 to 2 weeks. The symptoms may go in cycles in which you may seem to get better for a few days, then feel worse again before the illness ends.

Although Crypto can infect all people, some groups are likely to develop more serious illness.

- Young children and pregnant women may be more susceptible to the dehydration resulting from diarrhea and should drink plenty of fluids while ill.
- If you have a severely weakened immune system, you are at risk for more serious disease. Your symptoms may be more severe and could lead to serious or life-threatening illness. Examples of persons with weakened immune systems include those with AIDS; cancer and transplant patients who are taking certain immunosuppressive drugs; and those with inherited diseases that affect the immune system.

Protective measures:

1. Vaccination:

There is no vaccination against Cryptosporidia.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with cryptosporidia. Face protection should be worn when the activity presents a chance of splash or aerosolization of fecal material.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

- Minimize contact with the feces of all animals, particularly young animals.

- When cleaning up animal feces, wear disposable gloves, and always wash hands when finished.
- Wash hands after any contact with animals or their living areas.
- Do not swallow water while swimming in swimming pools, hot tubs, interactive fountains, lakes, rivers, springs, ponds, streams or the ocean.
- Do not drink untreated water from lakes, rivers, springs, ponds, streams, or shallow wells.
- Do not use or drink inadequately treated water or use ice when traveling in countries where the water supply might be unsafe.

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Cryptosporidia at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to http://www.cdc.gov/healthypets/browse_by_diseases.htm, look for this disease in the alphabetical index.

Giardiasis

Where Giardia is commonly found:

Giardiasis is a diarrheal illness caused by a one-celled, microscopic parasite, Giardia intestinalis (also known as Giardia lamblia). Once an animal or person has been infected with Giardia intestinalis, the parasite lives in the intestine and is passed in the stool. Because the parasite is protected by a cyst, it can survive outside the body and in the environment for long periods of time.

During the past 2 decades, Giardia infection has become recognized as one of the most common causes of waterborne disease (found in both drinking and recreational water) in humans in the United States. Giardia is found worldwide and within every region of the United States.

Anyone can become infected by this parasite but persons more likely to become infected include:

- Children who attend day care centers, including diaper-aged children
- Child care workers
- Parents of infected children
- International travelers
- People who swallow water from contaminated sources
- Backpackers, hikers, and campers who drink unfiltered, untreated water
- Swimmers who swallow water while swimming in lakes, rivers, ponds, and streams
- People who drink from shallow wells

Contaminated water includes water that has not been boiled, filtered, or disinfected with chemicals. Several community-wide outbreaks of giardiasis have been linked to drinking municipal water or recreational water contaminated with Giardia.

Common routes of transmission:

The Giardia parasite can be found in the intestine of infected humans or animals, in soil, food, water, or on surfaces that have been contaminated with the feces from infected humans or animals. Giardia can be spread by:

- Accidentally putting something into your mouth or swallowing something that has come into contact with feces of a person or animal infected with Giardia.
- Swallowing recreational water contaminated with Giardia. Recreational water includes water in swimming pools, hot tubs, jacuzzis, fountains, lakes, rivers, springs, ponds, or streams that can be contaminated with sewage or feces from humans or animals.
- Eating uncooked food contaminated with Giardia.
- Accidentally swallowing Giardia picked up from surfaces (such as bathroom fixtures, changing tables, diaper pails, or toys) contaminated with feces from an infected person.

You **can** become infected after accidentally swallowing the parasite; you **cannot** become infected through contact with blood.

Signs and symptoms:

Giardia infection can cause a variety of intestinal symptoms, which include

- Diarrhea
- Gas or flatulence
- Greasy stools that tend to float
- Stomach cramps
- Upset stomach or nausea.

These symptoms, if left untreated, may lead to weight loss and dehydration. Some people with giardiasis are asymptomatic.

Symptoms of giardiasis normally begin 1 to 2 weeks (average 7 days) after becoming infected. In otherwise healthy persons, symptoms of giardiasis may last 2 to 6 weeks. Occasionally, symptoms last longer.

Protective measures:

1. Vaccination:

There is no vaccine available for this organism.

2. PPE

Clinical setting: Since giardia can be transmitted person-to-person, gloves should be worn when caring for an infected patient. Face protection should be worn when the activity presents a chance of splash or aerosolization of contaminated material. Wash hands immediately after removing gloves.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of contaminated feces or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure. Wash hands immediately after removing gloves.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Giardia at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.

5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to: http://www.cdc.gov/healthypets/browse_by_diseases.htm look for Giardiasis in the 'Browse by Disease' list.

H5N1 Avian Influenza

Where H5N1 Avian Influenza is commonly found:

The H5N1 Highly Pathogenic Avian Influenza (HPAI) is a virus that impacts the avian and human pulmonary system.

- Animal reservoir: domestic poultry, migratory birds (there is no evidence of this strain in birds in the US at this time)
- Virus survival in the environment: The virus can survive, at cool temperatures, in contaminated manure for at least three months. In water, the virus can survive for up to four days at 72 ^{o}F and for more than 30 days at 32 ^{o}F. The virus can also survive in mud or other debris found on equipment or on the feet of humans and animals.

Common routes of transmission:

This virus is spread via aerosolization or splash of feces, or exposure to nasal/throat secretions when working with infected birds. Since there is evidence that this virus can live in the environment for a while, it may be possible to catch it from contaminated surfaces. This is unclear at this time
Sustained human to human transmission has not been reported at this time.

Signs and symptoms:

- Flu-like (fever, muscle aches)
- Severe shortness of breath
- Eye irritation (conjunctivitis)
- Symptoms appear within 7-10 days of exposure
- Human mortality is high

In humans, this virus causes much more severe respiratory symptoms than seasonal flu.

Protective measures:

1. Vaccination:

There is currently no vaccine for this strain of flu. Employees who may be exposed to H5N1 avian flu due to work activities should get the seasonal flu shot.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with the flu. Face protection should be worn when the activity presents a chance of splash or aerosolization of respiratory secretions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated respiratory tract secretions or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to H5N1 Avian Influenza at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to:

www.cdc.gov look for Influenza in the A-Z index.

file:///U:/IHBIOP~1/AVIANF~1/WHB_05~1.HTM

http://www.doi.gov/issues/birdflu_strategIPPlan.pdf

http://www.doi.gov/issues/avianflu.html

http://www.nwhc.usgs.gov/

http://www.osha.gov/dsg/guidance/avian-flu.html

http://www.nwhc.usgs.gov/publications/fact_sheets/index.jsp

http://www.cdc.gov/flu/avian/professional/protect-guid.htm

http://www.who.int/csr/disease/avian_influenza/en/

Hantavirus Pulmonary Syndrome

Where Hantavirus is commonly found:

Hantavirus pulmonary syndrome (HPS) is a rare but potentially deadly disease in humans. The **deer mouse** (Peromyscus maniculatus) is the primary reservoir of the hantavirus that causes hantavirus pulmonary syndrome (HPS) in the United States. Hantavirus is also found in cotton and rice rats, and the white-footed deer mouse. Rodents can transmit hantaviruses through urine, droppings, or saliva.

Hantavirus is most often associated with rodents in the Four Corners region of the western United States but mouse populations that carry a strain of hantavirus have been identified worldwide.

Virus survival in the environment varies but in normal environment hantavirus can remain viable for 2-3 days. Hantavirus is very susceptible to UV light and its viability increases as temperature decreases. However, in a rodent contaminated area, the virus is constantly being replenished so environmental viability is less a concern than the fact that there is a rodent infestation.

Common routes of transmission:

HPS is transmitted to humans via aerosolization of dried materials (typically rodent nests) contaminated by rodent excreta or saliva. HPS in the United States cannot be transmitted person to person.

In addition, HPS in the United States is not known to be transmitted by farm animals, dogs, or cats or from rodents purchased from a pet store.

Signs and symptoms:

- Flu-like (fever, muscle aches)
- Severe shortness of breath
- Symptoms appear within 45 days of exposure

Early symptoms include fatigue, fever and muscle aches, especially in the large muscle groups-thighs, hips, back, and sometimes shoulders. These symptoms are universal.

There may also be headaches, dizziness, chills, and abdominal problems, such as nausea, vomiting, diarrhea, and abdominal pain. About half of all HPS patients experience these symptoms.

Four to 10 days after the initial phase of illness, the late symptoms of HPS appear. These include coughing and shortness of breath, with the sensation of, as one survivor put it, a "...tight band around my chest and a pillow over my face" as the lungs fill with fluid.

Protective measures:

1. Vaccination:

There is no vaccine available for this organism.

2. PPE

Clinical setting: Since hantavirus cannot be transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of potentially contaminated nests or culture material; gloves resistant to rodent bites and scratches and lab coat/coveralls would be needed for activities with potential for skin exposure. Wash hands immediately after removing PPE.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Also refer to http://www.cdc.gov/ncidod/dvrd/spb/mnpages/rodentmanual.htm when doing field work with rodents.

Steps to take if you think you were exposed to Hantavirus at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you have had an exposure to rodents or their nesting material.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to: http://www.cdc.gov/healthypets/browse_by_diseases.htm look for Hantavirus in the 'Browse by Disease' list.

Leishmania

Where Leishmania is commonly found:

Leishmaniasis (LEASH-ma-NIGH-a-sis) is a parasitic disease that is found in parts of the tropics, subtropics, and southern Europe. It is caused by infection with Leishmania parasites, which are spread by the bite of infected sand flies. This disease is rare in the United States, but is occasionally found in dogs.

In the Western Hemisphere, leishmaniasis is found in some parts of Mexico, Central America, and South America. It is not found in Chile or Uruguay.

In the Eastern Hemisphere, leishmaniasis is found in some parts of Asia, the Middle East, Africa, and southern Europe. It is not found in Australia or the Pacific Islands.

Overall, leishmaniasis is found in focal areas of about 88 countries. Some of these countries account for most of the world's cases of leishmaniasis:

- Over 90 percent of the cases of **cutaneous leishmaniasis** occur in parts of Afghanistan, Algeria, Iran, Iraq, Saudi Arabia, and Syria and in Brazil and Peru;
- Over 90 percent of the cases of **visceral leishmaniasis** occur in parts of India, Bangladesh, Nepal, Sudan, and Brazil.

However, the cases of leishmaniasis evaluated in the United States reflect travel and immigration patterns. For example, cases in U.S. civilian travelers typically are cases of cutaneous leishmaniasis acquired in common tourist destinations in Latin America.

Common routes of transmission:

Sand flies become infected when they bite dogs or other animals that are sick with leishmaniasis. The infected flies then bite humans or animals and pass leishmaniasis to them. Because sand flies are smaller than other flies and do not make any noise when they are flying, people may not know sand flies are around them.

Sand flies usually are most active in twilight, evening, and night-time hours. Although sand flies are less active during the hottest time of the day, they may bite if they are disturbed (for example, if a person brushes up against the trunk of a tree or other site where sand flies are resting).

Some species of *Leishmania* parasites may also be spread by blood transfusions or contaminated needles. Spread from a pregnant woman to her baby has been reported.

Signs and symptoms:

There are several different forms of leishmaniasis in people. The most common forms are **cutaneous leishmaniasis**, which causes skin sores, and **visceral leishmaniasis**, which affects some of the internal organs of the body (for example, spleen, liver, and bone marrow).

People who get the cutaneous form of leishmaniasis may have symptoms that start several weeks or months after the germ enters the body. One or more sores form on the skin at the site of a bite and can change over time to look like volcanoes, with a raised edge and central crater. These sores may be painful or painless and may have scabs covering them. Sometimes, people have swollen glands near the sores (for example, under the arm if the sores are on the arm or hand). If this form of leishmaniasis is not treated, the sores can last for years and cause permanent scars.

People who get the visceral form have symptoms that start even later, usually several months after getting leishmaniasis. The spleen and liver, both organs in the stomach area, may become swollen. Swollen glands and changes to blood chemistry are also seen with this form of leishmaniasis. This form can be very serious if not treated and may lead to death.

Protective measures:

1. **Vaccination:**

There is no vaccination against Leishmaniasis

2. PPE

Clinical setting: Standard precautions are sufficient when treating a patient with Leishmaniasis.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

To decrease the risk of being bitten avoid outdoor activities, especially from dusk to dawn, when sand flies generally are the most active.

When outdoors (or in unprotected quarters):

- Minimize the amount of exposed skin. To the extent that is tolerable in the climate, wear long-sleeved shirts, long pants, and socks; and tuck your shirt into your pants.
- Apply insect repellent to exposed (uncovered) skin and under the ends of sleeves and pant legs. Follow the instructions on the label of the repellent. The most effective repellents are those that contain the chemical DEET (N,N-diethylmetatoluamide).

When indoors:

- Stay in well-screened or air-conditioned areas.
- Keep in mind that sand flies are much smaller than mosquitoes and therefore can get through smaller holes.
- Spray living/sleeping areas with an insecticide to kill insects.
- If you are not sleeping in a well-screened or air-conditioned area, use a bed net and tuck it under your mattress. If possible, use a bed net that has been soaked in or sprayed with a pyrethroid-containing insecticide (permethrin or deltamethrin). The same treatment can be applied to screens, curtains, sheets, and clothing (clothing should be retreated after five washings).

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Leishmania at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to http://www.cdc.gov/healthypets/browse_by_diseases.htm, look for this disease in the alphabetical index.

Leptospirosis

Where Leptospirosis is commonly found:

Leptospirosis occurs worldwide and can affect humans as well as many wild and domestic animals, including dogs and cats. The disease can be serious for both humans and animals.

It is estimated that 100-200 cases are identified annually in the United States with about 50% of cases occurring in Hawaii. However, leptospirosis is no longer a reportable disease in the United States. Although incidence in the United States is relatively low, leptospirosis is considered to be the most widespread zoonotic disease in the world.

Common routes of transmission:

The bacteria are spread through the urine of infected animals, which can get into water or soil and can survive there for weeks to months. Humans and animals can become infected through contact with this contaminated urine (or other body fluids, except saliva), water, or soil. The bacteria can enter the body through skin or mucous membranes, especially if the skin is broken from a cut or scratch. Drinking contaminated water can also cause infection. Infected wild and domestic animals may continue to excrete the bacteria into the environment continuously or every once in a while for a few months up to several years.

If your pet has become infected, it most likely came into contact with leptospires in the environment or infected animals. Your pet may have been drinking, swimming, or walking through contaminated water. Because of increased building and development into areas that were previously rural, pets may be exposed to more wildlife, such as raccoons, skunks, squirrels, opossums, or deer that are infected with leptospirosis. Dogs also may pass the disease to each other, but this happens very rarely. Cases of leptospirosis in cats are rare.

Signs and symptoms:

Symptoms include fever, headache, chills, muscle aches, vomiting, jaundice, anemia, and sometimes a rash. The incubation period usually is 7 days, with a range of 2-29 days. If not treated, the patient could develop kidney damage, meningitis, liver failure, and respiratory distress. In rare cases, death occurs.

Protective measures:

1. Vaccination:

There is no vaccination against leptospirosis.

2. PPE

Clinical setting: Standard precautions are sufficient when caring for a patient with leptospirosis.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Leptospires at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to http://www.cdc.gov/healthypets/browse_by_diseases.htm, look for this disease in the alphabetical index.

Monkeypox

Where Monkeypox is commonly found:

Monkeypox is caused by *Monkeypox virus*, which belongs to the orthopoxvirus group of viruses. Other orthopoxviruses that cause infections in humans include variola (smallpox), vaccinia (used for smallpox vaccine), and cowpox viruses. This is a rare viral disease that occurs mainly in the rain forest countries of Central and West Africa. The disease was first discovered in laboratory monkeys in 1958. Blood tests of animals in Africa later found evidence of monkeypox infection in a number of African rodents. The virus that causes monkeypox was recovered from an African squirrel. Laboratory studies showed that the virus also could infect mice, rats, and rabbits. In 1970, monkeypox was reported in humans for the first time. In June 2003, monkeypox was reported in prairie dogs and humans in the United States.

Common routes of transmission:

Monkeypox can spread to humans from an infected animal through an animal bite or direct contact with the animal's lesions or body fluids. The disease also can be spread from person to person, although it is much less infectious than smallpox. The virus is thought to be transmitted by respiratory droplets during direct and prolonged face-to-face contact. In addition, it is possible monkeypox can be spread by direct contact with body fluids of an infected person or with virus-contaminated objects, such as bedding or clothing.

Limited data on transmission of monkeypox virus are available from studies conducted in Africa. Person-to-person transmission is believed to occur primarily through direct contact and also by respiratory droplet spread. Transmission of monkeypox within hospitals has been described, albeit rarely. Extrapolating from smallpox for which airborne transmission has been clearly described, airborne transmission of monkeypox virus cannot be excluded, especially in patients presenting with cough. To date in the United States there has been no evidence of person-to-person transmission of monkeypox. However, recovery of monkeypox virus from skin lesions and tonsillar tissue demonstrates the potential for contact and droplet transmission, and at least a theoretical risk for airborne transmission.

Signs and symptoms:

In humans, monkeypox is similar to smallpox, although it is often milder. Unlike smallpox, monkeypox causes lymph nodes to swell (lymphadenopathy). The incubation period for monkeypox is about 12 days (range 7 to 17 days). The illness begins with fever, headache, muscle aches, backache, swollen lymph nodes, a general feeling of discomfort, and exhaustion. Within 1 to 3 days (sometimes longer) after the appearance of fever, the patient develops a papular rash (i.e., raised bumps), often first on the face but sometimes initially on other parts of the body. The lesions usually develop through several stages before crusting and falling off.

The illness typically lasts for 2 to 4 weeks. Studies of human monkeypox in rural central and west Africa – where people live in remote areas and are medically underserved – have reported case-fatality ratios of 1% to 10%.

Protective measures:

1. Vaccination:

Currently, there is no proven, safe treatment for monkeypox. Smallpox vaccine has been reported to reduce the risk of monkeypox among previously vaccinated persons in Africa. CDC is recommending

that persons investigating monkeypox outbreaks and involved in caring for infected individuals or animals should receive a smallpox vaccination to protect against monkeypox. Persons who have had close or intimate contact with individuals or animals confirmed to have monkeypox should also be vaccinated. These persons can be vaccinated up to 14 days after exposure. CDC is not recommending preexposure vaccination for unexposed veterinarians, veterinary staff, or animal control officers, unless such persons are involved in field investigations. For more information about CDC recommendations for the use of smallpox vaccine to protect against monkeypox, see the Monkeypox Vaccination page.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with Monkeypox. Face protection should be worn when the activity presents a chance of splash or aerosolization of lesion secretions or respiratory droplets.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Monkeypox at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to http://www.cdc.gov/healthypets/browse_by_diseases.htm, look for this disease in the alphabetical index.

Orf (sore mouth)

Where Orf is commonly found:

Sore mouth, also known as "scabby mouth," or contagious ecthyma, is a viral infection caused by a member of the poxvirus group and is an infection primarily of sheep and goats. Other ruminants that are occasionally infected include musk oxen and gazelles.

Sore mouth is caused by a poxvirus (specifically orf virus) and is found all over the world. The scabs of infected animals contain virus, can fall off, remain in the environment and serve as a source of infection to susceptible animals. A flock can become infected through contaminated bedding, feed or trucks, or by direct contact with infected animals (e.g. replacements brought onto the operation or at shows).

Animals may become infected with sore mouth more than once in their lifetime although infections are likely to occur years apart. Young animals will have the most visible disease because they have not likely been exposed to the virus before and because their immune systems are still developing.

Geographically, "sore mouth" infection is commonly found throughout the world. According to the United States Department of Agriculture Animal and Plant Health Inspection Service's National Animal Health Monitoring System (USDA APHIS NAHMS) 2001 sheep survey, 40 percent of U.S. operations reported sore mouth infecting their flocks in the previous three years.

Common routes of transmission:

The sore mouth virus survives in soil, and carrier animals may not show symptoms; as a result it is difficult to prevent infection, but using the measures above may assist in prevention.

Sore mouth may be transmitted through saliva. Some owners choose to assist the judges at shows by opening their own animal's mouth. While there is no evidence to prove that this will prevent sore mouth, it is a logical measure to decrease the spread of sore mouth by indirect contact (i.e. from infected animal to judge's hand to uninfected animal).

A person who comes into contact with virus from an infected animal or equipment (such as a harness that has rubbed the animal's sores) can potentially get infected. People often develop sores on their hands. The sore may be painful and can last for 2 months. People do not infect other people. Sores usually heal without scarring.

Since sore mouth is primarily an illness of sheep or goats, people who handle these animals are at greatest risk of infection. Specific activities that may put you at risk of infection include:

- Bottle feeding, tube feeding, or shearing animals (i.e., sheep or goats)
- Petting or having casual contact with infected animals
- Handling infected equipment
- Working with animals when you have an open cut or skin sore
- Being bitten by an infected animal

Signs and symptoms:

Early in the infection sores appear as blisters and then become crusty scabs. Sores are typically found on the lips, muzzle, and in the mouth. Sheep and goats may get similar sores/scabs on the lower legs and the teats, especially when ewes or does are nursing infected lambs or kids. Except in rare cases, animals recover completely from sore mouth infections within a month. Young animals may have difficulty

nursing/feeding and may require bottle or tube feeding. Nursing ewes may abandon their lambs, and older animals may also require nutritional support. Particular breeds (e.g. Boer goats) may be especially susceptible and have severe infections.

Humans tend to get the lesions on hands or fingers. A person who comes into contact with virus from an infected animal or equipment (such as a harness that has rubbed the animal's sores) can potentially get infected. People often develop sores on their hands (see photos). The sore may be painful and can last for 2 months. This disease is not transmitted human to human. Sores usually heal without scarring.

Most medical conditions do not affect the immune system enough to prevent your body from fighting off the sore mouth virus on its own. However, if you have an autoimmune disease (e.g. Lupus (SLE), rheumatoid arthritis), a transplanted organ, are taking chemotherapy for cancer or are taking corticosteroids (e.g. prednisone), you should talk to your primary care provider about potentially avoiding animal contact. People with these medical conditions have weakened immune systems and the sore mouth virus can cause a serious infection.

Protective measures:

1. Vaccination:

There is no vaccination for Orf that is approved for human use. Producers considering using an Orf vaccine product in their flock should consult a veterinarian. *All sore mouth vaccines contain live virus which, if proper protective measures are not taken, can cause infection in humans.*

2. PPE

Clinical setting: Orf is not transmitted human to human so standard precautions are sufficient when caring for a patient with Orf lesions.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

There are measures that may help lessen the risk of infection. These include:

- Reduce the likelihood of mouth/muzzle cuts (e.g. remove thistle or harsh brush from grazing areas)
- Quarantine new animals until sore mouth can be ruled out
- Avoid bringing animals with sore mouth to public events such as fairs and shows
- Wear disposable gloves when working with an animal with lesions
- Wash hands after removing PPE

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Orf at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to www.cdc.gov, look for this disease in the A-Z index.

Prion Diseases

Where Prion Diseases are commonly found:

Prion diseases or transmissible spongiform encephalopathy's (TSEs) are a family of rare progressive neurodegenerative disorders that affect both humans and animals. They are distinguished by long

incubation periods, characteristic spongiform changes associated with neuronal loss, and a failure to induce inflammatory response.

The causative agent of TSEs is believed to be a prion. A prion is an abnormal, transmissible agent that is able to induce abnormal folding of normal cellular prion proteins in the brain, leading to brain damage and the characteristics signs and symptoms of the disease. Prion diseases can have a long latent period (a decade or more in humans) but once symptoms occur, they are usually rapidly progressive and always fatal.

Chronic wasting disease (CWD) is a prion disease that affects North American cervids (hoofed ruminant mammals, with males characteristically having antlers). The known natural hosts of CWD are mule deer, white-tailed deer, elk, and moose. CWD was first identified as a fatal wasting syndrome in captive mule deer in Colorado in the late 1960s and in the wild in 1981. It was recognized as a spongiform encephalopathy in 1978. To date, no strong evidence of CWD transmission to humans has been reported.

Prion diseases include:

Animal Prion Diseases

- Bovine Spongiform Encephalopathy (BSE)
- Chronic Wasting Disease (CWD)
- Scrapie
- Transmissible mink encephalopathy
- Feline spongiform encephalopathy
- Ungulate spongiform encephalopathy

Human Prion Diseases

- Creutzfeldt-Jakob Disease (CJD)
- Variant Creutzfeldt-Jakob Disease (vCJD)
- Gerstmann-Straussler-Scheinker Syndrome
- Fatal Familial Insomnia
- Kuru

Common routes of transmission:

The nature of the transmissible agent is not well understood. Current theory is that the agent is a modified form of a normal protein known as prion protein. For reasons that are not yet clear, the normal prion protein changes into a pathogenic form that then damages the central nervous system.

There is evidence of prion transmission via food: BSE possibly originated as a result of feeding cattle meat-and-bone meal that contained scrapie-infected sheep products. Scrapie is a prion disease of sheep. There is strong evidence and general agreement that the outbreak was then amplified and spread throughout the United Kingdom cattle industry by feeding rendered, prion-infected, bovine meat-and-bone meal to young calves.

In addition, there is strong epidemiologic and laboratory evidence for a causal association between a new human prion disease called variant Creutzfeldt-Jakob disease (vCJD) that was first reported from the United Kingdom in 1996 and the BSE outbreak in cattle. The interval between the most likely period for the initial extended exposure of the population to potentially BSE-contaminated food (1984-1986) and the onset of initial variant CJD cases (1994-1996) is consistent with known incubation periods for the human forms of prion disease.

CWD can be highly transmissible within deer and elk populations. The mode of transmission is not fully understood, but evidence supports the possibility that the disease is spread through direct animal-to-animal contact or as a result of indirect exposure to prions in the environment (e.g., in contaminated feed and water sources). Several epidemiologic studies provide evidence that, to date, CWD has not been transmitted to humans. Additionally, routine surveillance has not shown any increase in the incidence of Creutzfeldt-Jakob disease in Colorado or Wyoming.

Specific studies have begun that focus on identifying human prion disease in a population that is at increased risk for exposure to potentially CWD-infected deer or elk meat. Because of the long time between exposure to CWD and the development of disease, many years of continued follow-up are required to be able to say what the risk, if any, of CWD is to humans.

Signs and symptoms:

Signs and symptoms of prion diseases can vary between the various forms and among the species affected by prion diseases. Typically changes in behavior and neurological function will be seen.

Protective measures:

1. Vaccination:

There is no vaccination for this organism.

2. PPE

Clinical setting: Since prion diseases are rarely transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research/Animal care setting: PPE use would be based on the risk of exposure that an activity presents. Anyone working with human neurological material, eyes or corneas should assume that these tissues have the potential for harboring prions. Face protection would be necessary if there is risk of aerosolization of known or potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to prion disease at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.

2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to: www.cdc.gov look for Prion disease in the A-Z index.

Q Fever

Where Q Fever is commonly found:

Q fever is a rickettsial infection caused by *Coxiella burnetii*. Approximately half the people infected with this organism get sick with Q fever.

Common routes of transmission:

Animals can transmit Q fever to people. Cattle, sheep, and goats are most likely to carry *C. burnetii*, but other species of animals can also have this disease. Most infected animals do not show signs of Q fever, but the organism can be in barnyard dust that contains manure, urine or dried fluids from the births of calves or lambs. People usually get Q fever by inhaling aerosolized material that is contaminated with *Coxiella burnetii*.

People can also get Q fever from drinking contaminated milk, human to human transmission, or from tick bites but these modes of transmission are very rare.

Signs and symptoms:

The incubation period for Q fever varies depending on the number of organisms that initially infect the patient. Infection with greater numbers of organisms will result in shorter incubation periods. Those who recover fully from infection may possess lifelong immunity against re-infection.

Typically, people who become ill start having symptoms 2 to 3 weeks after exposure to *C. burnetii*, although symptoms can start sooner. These symptoms include fever, headache, chest or stomach pain, vomiting, and diarrhea. The fever can last 1 to 2 weeks, but many people can also get more serious lung or liver infections as a result of Q fever.

Patients typically recover within 1 to 2 months after symptoms begin. Only 1%-2% of people with acute Q fever die of the disease.

Rarely, people can be sick from Q fever a year or more after getting this disease. For these individuals, inflammation of the heart, especially the valves in the heart, can be a serious problem. Chronic Q fever, characterized by infection that persists for more than 6 months is uncommon but is a much more serious disease. Patients who have had acute Q fever may develop the chronic form as soon as 1 year or as long as 20 years after initial infection. A serious complication of chronic Q fever is endocarditis, generally involving the aortic heart valves, less commonly the mitral valve. Most patients who develop chronic Q fever have pre-existing valvular heart disease or have a history of vascular graft. Transplant recipients, patients with cancer, and those with chronic kidney disease are also at risk of developing chronic Q fever. As many as 65% of persons with chronic Q fever may die of the disease.

Protective measures:

1. Vaccination:

A vaccine for Q fever has been developed and has successfully protected humans in occupational settings in Australia. However, this vaccine is not commercially available in the United States. Persons wishing to be vaccinated should first have a skin test to determine a history of previous exposure. Individuals who have previously been exposed to *C. burnetii* should not receive the vaccine

because severe reactions, localized to the area of the injected vaccine, may occur. A vaccine for use in animals has also been developed, but it is not available in the United States.

2. PPE

Clinical setting: Since Q Fever is rarely transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research/Animal care setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of known or potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

- Appropriately dispose of placenta, birth products, fetal membranes, and aborted fetuses at facilities housing sheep and goats.
- Restrict access to barns and laboratories used in housing potentially infected animals.
- Use only pasteurized milk and milk products.
- Use appropriate procedures for bagging, autoclaving, and washing of laboratory clothing.
- Vaccinate (where possible) individuals engaged in research with pregnant sheep or live *C. burnetii*.
- Quarantine imported animals.
- Ensure that holding facilities for sheep should be located away from populated areas. Animals should be routinely tested for antibodies to *C. burnetii,* and measures should be implemented to prevent airflow to other occupied areas.
- Counsel persons at highest risk for developing chronic Q fever, especially persons with pre-existing cardiac valvular disease or individuals with vascular grafts.

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Q Fever at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to: http://www.cdc.gov/healthypets/browse_by_diseases.htm look for this disease in the 'Browse by Disease' list.

Rabies

Where Rabies is commonly found:

Rabies is a disease caused by the rabies virus. Wild animals are much more likely to carry rabies, especially raccoons, skunks, bats, foxes, and coyotes. However, dogs, cats, cattle, or any warm-blooded animal can transmit rabies to people.

The East Coast region of the US has a very high number of reported rabies cases each year. See http://www.cdc.gov/ncidod/dvrd/rabies/Epidemiology/Epidemiology.htm for more information on the epidemiology of rabies in the US.

Common routes of transmission:

Transmission of rabies virus usually begins when infected saliva of a host is passed to an uninfected animal. Various routes of transmission have been documented and include contamination of mucous membranes (i.e., eyes, nose, mouth), aerosol transmission, and corneal transplantations. The most common mode of rabies virus transmission is through the bite and virus-containing saliva of an infected host.

Non-bite exposures to rabies are very rare. Scratches, abrasions, open wounds, or mucous membranes contaminated with saliva or other potentially infectious material (such as brain tissue) from a rabid animal constitute non-bite exposures. Occasionally reports of non-bite exposure are such that postexposure prophylaxis is given.

Inhalation of aerosolized rabies virus is also a potential non-bite route of exposure, but other than laboratory workers, most people are unlikely to encounter an aerosol of rabies virus. Other contact, such as petting a rabid animal or contact with the blood, urine or feces (e.g., guano) of a rabid animal, does not constitute an exposure and is not an indication for prophylaxis.

The only well-documented documented cases of rabies caused by human-to-human transmission occurred among 8 recipients of transplanted corneas, and recently among three recipients of solid organs. Guidelines for acceptance of suitable cornea and organ donations, as well as the rarity of human rabies in the United States, reduce this risk. In addition to transmission from cornea and organ transplants, bite and non-bite exposures inflicted by infected humans could theoretically transmit rabies, but no such cases have been documented. Casual contact, such as touching a person with rabies or contact with non-infectious fluid or tissue (urine, blood, feces) does not constitute an exposure and does not require postexposure prophylaxis. In addition, contact with someone who is receiving rabies vaccination does not constitute rabies exposure and does not require postexposure prophylaxis.

Signs and symptoms:

It may take several weeks or even a few years for people to show symptoms after getting infected with rabies, but usually people start to show signs of the disease 1 to 3 months after the virus infects them. The first symptoms of rabies may be nonspecific flu-like signs — malaise, fever, or headache, which may last for days. There may be discomfort or numbness, tingling, pricking, burning, or creeping on the skin at the site of exposure (typically a bite), progressing within days to symptoms of cerebral dysfunction, anxiety, confusion, agitation, progressing to delirium, abnormal behavior, hallucinations, and insomnia.

The acute period of disease typically ends after 2 to 10 days (6). Once clinical signs of rabies appear, the disease is nearly always fatal, and treatment is typically supportive. Disease prevention is entirely prophylactic and includes both passive antibody (immune globulin) and vaccine. Non-lethal exceptions are extremely rare. To date only six documented cases of human survival from clinical rabies have been reported and each included a history of either pre- or post-exposure prophylaxis.

Protective measures:

1. Vaccination:

There is a vaccine available for humans and animals. Individuals who may be exposed to species of concern or are doing field work in areas with endemic rabies should be vaccinated for rabies.

2. PPE

Clinical setting: Since rabies is rarely transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research/Animal care setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of known or potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Rabies at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. **DO NOT wait for signs and symptoms to develop before reporting a potential exposure to Rabies.** Medical assistance should be obtained as soon as possible after an exposure. There have been no vaccine failures in the United States (i.e., someone developed rabies) when postexposure prophylaxis (PEP) was given promptly and appropriately after an exposure to rabies.
5. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to: www.cdc.gov and look for Rabies in the A-Z index or http://www.cdc.gov/healthypets/browse_by_diseases.htm look for Rabies in the 'Browse by Disease' list.

Rickettsial Diseases

Where Rickettsial Diseases are commonly found:

Many species of Rickettsia can cause illnesses in humans. The term "rickettsiae" conventionally embraces a polyphyletic group of microorganisms in the class Proteobacteria, comprising species belonging to the genera *Rickettsia*, *Orientia, Ehrlichia, Anaplasma, Neo-rickettsia, Coxiella*, and *Bartonella*.

Travelers may be at risk for exposure to agents of rickettsial diseases if they engage in occupational or recreational activities which bring them into contact with habitats that support the vectors or animal reservoir species associated with these pathogens. See the chart on the following page for information on specific Rickettsial diseases (from http://wwwn.cdc.gov/travel/yellowBookCh4-Rickettsial.aspx).

Common routes of transmission:

These agents are usually not transmissible directly from person to person except by blood transfusion or organ transplantation, although sexual and placental transmission has been proposed for *Coxiella*. Transmission generally occurs via an infected arthropod vector or through exposure to an infected animal reservoir host. However, sennetsu fever is acquired following consumption of raw fish products.

With the exception of the louse-borne diseases, for which contact with infectious arthropod feces is the primary mode of transmission (through autoinoculation into a wound, conjunctiva, or inhalation), travelers and health-care providers are generally not at risk for becoming infected via exposure to an ill person.

Signs and symptoms:

The clinical severity and duration of illnesses associated with different rickettsial infections vary considerably, even within a given antigenic group. See chart above for more specific information on rickettsial diseases.

Clinical presentations of rickettsial illnesses vary (see table above), but common early symptoms, including fever, headache, and malaise, are generally nonspecific. Illnesses resulting from infection with rickettsial agents may go unrecognized or are attributed to other causes. Atypical presentations are common and may be expected with poorly characterized nonindigenous agents, so appropriate samples for examination by specialized reference laboratories should be obtained. A diagnosis of rickettsial diseases is based on two or more of the following:

- Clinical symptoms and an epidemiologic history compatible with a rickettsial disease,
- The development of specific convalescent-phase antibodies reactive with a given pathogen or antigenic group,
- A positive polymerase chain reaction test result,
- Specific immunohistologic detection of rickettsial agent, or
- Isolation of a rickettsial agent. Ascertaining the likely place and the nature of potential exposures is particularly helpful for accurate diagnostic testing.

Rickettsioses range in severity from diseases that are usually relatively mild (rickettsialpox, cat scratch disease, and African tick-bite fever) to those that can be life-threatening (epidemic and murine typhus, Rocky Mountain spotted fever, scrub typhus and Oroya fever), and they vary in duration from those that can be self-limiting to chronic (Q fever and bartonelloses) or recrudescent (Brill-Zinsser disease). Most patients with rickettsial infections recover with timely use of appropriate antibiotic therapy.

Protective measures:

1. Vaccination:

There are no vaccines available for these organisms.

2. PPE

Clinical setting: Since rickettsial diseases are unlikely to be transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of contaminated feces or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Limiting exposures to vectors or animal reservoirs remains the best means for reducing the risk for disease. Travelers should be advised that prevention is based on avoidance of vector-infested habitats, use of repellents and protective clothing, prompt detection and removal of arthropods from clothing and skin, and attention to hygiene.

Q fever and *Bartonella* group diseases may pose a special risk for persons with abnormal or prosthetic heart valves, and *Rickettsia, Ehrlichia*, and *Bartonella* for persons who are immunocompromised.

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with these organisms.

Steps to take if you think you were exposed to a Rickettsial disease at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to: http://www.cdc.gov and look for Rickettsial diseases in the A-Z index.

EPIDEMIOLOGIC FEATURES AND SYMPTOMS OF RICKETTSIAL DISEASES

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Typhus fevers	Epidemic typhus, Sylvatic typhus	Rickettsia prowazekii	Headache, chills, fever, prostration, confusion, photophobia, vomiting, rash (generally starting on trunk)	Human body louse, squirrel flea and louse	Humans, flying squirrels (US)	Cool mountainous regions of Africa, Asia, and Central and South America
	Murine typhus	R. typhi	As above, generally less severe	Rat flea	Rats, mice	Worldwide
Spotted fevers	African tickbite fever	R. africae	Fever, eschar(s), regional adenopathy, maculopapular or vesicular rash subtle or absent	Tick	Rodents	Sub-Saharan Africa
	Aneruptive fever	R. helvetica	Fever, headache, myalgia	Tick	Rodents	Old World
	Australian spotted fever	R. marmionii	Fever, eschar, maculopapular or vesicular rash, adenopathy	Tick	Rodents, reptiles	Australia
	Cat flea rickettsiosis	R. felis	As murine typhus, generally less severe	Cat and dog fleas	Domestic cats, opossums	Europe, South America
	Far Eastern spotted fever	R. heilongjiangensis	Fever, eschar, macular or maculopapular rash, lymphadenopathy, enlarged lymph nodes	Tick	Rodents	Far East of Russia, Northern China
	Flinders Island spotted fever, Thai tick typhus	R. honei	Mild spotted fever, eschar and adenopathy are rare	Tick	Not defined	Australia, Thailand
	Lymphangitis associated rickettsiosis	R. sibirica subsp. mongolotimonae	Fever, multiple eschars, regional adenopathy and lymphangitis, maculopapular rash	Tick	Rodents	Southern France, Portugal, Asia, Africa
	Maculatum infection	R. parkeri	Fever, eschar, rash maculopapular to vesicular	Tick	Rodents	Brazil, Uruguay

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Spotted fevers	Mediterranean spotted fevers‡	R. conorii	Fever, eschar, regional adenopathy, maculopapular rash on extremities	Tick	Dogs, rodents	Africa, India, Europe, Middle East, Mediterranean
	North Asian tick typhus	R. sibirica	Fever, eschar(s), regional adenopathy, maculopapular rash	Tick	Rodents	Russia, China, Mongolia
	Oriental spotted fever	R. japonica	As above	Tick	Rodents	Japan
	Queensland tick typhus	R. australis	Fever, eschar, regional adenopathy, rash on extremities	Tick	Not defined	Australia, Tasmania
	Rickettsialpox	R. akari	Fever, eschar, adenopathy, disseminated vesicular rash	Mite	House mice	Russia, South Africa, Korea, Turkey, Balkan countries
	Rocky Mountain spotted fever, Sao Paulo exanthematic typhus, Minas Gerais exanthematic typhus, Brazilian spotted fever	R. rickettsii	Headache, fever, abdominal pain, macular rash progressing into papular or petechial (generally starting on extremities)	Tick	Rodents	Mexico, Central, and South America
	Unnamed rickettsiosis	R. aeschlimannii	Fever, eschar, maculopapular rash	Tick	Domestic and wild animals	Africa
	Tick-borne lymphadenopathy (TIBOLA), Dermacentor- borne necrosis and lymphadenopathy (DEBONEL)	R. slovaca	Necrosis erythema, cervical lymphadenopathy and enlarged lymph nodes, rare maculopapular rash	Tick	Lagomorphs, rodents	Europe, Asia

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Orientia	Scrub typhus	Orientia tsutsugamushi	Fever, headache, sweating, conjunctival injection, adenopathy, eschar, rash (starting on trunk), respiratory distress	Mite	Rodents	South, Central, Eastern, and Southeast Asia and Australia
Coxiella	Q fever	Coxiella burnetii	Fever, headache, chills, sweating, pneumonia, hepatitis, endocarditis	Most human infections are acquired by inhalation of infectious aerosols; tick	Goats, sheep, cattle, domestic cats, other	Worldwide
Bartonella	Cat-scratch disease	Bartonella henselae	Fever, adenopathy, neuroretinitis, encephalitis	Cat flea	Domestic cats	Worldwide
	Trench fever	B. quintana	Fever, headache, pain in shins, splenomegaly, disseminated rash	Human body louse	Humans	Worldwide
	Oroya fever	B. bacilliformis	Fever, headache, anemia, shifting joint and muscle pain, nodular dermal eruption	Sand fly	Unknown	Peru, Ecuador, Colombia
Ehrlichia	Ehrlichosis	Ehrlichia chaffeensis#	Fever, headache, nausea, occasionally rash	Tick	Various large and small mammals, including deer and rodents	Worldwide
Anaplasma	Anaplasmosis	Anaplasma phagocytophilum#	Fever, headache, nausea, occasionally rash	Tick	Small mammals, and rodents	Europe, Asia, Africa

ANTIGENIC GROUP	DISEASE	AGENT	PREDOMINANT SYMPTOMS*	VECTOR OR ACQUISITION MECHANISM	ANIMAL RESERVOIR	GEOGRAPHIC DISTRIBUTION OUTSIDE THE US
Neorickettsia	Sennetsu fever	Neorickettsia sennetsu	Fever, chills, headache, sore throat, insomnia	Fish, fluke	Fish	Japan, Malaysia

* This represents only a partial list of symptoms. Patients may have different symptoms or only a few of those listed.
‡ Includes 4 different subspecies that can be distinguished serologically and by PCR assay, and respectively are the etiologic agents of Boutonneuse fever and Mediterranean tick fever in Southern Europe and Africa (R. conorii subsp. conorii), Indian tick typhus in South Asia (R. conorii subsp. indica), Israeli tick typhus in Southern Europe and Middle East (R. conorii subsp. israelensis), and Astrakhan spotted fever in the North Caspian region of Russia (R. conorii subsp. caspiae).
# Organisms antigenically related to these species are associated with ehrlichial diseases outside the continental United States.

Toxoplasma

Where Toxoplasma is is commonly found:

Toxoplasma gondii can be found in cat feces, soil that has been contaminated by cat feces, and in improperly cooked pork, lamb and venison. While the parasite is found throughout the world, more than 60 million people in the United States may be infected with the Toxoplasma parasite. Of those who are infected, very few have symptoms because a healthy person's immune system usually keeps the parasite from causing illness. However, pregnant women and individuals who have compromised immune systems should be cautious because a Toxoplasma infection could cause serious health problems.

Common routes of transmission:

People contract Toxoplasmosis from eating or touching face with contaminated hands or ingesting oocysts from poorly cooked meats, drinking contaminated water. Poor hand hygiene after working with contaminated materials is a major factor in causing ingestion of toxoplasma gondii oocysts. Pregnant women can pass this infection to the fetus. Transmission has occurred due to organ transplantation, blood transfusion, and needle stick exposure to infected blood. Fortunately these are rare incidents.

Signs and symptoms:

Most people who become infected with Toxoplasma gondii are not aware of it.

Some people who have toxoplasmosis may feel as if they have the "flu" with swollen lymph glands or muscle aches and pains that last for a month or more.

Severe toxoplasmosis, causing damage to the brain, eyes, or other organs, can develop from an acute Toxoplasma infection or one that had occurred earlier in life and is now reactivated. Severe cases are more likely in individuals who have weak immune systems, though occasionally, even persons with healthy immune systems may experience eye damage from toxoplasmosis.

Symptoms of ocular toxoplasmosis can include reduced vision, blurred vision, pain (often with bright light), redness of the eye, and sometimes tearing. Ophthalmologists sometimes prescribe medicine to treat active disease. Whether or not medication is recommended depends on the size of the eye lesion, the location, and the characteristics of the lesion (acute active, versus chronic not progressing). An ophthalmologist may provide the best care for ocular toxoplasmosis.

Most infants who are infected while still in the womb have no symptoms at birth, but they may develop symptoms later in life. A small percentage of infected newborns have serious eye or brain damage at birth.

Protective measures:

1. Vaccination:

There is no vaccination against Toxoplasma gondi.

2. PPE

Clinical setting: Standard precautions are sufficient when caring for a patient with Toxoplasmosis

Research setting: PPE use would be based on the risk of exposure that an activity presents. Face protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Pregnant women and imunocompromised invidivuals should avoid cleaning cat litter boxes or wear gloves and wash hands after cleaning litter boxes. Wash hands thoroughly after contact with potentially contaminated soil or sand, wash fruits and vegetables thoroughly, and cook meat to the proper temperature for the particular type of meat you are preparing.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Toxoplasma at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to http://www.cdc.gov/healthypets/browse_by_diseases.htm, look for this disease in the alphabetical index.

Tularemia

Where Tularemia is commonly found:

Tularemia is a potentially serious illness that occurs naturally in the United States. It is caused by the bacterium Francisella tularensis found in animals (especially rodents, rabbits, and hares). Tularemia, also known as "rabbit fever," is usually a rural disease and has been reported in all U.S. states except Hawaii.

Common routes of transmission:

People can get tularemia many different ways:

- being bitten by an infected tick, deerfly or other insect
- handling infected animal carcasses
- eating or drinking contaminated food or water
- inhalation of material containing the bacteria, F. tularensis

Cases also resulted from laboratory accidents. However, tularemia is not known to be spread from person to person so people who have tularemia do not need to be isolated. People who have been exposed to the tularemia bacteria should be treated as soon as possible since the disease can be fatal if it is not treated quickly with the right antibiotics.

Signs and symptoms:

Symptoms usually appear 3 to 5 days after exposure to the bacteria, but can take as long as 14 days. The signs and symptoms people develop depend on how they are exposed to tularemia. Possible symptoms include skin ulcers, swollen and painful lymph glands, inflamed eyes, sore throat, mouth sores, diarrhea or pneumonia. If the bacteria are inhaled, symptoms can include abrupt onset of fever, chills, headache, muscle aches, joint pain, dry cough, and progressive weakness. People with pneumonia can develop chest pain, difficulty breathing, bloody sputum, and respiratory failure. Tularemia can be fatal if the person is not treated with appropriate antibiotics.

Protective measures:

1. Vaccination:

There is no vaccine available for this organism.

2. PPE

Clinical setting: Since tularemia cannot be transmitted person-to-person, only PPE that would be worn for various patient care activities is necessary.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of contaminated material or culture material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Please refer to the Virginia Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other Engineering/Administrative Controls that may be required for work with this organism.

Steps to take if you think you were exposed to Tularemia at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Virginia Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e. severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report which may be downloaded from www.hr.vt.edu.

For more information go to: http://www.cdc.gov/healthypets/browse_by_diseases.htm look forTularemia in the 'Browse by Disease' list.

Yersinia enterocolitica

Where Yersinia enterocolitica is commonly found:

Y. enterocolitica belongs to a family of rod-shaped bacteria. Other species of bacteria in this family include *Y. pseudotuberculosis*, which causes an illness similar to *Y. enterocolitica*, and *Y. pestis*, which causes plague. Only a few strains of *Y. enterocolitica* cause illness in humans. The major animal reservoir for *Y. enterocolitica* strains that cause human illness is pigs, but other strains are also found in many other animals including rodents, rabbits, sheep, cattle, horses, dogs, and cats.

Y. enterocolitica is a relatively infrequent cause of diarrhea and abdominal pain. Children are infected more often than adults, and the infection is more common in the winter.

Common routes of transmission:

Infection is most often acquired by eating contaminated food, especially raw or undercooked pork products. The preparation of raw pork intestines (chitterlings) may be particularly risky. Infants can be infected if their caretakers handle raw chitterlings and then do not adequately clean their hands before handling the infant or the infant's toys, bottles, or pacifiers. Drinking contaminated unpasteurized milk or untreated water can also transmit the infection. Occasionally *Y. enterocolitica* infection occurs after contact with infected animals. On rare occasions, it can be transmitted as a result of the bacterium passing from the stools or soiled fingers of one person to the mouth of another person. This may happen when basic hygiene and handwashing habits are inadequate. Rarely, the organism is transmitted through contaminated blood during a transfusion.

Signs and symptoms:

Infection with *Y. enterocolitica* can cause a variety of symptoms depending on the age of the person infected. Infection with *Y. enterocolitica* occurs most often in young children. Common symptoms in children are fever, abdominal pain, and diarrhea, which is often bloody. Symptoms typically develop 4 to 7 days after exposure and may last 1 to 3 weeks or longer. In older children and adults, right-sided abdominal pain and fever may be the predominant symptoms, and may be confused with appendicitis. In a small proportion of cases, complications such as skin rash, joint pains, or spread of bacteria to the bloodstream can occur.

Protective measures:

1. Vaccination:

There is no vaccination against Y. entericolitica.

2. PPE

Clinical setting: Gloves should be worn when caring for a patient with Y. enterolitica. Face protection should be worn when the activity presents a chance of splash or aerosolization of feces.

Research setting: PPE use would be based on the risk of exposure that an activity presents. Respiratory protection would be necessary if there is risk of aerosolization of culture material or other potentially contaminated material; gloves, lab coat/coveralls would be needed for activities with potential for skin exposure.

3. Other Protective measures:

Isolation of a highly infectious patient may be necessary in a clinical setting. Care providers and laboratory personnel should wash hands immediately after removing PPE.

Please refer to the Va Tech Biosafety Manual for recommendations on use of Biosafety Cabinets and other recommendations on Engineering/Administrative Controls that may be required for research with this organism.

Steps to take if you think you were exposed to Yersinia entericolitica at work:

1. Rinse affected area immediately. Use soap and water (except on eyes) or flush with just water.
2. Notify your supervisor.
3. You or your supervisor must notify EHS as soon as possible after an exposure. EHS will consult with Va Tech's Occupational Health Physician regarding appropriate treatment for the exposure.
4. If necessary, seek medical attention for an emergency (i.e severe bleeding, difficulty breathing) before contacting EHS.
5. If you seek medical attention before contacting EHS **you MUST notify the care provider that you may have had an exposure to an infectious agent** before arriving at the clinic or Emergency Department**.**
6. Complete the Employer's Accident Report, which may be downloaded from www.hr.vt.edu.

For more information go to http://www.cdc.gov/healthypets/browse_by_diseases.htm, look for this disease in the alphabetical index.

Browse by animal species

http://www.cdc.gov/healthypets/browse_by_animal.htm

Search by Animal

Check the links below to determine the zoonotic disease risk for a particular species.

		
Birds	Cats	Dogs
		
Farm Animals	Fish	Horses
		
Reptiles	Wildlife	Pocket Pets

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Appendix D: Vaccinations

C. Botulinum

Hepatitis A

Hepatitis B

Influenza

Measles, Mumps, Reubella

Rabies

Tetanus

Typhoid

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Employees with potential for exposure to certain infectious agents via patient care activities (such as doctors, nurses, rescue squad, athletic trainers, veterinarians, animal care staff), or who are conducting research with specific infectious organisms, will be eligible to receive vaccinations against the microorganisms of concern. Below is a list of infectious agent vaccinations offered at Virginia Tech and the eligibility criteria for each.

C. Botulinum vaccine:

Laboratory personnel who are working with Clostridium Botulinum toxin.

Hepatitis A vaccine:

Employees working with, or who may potentially be exposed to, raw sewage.

Hepatitis B vaccine:

Employees who are working with or may potentially be exposed to human blood, tissue, body fluids or other potentially infectious materials.

Influenza (seasonal flu):

Employees who provide patient care or are working with the organism in a research lab.

Measles, Mumps, Rubella:

Employees who provide patient care.

Rabies vaccine:

Employees who are working with any animal species known to be a rabies reservoir, working with a wide variety of animal species that may include a species known to be a rabies reservoir, or who may be doing field work in habitat with known rabies reservoir species.

Tetanus (with pertussis):

Employees working with animals or who have the potential for acquiring a wound on dirty equipment at work (such as farm workers, garbage handlers, groundskeepers).

Thyphoid:

Employees working with, or who may potentially be exposed to, raw sewage or Laboratory personnel who are working with S. typhi.

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Appendix E: Exposure to Infectious Agent form

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EXPOSURE TO INFECTIOUS AGENT REPORT FORM

(Please return completed form to EHS at 0423, email to sowen@vt.edu, or fax to 1-866-460-0028)

EXPOSED EMPLOYEE INFORMATION			
Name:			VT ID No.:
Job Title:			Home Department:
Phone Numbers Work:			Home:
Brief Summary of Job Duties: _____ _____ _____ _____			
HBV Vaccination Series?	Yes	No	Dates Received:
Previous Titer Analysis Performed?	Yes	No	Date: Results:

EXPOSURE INCIDENT INFORMATION			
Date of Incident: _____/_____/_____			Campus Location:
Time of Incident: _____:_____ am pm			Infectious Agent (if known):
Route of Exposure (circle): ☐ Non-Intact Skin		☐ Mucous Membrane	☐ Puncture
Circumstances of Exposure: _____ _____ _____ _____ _____ _____ _____			

SOURCE INDIVIDUAL INFORMATION (IF APPLICABLE) ☐ N/A			
Name (if known):			VT ID No.:
Consent For Testing Obtained? ☐ Yes		☐ No	
HBV Status:		HIV Status:	

FOLLOW-UP		
Physician's Visit Yes No		
Physician Name:_____ Phone Number: _____ Address: _____ _____		
Please Check All That Apply		Comments
Baseline Blood Collection	☐	
HIV Serological Status	☐	
HBV Post-Exposure Series	☐	
HBV Immune Globulin	☐	
HBV Titer	☐	
Counseling	☐	
Other:	☐	

If this is a Laboratory Exposure, please describe any modifications that have been made to the organism you are working with:

_____

_____

_____

_____

_____

_____

_____

_____