Veterinary Contributions to Public Health Extend Beyond the Clinic with the U.S. Army Public Health Command

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Abstract

This is a report of my field experience with the U.S. Army Public Health Command (USAPHC) Region North in Fort Belvoir, VA from November 2012 to June 2013 under the guidance and supervision of Major Robert Paul, DVM, MPH, DACVPM. My public health experiences continued past the scheduled timeframe with my reassignment to the USAPHC Region South District Fort Hood, TX from September 2013 to present. During this time, I was fortunate to have the consultation and mentorship of Major Angel Schmillen, DVM, MPH, DACVPM. This report will focus on the scheduled field experience, then touch on a few interesting scenarios which developed while assigned to PHC District Fort Hood.

During my field experience, I was assigned an intern in the First Year Graduate Veterinary Education (FYGVE) program which included rotations through public health, veterinary clinical operations, and leadership. The public health and veterinary clinical rotations lasted at least three weeks each and allowed for successful completion of the planned learning objectives. The products developed from the field experience were multiple and included zoonotic disease client communication tri-folds, a joint agency approach to vector-borne disease surveillance, full credentialing as a commercial food facility auditor, and review of a biological risk mitigation application in a veterinary clinic. After the completion of the scheduled field experience, many unique scenarios developed which are worth mentioning under this field experience topic.

The purpose of this report is to describe my field experience with USAPHC and describe how the Masters in Public Health core curriculum provided the knowledge base to detect areas for improvement and develop products to effectively promote preventive medicine and public health.

Acknowledgements

I would like to thank Dr. David Renter, Dr. Michael Cates, Dr. Kate KuKanich and Mrs. Barta Stevenson for the support and guidance throughout the years. The continued encouragement and assistance has allowed for this opportunity which I am very grateful. I would also like to thank my mentors Major Robert Paul and Major Angela Schmillen for their leadership and direction through the many public health experiences. I also would not be where I am today without the unwavering support of my family.

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Chapter 1. USAPHC Overview

The United States Army Public Health Center (USAPHC) mission is to promote health and prevent disease, injury, and disability of Soldiers and military retirees, their families, and department of the Army civilian employees, and assure effective execution of full spectrum veterinary service for Army and Department of Defense Veterinary missions. The Public Health Center (PHC) is geographically separated into Regions, and further divided into Districts, Branches and Sections. PHC Regions cover a larger geographic area and are a one-health commodity, composed of several diverse specialties which allow for collaboration among many medical experts. The specialties within the PHC Region that work together to promote public health include Veterinary Services, Environmental Engineering and Sanitation, Industrial Hygiene, Entomology, Occupational Health, Health Physicists, Audiologist and Community Health Nursing. During my field experience the United States was divided into three geographic PHC Regions: North, South and West. The Regions were recently realigned but the redistribution did not impact the functionality of the USAPHC.

Region North – District Fort Belvoir, VA

The diverse capabilities within the PHC only exist at the Region level. Veterinary services remain the sole asset of the PHC at each District and Branch. Many organizations approach PHC at the installation level with public health concerns or situations. With veterinary services remaining the only asset within

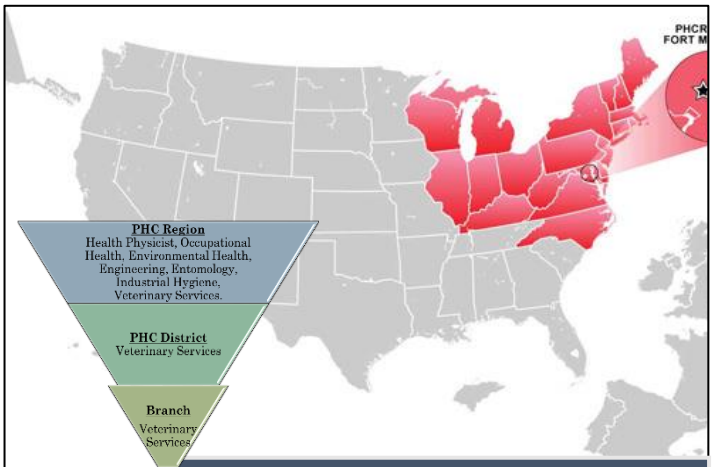


Figure 1: PHC Region North[8]

the PHC at the District and below, they are asked to assist in many diverse preventive medicine scenarios. Veterinarians and veterinary staff have the opportunity to be involved with many different public health events within the USAPHC. PHC Veterinary services are an integral part of the preventive medicine effort on each installation however extra effort is needed at the District and Branch levels to bridge the gap between Commands to consult with other medical assets on the installation.

Chapter 2. Field Experience Scope of Work

First Year Graduate Veterinary Education Program

My public health field experience was with the USAPHC Region North District Fort Belvoir, VA from November 2012 to June 2013. During this time, I was assigned to the Fort Belvoir First-Year Graduate Veterinary Education (FYGVE) program under the direct supervision of a Veterinary Preventive Medicine specialist, Major Robert Paul, which led to many opportunities to achieve the planned learning objectives, develop and implement programs, and gain valuable experiences. Four rotations of three weeks for each concentration of public health and veterinary clinical operations were completed during the field experience with FYGVE program.

Learning Objectives

Two main objectives for this field experience were: 1) to gain practical knowledge of infectious and zoonotic disease prevention programs on Military installations and 2) to become proficient at conducting commercial facility sanitation and food safety audits.

Figure 2: Veterinary Treatment Facility Fort Belvoir, VA

Chapter 3. Field Experience Projects

Evaluation of Zoonotic Disease Programs

When I arrived to the Fort Belvoir Veterinary Treatment Facility (VTF), the USAPHC did not have a standard zoonotic disease policy or program that could be applied to the veterinary clinic setting. As we diagnosed potentially contagious diseases, I found it very difficult in a fast paced veterinary clinic to effectively communicate all the hazards of potentially zoonotic diseases given the time restraint of a 30 minute appointment. Owners were often distracted, confused about what to do for their pet and had difficulty comprehending the risk of how a regular pet disease could infect them and their family. I acknowledged that diagnosing ringworm, hookworms, roundworms, giardia, or resistant bacterial skin infections could leave the veterinarian liable and increase the risk for zoonoses if the hazards were not communicated clearly. To complicate the situation, the exam room computers in the VTF did not always connect to the internet and on occasion, were unable to communicate with the printer. It wasn't practical in this setting to search online or print files in order to provide client handouts or supplemental educational information. The PHC Veterinary Services operates in accordance with published veterinary standards written by a Veterinary Medical Standardization Board (VMSB). In reviewing the VMSB guidance, I noticed it primarily pertains to clinical treatment of veterinary patients. VMSB lacks standards for preventive medicine and client communication. To improve client education and support preventive medicine, I developed zoonotic disease references for routine small animal practice for use within the USAPHC veterinary clinics (See Enclosures A-G). My intent was to develop a PHC zoonotic disease reference set for easy distribution and use within the veterinary clinics. The diseases covered are not a complete representation of the commonly diagnosed zoonotic diseases associated with

domestic pets although it was a starting point to see if tri-fold handouts were an effective means of communication. The zoonotic disease reference set could be expanded to include the other potential zoonotic diseases of companion animals listed in Table 1. The information for the tri-folds was compiled from a few main references sponsored by the Center for Food Security and Public Health, Iowa State University of Science and Technology, and the Centers for Disease Control and Prevention.[21] The flyers were reviewed and critiqued by the FYGVE instructors, mentors and peer reviewed by four co-workers. The references were submitted for review by the USAPHC VMSB. The flyers were also distributed among peers within the USAPHC and found to be useful in routine small animal veterinary and stray animal facility operations.

Table 1. Zoonotic Diseases Associated with Companion Animals[21]

Acariasis	Hantaviruses
Anthrax	Larva Migrans
Avian Influenza	Leishmaniasis
Bartonellosis	Leptospirosis
Baylisascariasis	Lyme Disease
Brucellosis	MRSA
Campylobacteriosis	Plague
Chagas Disease	Rabies
Chlamydiosis	Rift Valley Fever
Cryptosporidiosis	RMSF
Cryptococcosis	Salmonellosis
Dermatophytosis	Toxoplasmosis
Giardiasis	Tularemia

Vector-borne Disease Surveillance

Routine wellness clinics included a large amount of standard canine heartworm screenings which fortunately, as instructed by the VMSB, required the use of the enzyme-linked immunosorbent assay (ELISA) test, IDEXX SNAP 4Dx Plus which also detected antibodies for the tick-borne disease *Anaplasma phagocytophilum*, *Anaplasma platys*, *Borrelia burgdorferi*, *Ehrlichia canis* and *Ehrlichia ewingii*. As I conducted wellness appointments and routine sick calls, there seemed to be a high number of dogs diagnosed with Lyme disease and Ehrlichiosis in the fall and early spring. The veterinary medical record system utilized at the VTF did not have the capability to compile statistics or document diagnostic trends. The USAPHC Region North

Vector-borne Zoonosis Detection Laboratory provided diagnostic support to the VTF and had the ability to test for *Anaplasma*, *Babesia*, *Borrelia*, *Ehrlichia*, or *Rickettsia* by polymerase chain reaction (PCR). I contacted the laboratory and asked if we could increase the number of tick submissions in an effort to establish a more representative sample from the Fort Belvoir installation. The ticks submitted from the veterinary clinic were used to help build a database at the Region level to establish species and vector-borne disease prevalence in the area. We were only able to collect a few live ticks per month off patients. The sample size collected solely off patients in the Fort Belvoir VTF was not large enough to represent the true vector population in the area and therefore it was unfeasible to estimate the prevalence of disease on the installation. Fort Belvoir did not have an assigned entomologist to assist with a vector surveillance plan at the time, so we decided to utilize the tick magnets readily accessible through the Department of Public Works (DPW) Wildlife Department. DPW had the capability of collecting many ticks from wildlife to help magnify the sample size and achieve a more representative mixed population from the installation. DPW was very excited to participate in the public health surveillance effort and began dropping ticks off at the veterinary clinic every other week for submission. We used the standard tick submission form in Figure 3, annotated the ticks were from wildlife and submitted for surveillance data. Not all the ticks from the wildlife were tested by PCR due to conservation of resources at the laboratory; however, they were identified and added to the surveillance data at

USAPHC

SPECIMEN SUBMISSION
PUBLIC HEALTH COMMAND REGION-NORTH
VECTOR-BORNE ZOONOSIS DETECTION LABORATORY

DATE SUBMITTED: 03JUN13	DATE RECEIVED BY PHR-N: 03JUN13
SUBMITTER'S REFERENCE NUMBER: PHR-13-029.1-029.2	DATE RESULTS REPORTED 06JUNE2013
	PHC-N REPORT # VBDZL-13-029
NUMBER OF SAMPLES SUBMITTED: (2) Ectoparasites ( ) Blood ( ) Serum ( ) Other Please specify *A. americanum*	TYPE OF SAMPLES SUBMITTED: Blood [ ] Serum [ ] Ectoparasites [X] Other [ ] Please specify
ANIMAL SPECIES: canine COUNTRY OF ORIGIN:	__PET __FERAL _X_MWD* __Other
PLEASE LIST ANY PREVIOUS TESTS PERFORMED AND RESULTS:	ANALYSIS REQUESTED: Anaplasma [ ] Babesia [ ] Borrelia [ ] Ehrlichia [X] Rickettsia [ ] Other please specify [ ]

Please Send Samples on Freezer Packs via FEDEX next day delivery to :
USAPHC REGION-N VBZDL
MELISSA MILLER
4411 LLEWELLYN AVENUE
ROOM 111
FORT MEADE MD 20755-5225
COMM: 001 301 677-3806
DSN: 622-3806
Melissa.k.miller30.civ@mail.mil

NAME: Dr. Nancy Vincent-Johnson
ADDRESS: 10015 Theote Road
Fort Belvior, VA 22060-5441
COMM: 703 805 4336
DSN: FAX NUMBER:
E-MAIL:nancy.a.vincentjohnson.civ@mail.mil

***If applicable please provide recent travel history on a separate sheet.**
For prompt service, please contact the laboratory prior to submitting the sample.
Melissa Miller 301 677-3806 or Ms Alexandra Spring at 301 677-2607
We attempt to provide as fast a turn-around time as possible. However, please allow up to 10 working days for results. If faster turn-around time is required, please contact laboratory with request.

Polymerase chain reaction (PCR): Submit 2mL whole blood in an EDTA tube. Positive result by PCR indicates an active infection. **Blood from countries other than the US must be submitted dried on a Whatman FTA card®. Please contact us for directions and supplies.**
Ectoparasites: Submit ticks and fleas in sealed container or self-closing bag. No moisture required. Please contact us if unsure how to ship ectop
negative PCR test result d
removed. **Ectoparasites**
contact us for directions

Figure 3. PHC Tick Submission Form

the Region level. This program developed in the spring of 2013 toward the end of my FYGVE rotation, which unfortunately did not allow time to analyze or apply the surveillance data during my field experience.

Biological Risk Mitigation

A main project during the public health rotation was the development of a biological risk mitigation strategy and application to the Fort Belvoir VTF. The program was developed following the standard five step Army risk assessment format. The biological hazards of canine and feline disease transmission were first identified through research. Through the research, The Iowa State University Center for Food Security and Public Health publications proved to be a useful resource. The hazards were further defined in a spreadsheet with the type of agent, route of transmission, anatomical system affected and potential for zoonosis (Enclosure H). Step two, the hazards were then assessed for each agent by comparing the likelihood of transmission in the VTF environment versus the severity of transmission. Research based evidence declaring the prevalence of each agent in the VA area was not readily available for this review; therefore, the probability of the agent transmission was based on agent type, characteristics, route of transmission, the veterinary clinic operative environment and the clinical practice experience and knowledge of the FYGVE group. Each agent was discussed within the FYGVE group and assigned a hazard risk level of either low, moderate, high or extremely high utilizing the probability and severity tables in the Department of the Army Doctrine and Training Publication 5-19, Risk Management. In step three, effective mitigation strategies to prevent disease transmission were identified along with appropriate disinfectants for each agent. Step four did not require additional resources to accomplish since controls for mitigating communicable diseases were already in place with the hospital grade cleaning contract and internal veterinary

clinic standard operating procedures. Step five included an evaluation of the current controls by reviewing the written housekeeping contract, clinic sanitation standard operating procedures and observing the actual daily sanitation practices. The housekeeping contract stated procedures for veterinary facilities were to be consistent with the Association for the Healthcare Environment (AHE) Practice Guidance for Healthcare Environmental Cleaning, AHE Catalog/ Item Number 057034. Under the cleaning contract, the surgery suite was labeled Type I and the exam rooms, operating rooms, pharmacy and the main waiting area were all identified as Type IV indicating different medical cleaning standards. The amount of square footage or each type directly determined the cost of the cleaning contract. Evaluation of the contracted cleaning revealed a large discrepancy with what was written and what was actually happening daily. The contract cleaning occurred at the end of each business day and the entire veterinary clinic appeared to be cleaned the same throughout the facility with the exception of the bathrooms. When questioned, the contracted cleaning staff were not aware of which rooms were assigned different levels of cleaning. It was also noted the housekeeping did not enter the surgery suite to clean. When questioned, the contractors stated they thought the

Risk Assessment Levels:		Hazard Probability				
E H – Extremely High (Loss of ability to accomplish mission) H – High (Significant degradation of mission capabilities in terms of required mission standard) M – Moderate (Degradation of mission capabilities in terms of required mission standards) L – Low (Little or no impact on accomplishment of mission)		Frequent (Continuously experienced, occurs often)	Likely (Occurs frequently or several times)	Occasional (Will occur several times or sporadically)	Seldom (Unlikely, but can be expected to occur at some time)	Unlikely (Improbable but possible to occur)
Severity (The expected consequence of an event in terms of degree of injury, property damage, or other mission impairing factors)	Catastrophic (Death or permanent total disability, system loss, major property damage)	EH	EH	H	H	M
	Critical (Permanent partial disability, temporary total disability in excess of 3 months,major system damage, significant property damage)	EH	H	H	M	L
	Marginal (Minor injury, lost workday accident, minor system damage, minor property damage)	H	M	M	L	L
	Negligible (First aid or minor medical treatment, slight system impairment)	M				

Figure 4. Risk Assessment Guide[13]

surgery suite was cleaned by the veterinary staff. The discrepancies were reported to medical logistics and the staff was retrained. Majority of the infectious diseases identified required control strategies during the hours of operation to reduce the risk for transmission. The VTF standard operating procedures were reviewed and daily cleaning procedures were evaluated. The disinfectant Roccal, a quaternary ammonium compound, was sprayed on the exam table after each patient, spread with a paper towel and allowed to air-dry prior to the next patient. Roccal is a proper disinfectant for gram positive bacteria; although, it has limited effectiveness for gram negative, mycobacteria, enveloped viruses and fungi. Roccal is documented as not effective for non-enveloped viruses or spores and is inactivated by organic matter, hard water, soap and detergents. Evaluation of the daily procedures led to the findings that the frequency of cleaning by the staff, use of personal protective equipment and the knowledge for quarantine procedures were adequate to reduce the risk for agent transmission; however, the veterinary staff that conducted the cleaning, believed the Roccal disinfectant was adequate for most infectious agents of concern[5]. They were surprised to hear the limited spectrum of the routine disinfectant used in the vet clinic. As a result of the findings, the standard operating procedures were updated to include enclosures for antimicrobial spectrum of disinfectants and the characteristics of selected disinfectants to provide guidance for proper decontamination by veterinary personnel. The staff was trained on the new standards although the effectiveness of the training and updated standard operating procedures were not reevaluated during my field experience. This exercise did not specifically isolate zoonotic diseases but it was a practical application of a biological risk mitigation process which enhanced preventive medicine for veterinary operations at the Fort Belvoir VTF.

Commercial Facility Sanitary Audit Credentialing

Commercial food, water and ice production facilities that provide subsidence for the Department of Defense (DOD) must be listed on the *Worldwide Directory of Sanitarily Approved Food Establishments for Armed Forces Procurement*. In order for an establishment to be qualified as an approved source and listed on the worldwide directory, the company must be inspected by a certified military auditor, which is either an Army Veterinary Corps Officer, Warrant Officer or GS Food Inspector, and receive a satisfactory sanitation rating. Once a company is listed as an approved source, the agency can develop a contract and sell routinely to DOD agencies within the United States and overseas[7].

During my field experience, I was fortunate enough to shadow several military food inspectors and complete the commercial food auditor certification program. The certification process required the assisting with three commercial audits assigned as a staff auditor followed by the successful completion of three commercial audits assigned as a lead auditor. The staff auditor position allows for shadowing during the audit and practice writing the sanitary inspection report. The certification process also required the experience at each of the following facilities: water bottling, ice production, dairy, fresh-cut fruits or vegetables, bakery, and seafood. After completing a few audits as a staff auditor, I was assigned as the lead auditor for at least three commercial audits and was assessed by my supervisor. Prior to each audit, the regulatory guidelines relevant for the particular production facility were reviewed. The DOD reference for commercial audits is the Military Handbook 3006C which contains detailed guidance and lists of requirements for each establishment type. The handbook mimics the standards outlined in the current good manufacturing practices (CGMP), as provided in Title 21, Code of Federal Regulations (CFR), Part 110 as the basic sanitation standards for food

establishments. The CGMP requirements are also based upon the Federal Food, Drug and Cosmetic Act of 1938, as amended[7]. Prior to each site visit, I sent the company a pre-audit questionnaire to gain information on the production process, hazard analysis and critical control points, raw materials, laboratory testing strategies, and food defense program. During each sanitary audit, paperwork was first reviewed in detail with the agency representatives to evaluate the standard operating procedures, sanitation plans, lab results, HACCP, and critical control point data. The final part of the inspection is a walk-thru to observe production from raw material receipt, storage, to production, final storage and shipping. Conditions of the physical facility, sanitation and hygiene and production practices are evaluated during this portion of the audit and compared to the federal standards referenced in the handbook. After reviewing all the information required, the discrepancies are categorized as either an Observation, which is similar to a recommended good management practice, a Major finding, which is a potential public health risk and requires corrective action, or a Critical finding, which is an imminent public health hazard and results in an immediate unsatisfactory rating and can lead to discontinuation of the contract. All major and critical findings must be corrected by the agencies within the suspense date written on a corrective action report. After the initial audit, facilities are audited on a frequency based on the risk for product contamination or mishandling. Approved source commercial audits are conducted at least one a year and no more than once quarterly unless directed by a specific inquiry. For example, a creamery is often inspected semiannually; however, if a facility does not repasteurize the milk after transportation, there's potentially a higher risk for product contamination which would result in a quarterly audit requirement with required samples of the finished product for bacterial testing.

Chapter 4. Overview of the USAPHC Region South District Fort Hood, TX

After the scheduled MPH experience, I was reassigned to the PHC Region South District Fort Hood and participated in a few public health projects that are worth mentioning under this field experience topic. I was assigned as the Chief of North Texas Branch (NTB) which covers majority of North Texas and includes four installations and four attending sites: Dyess Air Force Base, Goodfellow Air Force Base, Naval Air Station Joint Reserve Base Fort Worth in Fort Worth, TX, Fort Hood Army Installation, Red River Army Depo, Waco, AAFES Headquaters in Dallas, and Camp Maybry. Within NTB, we were responsible for providing care to over 40 military working dogs (MWD), 39 government owned equids of the 1st Calvary Horse Detachment on Fort Hood, and the DOD MWD Puppies as requested from the MWD breeding program. NTB is comprised of four veterinary treatment facilities and a food safety section. The veterinary clinics provide services to privately owned animals of Military members, dependents and beneficiaries. NTB also operates a stray animal facility on the Fort Hood installation which processes over 900 animals annually. Working in this capacity at the Branch level, allowed for unique clinical experiences and application of many public health programs.

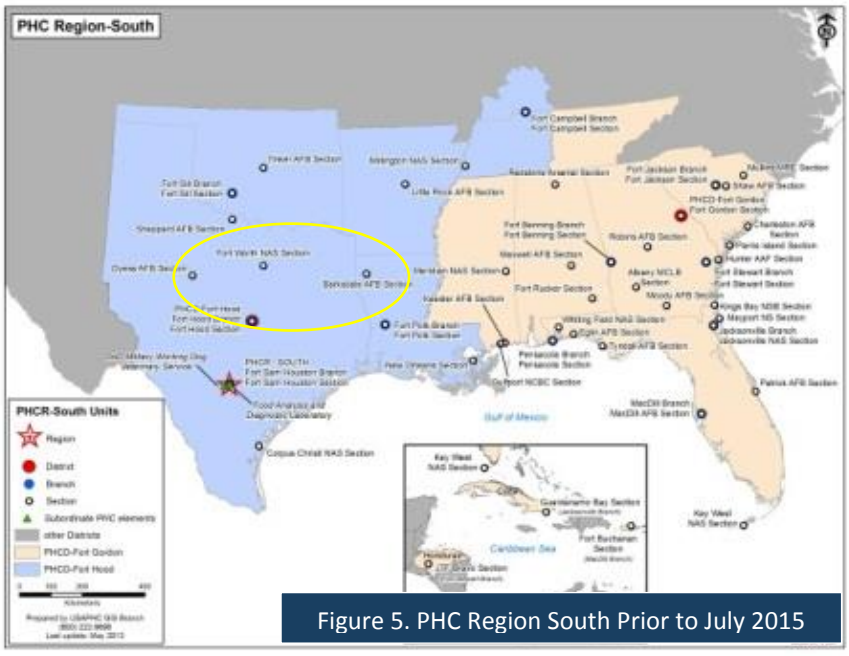


Figure 5. PHC Region South Prior to July 2015

Chapter 5. Continued Public Health Experiences

Potential Rabies Exposure Management

Fort Hood is the largest military installation in the United States with a population around 42,000 active duty personnel and more than 145,000 family members within the 40 mile radius[19]. The installation also has many open training areas and a large stray animal population. Many people seek medical care on the installation for animal bites. In 2014 we processed over 600 bite reports that were generated at the Carl R. Darnell Army Medical Center on the Fort Hood Installation. NTB veterinary services plays a key role in rabies exposure case management by processing animal bite reports, submitting potential rabies specimens to the lab for testing, conducting suspect animal quarantines and collaborating with law enforcement and human health officials to track and appropriately manage human potential rabies exposure cases. In addition to exceeding 600 bite reports in the 2014 calendar year, we submitted over 20 animal specimens for rabies testing. Samples were sent to either the TX State Health Department Diagnostic Laboratory in Austin, TX or the USAPHC Region South laboratory in San Antonio, TX depending on the nature of the exposure.

Accurately managing potential human rabies exposure cases requires collaboration between many agencies. The process usually begins when the Department of Emergency Services (DES) law enforcement officials are called to respond to an animal bite on the installation. The police investigate the case and advise all bite victims to report to the Emergency Room (ER). All animals involved are required to be seen at the Fort Hood Veterinary Center (VETCEN) as soon as possible for the initial quarantine exam. DES contacts animal control to safely apprehend the animal if it is a stray or wildlife. If the animal is not obtained, DES notifies NTB veterinary services via email to help allow for identification at the Fort Hood Stray Animal Facility or the veterinary clinic. All DES calls are recorded on the

Military Police Blotter Report which is sent through key word recognition to the PHC District Command for tracking. Our Command forwards blotter animal bite information via email to help ensure we located the animal and take appropriate actions initiating the quarantine.

Bite Reports

The bite report is generated when the patient arrives at the emergency room. The receptionist generates the bite report (DD Form 2341) with pre-sequenced numbers to permit tracking of all bite reports by the multiple agencies involved. The first portion of the bite report is filled out by the physician. One copy is placed in the patient record; the other is placed in a folder at the front desk for the animal health technician. On Fort Hood, the veterinary technician picks up bite reports daily (Monday through Friday) from the ER front desk no later than 9:00am to allow for efficient processing. The animal health technician signs the bite tracker log at the ER to validate each report was received and secured. A veterinary technician takes steps to locate the animals involved by contacting animal owners, victims or city animal control officials. If the animal is owned on the installation, the owner is instructed to bring the animal into the Fort Hood VETCEN for the initial rabies quarantine exam. Owned animals that are current on rabies vaccinations are home quarantined for 10 days. The owner signs an agreement to the home quarantine restrictions, given a list of signs to watch for and is required to return to the VETCEN after ten days of observation for the final quarantine exam. Animals that are not current on the rabies vaccination are placed in the rabies quarantine area at the Fort Hood Stray Animal Facility to reduce human exposure and for constant monitoring by the veterinary staff during the ten days. After the ten days of observation, a final physical exam is conducted, the animal is vaccinated and released back to the owner. The 10 day animal quarantine requirement is written into a Fort Hood regulation which gives leverage to law enforcement to enforce the requirement

on the installation. Stray animals that are captured and placed in the rabies quarantine area can either be examined and held for the 10 days or euthanized and sent for rabies testing. All animals that are euthanized or die prior to the ten day quarantine period are submitted to a diagnostic laboratory for rabies testing. Bite reports from the ER often involve animals located off the installation. If the animal is off the installation, veterinary staff contacts the respective city animal control official to report the bite or scratch, location of the incident and description of the animal. Veterinary staff must follow up with the city animal control officials within 3-5 days to determine if they were able to locate the animal. If the animal was unable to be found, the bite report is closed out early by the veterinarian and forwarded to Preventive Medicine with the recommendation to initiate post-exposure prophylaxis (PEP) based on assigned risk for rabies exposure as described in the Center for Disease Control Compendium of Animal Rabies Prevention and Control and local public health guidance. If the animal was located and quarantined properly, the veterinary staff contacts the city animal control officials at the end of the 10 day quarantine to ensure the health of the animal. The veterinarian closes the bite report by listing details of the health of the animal, agencies contacted, location and dates of the quarantine, results from rabies testing (if applicable) and recommendations for preventive medicine (i.e. completion of the post-exposure prophylaxis series). The report is sent to the Preventive Medicine Department for filing or follow-up with the patient.

Rabies Advisory Board

Due to the interagency involvement with patient care and bite report processing, a Rabies Advisory Board exists and conducts quarterly meetings to discuss management of animal bite reports, animal control and key events from the past quarter. The board is comprised of representatives from the Carl Darnel A. Medical Center (CRDAMC) to include the Chief of

Preventive Medicine, the Chief of Emergency Room Services, a Community Health Nurse Practitioner and the Chief of investigative Services (IS) from DES, the installation Game Warden, the Chief of wildlife management and the Chief of North Texas Branch veterinary services. The Rabies Advisory Board Meetings monitor the efficiency and accuracy of case management and tracking. The board also highlights areas requiring improvement. The past board case reviews identified an inconsistency with administration of PEP at the ER. As a corrective action, veterinary services developed and conducted training for the ER physicians to ensure accurate understanding of which animals were considered high, moderate and low risk, the role of the animal quarantine process, rabies testing capabilities and the bite report process. After the training, the inconsistent administration of PEP continued to be a problem with the rotating residents and physicians in the ER. For example in one instance, a Soldier was bit by a vaccinated 8 year old dog, which was available for quarantine; however, the ER physician still administered PEP despite the direct advice and explanation from a veterinarian in this case that the Soldier's exposure was low risk. It was also explained to the physician in one case that the animal was euthanized and submitted for rabies testing but the physician still administer PEP as a precaution. In the case described, PEP should only be necessary if the rabies test results from the laboratory were positive or if the sample was untestable. This is an example of one of the outstanding and reoccurring problems with rabies case management. It is an indication of the need for continued education and collaboration. It still seems the training conducted by veterinary services should be more compelling because from the few scenarios described it seems the advice and expertise of a veterinarian did not have much impact on an ER physician's decision to administer PEP.

Rabid Animal Management

Rabies is reported in many species throughout Texas every year. Historically the rabies serotypes found in Texas are skunk or bat serotypes. Fort Hood never had a laboratory confirmed positive rabies case on the installation prior to 2014. Last year, mixed in with the large number of bite reports and suspect rabies submissions, we had six animals test positive for rabies on the Fort Hood Installation. Three out of the six rabies cases involved direct human exposure.

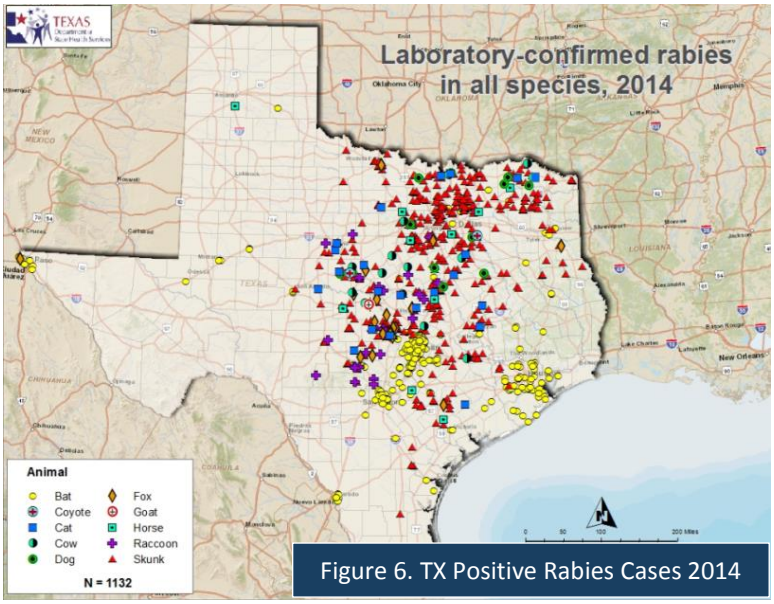


Figure 6. TX Positive Rabies Cases 2014

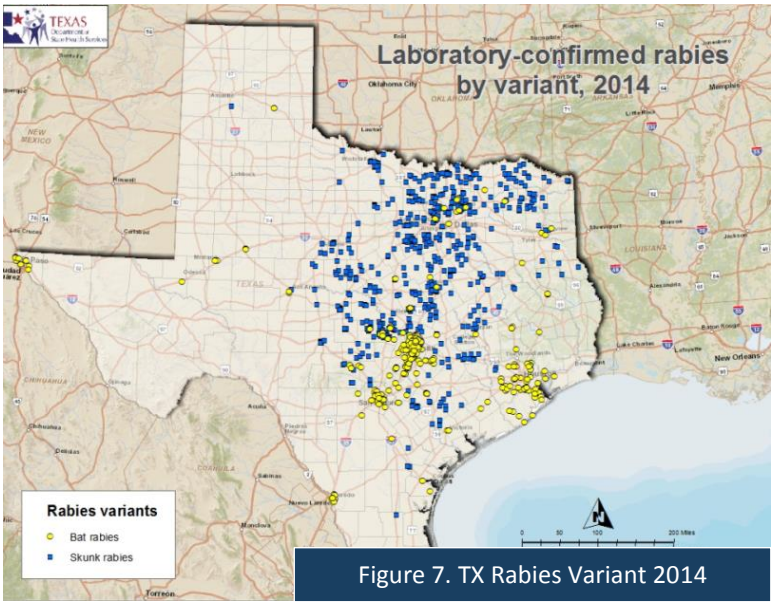


Figure 7. TX Rabies Variant 2014

Case #1: A stray cat attacked a lady outside her residence on the installation. She immediately called animal control and notified them of the aggressive animal. She was instructed to go to the ER. The cat was captured by animal control and brought to the Fort Hood Stray Animal Facility and placed in the in-processing area. The next day, when the bite report was picked up from the ER by veterinary technician, the stray cat was identified in the Stray Animal Facility. Upon the initial quarantine exam, the animal exhibited abnormal mentation and aggressive behavior. The cat was humanely euthanized and sent for rabies testing. The rabies test results were phoned in by the TX State Diagnostic Laboratory in Austin, TX within 24-48 hours. Preventive medicine, PHC and the TX

State Health Department were immediately notified. The information was published as public announcement by the CRDAMC Public Affairs Officer (PAO) and also passed onto the local news stations to help determine if anyone had contact with the stray black and white cat. The State Health Department led the epidemiologic investigation with the assistance of the veterinary and preventive medicine staff.

Case #2: A skunk was seen walking around a motorpool after 9:00am. Animal control was contacted to capture the animal and bring it to the veterinary center for testing. Again the positive rabies test results were called into the veterinary clinic. The same protocol was used to alert the public and investigate potential exposures. Luckily, this case resulted in no human exposures. Not many people try to handle adult skunks!

Case #3: A contractor found a baby fox recumbent in a field. The contractor picked up the baby fox and moved him close to the building and contacted the wildlife department. He told the wildlife department the baby fox was injured and unable to walk. An employee from the wildlife department picked up the fox and brought it to the Fort Hood Veterinary Center for treatment. The fox was videotaped displaying neurologic signs, humanely euthanized and sent for rabies testing. The fox was positive for the skunk variant of the rabies virus. Appropriate authorities were notified. Veterinary staff gathered the contact information for all the employees exposed when the animal was brought to the veterinary clinic and were able to assist the TX State Health Department in the epidemiologic investigation.

Case #4: An employee on the installation picked up a bat on the ground of the motorpool. He continued to show his colleagues and eventually contacted the Fort Hood Wildlife Department to take the bat since it could not fly. The bat was transported to the Fort Hood Veterinary Center for rabies testing. The bat in this case tested positive for rabies. The

employees exposed received post exposure prophylaxis at the local medical treatment facility. Since it was highly likely that more bats in the roosting colony were also rabid, the employees working in the motorpool were educated on the hazards, informed to report bats exhibiting abnormal behavior and to report human exposure. Cases #5 and #6 were bats from the same colony in the motorpool, found on two separate occasions. One bat was in a tool box and the other was on the ground in the open bay. Both subsequent rabies cases did not result in direct human exposure. The Wildlife Department was unable to disrupt the colony due to wildlife protection laws. They waited until the colony migrated before they were able to bat proof the building and exclude them from roosting over a work area in the future.

FORT HOOD SENTINEL

FortHoodSentinel.com
http://www.forthoodsentinel.com/story.php?id=14359

Fort Hood recognizes World Rabies Day

by Sentinel Staff
October 2, 2014

Public Health Outreach Efforts

Fifty percent of the rabies cases on Fort Hood involved direct human exposure which led to the initiative for public outreach and education efforts. I developed training slides that detailed the cases, described the basic characteristics of the rabies virus, and steps to take to reduce individual risk. The slides were distributed with an operations order to all units on the installation to conduct mandatory training for all assigned personnel. Installation Preventive Medicine tracked the training compliance resulting on over 90% of the units on Fort Hood reporting compliance with the tasking. I also planned and coordinated for a Fort Hood World

Rabies Event on 28 September 2014. The World Rabies Day events included a free 5K Dog-n-Jog, a walk-in rabies vaccination clinic, free food, education booths and a bounce house for children. The public turnout was fairly decent for a Sunday morning. Over 70 people participated in the 5K Dog-n-Jog and several news stations reported on the event to highlight the cause.

Veterinary Ebola Response

Fort Hood Soldiers deployed for several months to Liberia, West Africa to help control the Ebola outbreak as part of Operation United Assistance. An area on North Fort Hood was identified as a main quarantine area for units redeploying from West Africa. Soldiers returning from West Africa were held for at least 21 days in the containment area. A policy letter was issued prior to deployment operations stating Military Working Dogs should not to deploy to regions supporting the Ebola crisis since to date, it is not known whether the virus can be carried on an animal's body. The Public Health Command Veterinary Services was contacted to assist with the quarantine planning and asked to be prepared to receive potentially exposed animals in the unlikely event that the Ebola virus was brought to Fort Hood. Although it was an unlikely scenario, a few veterinarians and technicians were respirator FIT tested, issued HEPA filtered masks and received level 4 personal protective equipment training. An area on the installation was identified for animal quarantine but the scenario details were not fully determined due to the unlikelihood of the event. We reviewed the Interim Guidance for Dog or Cat Quarantine after Exposure to a Human with Confirmed Ebola Virus Disease, released November 2014 by the American Veterinary Medical Association Ebola Companion Animal Response Plan Working Group and planned to contact the TX State Health Department and CDC if we were called to respond to a case involving and infected Soldier[14]. It was a good exercise to join the installation

medical personnel in training and preparations for establishing the contagious disease control program.

Vector Surveillance

In September 2013, I observed a unique opportunity for tick surveillance at the Fort Hood stray animal facility and the routine hog and skunk trapping on the installation. However, the Preventive Medicine Entomology Department did not have a tick testing program established and surprisingly the animals were rarely infested with ticks, a stark difference from the Fort Belvoir, VA. I contacted the PHC Region South laboratory in San Antonio, TX to determine if they were willing to accept specimens from animals for species identification and tick-borne disease surveillance. The laboratory routinely receives tick specimens from the human medical clinic. The laboratory was willing and able to accept insects from various animals for vector surveillance free of charge. I developed a tick submission standard operating procedure for the Fort Hood veterinary services in the summer of 2014. When a new installation entomologist arrived to Fort Hood in the beginning of 2015, we held a meeting to discuss the veterinary services contributions to vector surveillance and ideas for future surveillance. The entomologist department is currently managing several programs. We continue to assist with surveillance by submitting ticks found off the animals to our Fort Hood Installation Entomologist for accurate identification, recording into the Vector Map online database system, specimen preservation and shipping to the PHCR-South entomology laboratory[2]. One interesting situation evolved last summer from the tick submissions at the Fort Hood VETCEN. A 4 year old Jack Russel Terrier had 5 ticks removed during a routine wellness exam at the Fort Hood Veterinary Treatment Center. The dog just arrived to the Fort Hood area from Mexico. The owner refused to purchase flea and tick prevention during the exam. The ticks were submitted to the laboratory were

identified as the reportable tick *Rhipicephalus (Boophilus) annulatus*. I contacted the TX State Health Department and the TX Animal Health Commission with the findings. The TX Animal Health Commission conducted an epidemiology investigation and also obtained the tick samples from the laboratory for confirmatory testing at the National Veterinary Services Laboratory (NVSL), Ames, Iowa. The *Boophilus annulatus* tick resides on one host and is commonly referred to as the cattle tick. The tick is usually found on livestock and deer and is not documented to reside on domestic animals. The quarantine areas are located in Southern TX along the border. The economic devastation which would occur from infestation could have an impact on human health and wellbeing in the state of TX[12]. NVSL report stated the identification of the nymph stages were difficult to differentiate and inconclusive. Given the host, it was unlikely to be *Rhipicephalus (Boophilus) annulatus*.

Surveillance efforts are underway for triatomine bugs, commonly known as the "kissing bug," since the arrival of the installation entomologist. The veterinary staff cross-trained with the entomology department on the identification and proper collection methods in order to assist with public education. Surveillance is not easy since the bugs are usually dispersed and difficult to collect. The plan is to publish a public awareness article in the near future through the installation newspaper with instructions on how to safely capture kissing bugs and submit them with basic information on location, date, time to the Fort Hood VETCEN for testing. Our veterinary section seeks to actively support the installation vector surveillance efforts in order to promote effective preventive medicine programs for both humans and animals on the installation.

Food Safety and Security

I had the opportunity over the past year to travel overseas and apply the food safety, security and public health knowledge while conducting a routine sanitary audit for a water bottling plant in Paraguay, an initial sanitary audit for a catering company in Antigua, and a food and water risk assessment (FWRA) for three catering facilities in Guatemala. Approved sources overseas are inspected to the same standard as facilities within the United States. If a food processing facility does not routinely supply DOD agencies, a FWRA is often conducted to allow for a onetime event and to outline the risks of utilizing an unapproved source. While in Guatemala I conducted three separate FWRAs for catering services in order to help the military command determine if the food source was a safe option and adequate to support a fleet of over 500 sailors during a 2 week training exercise. The resulting product was a risk assessment for each facility that outlined the hazards for the food processing facility and allowed the Command to compare and evaluate the food sources. All three facilities inspected were considered high risk for food-borne illness prior to implementing mitigation factors; however, I was able to assess residual risk based on the practicality of implementing controls which resulted in one facility having less residual risk than the other two. For example, the facility with the least residual risk did not monitor temperatures in the cold holding units, mark dates on potentially hazardous foods nor have adequate training for their employees on cross-contamination. During the inspection, the Chef grabbed a raw beef patty with gloved hands, placed it on the grill then continued to grab the bun and lettuce with the same gloves. The Chef also touched many other items in the kitchen with the contaminated gloves. The Chef worked for several hours daily and was unaware of the hazards of cross-contamination. Ultimately, the military Commander

utilized the risk assessments to determine whether or not to accept the risk of supplying the unit with an unapproved source.

Chapter 6. Conclusion

The MPH Core Curriculum has been the foundation of my approach to many situations and provided the knowledge base leading to the initiatives and outcomes described in this report. I felt the most valuable courses were Statistical Methods for Natural Scientists which explored the Microsoft excel program capabilities and utilization of equations to demonstrate appropriate sample sizes to accurately represent a given population in a study along with the concepts of statistical significance and probability as applied to a biological research setting. Knowledge gained from the Fundamental Concepts in Emerging Pathogenic Diseases, Veterinary Bacteriology and Mycology, and Principles and Methods of Epidemiology also proved to be beneficial throughout my experiences.

Veterinarians within the USAPHC have many opportunities inside and outside the veterinary clinics to influence the community through promotion of preventive medicine and public health. Collaboration between Federal, State and local health agencies is essential to develop effective and sustainable programs. There are still gaps to bridge with implementing the one-health approach; however, external agencies seem to welcome the veterinary initiative to be part of the team.

References

1. Brown, Catherine M., Lisa Conti, Paul Ettestad, Mira J. Leslie, Faye E. Sorhage, and Ben Sun. "Compendium of Animal Rabies Prevention and Control, 2011." Journal of the American Veterinary Medical Association: 609-17.

2. "Entomological Surveillance Working Group (ESWG)." Vector Map. Walter Reed Biosystematics Unit (WRBU), MAJ Jeffery Clark, Des Foley, David Pecor. Web. 29 Oct. 2015.

3. Centers for Disease Control and Prevention. General Recommendations on Immunization - Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR.* 2011;60 (No. RR-2). http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6002a1.htm

4. Centers for Disease Control and Prevention. Compendium of Animal Rabies Prevention and Control, 2011, National Association of State Public Health Veterinarians, Inc. *MMWR.* 2011; 60(RR-06):1-14. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6006a1.htm

5. Dvorak, Glenda. "Disinfection 101." The Center for Food Security and Public Health. Iowa State University, 1 May 2008. Web. 20 Oct. 2015.

6. "Fort Hood Recognizes World Rabies Day." Fort Hood Sentinel 2 Oct. 2014. Web. 20 Oct. 2015.

7. "Guidelines for Auditing Food Establishments." Department of Defense Military Handbook. MIL-HDBK ed. Vol. 3006C. Falls Church, VA: DOD Veterinary Service Activity, 2008. Print.

8. "Organization - Army Public Health Center." Organization - Army Public Health Center. U.S. Army Medical Department, 1 Sept. 2015. Web. 22 Oct. 2015.

9. Public Health Image Library (PHIL). Centers for Disease Control and Prevention, 28 July 2014. Web. 20 Oct. 2015.

10. "Rabies ACIP Vaccine Recommendations." Centers for Disease Control and Prevention. Centers for Disease Control and Prevention, 10 Feb. 2015. Web. 20 Oct. 2015.

11. “Rabies." Centers for Disease Control and Prevention, 21 Sept. 2015. Web. 20 Oct. 2015.

12. "Rabies Maps." Infectious Disease Control Unit. Texas Department of State Health Services, 12 Feb. 2015. Web. 22 Oct. 2015.

13. "Rhipicephalus (Boophilus) Annulatus." The Center for Food Security and Public Health. Iowa State University, 1 Feb. 2007. Web. 20 Oct. 2015

14. "Risk Management." ATP 5-19. Department of the Army, 1 Apr. 2014. Web. 20 Oct. 2015

15. Spengler, Jessica R., Shelley Stonecipher, Catherine Mcmanus, Holly Hughes-Garza, Max Dow, Debra L. Zoran, Wesley Bissett, Tammy Beckham, Derron A. Alves, Mark Wolcott, Samantha Tostenson, Bill Dorman, Jody Jones, Thomas J. Sidwa, Barbara Knust, and Casey Barton Behravesh. "Management of a Pet Dog after Exposure to a Human Patient with Ebola Virus Disease." Journal of the American Veterinary Medical Association: 531-38. Print

16. Scheftel, Joni M., Brigid L. Elchos, Bryan Cherry, Emilio E. Debess, Sharon G. Hopkins, Jay F. Levine, Carl J. Williams, Michael R. Bell, Glenda D. Dvorak, Renee H. Funk, Steven D. Just, Oreta M. Samples, Elysia C. Schaefer, and Christine A. Silvia. "Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel: National Association of State Public Health Veterinarians Veterinary Infection Control Committee 2010." Journal of the American Veterinary Medical Association (2010): 1403-422.

17. "Texas Cattle Fever Tick." Texas Animal Health Commission. 1 Mar. 2015. Web. 22 Oct. 2015.

18. Texas Department of State Health Services, Zoonosis Control, *Rabies Prevention in Texas*. Stock No 6-108. 2015

19. "Welcome to Carl R. Darnall Army Medical Center." Carl R. Darnall Army Medical Center. U.S. Army Medical Department, 20 Sept. 2015. Web. 20 Oct. 2015.

20. "World Rabies Day, September 28." Global Alliance for Rabies Control. Web. 20 Oct. 2015.

21. "Zoonosis Control." Texas Department of State Health Services, Infectious Disease Control Unit. Web. 29 Oct. 2015.

22. "Zoonotic Diseases." Animal Disease Information. The Center for Food Security and Public Health. Web. 28 Jan. 2013

ACARIASIS

Acariasis is a skin disease caused by microscopic parasites called mites. Some mites can infect both people and animals. Mites cause skin irritation.

"Mange" = A mite infestation
"Scabies" = Infestation by a specific mite

Scabies and mange can occur in more than 100 species of animals and birds. Mites are spread by direct contact with an infected animal or by contact with items in a contaminated environment (such as clothes, animal bedding, harnesses, leashes, etc.). Scabies and mange mites are highly contagious.

USAPHC

For More Information:

CFSPH Technical Fact Sheets. Acariasis at www.cfsph.iastate.edu/DiseaseInfo/

CDC website. Scabies at www.cdc.gov/ncidod/dpd/parasites/scabies/factsht_scabies.htm

All pictures cited are courtesy of the Center for Disease Control and Prevention. http://phil.cdc.gov/phil/

This publication was produced to raise awareness for certain zoonotic diseases. Any medical concerns should be addressed with your local veterinarian or physician.

USAPHC U.S. Army Public Health Command

MANGE AND SCABIES (ACARIASIS)

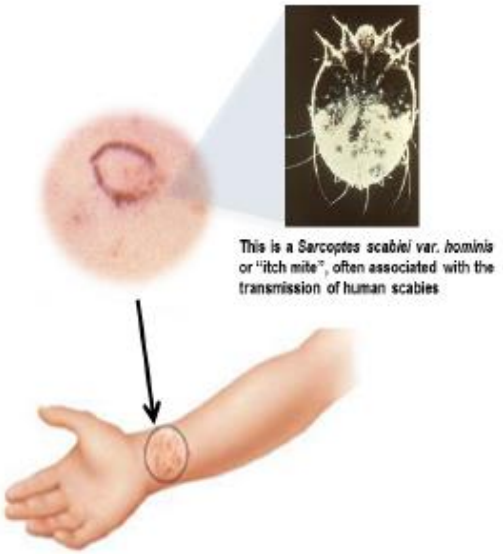
a skin disease caused by microscopic mites.

Zoonotic Disease Reference

What should you know about Acariasis?

How does Acariasis affect my pet?

Mite infestation causes extreme itching and hair loss. Skin inflammation may create small blisters initially that break open, ooze, scab or scale and over time the skin may become thickened. Bring your animal to a veterinarian if you notice any of these abnormalities. Prevention relies on identifying and treating Acariasis cases as soon as possible. The environment must be thoroughly cleaned in order to prevent re-infestation and spread of disease.



This is a *Sarcoptes scabiei* var. *hominis* or "itch mite", often associated with the transmission of human scabies

Can I get Acariasis from pets, birds or other animals?

Yes! Mites are spread by direct contact with infected animals. Typically mites cause localized skin disease:

- Redness
- Irritation
- Intense itching
- Rash

Skin inflammation from direct contact with most mites should resolve in a few days. Most cases do not need to be medically treated. The human specific mite species does require medical treatment.

How can I protect myself from Acariasis?

Treat infected animals immediately. Contact your veterinarian for guidance on approved insecticide or acaracide products. Wear gloves, boots and protective clothing as needed when handling affected animals. Always wash your hands after having contact with suspect animals. Be sure to effectively clean items and surfaces when mites are diagnosed in your pet. Prevent mite infestation with monthly preventatives.

Enclosure B: Zoonotic Disease Reference - Bartonellosis

BARTONELLOSIS

Cat scratch fever is the common name for Bartonellosis which is a bacterial infection caused by the bacteria Bartonella henselae. Some cats carry this bacteria on their nails and in their mouth. People become infected through a scratch, bite or licking from an infected cat. Not all cats are infected nor carry the Bartonella bacteria. The bacteria is spread to cats by fleas, ticks and possibly other insects.

People can contract the disease from pets but most often people are infected by stray cats and kittens. Flea control has shown to reduce the incidence of the disease in communities.

USAPHC

For More Information:

CFSPH Technical Fact Sheets. Cat Scratch Disease and Other *Bartonella henselae* infections at www.cfsph.iastate.edu/DiseaseInfo/

CDC website. Cat Scratch Fever at www.cdc.gov/healthypets/diseases/catscratch.htm

All pictures cited are courtesy of the Center for Disease Control and Prevention. http://phil.cdc.gov/phil/

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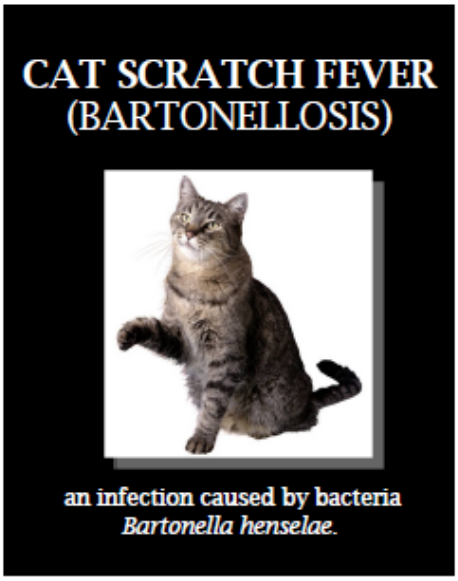

Zoonotic Disease Reference

What should you know about Cat Scratch Fever?

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How do I know if I have Cat Scratch Disease?

The disease usually takes 3-10 days or in some cases, up to 20 days, before a person develops clinical signs from Bartonellosis after coming into contact with an infected cat (scratch, bite or lick). Common clinical signs for people include:

- A skin rash at the infection site +/- a fever.
- Enlarged lymph nodes 1-3 weeks later. Lymph nodes may remain enlarged for weeks to years.
- Painful or tender lymph nodes near site of infection. Skin over lymph node may turn red and warm.
- Rare manifestations such as eye infections, severe muscle pain, or encephalitis may also occur. These are more likely to occur in people with weak or compromised immune systems.
- A few complications such as heart or liver damage have been reported in 5-16% of patients.
- Most infections in healthy adults are self-limiting and resolve over 1-5 months, sometimes longer.

How common is Cat Scratch Fever in the United States?

- 22,000 to 24,000 cases of cat scratch disease occur in the U.S. every year.
- *Bartonella henselae* bacteremia has been documented in up to 41% of healthy cats.

Photo shows a lesion of cat scratch disease, on skin of thumb.

How do I protect my family from Cat Scratch Fever?

- Use flea prevention annually on all pets.
- Keep cats indoors away from stray cats.
- Avoid bites and scratches from cats, especially kittens!
- Wash bites or scratches immediately with soap and water.
- See a physician if you or a family member receives a significant bite or scratch from a cat.
- Bartonellosis infection can be prevented by antibiotics.

Enclosure C: Zoonotic Disease Reference – Baylisascaris

U.S. Army
Public Health Command

BAYLISASCARIS

This roundworm can infect people as well as a variety of other animals, including dogs. Human infections are rare, but can be severe because parasites can migrate through the body and invade the eye (ocular larva migrans), organs (visceral larva migrans) or the brain (neural larva migrans).

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For More Information:

CFSPH Technical Fact Sheets. Baylisascariasis at www.cfsph.iastate.edu/DiseaseInfo/

CDC website. Baylisascariasis at www.cdc.gov/parasites/baylisascaris/default.htm

All pictures cited are courtesy of the Center for Disease Control and Prevention. http://phil.cdc.gov/phil/

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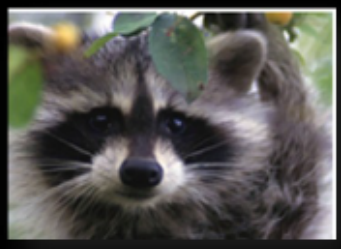
BAYLISASCARIS



a parasite infection caused by roundworms spread by Raccoons.

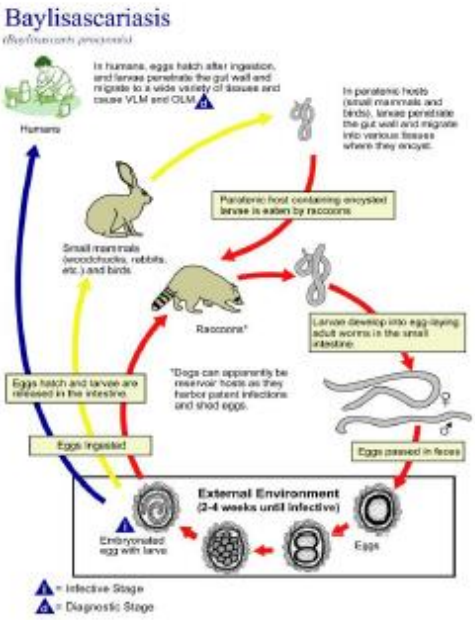
Zoonotic Disease Reference

What should you know about Baylisascariasis?

How would I get this roundworm infection?

Humans become infected by ingesting embryonated (fertile) roundworm eggs from the soil. Young children are at highest risk for infection since they may be more likely to put soil or objects into their mouth.

Fewer than 25 cases of *Baylisascaris* disease have been documented in the United States. However many cases are likely to be misdiagnosed. Balisascaris infections have been reported in California, Illinois, Louisiana, Massachusetts, Michigan, Minnesota, Missouri, New York, Oregon, and Pennsylvania. As of 2012, there were 16 published human neurological cases in the US; six of the infected persons died.



What are signs of infection?

- *Nausea*
- *Tiredness*
- *Liver enlargement*
- *Loss of coordination*
- *Lack of attention to people and surroundings*
- *Loss of muscle control*
- *Blindness*
- *Coma*

How can I prevent infection?

Eggs passed in raccoon feces are not immediately infectious. Eggs passed in feces of raccoons take 2 to 4 weeks to become infectious in the environment. If raccoons have set up a den or a latrine in your yard, raccoon feces and material contaminated with feces should be removed carefully and burned, buried, or sent to a landfill as soon as possible. Decks, patios, and other surfaces should be treated with boiling water or a propane flame-gun (exercise proper precautions) to kill the roundworm eggs. Further guidance on cleaning contaminated areas is provided on the CDC website on the back page.

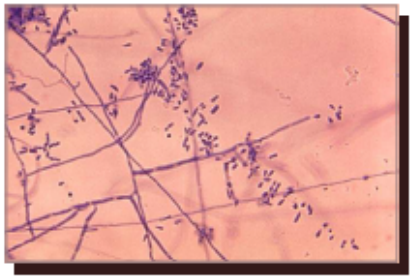
Do not keep, feed, or adopt wild animals as pets! Washing your hands after working or playing outdoors is good practice to prevent a number of diseases.

Enclosure D: Zoonotic Disease Reference – Dermatophytosis

RINGWORM

U.S. Army
Public Health Command

Dermatophytosis is a skin infection caused by many different species of fungi which infect both humans and animals. This skin disease is caused by fungus, not worms. It is called "ringworm" due to the type of rash that occurs. Some fungi species that cause ringworm are only found on humans (not on animals). Other species of fungi found on animals can be transferred to both people and other animals.



For More Information:

CFSPH Technical Fact Sheets. Dermatophytes at www.cfsph.iastate.edu/DiseaseInfo/

CDC website. Ringworm at www.cdc.gov/healthypets/diseases/ringworm.htm

All pictures cited are courtesy of the Center for Disease Control and Prevention. http://phil.cdc.gov/phil/

This publication was produced to raise awareness for certain zoonotic diseases. Any medical concerns should be addressed with your local veterinarian or physician.

Zoonotic Disease Reference

What should you know about Ringworm?

How can I get Dermatophytosis?

Ringworm is spread by direct contact with an infected animal or people. Many animal species can have this fungal skin infection to include dogs, cats, horses, cattle, sheep, goats, pigs, rodents, rabbits and birds.

What does ringworm look like on animals?

- *Patches of hair loss*
- *Patches of dry, scaly skin*
- *Skin can be red and itchy*
- *Sometimes the infection forms the classic circle or ring shape in your animals fur.*

How do I protect my pet from ringworm?

This fungal skin infection usually occurs in animals with poor or immature immune systems. Puppies and kittens are at a higher risk of infection compared to healthy adult animals. Keep puppies and kittens in clean environments to reduce the risk of fungal infections. Keep immune compromised animals (those with cancer, kidney disease or other underlying illness) away from infected animals. Contact your veterinarian immediately if you notice patchy hair loss or suspect your pet has ringworm.

Protect yourself and your family!

Wash potentially contaminated skin with soap and water as soon as possible. Wear gloves when handling infected animals. Clean and disinfect brushes, leashes, blankets and contaminated surfaces with a dilute chlorine bleach solution (1:10) to kill the fungus.

If you are pregnant or have a weak immune system, stay away from any known infected animal or person. Contact your physician immediately if you suspect a ringworm infection.

Enclosure E: Zoonotic Disease Reference – Giardia

U.S. Army
Public Health Command

GIARDIASIS

The microscopic protozoan called *Giardia intestinalis* can survive in the environment for long periods of time due to its outer protective shell. The Giardia parasite is found in the intestine of infected animals and people and is passed in large numbers to the environment in feces. A wide variety of animals can carry Giardia to include dogs, cats, sheep, goats, horses, cows, pigs, beavers, coyotes, rodents, and raccoons. The Giardia protozoa can be found in contaminated soil, food, water or on surfaces contaminated with feces from infected humans and animals.

For More Information:

CFSPH Technical Fact Sheets. Giardiasis at www.cfsph.iastate.edu/DiseaseInfo/

CDC website. Giardia at www.cdc.gov/ncidod/dpd/parasites/giardiasis/default.htm

All pictures cited are courtesy of the Center for Disease Control and Prevention. http://phil.cdc.gov/phil/

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GIARDIA

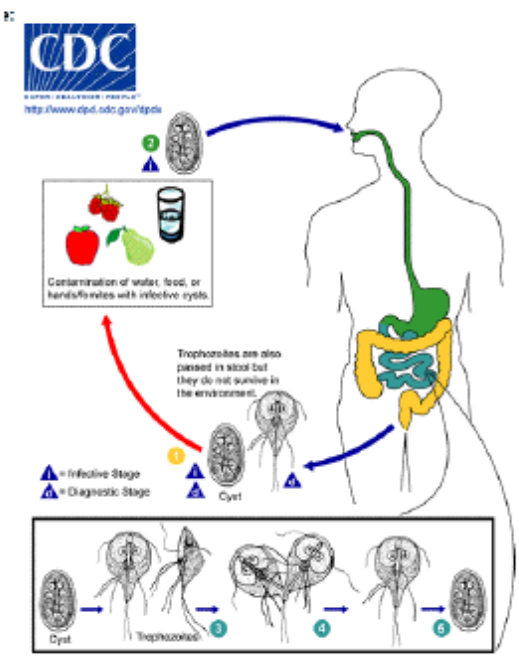
a protozoal infection that causes diarrhea.

Zoonotic Disease Reference

What should you know about Giardiasis?

How can I get Giardiasis?

Infection is usually through oral ingestion of the parasite in contaminated water or food. Giardia is spread by fecal material of infected people and animals. It has been a cause of traveler's diarrhea in some cases. Hikers and campers who drink unfiltered water are at high risk for ingesting giardia.



What does this protozoa infection do in people and animals?

- *Diarrhea or soft stools*
- *Intestinal gas*
- *Abdominal discomfort*
- *Nausea*
- *Vomiting*
- *Weight loss or failure to gain weight*
- ***Some people and <u>most</u> animals shed Giardia protozoa but do not show signs of disease!***

How can I prevent Giardiasis?

This parasite is shed by a variety of animals and is found worldwide. People should not drink untreated water from lakes, rivers, streams, springs or shallow wells. Be aware that pets and farm animals can also be infected from water sources such as lakes, streams, springs and shallow wells.

Practice good hygiene! Wash your hands before eating or after playing outside. Wash all raw vegetables and fruits. Remove animal feces from the environment promptly. Clean and disinfect pet areas routinely. Household disinfection guidelines are provided on the CDC website referenced on the back page. If you notice any of the clinical signs listed seek medical care for you or your pet immediately.

Enclosure F: Zoonotic Disease Reference – Hookworms

HOOKWORMS

In dogs, larval hookworms are often transmitted from mother to puppies during pregnancy or through the mothers milk. Dogs and cats can get hookworms from the environment. Eggs are shed by infected animals through their feces. These eggs hatch into larvae in the soil and become infective in 3 weeks. The hookworm larvae can directly penetrate human and animal skin if skin is in contact with contaminated sand or soil for 5-10 minutes.

Hookworms are primarily found in the intestine of carnivores and eggs are shed in the feces. Cattle and rodents may also be infected. Up to 96% of the dogs and 80% of the cats in some countries may be infested.

Photo shows human hookworm infection involving the toes.

USAPHC

For More Information:

CFSPH Technical Fact Sheets. Hookworm at www.cfsph.iastate.edu/DiseaseInfo/

CDC website. Human hookworms at www.cdc.gov/ncidod/dpd/parasites/hookworms/factsht_hookworm.htm

All pictures cited are courtesy of the Center for Disease Control and Prevention. http://phil.cdc.gov/phil/

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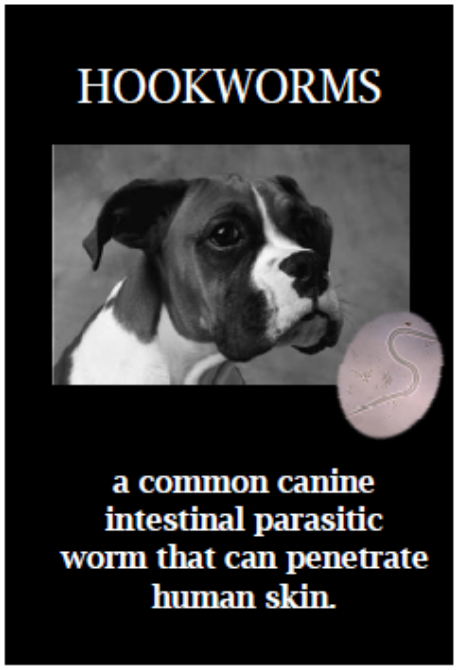

Zoonotic Disease Reference

What should you know about Hookworms?

How do people get hookworms?

People become infected when the zoonotic hookworm larvae penetrate unprotected skin, especially when walking barefoot or sitting on contaminated soil or sand. The larva migrate through the skin and cause inflammation, burning or an itching sensation. This disease is called cutaneous larva migrans (CLM).

People can also be infected by ingesting larvae from the soil. This is a less likely route of infection and results from poor hygiene. Wash your hands after working or playing in dirt!

How do hookworms affect my pet?

Animals can have different clinical signs based on the number of parasites present. Large number of worms can be fatal to puppies and kittens.

- *Diarrhea or soft stools*
- *Pale mucous membranes*
- *Weight loss*
- *Reddened raised "tracts" or lines from worms that penetrated the skin*

How can I prevent hookworms?

Have your pets screened for intestinal parasites at least once a year by your veterinarian. Puppies should be dewormed by a veterinarian at 2 week intervals: 6 weeks of age, 8 weeks, 10 weeks and 12 weeks. Remove dog feces from the environment. It takes about 3 weeks for parasite eggs shed in the feces to mature into the infective larval stage. Removing feces immediately will reduce the amount of parasites in the environment!

Good hygiene is important! Wash hands after playing in soil or contact with animals. Avoid bare skin direct contact with potentially contaminated soil.

If you suspect hookworm disease contact your veterinarian or your physician.

Enclosure G: Zoonotic Disease Reference- MRSA

MRSA

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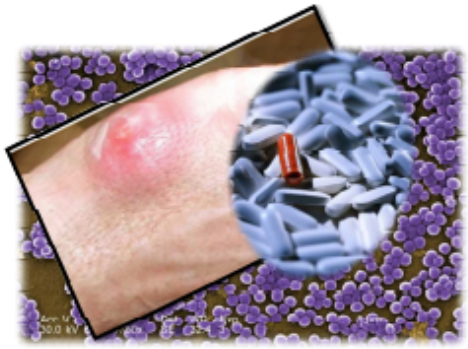
Methicillin resistant *Staphylococcus aureus* (MRSA) is a strain of bacteria that has become resistant to certain antibiotics. It causes infections that have a prolonged healing time in both humans and animals. MRSA bacteria have the potential to spread from animals to humans. Various species such as dogs, horses, cats, cattle, swine, sheep, rabbits, chickens, parrots and humans have all been reported to be infected by MRSA. These infections occur more often in people with weakened immune systems.



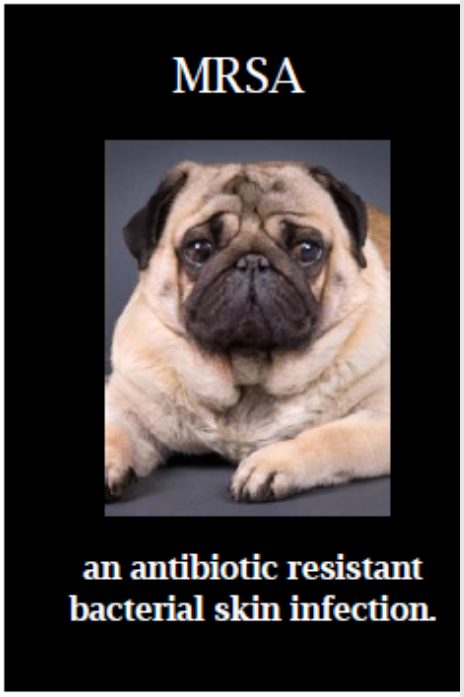
For More Information:

CFSPH Technical Fact Sheets. Methicillin-resistant *Staphylococcus aureus* at www.cfsph.iastate.edu/DiseaseInfo/

CDC website. Healthcare-associated methicillin-resistant *Staphylococcus aureus* (HA-MRSA) at www.cdc.gov/ncidod/dhqp/ar_mrsa.html

CDC website. Community-associated methicillin-resistant *staphylococcus aureus* (CA-MRSA) at www.cdc.gov/ncidod/dhqp/ar_mrsa_ca.html

This publication was produced to raise awareness for certain zoonotic diseases. Any medical concerns should be addressed with your local veterinarian or physician.



Zoonotic Disease Reference

What should you know about MRSA?

How do people or animals get MRSA?

Staphylococcus aureus is a bacteria found on the skin or in the nose of healthy people. About 25% to 30% of the population have staph bacteria in their nose, which can lead to an infection. Staph bacteria are one of the most common causes of skin infections. Most of these skin infections are minor (such as pimples or boils) and can be treated without antibiotics. Staph can also cause serious infections (such as wound infections, bloodstream infections, and pneumonia) that require antibiotic treatment.

Some Staph bacteria are not killed or halted by methicillin, penicillin, amoxicillin or oxacillin. Staph that are resistant or cannot be treated by these antibiotics are referred to as methicillin-resistant *Staphylococcus aureus* or MRSA.

Most common method of contracting a MRSA infection is through direct contact with an infected person. The bacteria can also be transmitted on fomites (objects in the environment that come into contact with the infected area).

MRSA clinical signs animals:

- Skin or wound infection.
- Pneumonia or respiratory infections.
- Arthritis or joint infections.
- MRSA infections are often mistaken for spider bites. Staph skin infections can resemble a pimple or boil.
- **Most animals with MRSA bacteria do not show any clinical signs of illness.**

How can I prevent MRSA?

MRSA infections can be prevented by practicing good hygiene. Wash hands often with soap and water or sanitize with an alcohol-based hand sanitizer. Keep cuts and scrapes clean and covered with a bandage until they are healed. Do not touch wounds on other people or animals. Always seek medical attention if you or your animal develops a boil, red inflamed skin, or if you have a sore that does not go away. Keep draining sores covered to prevent others from getting infected. Only health care providers should drain sores.

Enclosure H: Infectious Agent Hazard Analysis and Mitigation Chart

System	Species Affected	Agent	Route of Transmission	Zoonotic	Type	Specific Type	Hazard of Transmission	Mitigation	Cleaner Disinfectant
Respiratory, GI	Feline	Feline Infectious Peritonitis (coronavirus)	Aerosol, Oral, Fomite	N	Virus	Enveloped Virus	High	Collect Feces, Wash Hands, Clean Fomites	Acids, Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite and iodine), Oxidizing Agents
Respiratory	Feline	Feline Viral Rhinotracheitis (FRV)	Aerosol, Fomite	N	Virus	Enveloped Virus	High	Segregate, Clean Fomites, Wash Hands	Acids, Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite and iodine), Oxidizing Agents
Respiratory, GI	Canine, Feline	*Histoplasma capsulatum*	Aerosol	N	Fungal	Fungal Spores	Low	Avoid contact with contaminated environments	
Respiratory, Dermal	Feline	Plague (*Yersina pestis*)	Aerosol, Vector	Y	Bacteria	Gram-Negative	Low	Avoid Vectos, flea control	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
Nervous	Canine, Feline	Botulism (*Clostridium botulinum*)	Oral	N	Bacteria	Bacterial Spores	Low	Avoid contact with contaminated areas	Aldehydes, Halogens (hypochlorite, iodine), Oxidizing Agents
GI	Canine, Feline	Cryptosporidium parvum	Oral	Y	Parasite	Coccidia	High	Wash Hands, Collect Feces	Alkalis, Phenolic Compounds
Multiple	Feline	Feline Immunodeficiency Virus	Oral, Direct Contact	N	Virus	Enveloped Virus	Low	Keep Animals away from other animals while in clinic	Acids, Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite and iodine), Oxidizing Agents
Multiple	Feline	Feline Leukemia virus	Oral, Fomite	N	Virus	Enveloped Virus	Moderate	Keep Animals away from other animals while in clinic	Acids, Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite and iodine), Oxidizing Agents
GI, Reproductive	Canine, Feline	*Listeria Monocytogenes*	Oral	Y	Bacteria	Gram-Positive	Moderate	Wash Hands	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
GI	Canine, Feline	*Salmonella spp.*	Oral	Y	Bacteria	Gram-Negative	Moderate	Wash Hands, Collect Feces	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
Multiple	Canine, **Feline**	Tularemia (*Francisella tularensis*)	Oral, Vector	Y	Bacteria	Gram-Negative	Low	Wear PPE, Keep Animals Separated, Properly dispose of carcases	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds

Enclosure H: Infectious Agent Hazard Analysis and Mitigation Chart

System	Species Affected	Agent	Route of Transmission	Zoonotic	Type	Specific Type	Hazard of Transmission	Mitigation	Cleaner Disinfectant
Ocular, Respiratory	Feline	*Chlamydophila felis*	Fomite	Y	Bacteria	Gram-Negative (Obgligate Intracellular)	Moderate	Wash Hands, Clean Fomites	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
Otic	Feline	Otodectes Cynotis	Direct Contact, Fomite	N	Parasite	Mite	Moderate	Segregation, Wash Fomites	
Dermal	Canine, Feline	Rose Gardener's Disease (*Sporothrix schenckii*)	Direct Contact	Y	Fungal	Dimorphic Fungi	Low	Avoid Contact with infected environment	
Nervous	Canine, Feline	Tetanus (*Clostrisium tetani*)	Direct Contact	Y	Bacteria	Gram-Positive; Bacterial Spores	Low	Avoid contact with infected environment, Vaccination (humans)	Aldehydes, Halogens (hypochlorite, iodine), Oxidizing Agents
Dermal	Canine, Feline	Bite Wound Abcess (Pasteurella spp.)	Direct Contact	Y	Bacteria	Gram-Negative	Low	Segregation of animals	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
Non-Specific, Reproductive	Canine, Feline	Q Fever (Coxiella burnetii)	Direct Contact, Vector	Y	Bacteria	Obligate Intracellular Gram Negative	Low	Segregation, Control Vectors	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
	Feline	*Haemobartonella felis*	Direct Contact	N	Bacteria				
Multiiple	Canine, Feline	Anthrax (Bacillus anthracis)	Direct Contact	Y	Bacteria	Bacterial Spores		Avoid Contact with infected environement, properly dispose of infected carcases	Aldehydes, Halogens (hypochlorite, iodine), Oxidizing Agents
Integument	Canine, Feline	Fleas (Ctenocephalides felis)	Direct Contact, Fomite	N	Parasite	Flea	Moderate	Segregation, Clean Fomites, Flea Control	
Respiratory, Musculo-Skeletal	Canine	Blastomyces dermatitidis	Aerosol	Y	Fungal	Fungi	Low	Avoid Contact with infected environments	
GI	Canine	Campylobacter jejuni	Oral	Y	Bacterial	Gram-Negative	Moderate	Collect Feces, Wash Hands	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
Nervous	Canine	Neospora Caninum	Oral	N	Parasite	Coccidia	Moderate	Collect Feces, Wash Hands	Alkalis, Phenolic Compounds

Enclosure H: Infectious Agent Hazard Analysis and Mitigation Chart

System	Species Affected	Agent	Route of Transmission	Zoonotic	Type	Specific Type	Hazard of Transmission	Mitigation	Cleaner Disinfectant
Respiratory	Canine, Feline	*Bordetella bronchiseptica*	Aerosol	Y	Bacteria	Gram-Negative	Moderate (C3)	Aerosolized disinfection, Isolation, PPE, Wash Hands, Wash fomites, Vaccination	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
Respiratory, GI, Nervous	Canine	Distemper Virus	Aerosol, Oral, Fomite, Direct Contact	N	Virus	Enveloped Virus	Extremely High (B1)	Physical cleaning of bodily fluids, Isolation, PPE, Wash Hands, Vaccination	Acids, Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite and iodine), Oxidizing Agents
GI, Cardiovascular	Canine	Parvo Virus Type 2	Aerosol, Oral, Fomite	N	Virus	Parvovirus	Extremely High (B1)	Strict Isolation, PPE, Wash Hands, Disinfection of bodily fluids, Vaccination	Aldehydes, Halogens (hypochlorite, iodine)
GI	Canine, Feline	Giardia spp.	Oral, Fomite	Y	Protozoan	Protozoan	Extremely High (B1)	Collect Feces, Wash Hands, Dessication	5% sodium hypoochlorite at 1:30 dilution, Quaternary Ammonium
GI	Canine, Feline	Hookworms (Ancylostoma spp., Uncinaria stenocephala)	Oral	Y	Parasite	Nematode	Low (D3)	Collect Feces, Wash Hands	Aqueous iodine at 50-60 ppm, sodium borate, 1% sodium hypoochlorite, 2% glutarldehyde
Urinary	Canine, Feline	*Leptospira spp.*	Oral, Fomite, Direct Contact	Y	Bacteria	Gram-Negative	Extremely High (B1)	Isolation, PPE, Wash Hands, Disinfection of urine, Limit contact sources of infection	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
GI	Canine, Feline	Toxocara spp.	Oral	Y	Parasite	Nematode	Low (D3)	Collect Feces, Wash Hands, Client Education	Aqueous iodine, 1% sodium hydroxide (doesn't kill, but helps to remove)
GI	Canine, Feline	Tapeworms (Dipylidium caninum, Echinococcus spp.)	Oral, Vector	Y	Parasite	Cestode	Low (D3)	Collect Feces, Wash Hands, Vector (Flea) Control	sodium hypochloride
GI	Canine, Feline	Whipworms (Trichuris vulpis)	Oral	N	Parasite	Nematode	Low (D3)	Collect Feces, Wash Hands	30% (v/v) ammonia w/ temperature >30 degrees C
Dermal	Canine, Feline	Ringworm (Microsporum spp., Trichophyton spp.)	Fomite, Direct Contact	Y	Fungal	Fungi	Moderate (B3)	Gloves, Avoid Direct Contact, PPE, Wash Hands, Wash fomites	Alcohol, Aldehydes, Halogens (hypochlorite and iodine)

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System	Species Affected	Agent	Route of Transmission	Zoonotic	Type	Specific Type	Hazard of Transmission	Mitigation	Cleaner Disinfectant
GI	Canine	Salmon Poisoning (*Neorickettsia helminthoe* a)	Oral	N	Parasite	Rickettsia	Low	Confine dead carcasses	Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite, iodine), Oxidizing Agents, Phenolic Compounds
Nervous, Ocular	Canine	Verminous Myelitis (Baylisascaris procyonis)	Oral	Y	Parasite	Nematode	Low		
Multiple	Canine	Babesia Canis	Vector	Y	Parasite	Protozoan	Low	Vector Control (ticks)	
	Canine	Chagas Disease (T. cruzi)	Vector	Y	Parasite	Protozoan	Low	Vector Control, Blood Screening	
Multiple, Ocular, Nervous, Muscular Skeletal	Canine	Ehrlichia	Vector	N	Bacteria	Rickettsiae	Low	Vector Control, Blood Screening	Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite, iodine), Oxidizing Agents, Phenolic Compounds
	Canine	Mycoplasma haemocanis	Vector	N	Bacteria	Mycoplasma	Low	Vector Control, Blood Screening	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
GI, Renal, Integument	Canine	Leishmaniasis	Vector	Y	Parasite	Protozoan	Low	Vector Control, Blood Screening	1% sodium hypochlorite, 2% glutaraldehyde, formaldehyde
Musculo-Skeletal	Canine	Lyme Diseasee (Borrelia burgdorferi)	Vector	Y	Bacteria	Gram-Negative	Low	Vector Control, Blood Screening	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
Multiple, Hematologic	Canine	Rocky Mountain Spotted Fever (Rickettsia rickettsii)	Vector	Y	Bacteria	Rickettsiae	Low	Vector Control, Blood Screening	Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite, iodine), Oxidizing Agents, Phenolic Compounds
Neurologic, Vardiovascular	Canine	West Nile Virus	Vector	Y	Virus	Enveloped Virus	Low	Vector Control, Blood Screening	Acids, Alcohols, Aldehydes, Alkalis, Halogens (hypochlorite and iodine), Oxidizing Agents
Integument	Canine, Feline	Pseudomonas spp.	Direct Contact	Y	Bacteria	Gram Negative	High	PPE, Gloves, Wash Hands	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds
Integument	Canine, Feline	Staph spp. (MRSP)	Direct Contact	Y	Bacteria	Gram Positive	High	PPE, Gloves, Wash Hands	Acids, Alcohols, Aldehydes, Alkalis, Biguanides, Halogens (hypochlorite and iodine), Oxidizing Agents, Phenolic Compounds, Quaternary Ammonium Compounds