

PUBLIC HEALTH RISKS IN ANIMAL SHELTERS

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Master of Public Health Report

Kansas State University

2018

OVERVIEW

1. Learning Objectives
2. Overview of Methods
3. Public health consults
 - a. Shelter A
 - b. Shelter B
4. Ringworm case outbreak
5. Protocols
6. Public health risks in shelters
 - a. Zoonoses
 - b. Animal-related injuries
 - c. Personal safety
7. Conclusion

LEARNING OBJECTIVES

1. To understand the role a shelter veterinarian plays in protecting public health
2. To go through the entire process of a public health consult of an animal shelter
3. To recognize public health hazards in a shelter setting and to work with shelter staff to reduce risks
4. To learn the most effective way to make recommendations for improvement
5. To specifically investigate the public health implications of ringworm in a shelter setting and make recommendations for minimizing risk of human and animal infection

OVERVIEW OF METHODS

- Public health assessments
 - Shelter A
 - Shelter B
- Ringworm outbreak
- Protocols

PUBLIC HEALTH ASSESSMENTS OF 2 ANIMAL SHELTERS

- Association of Shelter Veterinarians: Guidelines for Standards of Care in Animal Shelters
- Preparation
- On-site checklist
 - Personal safety
 - Animal-related injuries
 - Zoonoses
- Report write up
- Recommendations

PREPARATION

- Written infection control document?
- Rabies vaccines for staff
- Local jurisdictional regulations for reporting and managing dog and cat bites and/or scratches to humans
 - Quarantine requirements
- Reportable dog and cat diseases in California



Guidelines for Standards of Care in Animal Shelters

The Association of Shelter Veterinarians • 2010

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**REPORTABLE COMMUNICABLE DISEASES AND CONDITIONS
CALIFORNIA CODE OF REGULATIONS**

Section 2500, 2641.5-2643.20

Reporting to the Local Health Authority

Acquired Immune Deficiency Syndrome (AIDS)
(HIV Infections only: see "Human Immunodeficiency Virus")
Amebiasis †
Anaplasmosis/Ehrlichiosis
Anthrax, human or animal*
Babesiosis †
Botulism (Infant, Foodborne, Wound, Other)*
Brucellosis, animal (except infections due to *Brucella canis*)*
Brucellosis, human*
Campylobacteriosis †
Chancroid
Chickenpox (Varicella) (only hospitalization and death) †
Chlamydia trachomatis infections, including lymphogranuloma
Venereum (LGV)
Cholera*
Ciguatera Fish Poisoning*
Coccidioidomycosis
Creutzfeldt-Jakob Disease (CJD) and Other Transmissible
Spongiform Encephalopathies (TSE)
Cryptosporidiosis †
Cysticercosis or Taeniasis
Dengue*
Diphtheria*
Domoic Acid Poisoning (Amnesic Shellfish Poisoning)*
Encephalitis, Specify Etiology: Viral, Bacterial, Fungal, Parasitic †
Escherichia coli: Shiga Toxin Producing (STEC) incl *E coli O157**
Foodborne Disease † †
Giardiasis
Gonococcal Infections
Haemophilus influenzae, Invasive Disease (report an incident of <15
years of age) †
Hantavirus Infections*
Hemolytic Uremic Syndrome*
Hepatitis A, acute infection †
Hepatitis B (specify acute case or chronic)
Hepatitis C (specify acute case or chronic)
Hepatitis D (Delta) (specify acute case or chronic)
Hepatitis E, acute infection
Human Immunodeficiency Virus (HIV) § (2641-2643) See Note 1
Influenza, deaths in laboratory-confirmed cases for age 0-64 years
Influenza, novel strains (human)
Legionellosis
Leprosy (Hansen Disease)
Leptospirosis
Listeriosis †
Lyme Disease
Malaria †

Measles (Rubeola) †
Meningitis, Specify Etiology: Viral, Bacterial,
Fungal, Parasitic †
Meningococcal Infections*
Mumps
Paralytic Shellfish Poisoning*
Pelvic Inflammatory Disease (PID)
Pertussis † (Whooping Cough)
Plague, Human or Animal*
Poliovirus Infection †
Psittacosis †
Q Fever †
Rabies, Human or Animal*
Relapsing Fever †
Rheumatic Fever, Acute
Rickettsial Diseases (non-Rocky Mountain Spotted
Fever), including Typhus and Typhus-like
illnesses
Rocky Mountain Spotted Fever
Respiratory Syncytial Virus (RSV) ∞
Rubella (German Measles)
Rubella Syndrome, Congenital
Salmonellosis † (Not Typhoid Fever)
Scombroid Fish Poisoning*
Severe Acute Respiratory Syndrome (SARS)*
Shiga Toxin (detected in feces)*
Shigellosis †
Smallpox (Variola)*
Staphylococcus aureus Infections, Severe † †
Streptococcal Infections † (Outbreaks of any type
and individual cases in food handlers and
dairy workers only)
Syphilis †
Tetanus
Toxic Shock Syndrome
Trichinosis †
Tuberculosis †
Tularemia, animal
Tularemia, human*
Typhoid Fever, Cases and Carriers †
Vibrio Infections †
Viral Hemorrhagic Fevers, human or animal* (e.g.,
Crimean-Congo, Ebola, Lassa, and Marburg
viruses)
West Nile Virus (WNV) Infection †
Yellow Fever*
Yersiniosis †

* **Occurrence of Any Unusual Disease** - a rare disease or emerging disease or syndrome of uncertain etiology which could possibly be caused by a transmissible infectious agent or microbial toxin.

† **Outbreak of Any Disease** - occurrence of cases of a disease above the expected level over a given amount of time, in a geographic area or facility, or in a specific population group, including diseases not listed in Section 2500.

ON-SITE CHECKLIST

ON-SITE CHECKLIST

Personal Safety

- Does staff wear PPE during sanitation of animal housing areas (smock, apron, gown, boots, gloves, eye protection)?
- Are the animal housing areas well-ventilated during sanitation or are fumes from the cleaners/disinfectants noticeable?
- Does staff change gloves after handling animal waste and handling animals?
- Does staff remove PPE when leaving the animal housing area?
- Does staff wear PPE (gown, gloves, eye protection, face shield) when making solutions of concentrated stocks of cleaners and disinfectants?
 - Are MSDS sheets for each chemical available?
 - Ask staff if they know the potential hazards of the chemicals and steps to follow to prevent exposure to harmful levels
 - Are written protocols posted in the area to provide directions if staff is contaminated?
 - Observe the preparation of a cleaning solution and disinfectant solution. Are the dilutions appropriate?
 - Are cleaning products and disinfectants mixed together?
- Are wet floors anywhere in the facility appropriately marked by signage to warn about slipping hazards?
- Are hand-washing sinks and/or hand sanitizers available in each animal housing or handling area, human food preparation/eating area, employee and public bathrooms, public areas?
 - Is there soap, disposable paper towels, and garbage can at each sink?
 - Do the hand sanitizers contain at least 60% alcohol?
 - Is there signage at each hand sanitation station to encourage staff, volunteers, and visitors about hand sanitation?
 - Observe to see if staff, volunteers, and visitors sanitize their hands after leaving an animal housing area, handling animals, before eating/drinking/touching face
 - Observe (and time) the hand-washing procedures performed by staff and others
- Do people eat or drink in animal housing areas or smoke in the shelter?
- Are sharps (syringes with needles, surgical needles and blades, broken medication vials, etc) placed in approved sharps boxes with biohazard labels?
 - Are there sharps boxes in animal intake areas, animal treatment areas, anesthesia areas, surgery preparation areas, and operating rooms?
 - Observe staff in intake and medical services areas using syringes with needles. Does staff remove needle caps with their mouth or recap needles? Are needles removed from the syringe bare-handed? Do they dispose of the syringe/needle in a sharps box?
 - Observe disposal of used surgical needles and surgical sharps. Are these handled bare-handed? Are they put in a sharps box?
 - Are the sharps boxes too full?
- Observe disposal of animal blood, secretions/excretions, tissues and blood-contaminated supplies. Is there an approved biohazard bag for disposal?
- Is there a scavenger system for anesthesia gases?
 - Can you smell gases when the anesthesia machines are in use?
 - If a scavenger canister is used, is it properly set up?
 - Is the weight and date written on the canister?
 - Does staff know when to replace the canister?

Animal-related injuries

- Is there a posted policy for handling of animals, including those with behavioral concerns that may result in human injury?
- Observe the handling of various dogs (friendly vs aggressive, large vs small), cats (friendly vs scared vs feral) and wildlife during intake, sanitation, medication, and euthanasia
 - Ask staff if they receive training in basic animal handling skills
 - Note what kind of safety equipment is available for animal handling and observe how it is used
 - Control poles
 - Muzzles
 - Leather gloves
 - Nets
 - Tongs
 - Feral cat boxes
 - Does sanitation of housing units require animal handling? Particularly note what is done in housing units for dangerous animals
- Observe animal handling at intake - note whether the animals are examined for bite wounds or not
 - Does staff wear gloves?
 - What happens when bite wounds are found?
- Observe intake of stray or pet animals over the counter - are the relinquishers asked if the animal has been bitten or scratched anyone in the past 10 days or has had known recent contact with wildlife?
- Are housing units for dangerous animals and rabies quarantines clearly marked with warning or limited access signage?
- Note the "due out" or "review" date on the kennel cards or the computerized record for animals in rabies quarantine
 - Is this in accordance with local regulations?
 - Does the local ordinance require quarantine for biting people only or is scratching people included? What is the shelter policy?
- Note whether volunteers or the public is allowed access to housing areas for dangerous animals and rabies quarantine
- Not if public interaction with animals in housing areas or meet-n-greet areas is supervised by staff. Observe for interactions that threaten human or animal safety
- Are employees/animal control officers/volunteers that handle dogs and cats or wildlife vaccinated against rabies?
- Observe the preparations of tissue for submission for rabies testing if possible
 - What staff performs this task and what training have they received?
 - What PPE is worn (apron, gloves, goggles, face shield)?
 - What happens if the staff is cut or splattered during the process?
- Ask staff member what happens when someone is bitten, scratched, or otherwise injured by an animal. Ask the operations manager the same question

Zoonoses

- Ask the personnel or operations manager and the volunteer coordinator if staff and volunteers receive training on potential zoonotic pathogens, particularly those commonly seen in shelters
- Is there a posted list and description of zoonotic pathogens that staff and volunteers can refer to?
- Is there a posted policy for handling of animals with potential zoonotic infections?
- Where are animals with potential zoonotic infections housed?
 - Is this housing clearly marked with warning or limited access signage?
 - Who is allowed access to the housing area?
- Observe staff and volunteers providing care to animals with potential zoonotic infections
 - Are they wearing appropriate PPE?
 - Ask if they know what to do or who to report to if they are accidentally exposed?
- Are information sheets on zoonotic diseases given to visitors, adopters, and foster-care providers?
 - Do these sheets contain information about increased risk for immunocompromised people, children, and pregnant women with the recommendation to discuss pet selection with their healthcare provider?
- Is signage about zoonotic diseases posted in the lobby, adoption stations, intake areas, housing areas, meet-n-greet areas, medical services areas, staff lounges/locker rooms, etc.?
 - Does signage and/or handouts inform without creating undue alarm?

SHELTER A

Shelter Consultation Report

Date: July 2016

SHELTER A

Kansas State University
Kelly Voss

ANIMAL-RELATED INJURIES

According to the ASV Guidelines, animal shelters should provide policies, training, and equipment necessary to prevent and minimize risk of animal-related injuries.

Strengths Observed

- ❑ **Sanitation of housing units for dogs and cats does not always require animal handling.** Guillotine-style kennels for large dogs and divider slots for cat cages allow for sanitation of housing with little to animal handling. However, some of the cat cages had malfunctioning divider slots which prohibited sectioning of animals.
- ❑ **Dangerous animals are sufficiently separated from parts of the shelter accessible to volunteers and the public.** Dangerous animals and rabies quarantined animals are housed in the back of the shelter in a room clearly marked "Quarantine." This room is locked and only certain staff members have key access. However, some rabies quarantined animals were also housed in the isolation room in cages that are not clearly marked. This room is not locked.
- ❑ **Meet & Greet areas are supervised by staff.** Staff oversees animal introductions to visitors within the animal housing areas.
- ❑ **Safety equipment is available for handling fractious animals, including control poles, muzzles, leather gloves, nets, and feral cat boxes.** All animal handling equipment is kept in the medical room.
- ❑ **The shelter vaccinates animals for rabies prior to adoption.** If an animal is adopted prior to 12 weeks of age, the shelter requires that the animal be vaccinated after adoption when it is old enough.

Concerns Identified

- ❑ **There is no posted policy for handling animals, including those with behavioral concerns that may result in human injury.** The volunteer handbook addresses handling animals with behavioral issues; however, this is not readily available to everyone in the shelter, including visitors. Some identification cards are marked with a red crosshatch, but there is no posted information about what this means.
- ❑ **Employees that handle dogs, cats, and wildlife are not all vaccinated against rabies.** The shelter only requires that animal control officers are vaccinated against rabies, and yet employees and volunteers are often the ones taking care of these animals or preparing rabies test submissions and are therefore most at risk.

- ❑ **Quarantined cats were sometimes housed in the isolation room.** The "due out" dates on quarantined animals were observed to be out of date. These animals should be checked up on regularly to ensure their quarantine is in accordance with local regulations, which is 10 days in San Bernardino County.
- ❑ **There is no written policy about animal related injuries.** There is some information about animal-related injuries in the volunteer handbook, but not everyone has access to this or is given this information. Employees and volunteers didn't always know what to do in the event of a bite or scratch.
- ❑ **Staff and volunteers have not all received training in basic animal handling.** Some reported to be self-taught in animal handling, while others did receive informal training upon starting work at the shelter.

Recommendations

- 1 | **An animal-handling policy should be clearly posted for staff, volunteers, and visitors to see.** In addition, the Safety Manual should provide information for staff and volunteers about handling animals with behavioral concerns. Animals with behavioral issues should have clearly marked signage on their cages that can be understood by everyone. Dangerous animals should only be handled by trained staff members, preferably animal control officers.
- 2 | **Every employee or volunteer that handles potentially rabid animals should be vaccinated against rabies.** Only vaccinated staff should be allowed to perform intake exams on animals with unknown histories, as well as handle any wildlife brought into the shelter. Only trained, vaccinated staff members should be allowed to care for quarantined animals. The most common reservoir for rabies in California is bats, so special precautions should be taken when handling live or dead bats brought to the shelter. The Advisory Committee in Immunization Practices advises that all people who routinely work with companion animals or wildlife receive pre-exposure vaccinations against rabies.
- 3 | **Quarantined animals should be housed in a separate part of the shelter so that only properly vaccinated and trained staff have access to them.** Additionally, animals in isolation due to infectious disease should be housed separately from quarantined animals. "Due Out" dates on quarantined animals (10 days in San Bernardino County) should be acknowledged and animals should be removed from quarantine when their 10 days is up.
- 4 | **The written Safety Manual should include a policy about animal-related injuries.** Animal related injuries, such as bites and scratches, pose a serious risk to staff, volunteers, and visitors at the would increase reporting compliance and documentation of injuries at the shelter. Staff and volunteers should be made aware of what to do in the event of a bite or scratch so appropriate measures can be taken.
- 5 | **Staff and volunteers should be provided adequate training in basic animal handling.** Training opportunities to refresh and improve animal handling skills should be offered at various times throughout the year. Training should include recognition of dangerous animals, proper use of equipment to handle dangerous animals (for designated personnel only), and techniques to minimize animal-human contact when sanitizing cages.

SHELTER B

Shelter Consultation Report

Date: July 2016

SHELTER B

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ZOONOTIC DISEASE

According to the ASV Guidelines, animal shelters are responsible for training staff about zoonotic conditions, protecting the public from diseased animals, and informing visitors, adopters, and foster-care providers of zoonotic disease risks.

Strengths Observed

- Staff and volunteers receive some verbal information about zoonoses (i.e. Why do we wash our hands?) but not always depending on position within the shelter. If there is a disease outbreak in the shelter, a staff meeting will be held where animal handling staff will be reminded to wear personal protective equipment.
- If an animal had a zoonotic disease, it was typically housed in the technician room where it received treatment. Notes on the animal's paperwork indicated which disease the animal had and advised appropriate PPE that should be worn. It is recommended to add the word "zoonotic" to the notes so staff members who are not aware of which diseases are zoonotic can remain informed and safe. The public does not have access to this room.
- Animals are prophylactically dewormed upon intake. Dogs and cats are administered Pyrantel pamoate during their intake exam, which controls for ascarids.

Concerns Identified

- There is no written infection control document for the shelter. The protocols for infection control were verbal only. For ringworm specifically, all cats are Wood's lamp examined upon intake. If a cat illuminates, it will be Lyme-sulfur dipped and moved to the x-ray room, where it is then euthanized. If the Wood's lamp examine is not conclusive, a trichogram is completed. If a cat has a URI, it will be moved to the URI isolation room. If a cat has something other than a URI, it will be moved to the "tech room" where it is treated. Recently MRSA was cultured from several kittens in the kitten nursery, which is located in a portable unit adjacent to the shelter. Specific handling instructions were given to staff members caring for those kittens, including gown and gloves. One of the MRSA infected kittens was moved into foster care.
- Staff and volunteers do not receive enough training on how to respond to zoonotic disease exposure. While they do receive some verbal information about zoonotic diseases, information about what to do in the event of a possible exposure are not communicated. Training should inform staff of how to respond when a zoonotic disease is suspected.

- There is a general lack of posted educational material warning staff, volunteers, and visitors of the potential of zoonotic disease transmission. There are no zoonotic disease signs posted in the lobby, adoption stations, intake areas, housing areas, meet & greet areas, medical services area, or staff break room.
- Information about zoonotic diseases is not always given to visitors, foster homes, or adopters. New foster parents are required to attend an informational presentation which does include some information regarding zoonoses.

Recommendations

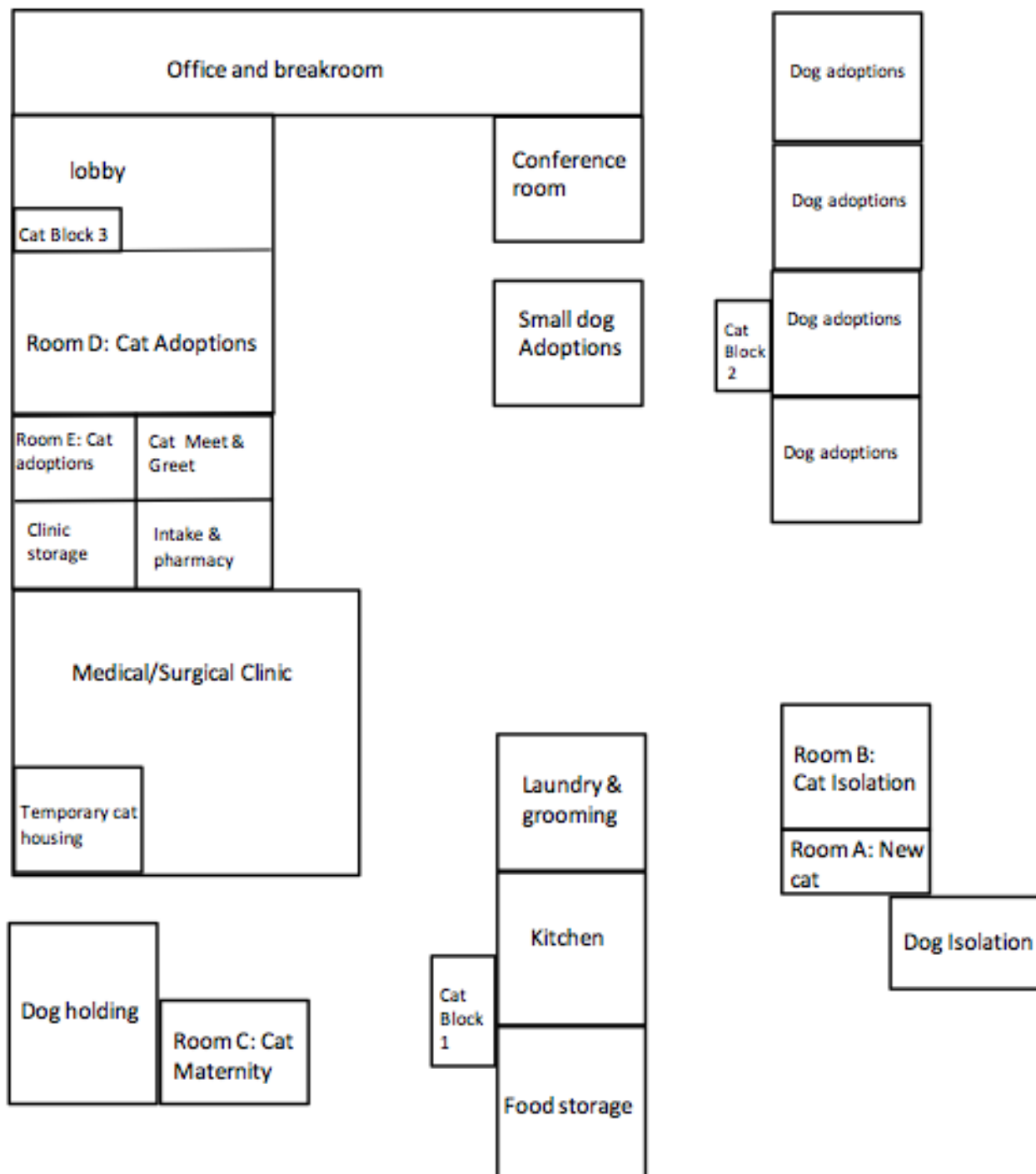
- 1 | Develop a written infection control protocol with special consideration given to zoonotic disease outbreaks. Written guidelines of how to manage a zoonotic disease outbreak would help guide staff to take proper steps to ensuring the best infection control possible. While a verbal protocol is currently in place, written policies can increase consistency and adherence. Human safety should be the priority, and staff, volunteers, and the public should be adequately informed on how to protect their own health.
- 2 | Implement a zoonotic disease training program for staff and volunteers. In addition to the verbal information given to staff and volunteers about zoonotic diseases, an official training program should be in place to educate staff about prevention and management of zoonotic diseases in shelters. Educating staff and volunteers about zoonotic diseases can help decrease animal-to-human disease transmission as well as decrease severity of disease outbreaks by means of early detection. Training should include recognition of clinical signs, modes of transmission, and species affected.
- 3 | Educational material should be posted throughout the shelter to educate staff, volunteers, and visitors about the risks of zoonotic diseases in animal shelters. Signs should be posted near animal handling areas, such as the adoptions room and meet n' greet areas. Signs should include information about commonly transmitted zoonotic diseases in companion animals, precautions to take to prevent transmission of disease, and clinical signs to look for.
- 4 | Information about zoonotic diseases should be provided to visitors, adopters, and foster parents. Informational pamphlets should be readily available in the reception area of the shelter. New adopters and foster parents should be educated about zoonotic disease risks their animals may present to humans in the household.

RINGWORM CASE REPORT

- Background information
- Etiology and susceptibility
- Timeline of investigation
- Outbreak management recommendations
- Initial assessment of feline population
- Case management and treatment
- Case outcomes
- Preventative measures

BACKGROUND INFORMATION

- Shelter A
 - Non-profit organization
 - City's animal control officers
 - WesternU
 - Petco



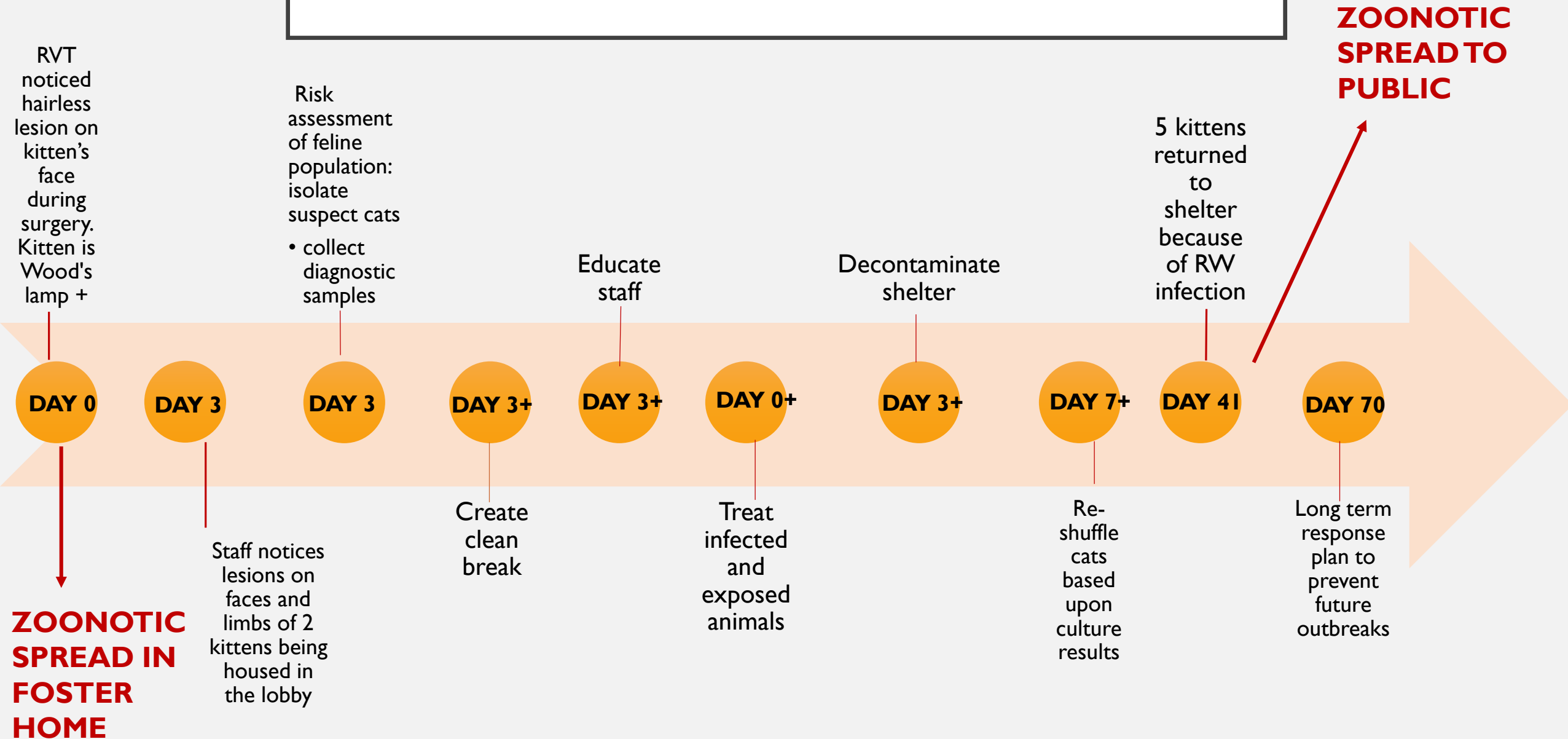
ETIOLOGY AND SUSCEPTIBILITY

- Dermatophytosis (ringworm) is caused by a fungal infection with dermatophytes
 - *Microsporum canis* → 95% of all feline ringworm
 - *Microsporum gypseum*
 - *Trichophyton mentagrophytes*

Factors that increase susceptibility to ringworm:

- Age
- Immunosuppression
 - Pregnancy
 - Lactation
 - Infection
- Parasitic infestation
- Stress

TIMELINE OF INVESTIGATION



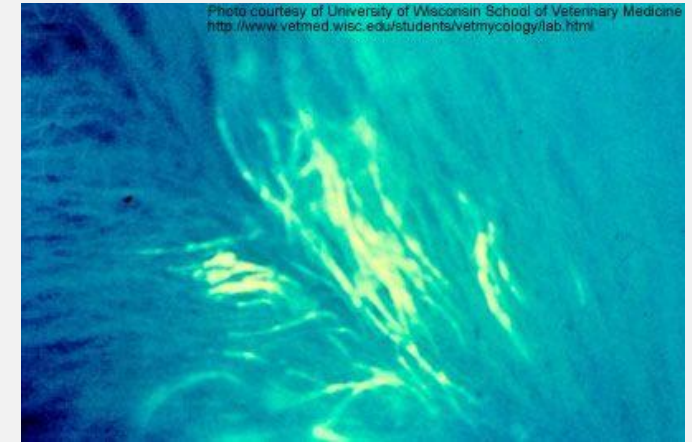
OUTBREAK MANAGEMENT RECOMMENDATIONS

- Immediate action is very important in shelter setting
 - Prevent spread of infection
 - Reduce panic amongst staff
 - Educate about zoonoses
- Written infection control protocol?
- Trace back investigation → foster home
 - Advised foster home to treat cats and environment
 - Do not bring exposed/infected foster cats back to shelter until they are cleared of RW

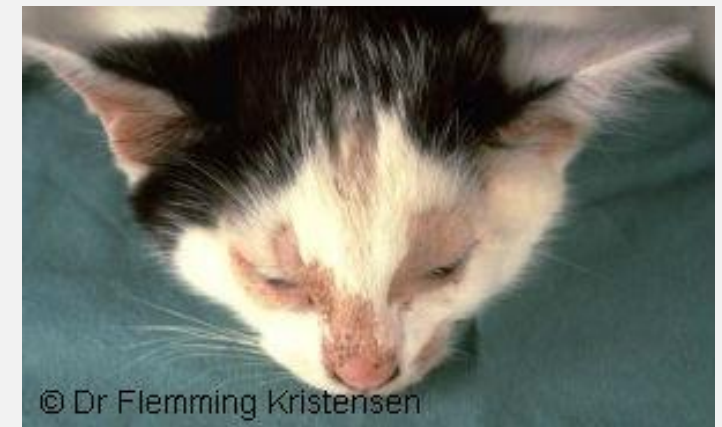
INITIAL ASSESSMENT OF FELINE POPULATION

- Every cat was classified into low, moderate, or high risk groups based upon:
 - Presence of skin lesions
 - Wood's lamp exam
 - Age

	Low Risk	Moderate Risk	High Risk
Age	>1 year	3 months-1 year	<3 months
Lesions	No lesions visible	Lesions visible	Lesions visible
Wood's Lamp Exam	Wood's lamp negative	Wood's lamp negative	Wood's lamp positive
Other disease status (upper respiratory infection, fleas)	No upper respiratory infection,, no fleas	Moderate upper respiratory infection, fleas	Severe upper respiratory infection, fleas
Culture results; pathogen scores P1= <4 colonies P2= 5-9 colonies P3= >9 colonies	P1	P2	P3



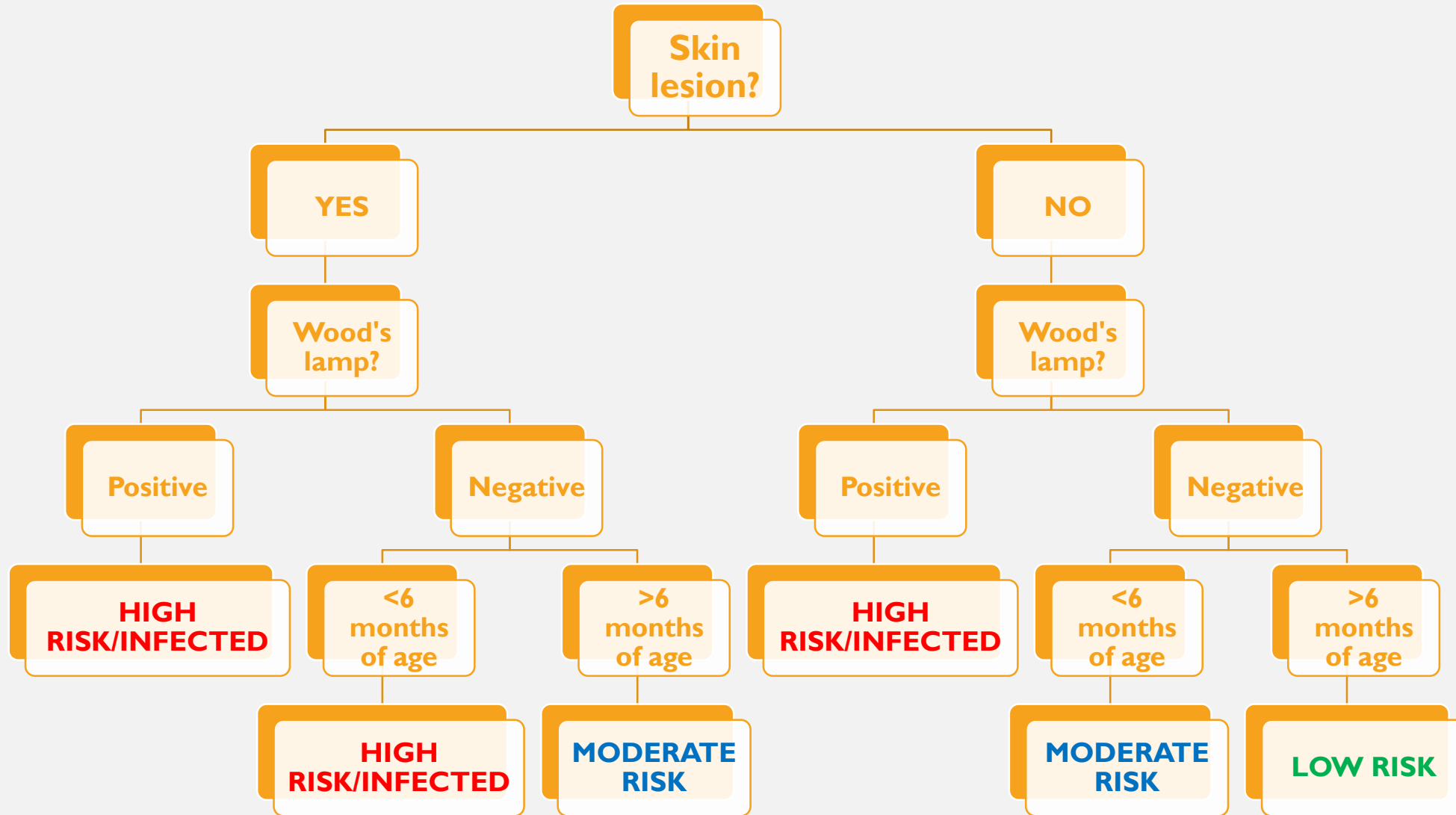
<http://www.vin.com/Members/Associate/Associate.plx?from=GetDzInfo&DiseaseId=800>



© Dr Flemming Kristensen

<https://www.vetstream.com/treat/felis/owner-factsheets/ringworm>

RISK ASSESSMENT FLOW CHART



COLLECT DIAGNOSTIC SAMPLES

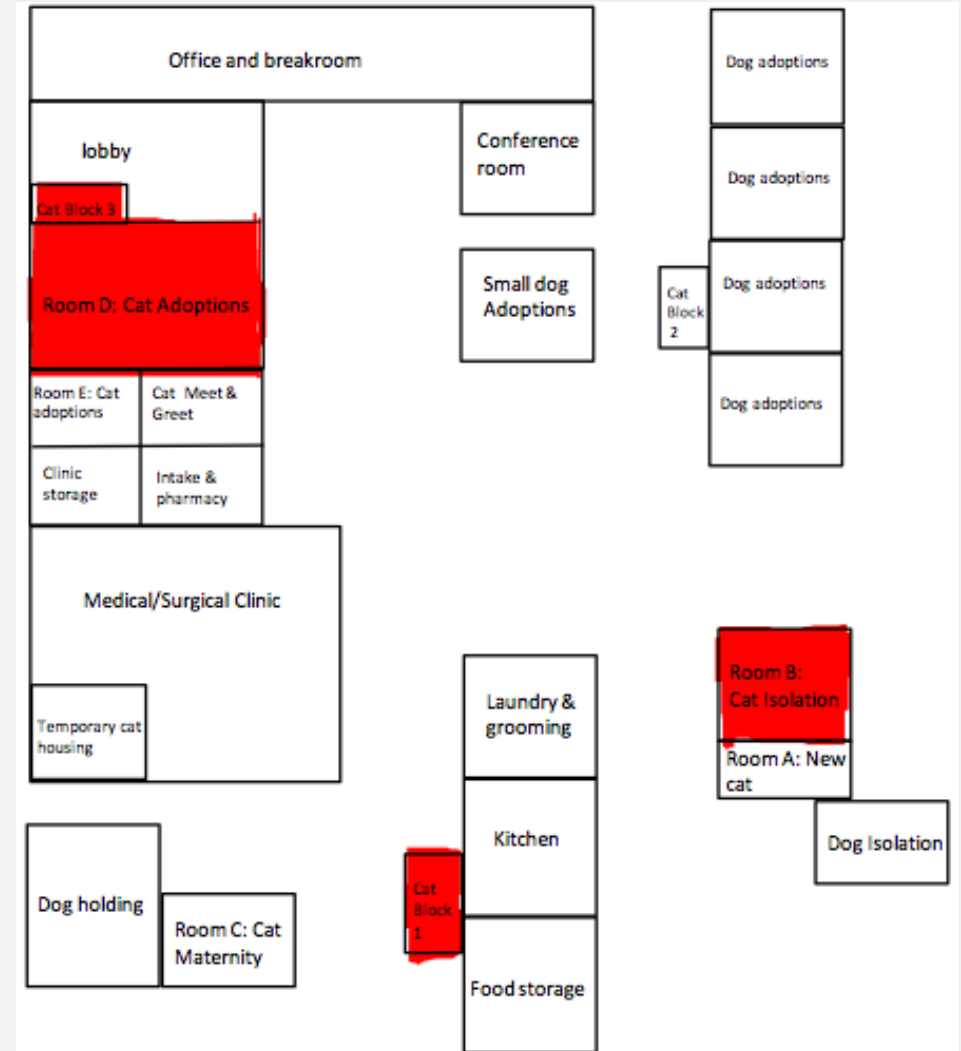
- High and moderate risk cats were cultured on dermatophyte test media (DTM) plates using the toothbrush technique
 - Cultures initially checked daily for color change and growth
 - Microscopic exams looked for presence of **hyphae** and **macroconidia** and a pathogen score was assigned to each plate

Pathogen Score	# of colonies
P1	0-4 colonies
P2	5-9 colonies
P3	>9 colonies

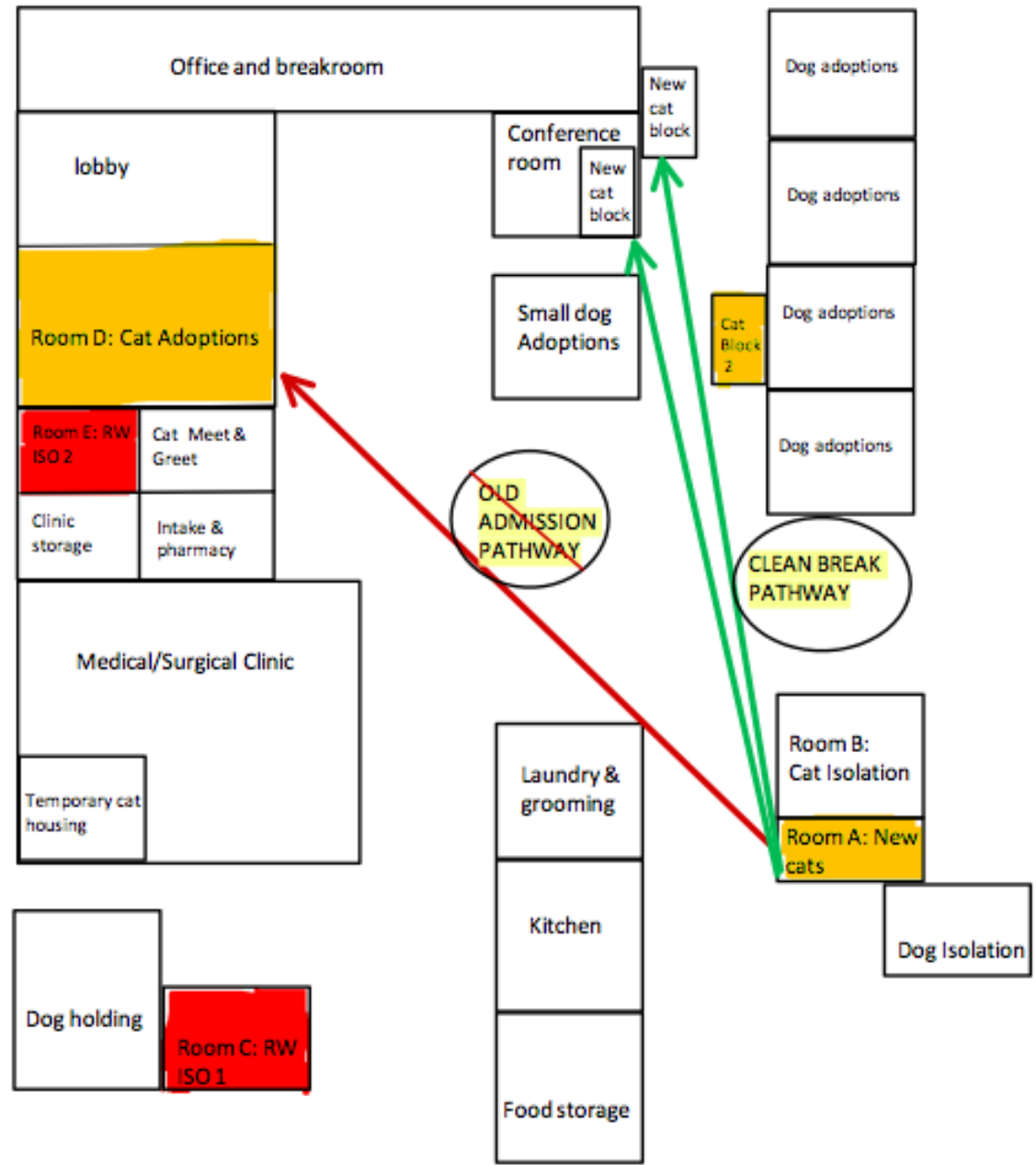


ALTER MOVEMENT OF CATS

- Isolate high and moderate risk cats
 - High risk → Room C
 - Moderate risk → Room E
 - Low risk → left in current housing. Some left in Room D due to lack of space
- Limit movement of animals within the shelter
- Clean break = protect unexposed cats from exposure by altering the flow pattern for cats entering the shelter



Red color indicates rooms where high-risk cats were housed at the time of the initial outbreak



Red color indicates RW isolation rooms with high-risk cats (isolation rooms)
 Orange color indicates rooms with moderate-risk cats (quarantine rooms)
 Cat blocks 1 and 3 were removed from the shelter after initial risk assessment

EDUCATE STAFF

- Medical management
- Environmental control
- Zoonoses education

MEDICAL MANAGEMENT

HIGH RISK	MODERATE RISK	LOW RISK
<ul style="list-style-type: none"> • Perform dermatophyte test media cultures weekly until 2 consecutive negative cultures • Lime-sulfur dips (1:16) every 3 days until cleared from isolation • Oral terbinafine once per day <p><u>Weight range (kg)</u> <u>dose</u></p> <p><2.8 1/4 tablet (62.5 mg)</p> <p>2.8-5.5 1/2 tablet (125 mg)</p> <p>>5.5 1 tablet (250 mg)</p>	<ul style="list-style-type: none"> • Perform dermatophyte test media cultures weekly until 2 consecutive negative cultures • Lime-sulfur dips (1:16) every 3 days until cleared from quarantine 	<ul style="list-style-type: none"> • Lime-sulfur dip (1:16) once

Doses came from: Moriello K CK, Trimmer A, Newbury S, Kunder D. Treatment of shelter cats with oral terbinafine and concurrent lime sulphur rinses. Vet Dermatol 2013;24:618-620

ENVIRONMENTAL CONTROL

- Triple cleaning technique:
 1. Mechanical removal of hair, dirt, debris
 2. Washing affected area with detergent, followed by thoroughly rinsing
 3. Disinfect with 1:32 bleach, allowing 10 min of contact time
- A detailed cleaning protocol was given to the shelter staff, which included daily cleaning, bi-weekly deep cleaning, laundry cleaning, and foster home disinfection

ZOONOSES EDUCATION

- Authorized personnel only
- Personal protective equipment (PPE)
- Informative signs
- Handouts for the public
 - Waivers for new adopters
- Foster education

HOW TO BE SAFE AROUND RINGWORM

1. Always wear PPE (personal protective equipment) when handling ringworm cats and cleaning their cages – gloves, gown, booties over shoes
2. Change your gloves between EACH kennel
3. Do not touch cats between cages or between rooms without changing gloves
4. CLEAN, CLEAN, AND CLEAN AGAIN!
 - a. Wipe down all surfaces ringworm cats have had contact with – first with wet towel to get hairs, and then with BLEACH (1:32 dilution)
 - b. Let bleach sit for 10 minutes before wiping out cage again with wet towel
 - c. NEVER mix bleach with ammonia or acids (many cleaning agents contain ammonia and acids) – these mixtures will create dangerous toxic gases
5. Do not move cats between cages, unless new cats are found to be positive, and then they should be moved to the isolation room
6. Avoid touching your face or skin while wearing your gloves.
7. Remove your PPE and throw it away in the garbage INSIDE the isolation room.
8. Wash your hands before leaving the isolation room (or immediately after leaving if there is no sink)
9. Ringworm is easily transmitted if proper precautions are not taken – keep yourself and the animals protected.



Ringworm lesion on a human

RINGWORM FACT SHEET

WHAT IS RINGWORM?

- Ringworm (dermatophytosis) is a fungal infection affecting the skin, hair, and occasionally the nails of animals and people

WHY DO WE CARE ABOUT RINGWORM?

- Ringworm can be passed between dogs, cats and humans
- Individually ringworm is not very damaging, but since the fungus spreads so easily, even just one case can lead to an outbreak if the disease is not properly managed

WHO IS AT RISK OF GETTING RINGWORM?

- All mammals (including humans) are susceptible to ringworm, but certain groups have higher risk
- AGE: younger animals (< 1 year) and older animals are at higher risk
- SPECIES & BREED: Cats are at higher risk than dogs; long haired animals are at higher risk
- IMMUNE STATUS: animals with compromised immune systems are at higher risk (FIV, FeLV, pregnancy/lactation, malnutrition, stress)
- PREEXISTING CONDITIONS: animals with conditions that affect grooming (URI) or skin integrity (flea allergies, external parasites) are at higher risk

HOW IS RINGWORM SPREAD?

- Ringworm is spread via contact with an infected animal or contaminated environment
- In the outdoor environment, ringworm has been found in rodent nests and in soil
- Ringworm is very tough in the environment and can persist on surfaces for months or years
- Ringworm can be easily spread via contaminated toys, bedding, or by humans on clothes and hands
- The time it takes after exposure for clinical signs to develop is between 4 days and 4 weeks
- Ringworm can be found on the hair of animals from a contaminated environment even if the animal is not showing any signs

WHAT DOES RINGWORM LOOK LIKE?

- The most common clinical sign is a circular area of hair loss and scaling skin
- Most common locations for lesions are the face, ears, feet, tail, toenails
- The skin is often red, swollen, warm, itchy, or painful
- Animals with no apparent lesions could still have ringworm – use Wood's lamp and cultures to confirm

WHAT SHOULD YOU DO IF YOUR ANIMALS HAVE RINGWORM?

- Identify all affected animals
- Segregate affected animals from general population
- Clean all surfaces that suspected ringworm animals have had contact with (floors, carriers, transport vehicles, countertops) with diluted bleach (1:32)
- Disinfect cages and all surfaces in contact with affected cats twice weekly with diluted bleach (1:32). Spot cleaning should be performed on a daily basis.

SAFETY PRECAUTIONS

- Wear personal protective equipment (PPE) when working with suspected or confirmed ringworm animals (long sleeve gown, gloves, shoe covers)
- Change gloves between touching animals and their environment (cage or kennel), and change gown if animal touches the gown (try to prevent contact if possible).
- Remove and discard PPE before leaving the quarantine area to reduce chances of ringworm spreading outside the quarantine area
- Do not mix cleaning agents with bleach – this could create a very dangerous gas



RE-SHUFFLE CATS BASED UPON CULTURE RESULTS

- Moderate and high risk cats were cultured until 2 consecutive cultures were achieved
- Ongoing process...
 - Day 32: a positive cat was found in Room D (quarantine) → moved him to Room E
 - Raised concerns over staff compliance with disinfection protocol because this kitten (and his littermate) had 2 consecutively negative cultures prior to the appearance of the lesion
 - Room E (moderate risk initially) became another isolation room after 5 more kittens had positive cultures
 - Environment culture: negative
 - Suspected lack of compliance with sanitation protocol and proper use of PPE

FLEXIBLE TIMELINE

6 kittens
RW
positive in
quarantine
room

DAY 32

Risk assessment
of feline
population:
isolate suspect
cats

- collect
diagnostic
samples
- Culture
environment

Treat
infected
and
exposed
animals

DAY 35

Shelter
manager
suddenly
removed from
position

Decontamination
of shelter

Re-
shuffle
cats
based
upon
culture
results

1 kitten
returned
to
shelter
upon
suspicion
of RW

DAY 38

4 kittens
returned
to
shelter
upon
suspicion
of RW

DAY 41

**ZOONOTIC
SPREAD!**

Last
kitten is
cleared
of RW

DAY 75

CASE OUTCOMES

- Total # of cats cultured: 84 (71 in shelter, 13 in foster)
- Ringworm positive cats: 47 (34 in shelter, 13 in foster)
 - Incidence of ringworm in the shelter over a 15 week period = 41%
 - Incidence of ringworm in the shelter & foster care over a 15 week period = 49%
- Total # of humans infected: 5
- Total # cats returned to shelter due to RW: 5
- Duration of outbreak: 75 days

PREVENTATIVE MEASURES

- Intake exams
 - Wood's lamp exam
- Staff education and training → zoonotic diseases!
- Communication
- Staffing capacity
- Personal protective equipment
- Cat housing
 - Locations (lobby, hallways)
 - Appropriate enrichment
- Lack of developed foster program

PROTOCOLS

Appendix C - Zoonotic disease protocol

PROTOCOL FOR HANDLING ANIMALS SUSPECTED OF ZONOTIC DISEASE INFECTION

1. Any animal suspected of having a zoonotic disease (see list below) should be identified upon admission. *If rabies is suspected, the animal should not be handled and the animal control officer should be the sole person responsible for this animal until rabies quarantine is cleared.*
2. The suspected infectious animal(s) should be placed in isolation housing, separate from the general population of animals at the shelter.
3. Adequate signage should be placed on entry ways to the isolation room and on individual animal cages prohibiting unauthorized persons from entering. Only trained staff members should be authorized to enter the isolation room.
4. Proper personal protective equipment (PPE) must be worn when handling animals in isolation. PPE should be donned before entering the isolation room and removed and disposed of at the doorway immediately before leaving the isolation room.
 - a. Gloves
 - b. Disposable long-sleeved gown
 - c. Shoe covers
 - d. Facial protection
5. Any item in contact with suspected infectious animal should be considered contaminated and should be cleaned or disposed of only by authorized personnel wearing appropriate PPE. If possible all husbandry supplies for isolation animals should be cleaned and stored within the isolation room.
6. Hands should be washed immediately after removal of PPE.

Zoonotic diseases of concern in animal shelters include:

1. Bartonellosis
2. Brucellosis
3. Bubonic plague
4. Campylobacteriosis
5. Cutaneous larval migrans
6. Dermatophytosis
7. Giardiasis
8. Leptospirosis
9. Psittacosis
10. Rabies
11. Rickettsioses
12. Salmonellosis
13. Scabies
14. Toxocariasis
15. Toxoplasmosis

Key point: isolation

Key point: adequate signs

Key point: personal protective equipment

Key point: hand hygiene

PROTOCOL FOR DOG OR CAT BITE/SCRATCH TO STAFF MEMBER

Use this protocol when any person is bitten by an animal while on shelter property
Adapted from Investigation, Management, and Prevention of Animal Bites in California produced by the California Department of Public Health

1. Initiate immediate first-aid treatment to the bite victim
 - a. Vigorously wash the bite wound with soap and water
 - b. Irrigate the wound with normal saline (especially important for deep puncture wounds)
2. If the bite is severe, deep, entails considerable tissue damage, or is to parts of the body more sensitive or susceptible to infection, the victim should immediately seek medical care
3. Keep the biting animal isolated and confined away from public access. Post signage on the animal's cage prohibiting handling of the animal until the incident is investigated by a qualified health officer.
4. Report the bite to the shelter manager, who will then report the bite to the Upland animal control officer who will file a report to the local health officer
 - a. California regulation (17 California Code of Regulations [CCR] 2606 mandates that all bites from animals susceptible to rabies be reported to the local health officer
 - b. San Bernardino County health officer: Maxwell ~~Qhikhuare~~, MD
 - i. (909) 387-6218
 - ii. mohikhuare@dph.sbcounty.gov
5. Animal bite investigation is initiated (local health officer may delegate to department of public health, city or county law enforcement, or municipal animal control)
 - a. Verify accuracy of initial report and collect additional information about the alleged bite incident
 - b. Determine the risk of rabies virus transmission
 - c. Identify measures to reduce or eliminate the potential for additional bite incidents
6. Follow instructions from local health officer for how to manage the biting animal (quarantine, vaccination, euthanasia, etc.)

****If a person is scratched (but not bitten):** Initiate first-aid treatment and seek medical attention if the scratch is deep, entails considerable tissue damage, or is to parts of the body more sensitive or susceptible to infection. Per the CDPH, "Abrasions or scratches inflicted by the claws of an animal do not constitute a rabies exposure per se. Rabies transmission requires deposition of viable virus onto nerve endings which lie below the epidermis. Superficial scratches that do not penetrate the dermis and draw blood do not provide an avenue for rabies infection. Similarly, deep scratches for which subsequent deposition of fresh saliva can be ruled out do not represent possible rabies exposures. If injuries inflicted by an animal's nails are deep or extensive, and subdermal contamination with saliva is likely, the potential for rabies transmission should be considered."

Key point: immediate first-aid

Key point: medical attention if necessary

Key point: isolate biting animal

Key point: report the incident

Key point: bite investigation

PUBLIC HEALTH RISKS IN SHELTERS

Public health risks in animal shelters can be divided into three major categories:

1. Zoonoses
2. Animal-related injuries
3. Personal Safety

ZOONOSES

- Transmission
 - Direct
 - Indirect
- Shelter design

TRANSMISSION ROUTES OF ZOOBOTIC DISEASES OF COMPANION ANIMALS

Aerosol

Inhalation of droplets passed through the air from an infected animal. Exposure can occur from droplets created by coughing, sneezing, or from air-borne dust or soil contaminated with feces, urine, saliva or bacteria.



Vectors

Transfer of certain pathogens can occur from an infected animal to another animal or person by insects, such as fleas, ticks or mosquitoes.



Oral

Ingestion of food or water, such as unpasteurized milk or under cooked meat, contaminated with a pathogen. Eating or drinking after handling animals or feces without washing your hands can also lead to oral transmission of diseases.



Direct Contact

Exposure can occur when a pathogen directly touches an open wound or mucous membranes. It can also be transmitted by bites and scratches and rarely through direct penetration of the skin.



Fomites

Objects or surfaces contaminated by an infected animal can lead to pathogen exposure for other animals and people. Examples include cages, aquaria, bowls, toys, or bedding.



FACTORS TO CONSIDER REGARDING DISEASE TRANSMISSION

- Incubation periods
- Shedding period
- Clinical signs – easily recognizable?
- Stability or resistance of the pathogen
- Population density
- Vector control

SHELTER DESIGN & ZOONOSES

- Isolation
- Animal stress
- Materials that are easy to disinfect
- Barriers
- Health check system
- Ventilation
- Flow through the shelter

ZOONOTIC DISEASES OF IMPORTANCE IN SHELTERS

- American trypanosomiasis
- Bartonellosis
- Brucellosis
- Bubonic plague
- Campylobacteriosis
- Cutaneous larval migrans
- Dermatophytosis
- Giardiasis
- Leptospirosis
- Lyme borreliosis
- Rabies
- Rickettsioses
- Salmonellosis
- Scabies
- Toxocariasis
- Toxoplasmosis
- Tularemia

Zoonotic Diseases of Companion Animals

Routes of Transmission

This handout lists potential routes of transmission of select zoonotic diseases between animals and humans.

Additional routes may occur between animals.

Direct Contact and Fomite

These diseases may be spread by bites, scratches, or direct contact with animal tissues or fluids (e.g., urine, feces, saliva). Disease transmission may also occur indirectly through contact with contaminated objects or surfaces (fomites), such as cages, aquaria, bowls, or bedding.

- | | | |
|-----------------------|--|------------------|
| • Acariasis (mange) | • Lymphocytic Choriomeningitis | • Pasteurellosis |
| • Brucellosis | • Melioidosis | • Plague |
| • Cat Scratch Disease | • Monkeypox | • Q Fever |
| • Dermatophytosis | • Mycobacteriosis | • Rabies |
| • Glanders | • Methicillin-Resistant Staphylococcus aureus (MRSA) | • Rat Bite Fever |
| • Influenza | | • Salmonellosis |
| • Leptospirosis | | • Sporotrichosis |
| | | • Tularemia |

Oral

These diseases can be transmitted by ingestion of food or water contaminated with a pathogen. This typically occurs from fecal contamination from unwashed hands or soil contact.

- | | | |
|----------------------------|----------------------|-----------------|
| • Baylisascariasis | • Echinococcosis | • Toxocariasis |
| • Campylobacteriosis | • Giardiasis | • Toxoplasmosis |
| • Cryptosporidiosis | • Hookworm Infection | • Trichuriasis |
| • Escherichia coli O157:H7 | • Leptospirosis | • Tularemia |
| | • Salmonellosis | • Yersiniosis |

Aerosol

These diseases can be transmitted through the air by droplet transfer, fluids aerosolized from an animal to a person (e.g., sneezing or cough) or by aerosolized materials which are inhaled.

- | | | |
|------------------------|-----------------|-------------|
| • Bordetella Infection | • Leptospirosis | • Q Fever |
| • Cryptococcosis | • Melioidosis | • Tularemia |
| • Hantavirus | • Plague | |
| • Influenza | • Psittacosis | |

Vector-borne

These diseases are transmitted by an arthropod vector.

- | | | |
|--------------------------|--------------------------------|---------------------------------------|
| FLEAS | TICKS | TRIATOMINE
("kissing bugs") |
| • Plague | • Ehrlichiosis | • Trypanosomiasis |
| MOSQUITOES | • Lyme Disease | (Chagas disease) |
| • West Nile Encephalitis | • Rocky Mountain Spotted Fever | |
| SAND FLIES | • Tularemia | |
| • Leishmaniasis | | |



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Zoonotic Diseases of Companion Animals

By Animal Species

This handout lists select zoonotic diseases that may be carried by companion animals and potentially transmitted to humans.

Most zoonoses can be prevented when proper precautions are taken.



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Dogs

Brucellosis	Leptospirosis	Mange (acariasis)
Campylobacteriosis	Larva Migrans:	Rabies
Dermatophytosis (ringworm)	Hookworms	Salmonellosis
Ectoparasites: fleas, ticks	Roundworms	
	Whipworms	

Cats

Campylobacteriosis	Ectoparasites: fleas, ticks	Rabies
Cat Scratch Disease	Larva Migrans	Salmonellosis
Cryptococcosis	Mange (acariasis)	Sporotrichosis
Dermatophytosis (ringworm)	Plague	Toxoplasmosis
	Q Fever	

Ferrets and Rabbits

Ferrets	Roundworms	Pasteurellosis
Campylobacteriosis	Salmonellosis	Salmonellosis
Dermatophytosis (ringworm)	Tuberculosis	Tularemia
Ectoparasites: fleas	Rabbits	Yersiniosis
Influenza	Cheyletiellosis	
Rabies	Dermatophytosis	
	Ectoparasites	

Rodents

Gerbils	Hamsters	Hedgehogs	Mice and Rats
Ectoparasites	Campylobacteriosis	Dermatophytosis (ringworm)	Ectoparasites
Leptospirosis	Dermatophytosis (ringworm)	Lymphocytic choriomeningitis	Dermatophytosis (ringworm)
Salmonellosis	Ectoparasites	Salmonellosis	Leptospirosis
Tularemia	Leptospirosis	Yersiniosis	Lymphocytic choriomeningitis
Guinea Pigs	Lymphocytic choriomeningitis		Pasteurellosis
Campylobacteriosis	Mange (acariasis)		Rat bite fever
Chlamydiosis	Pasteurellosis		Ringworm
Dermatophytosis (ringworm)	Salmonellosis		Salmonellosis
Ectoparasites	Tularemia		Yersiniosis
Lymphocytic choriomeningitis			Prairie Dogs
Pasteurellosis			Ectoparasites
Salmonellosis			Monkeypox
Sarcoptic mange			Plague
Tularemia			

Pet Birds

Campylobacteriosis	Newcastle disease	Salmonellosis
Cryptococcosis	Pasteurellosis	Tuberculosis
Ectoparasites	Psittacosis	

Reptiles and Amphibians

Campylobacteriosis	Mycobacteriosis	Salmonellosis
--------------------	-----------------	---------------

Aquarium Fish

Chlamydiosis	Erysipeloid	Melioidosis
Cryptosporidiosis	Mycobacteriosis	Salmonellosis

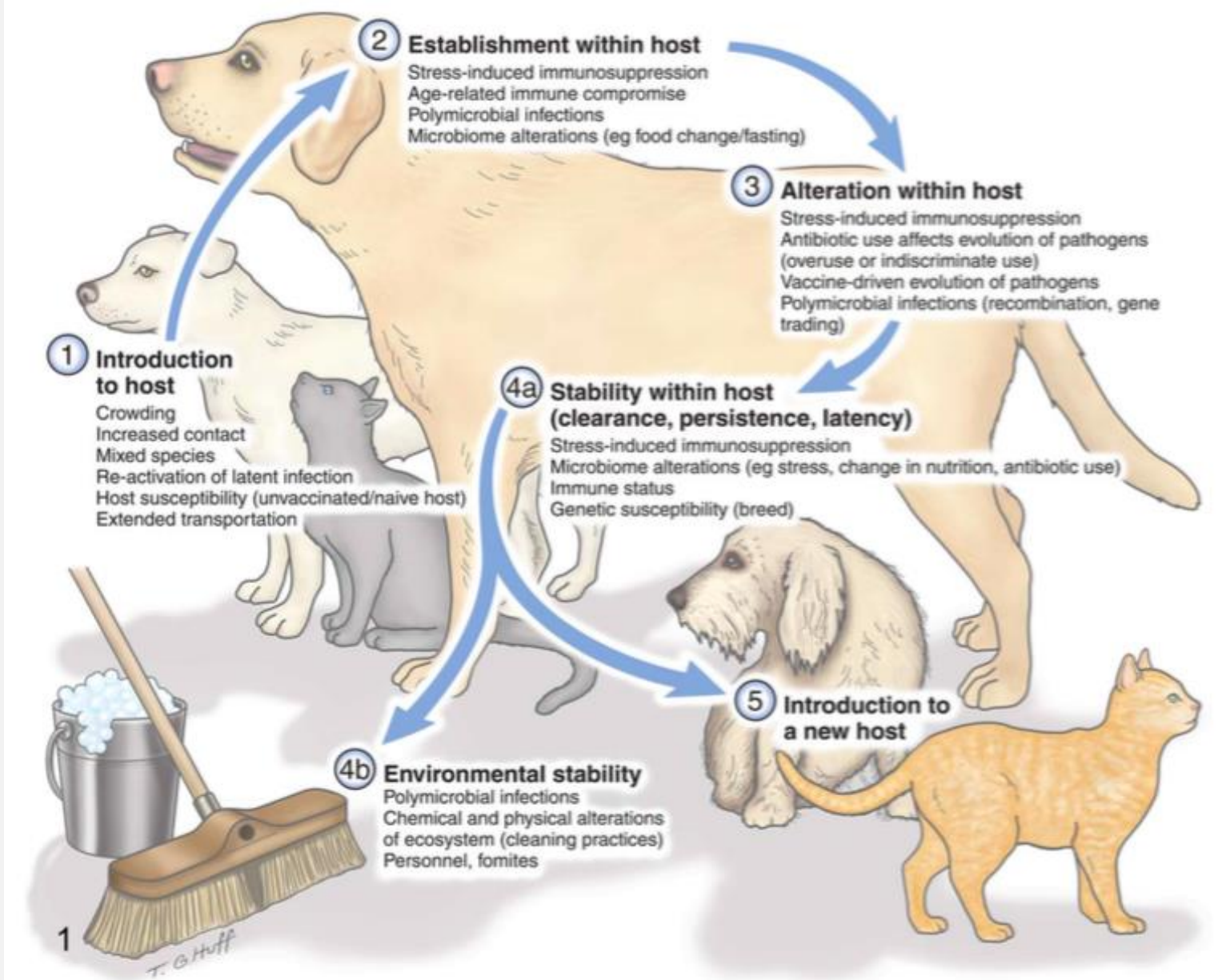


Figure 1. Reasons that an intensively housed environment, like a shelter, can contribute to the emergence of novel pathogens, to novel hosts targeted by a pathogen, or to altered virulence.

ZOONOSES PREVENTION

1. Hand hygiene
2. Proper use of personal protective equipment (PPE)
3. Zoonotic disease training for staff



WASH YOUR HANDS

- Wet hands and forearms with warm water
- Add at least 3-5 mls of soap (the size of an olive)
- Lather up and vigorously scrub each side of the hands beyond the wrist for 10-30 seconds, cleaning under rings and scrubbing dirty fingernails
- Rinse under warm water until no soap residue remains
- Turn off running water with a paper towel, not bare hands
- Dry hands with paper towel or hot air dryer

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

- #### 1. GOWN

 - Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
 - Fasten in back of neck and waist
- #### 2. MASK OR RESPIRATOR

 - Secure ties or elastic bands at middle of head and neck
 - Fit flexible band to nose bridge
 - Fit snug to face and below chin
 - Fit-check respirator
- #### 3. GOGGLES OR FACE SHIELD

 - Place over face and eyes and adjust to fit
- #### 4. GLOVES

 - Extend to cover wrist of isolation gown

USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

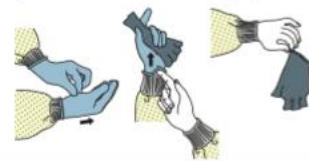
- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene





HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 1


There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:


- #### 1. GLOVES

 - Outside of gloves are contaminated!
 - If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
 - Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
 - Hold removed glove in gloved hand
 - Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
 - Discard gloves in a waste container
- #### 2. GOGGLES OR FACE SHIELD


 - Outside of goggles or face shield are contaminated!
 - If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
 - Remove goggles or face shield from the back by lifting head band or ear pieces
 - If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container
- #### 3. GOWN

 - Gown front and sleeves are contaminated!
 - If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
 - Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
 - Pull gown away from neck and shoulders, touching inside of gown only
 - Turn gown inside out
 - Fold or roll into a bundle and discard in a waste container
- #### 4. MASK OR RESPIRATOR

 - Front of mask/respirator is contaminated — DO NOT TOUCH!
 - If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
 - Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
 - Discard in a waste container
- #### 5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE



ZOONOTIC DISEASE TRAINING

- 2010 study → assessed zoonoses knowledge of shelter workers before and after implementation of a zoonotic disease training session
- The results of the study showed a statistically significant difference between pre-test and post-test scores for:
 - species susceptibility
 - clinical signs
 - routes of transmission
 - zoonotic disease transmission
- No association was observed between test scores and role in the shelter or years experience working in shelters
- Take away message → educational training in zoonotic diseases improves knowledge of shelter workers

Table 1. Identification of routes of disease transmission to humans, routes of disease transmission to animals, susceptible species and clinical signs of zoonotic diseases by pre-test and post-test scores by 111 employees and volunteers in nine animal shelters in four U.S. states who participated in zoonotic disease awareness training

Disease	Pre-test score (%)	Post-test score (%)	Change in score
Plague			
Routes of transmission to humans	53.0	73.9	+20.9
Susceptible species	77.8	91.9	+14.1
Clinical signs	38.7	49.8	+11.1
Routes of transmission to animals	64.5	75.7	+11.2
Rabies			
Routes of transmission to humans	57.3	64.0	+6.7
Susceptible species	86.4	90.7	+4.3
Clinical signs	39.8	55.4	+15.6
Routes of transmission to animals	55.9	81.5	+25.6
Leptospirosis			
Routes of transmission to humans	20.6	59.2	+38.6
Susceptible species	39.5	73.5	+34.0
Clinical signs	18.9	43.3	+24.4
Routes of transmission to animals	37.0	73.3	+36.3
Parasites – internal			
Routes of transmission to humans	68.6	68.7	+0.1
Susceptible species	76.4	80.5	+4.1
Clinical signs	57.1	62.5	+5.4
Routes of transmission to animals	63.2	72.5	+9.3
MRSA			
Routes of transmission to humans	35.5	66.1	+30.6
Susceptible species	55.2	66.6	+11.4
Clinical signs	19.1	42.3	+23.2
Routes of transmission to animals	44.5	69.4	+24.9
Salmonella			
Routes of transmission to humans	74.5	83.8	+9.3
Susceptible species	72.0	73.9	+1.9
Clinical signs	58.5	63.7	+5.2
Routes of transmission to animals	74.1	83.3	+9.2

ANIMAL-RELATED INJURIES

- Bites and scratches
 - Pasteurella
 - Capnocytophaga
- Minimize risks → prevention through design
 - Guillotine-style housing
 - Partitions in cat cages
 - Feral cat boxes
 - Other equipment
 - Appropriate identification of dangerous animals
 - Monitored visitor interactions
 - Behavior training for staff and volunteers

PERSONAL SAFETY

Physical hazards

- Wet floors
- Loud noises
- Accidental needle sticks

Chemical hazards

- Cleaning agents
- Hazardous drugs
- Latex
- Waste anesthetic gases
- Pesticides

CONCLUSIONS & OBJECTIVE ANALYSIS

1. To understand the role a shelter veterinarian plays in protecting public health
2. To go through the entire process of a public health consult of an animal shelter
3. To recognize public health hazards in a shelter setting and to work with shelter staff to reduce risks
4. To learn the most effective way to make recommendations for improvement
5. To specifically investigate the public health implications of ringworm in a shelter setting and make recommendations for minimizing risk of human and animal infection

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QUESTIONS?