Have you “herd”?
You can’t disinfect EWWW!

Infectious diseases and the
importance of cleaning protocols

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YOU CAN'T DISINFECT
POO .... EWWWW

Lecture Overview

- Principles of disease prevention
- Discussion of common diseases
- Treatment Strategies
- Outbreak Management
- Cleaning and disinfecting protocols

Principles of Disease Prevention

- Infectious disease control prioritizes the utilization of measures that prevent and manage infectious disease in individual animals as well as steps to ensure that the health and welfare of the entire population is also protected.

"Herd Health"

Three requirements for disease spread

- A source of infection sufficient to cause disease (pathogen)
- A susceptible host
- A mode of transmission of the infection to another host for the disease to continue

Typically, the population of animals is constantly changing. Therefore, breaking the cycle of transmission is usually the focus. We do this by decreasing exposure to pathogens.

Three Aims of infection control

- Minimize any factors that may lead to increase host susceptibility
- Optimize every individual animal's ability to resist disease.
- Simultaneously decrease the likelihood of exposure to the pathogens that cause disease.

Note that regardless of your program or set-up, any time animals of different ages, backgrounds, stress levels and health conditions come together infectious diseases will occur.

Host susceptibility

- Avoid dietary changes
- Avoid unnecessary treatments
- Keep population within the capacity to care
- Enrich the environment/decrease stress & overcrowding.

Optimize ability to resist disease

- Vaccination
  - Ideally immediate vaccination of all animals as they enter a facility, including those pregnant and mildly ill
- Parasite control
  - Tailored to zoonotic parasites and to regional and facility parasite prevalence

Modes of disease transmission

- Direct transmission: the body surface of one animal touches the body surface of another animal
- Indirect or Fomite transmission: a animal comes into contact with a contaminated inanimate object. (not washing hands/bowls)
- Droplet transmission: small, infectious droplets travel through the air and land on another animal's mucous membranes or in the environment. (sneezing)
- Airborne transmission: infectious residue in dried droplets or dust remain suspended and travel through the air. (cleaning)
- Vector transmission: another living animal serves as an intermediary to transmit diseases to the next animal. (mosquitos/rodents/fleas/ticks)

Preventing disease transmission is complicated

- Many diseases cause similar symptoms
- Some animals may be sick but not showing any signs or may be “carriers” that only shed the disease periodically
- Disease may be short-lived or killed easily, or persist in the environment

The key to disease control is to ensure that staff working with animals understand that there are many agents of disease capable of being transmitted by a variety of modes.

Decrease exposure to pathogens

- Facility design
  - Sink, drainage, water supply
  - Ventilation/HVAC system
  - Animal housing and isolation rooms
  - Human & animal traffic patterns (healthy to sick)
  - Segregation (species, age, physical/health & behavior status)

Decrease exposure to pathogens cont.

- Administrative measures
  - Written plans → communicated & followed
  - Hand hygiene ** single most important thing **
  - Monitoring and removing ill animals
  - Managing people/animals during an outbreak
- Personal Protective Equipment (PPE)
  - Only serves as a barrier to pathogens so it should not be the only precaution utilized.
  - Use of disposable gloves, disposable or routinely laundered gowns, and protective foot wear can help reduce indirect transmission and minimize exposure to zoonotic pathogens.

Common Diseases

- Respiratory
  - Feline Upper Respiratory Disease
  - Canine Kennel Cough Complex
  - Canine Distemper
  - Canine Influenza
- Gastrointestinal
  - Canine Parvovirus and Coronavirus
  - Feline Panleukopenia
  - Internal parasites
  - Bacterial and Protozoal infections

Common Disease cont.

- Dermatological
  - Dermatophytosis (“Ringworm”)
  - Ectoparasites
- Other
  - Rabies
  - Feline Leukemia & Feline Immunodeficiency Virus
  - Feline Infectious Peritonitis
  - Vector-Borne Diseases
  - Heartworm Disease

Feline Upper Respiratory Disease

- Causes
  - Feline Herpesvirus (FVR) and Calicivirus are most common.
  - Bacterial agents: *Bordatella bronchiseptica, Chlamydophila felis, Mycoplasma* species
- Transmission
  - highly infectious transmitted primarily in ocular, nasal and oral secretions
  - Primarily by fomites or direct transmission
  - Droplet transmission (group housing, cages facing each other < 4 feet apart)

Feline Upper Respiratory Disease

- Herpesvirus can live up to 18 hours outside the body in a moist enviroment.
  - Once infected, shedding can occur as early as 24 hours after infection and lasts for 1-3 weeks.
- Calicivirus can survive up to 28 days at room temperature in the environment even in a dried state.
  - Also can shed < 24 hours after infection and can last 30 days. Half of cats were still shedding infection after 2 months.

Canine Kennel Cough Complex

- Causes (many !!)
  - Canine adenovirus-1 (CAV-2)
  - Canine parainfluenza virus (CPiV)
  - Canine respiratory coronavirus (CRCoV)
  - Canine herpesvirus (CHV)
  - Canine distemper virus (CDV)
  - Canine influenza virus (CIV)
  - *Bordatella bronchiseptica*
  - *Mycoplasma cynos*
  - *Streptococcus equi* subsp. *zooepidemicus*

Canine Kennel Cough Complex

- Transmission
  - Direct – when sharing kennels, when solid walls are not used to separate runs, or when dogs have common run areas where they may be exposed to mucous
  - Airborne (aerosolization)
  - Indirect/Fomite
  - Fecal/oral (Distemper virus)
- Incubation periods may be as short as 2 days and as long as 14 days.

Canine Distemper

- Causes
  - Canine distemper virus
  - Found in all body secretions and excretions depending on the stage of infection
- Transmission
  - Airborne
  - Direct contact
  - Indirect/Fomite – however, virus does not remain infectious for more than hours to a few days.
- Incubation
  - Depends on the virus and the host
  - Ranges from less than 2 weeks up to 6 weeks post infection

Canine Influenza

- Causes
  - H2N8 Influenza A virus
- Transmission
  - Airborne
  - Droplet
  - Direct contact with respiratory secretions
  - Indirect/Fomite
- Incubation
  - 2 to 4 days from exposure

Shelter facilities area at high risk for CIV, and CIV has spread to multiple shelters in CA, CO, DE, FL, KY, NY, PA, UT and WY.

Closely related to equine H3N8 – suggests interspecies transmission, followed by viral adaptation to the dog.

Feline Panleukopenia

- Cause
  - Feline Panleukopenia virus AKA “feline distemper”
    - Leads to cerebellar hypoplasia in unborn kittens
- Transmission
  - Direct contact (cat to cat; in the environment; transplacental)
  - Droplet
  - Fecal/oral (even via flies & mosquitos)
- Incubation
  - 2 to 10 days
  - Virus can stay in the environment for months to years

Canine Parvovirus

- Cause
  - Canine Parvovirus – most significant because of highly contagious nature and ability to survive long-term in the environment
- Transmission – highly contagious !!!
  - Direct contact with contaminated feces
  - Indirect/fomite
  - Airborne (aerosolized while cleaning??)
- Incubation
  - Commonly 7 to 14 days
  - Recent strains – 4 to 6 days

Canine Coronavirus

- Cause
  - Canine coronavirus
- Transmission
  - Same as parvovirus
- Incubation
  - 1 to 3 days

Generally regarded as a mild, usually sublethal, hightly contagious disease of puppies < 12 weeks old.

Coronavirus is easily inactivated by most commercial detergents and disinfectants.

Internal parasites

- Roundworms (*Toxocara and Baylisascaris spp*)
  - Transmission: ingestion of feces or other hosts (rodents, birds); in utero; nursing
- Hookworms (*Ancylostoma spp*)
  - "voracious blood suckers"
  - Tranmission: skin penetration; ingestion of feces or other hosts, nursing
- Whipworms (*Trichuris vulpis*)
  - Transmission: ingesting eggs in the soil

Eggs are difficult to kill – but can be killed with heat and disinfectants such as ammonia or chlorine bleach. Once eggs are in the soil, nearly impossible to inactivate or kill them.

Both Roundworms and Hooksworms are zoonotic – causing visceral and ocular larval migrans.

Bacterial & Protozoal GI infections

- Bacteria
  - *Campylobacter* spp.
  - *Clostridium* spp.
  - *Escherichia coli (E. coli)*
  - *Helicobacter* spp.
  - *Salmonella* spp.
  - *Yersinia* spp.
- Protozoa
  - *Giardia* spp.
  - *Tritrichomonas foetus*
  - *Cryptosporidim* spp.
  - *Cystoisospora* spp.
  - *Toxoplasma gondii*

Bacterial & Protozoal GI infections

- Transmission
  - Direct Fecal/oral – contact with feces, contaminated food, water or fomites
  - Indirect/Fomite – spread by intermediate hosts (rodents) or carried by flies or cockroaches
- Zoonotic – all of these organisms can infect people. *Toxoplasma gondii* can affect developing fetuses in pregnant women. All should be of concern for immunosuppressed people.

Dermatological diseases

- Dermatophytosis AKA “Ringworm”
  - Causes: more than 30 species
    - *Microsporum canis*
    - *Microsporum gypseum*
    - *Trychophyton* spp.
  - Transmission by infective hairs and fungal spores
    - Direct contact
    - Indirect/Fomite – environment, external parasites
    - Airborne (not likely, but possible)
  - Incubation
    - 2 to 4 weeks
    - Spores can persist in the environment and remain infectious for weeks to months unless environment is thoroughly cleaned and disinfected.

Dermatological Diseases

- Ectoparasites
  - Fleas
  - Ticks
    - Rhipicephalus (Brown dog tick) – RMSF, Rickettsia, Ehrlichiosis, Babesiosis
    - Dermacentor (American dog tick) – RMSF, Tuleremia, Rickettsia
    - Ixodes (Blacklegged ticks or Deer ticks) – Lyme, Babesiosis, Anaplasmosis
    - Amblyomma (Lone Star tick) – Ehrlichiosis, RMSF
  - Mites
    - Demodex
    - Sarcoptes (scabies)
    - Notoedres cati (feline scabies)
    - Cheyletiella (“walking dandruff”)
    - Otodectes (ear mite)
  - Lice
  - Flies

Other diseases

- Rabies (Rhabdovirus)
  - Transmission – bite wounds and rarely, scratches and aerosolization
- Feline leukemia virus (Felv)
  - Shed in saliva, nasal secretions, feces, milk & urine
  - Transmission – Close, intimate contact, nursing, grooming, sharing dishes/litterboxes, bites, fomites
- Feline immunodeficiency virus (FIV)
  - Transmission primarily through bites, also sexual contact, in utero and nursing

Other diseases

- Feline Infectious Peritonitis (FIP)
  - Cause: Feline Coronavirus – mutated
  - Transmission: Fecal/oral, but also Indirect/fomites

The pathogenesis is still not fully known and diagnosis is frustrating to say the least.

Other diseases

- Vector-Borne diseases
  - Mosquitos
    - Heartworms, West Nile virus, Zika virus
  - Ticks
    - RMSF (Rickettsia), Babesiosis, Anaplasmosis, Ehrlichia, Lyme disease (Borrelia), Q fever (Coxiella), Tuleremia (Francisella)
  - Fleas
    - Cat scratch fever (Bartonella), Rickettsia, Plague (Yersinia)

Other diseases

- Heartworm disease
  - Cause: Dirofilaria immitis (nematode/worm)
  - Affects: Dogs, cats, ferrets
  - Transmission – mosquito - > 70 spp. of mosquitos can transmit the disease. 22 spp. have been shown to be significant vectors. *Culex* spp. are even found indoors.
  - Incubation: 5-6 months from bite of infected mosquito. However, immature worms have been found in pulmonary arteries 3 months post infection.

Treatment Strategies

- Prevention is key
  - Vaccination: provides the best option. However, most vaccinations only minimize the severity of the disease.
- Treat the causative agent
  - This may be challenging for viral infections
- Treat secondary infections (usually bacterial)
- Supportive care
  - Hydration, fluids
  - Nutrition
  - Decrease stress
- Reduce likelihood of spread

Respiratory Diseases

- Feline upper respiratory disease
  - Majority are viral infections
    - L-Lysine
  - Secondary bacterial infections (purulent ocular/nasal discharge)
    - Doxycycline 5-10 mg/kg PO BID x 10 days
    - Amoxicillin/Clavulanic Acid (Clavamox) 15 mg/kg BID
    - Cephalosporins (Cefa-Drops)
  - Ocular disease (topical ointments)
    - Tetracylcine or Erythromycin (Terramycin) BID
    - NeoPolyBac BID
  - Supportive care – make sure eating/drinking

Respiratory Diseases

- Canine Kennel Cough Complex
  - Viral component
  - Bacterial component
    - Doxycycline – 3-5 mg/kg q 12 hrs x 7-14 days (g.i. effects)
    - Amoxicillin – 10-20 mg/kg q 8-12 hrs x until 2 days after symptoms
    - Amoxicillin/Clavulanate (Augmentin) – see amoxicillin
    - Azithromycin – 5-10 mg/kg q 24 hrs x 3-5 days
    - Cephalexin – 20-40 mg/kg q 8 hrs
    - Clindamycin – 10 mg/kg q12 hrs
    - Enrofloxacin – 5-20 mg/kg q24 hrs (bone effects)
    - Trimethoprim/Sulfonamide – 15 mg/kg q 12 hrs x 14 days (dry eye)
  - Antitussive/Anti-inflammatory/Bronchodilator
    - Hycodan (hydrocodone) – 0.22 mg/kg q 6-12 hrs
    - Temaril P – see label for dosing
    - Prednisone – 1-2 mg/kg divided q 8-12 hrs, reducing dose q 7 days
    - Aminophylline – 10 mg/kg q 8 hrs

Respiratory Diseases

- Canine Distemper
  - Prevention is best option: vaccination
  - Supportive care: fluids, nutrition
  - Antimicrobials used for Canine Kennel cough
- Canine Influenza
  - Supportive care: fluids
  - Antimicrobial used for Canine Kennel cough if secondary bacterial infection

Gastrointestinal Diseases

- Canine Parvovirus/Canine Coronavirus
  - Antiviral therapy
    - Antiendotoxin serum
    - Hyperimmune Plasma
    - Interferon – 30 IU q 24 hrs
    - Tamiflu – 2.2 mg/kg q 12 hrs (efficacy not proven)
  - Supportive care: fluids, nutrition
  - Symptomatic therapy
    - Vomitiing
      - Cerenia – 1 mg/kg q 24 hrs x 5 days max
    - Diarrhea
      - Metronidazole (Flagyl) – 15-25 mg/kg q 12-24 hrs (neuro effects)
    - Secondary bacterial infections
      - Cephalosporins – 20-30 mg/kg q12 hrs
      - Enrofloxacin – 5-20 mg/kg q 24 hrs (bone effects)
      - Ampicillin – 20-40 mg/kg IV q6-8 hrs
      - Gentamicn – 6 mg/kg IV q 24 hrs (kidney effects)

Gastrointestinal Diseases

- Feline Panleukopenia
  - Supportive therapy: Fluids, nutrition
  - Symptomatic therapy
- Internal parasites
  - Pyrantel Pamoate (Strongid T)
    - 1 cc per 5 lbs body weight PO, repeat in 2 weeks
    - Treats Roundworms & Hookworms
  - Fenbendazole
    - 1 cc per 5 lbs PO or 1 cc per 10 lbs PO x 3 days
    - Treats Whipworms and certain Tapeworms

Gastrointestinal Diseases

- Bacterial infections/Protozoal infections
  - Fenbendazole (Panacur)
    - 50 mg/kg SID PO x 3-5 days (Giardia)
  - Sulfadimethoxine (Albon)
    - 50 – 60 mg SID PO x 5-20 days (Cystoisospora/Coccidia)
  - Trimethoprim-sulfa
    - 15mg/kg BID PO x 5 days (Cystoisospora/Toxocara)
  - Metronidazole (Flagyl)
    - 10 – 25 mg BID PO x 7 days (Giardia, bact. overgrowth)
  - Amoxicillin
    - 22 mg/kg SID PO x 5 days (Clostridium)
  - Tylosin
    - 10-15 mg/kg BID PO x 7-21 days (Clostridium/Crypto/Campylobacter)

Dermatological Diseases

- Dermatophytosis (Ringworm)
  - Clipping of hair
  - Topical Miconazole, Enilconazole, Lime sulfur
  - Systemic treatment
    - Itraconazole – week on/week off
      - 5-10 mg/kg daily until cured
    - Fluconazole
      - 10 mg/kg daily until cured
    - Lufenuron (Program)
      - Not recommended

Dermatological Diseases

- Ectoparasites
  - Fleas/Ticks
    - OMG – so many options…
  - Mites
    - Demodex (dogs)
      - Amitraz dips weekly
      - Ivermectin 0.4-0.6 mg/kg SID PO x 90 days
      - Ivermectin 0.1 cc per 10 lb SQ every other week
    - Demodex (cat)
      - Usually secondary to diabetes, Felv/FIV, neoplasia, etc.
      - Treat underlying disease if possible
      - Lyme Sulfur Dips topically
    - Notoedres (earmites)
      - Topical Ivermectin application
    - Sarcoptes
      - Ivermectin 0.2-0.4 mg/kg PO every other week
      - Topical Lyme Sulfur rinses weekly
      - Fipronil Spray (Frontline)

Dermatological Diseases

- Lice
  - Lyme Sulfur rinse twice weekly
  - Fipronil (Frontline) spray every 2 weeks
  - Amitraz every 2 weeks (not for cats)
- Flies
  - Permethrin repellants (VIP Fly ointment) not for cats
  - Do not use products with DEET on animals
  - Remove source of flies (compost heaps, manure piles, puddles of standing water

Other Diseases

- Rabies
  - Unless postexposure prophylaxis is instituted, rabies in cats and dogs is usually fatal
- FeLV/FIV
  - No specific treatment
  - Supportive care
- FIP
  - Still considered to be 100% fatal
  - Treatment is usually palliative, curative

Other Diseases

- Vector-Borne
  - West Nile/Zika Virus
    - supportive care
  - Babesiosis
    - Imidocarb – 6.6 mg/kg IM or SC q 2 weeks
    - Doxycyline – 5-10 mg/kg q 12 hrs x 7-10 days
    - Metronidazole -30-60 mg/kg q 24 hrs x 5-7 days
    - Clindamycin – 12.5 mg/kg q 12 hrs x 14 days
  - Rickettsial infection
    - Tetracycline – 22 mg/kg q 8 hrs x 14 days (enamel)
    - Enrofloxacin – 5-20 mg/kg q 24 hrs
    - Chloramphenicol – 25-50 mg/kg q 8 hrs x 7 days (bone marrow/anemia)
  - Ehrilichia
    - Doxycycline – 5 mg/kg q 12 hrs or 10 mg/kg q 24 hrs x 14-16 days

Other Diseases

- Vector-Borne
  - Bartonella
    - Tetracycline – 10-15 mg/kg q 8-12 hrs >14 days (enamel)
    - Amoxicillin/clavulanate acid – 12.5 mg/kg q 12 hrs (dog); 62.5 mg q 12 hrs (cats)
    - Enrofloxacin – 5-10 mg/kg q 12 hrs (dog); 5 mg/kg q 24 hrs (cat-blindness)
  - Borrelia (Lyme disease)
    - Doxycycline – 10 mg/kg q 24 hr x 21-28 days (dog); 5-10 mg/kg q 12 hr x 21 days (cats)
    - Amoxicillin – 22 mg/kg q 12 hrs x 21-28 days (dog); 10-20 mg/kg q 12 hrs
    - Azithromycin – 5-10 mg/kg q 24 hrs
  - Yersinia (Plague)
    - Gentamicin – 6-8 mg/kg IV q 24 hrs (kidney)
    - Enrofloxacin – see doses for Bartonella
  - Heartworm disease
    - Immiticide
    - See American Heartworm Society website for current recommendations

Outbreak Management

Ideally, the focus is on prevention. However, having a plan in place prior to an outbreak, greatly enhances the ability to control disease spread, minimize mortality, reduce the possibility of panic and protect your reputation.

Tools for Outbreak Management

- Diagnose AND isolate of sick animals
- Identify and manage exposed/at-risk animals
- Decontaminate the environment
- Protect newly admitted animals
- Document the outbreak and treatment
- Communicate with staff, stakeholders, adopters, and the public

Cleaning, Sanitizing & Disinfecting

- Basic principles: selection of an appropriate method, proper use and application, safety of the personnel and the animals being exposed.

- This is where “you can’t disinfect…ew” comes in to the picture…

Commonly Used Disinfectants

- Quaternary ammonium compounds
- Hypochlorites
- Peroxygen compounds (Oxidizing agents)
- Chlorhexidine (Biguanides)
- Alcohol

Note that most disinfectants are inactivated to some extent in the presence of organic material (feces, blood, secretions, excretions)

Characteristics of Selected Disinfectants

For More Information, see the 'Disinfection 101' document at www.cfsph.iastate.edu

Disinfectant Category	Alcohols	Aldehydes	Biguanides	Halogens: Hypochlorites	Halogens: Iodine Compounds	Oxidizing Agents	Phenols	Quaternary Ammonium Compounds (QAC)
Sample Trade Names	Ethyl alcohol Isopropyl alcohol	Formaldehyde Glutaraldehyde	Chlorhexidine Nolvasan® Virosan®	Bleach	Betadyne® Providone®	Hydrogen peroxide Peracetic acid Virkon S® Oxy-Sept 333®	One-Stroke Environ® Pheno-Tek II® Tek-Trol®	Roccal® DiQuat® D-256®
Mechanism of Action	•Precipitates proteins •Denatures lipids	•Denatures proteins •Alkylates nucleic acids	•Alters membrane permeability	•Denatures proteins	•Denatures proteins	•Denature proteins and lipids	• Denatures proteins • Alters cell wall permeability	• Denatures proteins • Binds phospholipids of cell membrane
Advantages	•Fast acting •Leaves no residue	•Broad spectrum	•Broad spectrum	•Broad spectrum •Short contact time •Inexpensive	•Stable in storage •Relatively safe	•Broad spectrum	• Good efficacy with organic material • Non-corrosive • Stable in storage	• Stable in storage • Non-irritating to skin • Effective at high temperatures and high pH (9-10)
Disadvantages	•Rapid evaporation •Flammable	•Carcinogenic •Mucous membranes and tissue irritation •Only use in well ventilated areas	•Only functions in limited pH range (5–7) •Toxic to fish (environmental concern)	•Inactivated by sunlight •Requires frequent application •Corrodes metals •Mucous membrane and tissue irritation	•Inactivated by QACs •Requires frequent application •Corrosive •Stains clothes and treated surfaces	•Damaging to some metals	• Can cause skin and eye irritation	
Precautions	Flammable	Carcinogenic		Never mix with acids; toxic chlorine gas will be released			May be toxic to animals, especially cats and pigs	
Vegetative Bacteria	Effective	Effective	Effective	Effective	Effective	Effective	Effective	YES—Gram Positive Limited—Gram Negative
Mycobacteria	Effective	Effective	Variable	Effective	Limited	Effective	Variable	Variable
Enveloped Viruses	Effective	Effective	Limited	Effective	Effective	Effective	Effective	Variable
Non-enveloped Viruses	Variable	Effective	Limited	Effective	Limited	Effective	Variable	Not Effective
Spores	Not Effective	Effective	Not Effective	Variable	Limited	Variable	Not Effective	Not Effective
Fungi	Effective	Effective	Limited	Effective	Effective	Variable	Variable	Variable
Efficacy with Organic Matter	Reduced	Reduced	?	Rapidly reduced	Rapidly reduced	Variable	Effective	Inactivated
Efficacy with Hard Water	?	Reduced	?	Effective	?	?	Effective	Inactivated
Efficacy with Soap/ Detergents	?	Reduced	Inactivated	Inactivated	Effective	?	Effective	Inactivated

? Information not found

Disclaimer: The use of trade names does not in any way signify endorsement of a particular product. For additional product names, please consult the most recent Compendium of Veterinary Products.

References: Linton AH, Hugo WB, Russel AD. Disinfection in Veterinary and Farm Practice. 1987. Blackwell Scientific Publications; Oxford, England; Quinn PJ, Markey BK. Disinfection and Disease Prevention in Veterinary Medicine, In: Block SS, ed., Disinfection, Sterilization and Preservation. 5th edition. 2001. Lippincott, Williams and Wilkins: Philadelphia.

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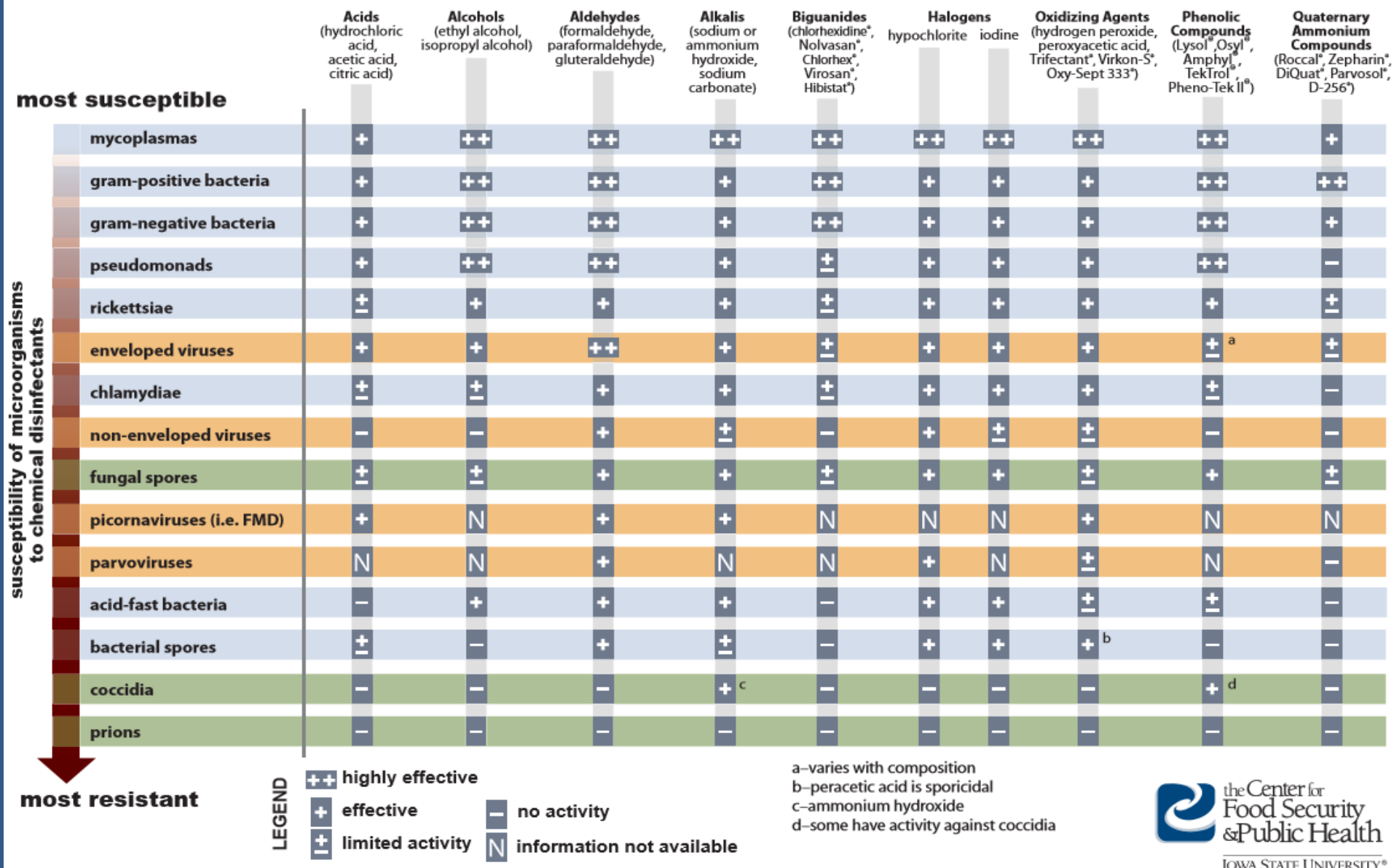
The Antimicrobial Spectrum of Disinfectants

Chemical Disinfectants

Note: Removal of organic material must always precede the use of any disinfectant.



LEGEND

++ highly effective
+ effective
± limited activity
– no activity
N information not available

a–varies with composition
b–peracetic acid is sporicidal
c–ammonium hydroxide
d–some have activity against coccidia

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Bacterial Group Review Table

Gram Positive Cocci	Gram Negative Aerobic	Anaerobic
Enterococcus *Micrococcus* *Staphylococcus* *Streptococcus*	*Actinobacillus* *Aeromonas* *Bartonella* *Bordetella* *Brucella* *Burkholderia* *Capnocytophaga* *Citrobacter* *Enterobacter* *Enterobacteriaceae* *Escherichia* *Francisella* *Haemophilus* *Klebsiella* *Legionella* *Moraxella* *Neisseria* *Pasteurella* *Pseudomonas* *Salmonella* *Serratia* *Shigella* *Vibrio* *Yersinia*	*Actinomyces—GP* *Bacteroides—GN* *Clostridium—GP* *Fusobacterium—GN* *Lactobacillus—GP* *GP = Gram-positive* *GN = Gram negative*
Gram Positive Rods	**Gram Negative Rods, Curved-Spiral Shaped**	**Mycoplasmas and Obligate Intracellular**
Actinomycetes *Bacillus* *Coryneform* *Erysipelothrix* *Listeria* *Mycobacterium* *Nocardia* *Rhodococcus* *Streptomyces*	*Borrelia* *Campylobacter* *Helicobacter* *Leptonema* *Leptospira* *Treponema*	*Chlamydia* *Coxiella* *Ehrlichia* *Mycoplasma* *Rickettsia* *Ureaplasma*

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DISINFECTANT PRODUCT LABELS

Understanding the information on a disinfectant product label is essential for effective disease organism removal and the safety of those handling the product. Always read the product label before use. It is a violation of federal law to use a product in a manner inconsistent with its labeling. In order to increase awareness of what a product label contains, this handout will provide you with a step-by-step guide of a disinfectant label.

Only products with EPA registration numbers should be used. This number indicates the product has been reviewed by the EPA and poses minimal risk to animals, people and the environment when used in accordance with their label.

This section will describe the hazards related to humans and animals when using this product. It recommends personal protective gear that should be worn, what effects it will have on the environment and treatment information should it be splashed into the eyes or ingested.

EPA Reg. No. 1658 – XX

COMPANY Y

EPA Est. No. 16XX – MO – 1

PRODUCT X

Disinfect-Cleaner-Sanitizer-Fungicide-Mildewstat-Virucide*–Deodorizer for Hospitals, Institutional and Industrial Use

Effective in hard water up to 400 ppm hardness (calculated as CaCO3) in the presence of 5% serum contamination

ACTIVE INGREDIENTS:
Octyl decyl dimethyl ammonium chloride.....1.650%
Dioctyl dimethyl ammonium chloride.....0.825%
Didecyl dimethyl ammonium chloride.....0.825%
Alkyl (C14, 50%, C12, 40%; C16, 10%)
Dimethyl benzyl ammonium chloride.....2.200%
INERT INGREDIENTS:.....94.500%
TOTAL:.....100.000%

KEEP OUT OF REACH OF CHILDREN

DANGER

HAZARD TO HUMANS AND DOMESTIC ANIMALS

PRECAUTIONARY STATEMENTS

CORROSIVE: Causes severe eye and skin damage. Do not get into eyes, on skin or clothing. Wear goggles or face shield and rubber gloves when handling Product X. Harmful or fatal if swallowed. Wash thoroughly with soap and water after handling.

ENVIRONMENTAL HAZARDS: This product is toxic to fish. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. For guidance contact your State Water Board or Regional Office of the EPA.

PHYSICAL AND CHEMICAL HAZARDS: Do not use or store near heat or open flame.

STATEMENT OF PRACTICAL TREATMENT: In case of contact, immediately flush eyes or skin with plenty of water for at least 20 minutes. For eyes, call a physician. Remove and wash contaminated clothing before reuse. If ingested, call a physician immediately.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage.

Manufactured by
Company Y Chemical Company, Sometown, Somestate 12345

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

DIRECTIONS FOR USE

Product X is a germicide, soapless cleaner and deodorant which is effective in water up to 400 ppm hardness in the presence of organic soil (5% serum). When used as directed, will not harm tile, terrazzo, resilient flooring, concrete, painted or varnished wood, glass or metals.

FOR USE IN VETERINARY CLINICS, ANIMAL CARE FACILITIES, LIVESTOCK FACILITIES AND ANIMAL QUARANTINE AREAS

Apply Product X to walls, floors and other hard (inanimate) non-porous surfaces with a cloth, mop or mechanical spray device so as to thoroughly wet surfaces. Prepare a fresh solution daily or when use solution becomes visibly dirty.

Disinfection: To disinfect hard surfaces, use 1 fluid ounce of Product X per gallon of water. Apply by immersion, flushing solution over treated surfaces with a mop, sponge or cloth to thoroughly wet surfaces. Allow treated surfaces to remain moist for at least 10 minutes before wiping or rinsing. Product X will disinfect hard non-porous surfaces in veterinary clinics, animal care facilities, livestock facilities and animal quarantine areas. For heavily soiled areas, a preliminary cleaning is required.

2 oz. gallon use-level. The activity of Product X has been evaluated in the presence of 5% serum and 400 ppm hard water by the AOAC use dilution test and found to be effective against a broad spectrum of gram negative and gram positive organisms as represented by:

Pseudomonas aeruginosa	Pasteurella multocida
Escherichia coli	Enterococcus faecalis
Staphylococcus aureus	Streptococcus faecalis
Salmonella choleraesuis	Shigella dysenteriae
Escherichia coli	Bordetella bronchiseptica
Streptococcus pyogenes	Salmonella typhi
Klebsiella pneumoniae	Serratia marcescens
Streptococcus agalactiae	Actinomyces pyogenes

Boot bath. Use 1.5 fluid ounces per gallon in boot baths. Change solution daily and anytime it becomes visibly soiled. Use a bristle brush to clean soil from boots before disinfecting with Product X.

Disinfecting trucks and farm vehicles. Clean and rinse vehicles and disinfect with 1 fluid ounce per gallon of Product X. If desired, rinse after 10 minutes contact or leave unrinsed. Do not use Product X on vaccination equipment, needles or diluent bottles as the residual germicide may render the vaccines ineffective.

Sanitizing Non-Food Contact Surfaces such as floors, walls, fences, etc.: At 1 oz. per 2 ½ gallon use-level, Product X is an effective sanitizer against Staphylococcus aureus and Klebsiella pneumoniae on hard porous and non-porous environmental surfaces. Treated surfaces must remain wet for 60 seconds.

Some products may have multiple uses (i.e., cleaning versus disinfection) and require different dilutions and contact times for such actions.

This section describes what disease organism the product controls, as well as where, how and when to use it.

Specialty applications for the product (i.e., boot baths, vehicle disinfection) will also be listed.

disinfectant_product_label

the Center for Food Security & Public Health

Iowa State University

Steps to Effective Cleaning and Disinfecting

- Physical cleaning – removal of visible debris is essential as the presence of organic material can inactivate many disinfectants.
- Sanitation/Cleaning – This step alone can remove over 90% of bacteria from surfaces. The area should be soaked with hot water and detergent. When using high-pressure spraying, be aware that organisms can be aerosolized and enhance the spread of some diseases.

Cleaning and Disinfecting cont.

- Disinfection – Use the best product for the area to be cleaned. Make sure to dilute the product appropriately. Follow label directions for contact time and personal protective equipment. Rinse the area or allow the area to air-dry as the label directs.

Remove all grossly visible debris

- The presence of gross contamination or organic material, especially feces will inactive most disinfectants.

Wash the area with water and detergent

- Remember that this can remove over 90% of bacteria.
- Also, be aware of aerosolization.

Thoroughly rinse the cleaned area to remove any detergent

- Some disinfectants may be inactivated by detergents.
- If time allows, let the area dry completely.
- Be aware that residual detergent can be irritating.

Apply the disinfectant

ALLOW PROPER CONTACT TIME !

- This is one of the most overlooked steps
- Contact time varies depending on the product
- Rule of thumb is a contact time of 10 minutes.

Thoroughly rinse the disinfectant

- If time allows, let the area air dry again.
- Can use a squeegee if needed.
- Can also towel dry
- Be aware that the disinfectant can be irritating to the skin, airways and mucous membranes.

What a mess !!

Don’t forget the doors!

- Cage has been “pre-cleaned” and now Accel is applied and allowed to set for 10 minutes.
- Cage is then cleaned and dried.
- Cage is set up for the cat.

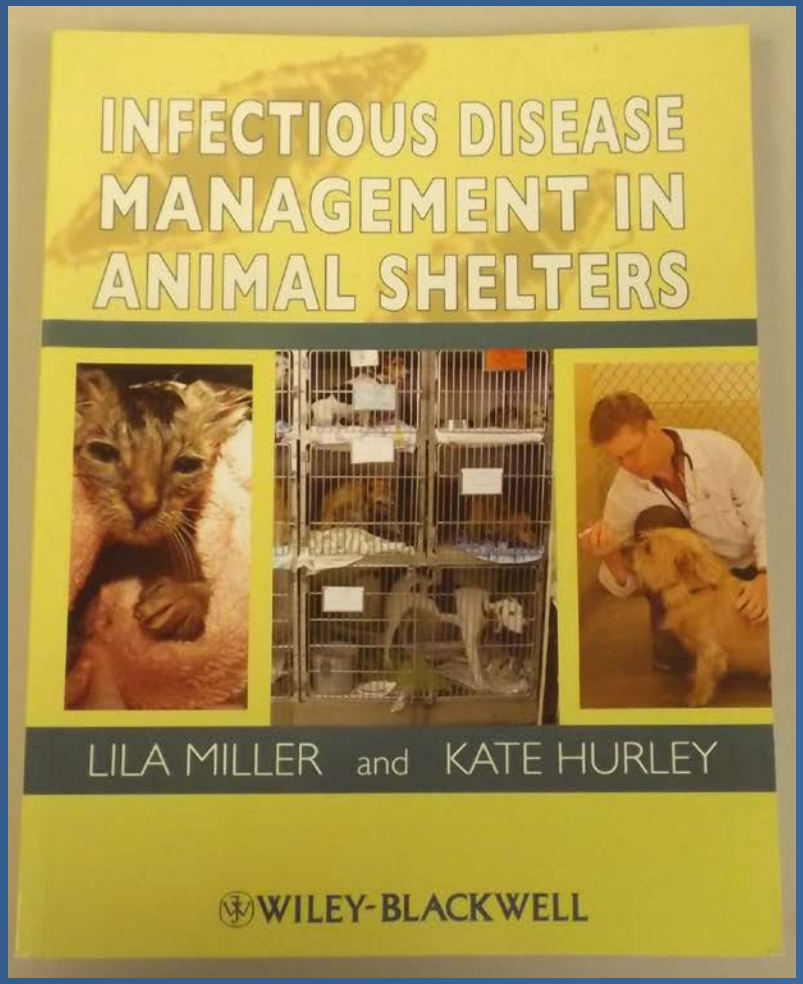
Clean & Disinfect other items

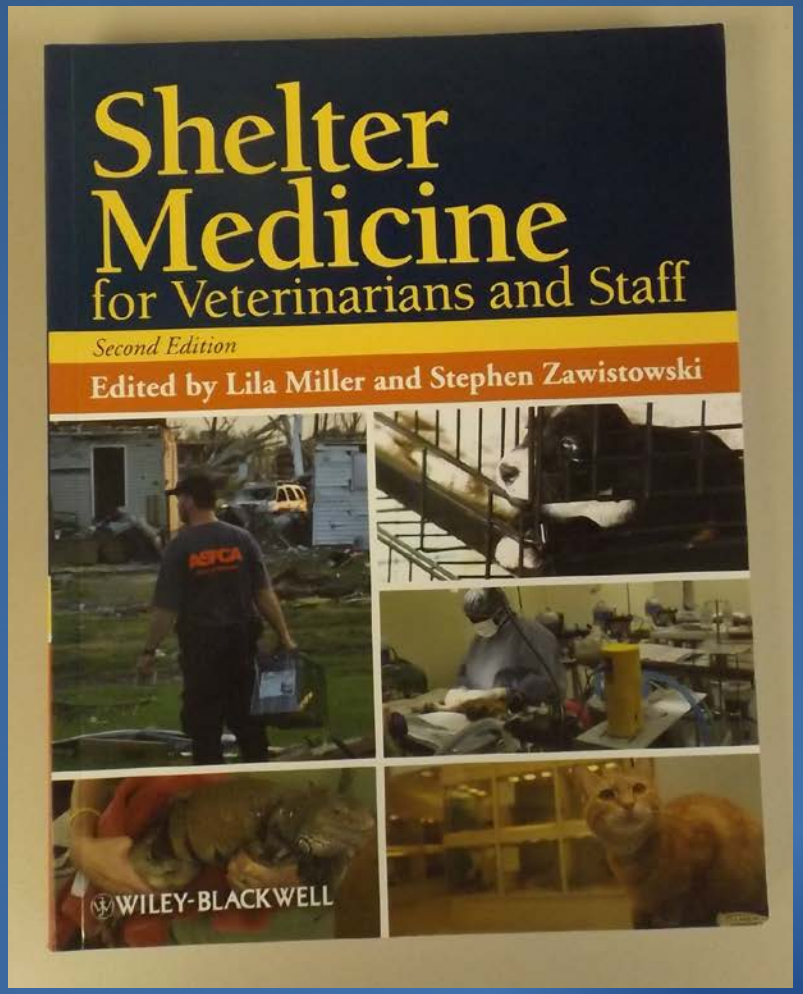
- Dishes, toys, litter pans (in that order)
  - Disposable is ideal, stainless steel is preferred
  - Commercial dishwasher is preferred due to use of high temperature cleaning
- Laundry
  - Hot water, detergent and a half cup of bleach per standard household washer load is recommended.
  - Do no overfill/overload the washer.
  - Dry items completely, do no overload the dryer

Factors causing failure of disinfection protocol

- Improper disinfectant selection
- Improper disinfectant concentration
- Inadequate contact time
- Failure to remove organic material
- Inactivation by other chemical compounds
- Improper application
- Failure to allow areas to dry thoroughly

Source information





Questions ??