Taking the Teeth Out of Canine Distemper Virus

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Many thanks to Maddie's
Fund and the ASPCA for
funding diagnostic testing that
has helped us work with
shelters to develop lifesaving
approaches to responding to
canine distemper!



CDV

- · Enveloped RNA virus
- · Relatively easy to kill
- Dogs and ferrets are susceptible
- Raccoons and other wildlife species
- Not the same as feline "distemper" (aka panleukopenia)



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Clinical signs

- · Individual Animal
- "Herd" signs
- No signs
- Sub-clinical or inapparent infections
- · Wide range of affected systems
- · Range of severity
- Many (most) dogs will recover





Neurologic and Ocular Signs



- Seizures
 - Grand mal
 - "Chewing gum"
- Squinting / blinking
- Uveitis
- · Ocular discharge
- Prognosis falls once neuro signs develop



Respiratory Disease



- Nasal / Ocular discharge
- Sneezing
- Coughing
- Dyspnea (trouble breathing)
- Pneumonia
- Secondary pneumonia



Gastrointestinal and Skin Disease



- GI SIGNS
 - Diarrhea
 - Vomiting
 - Anorexia
 - Wasting
- SKIN
 - Pustular DermatitisRash
 - Nasal and Digital Hyperkeratosis

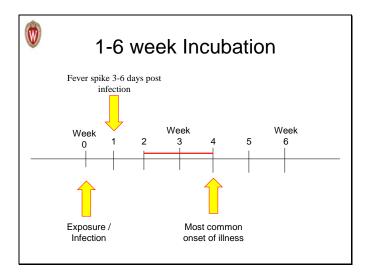


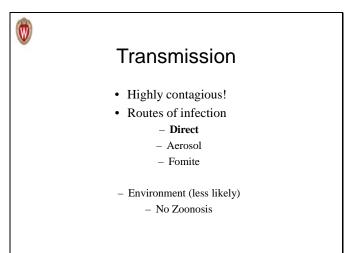
"Herd" signs



- Unusual or high number of dogs affected with "Kennel Cough"
- Pneumonia
- Some dogs progress to neurologic disease
- Post-adoption reports of neurologic disease
- Puppies who progress to neurologic disease

How frequentl	y do you see it?
Constant level	Outbreaks
Many isolated cases	Rare Isolated cases
Almost ne	ever or never







Direct, most common



- How do you define direct?
- Co-housing
- Improperly used housing, guillotine doors down
- Tie outs for cleaning
- Yards during cleaning
- Admitting areas
- Play groups?



Aerosol Transmission



• Up to 20 feet distance*

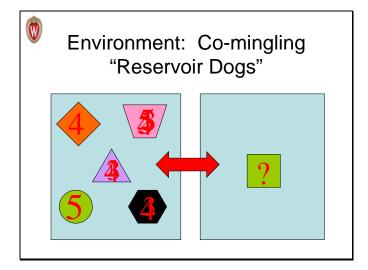
*Max Appel, Cornell University, 2006



Fomite over short distances



Staff and volunteer handling



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Shedding



- Inapparent or sub-clinical shedding possible in exposed dogs
- Post-recovery shedding Usually less than 4-6 weeks

The Furminator

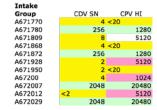


Long-term PCR positives

- · Rare but real issue
- · Many months past recovery
- Does PCR positive = viral shedding?
- Infectious potential is unknown, but thought to be low



Susceptibility?



- Many dogs are susceptible on intake
- Varies by community
- Primarily serologic response
- Puppies under 16 20 weeks of age assumed to be susceptible
- Maternal Antibodies

7/11 (64%) susceptible to CDV



Which dog is susceptible?







Vaccination



- Key to prevention
- Almost a magic bullet!
- But not quite.



Vaccine handling!!



- Mix just before use
- Don't allow to sit even at room temperature
- Most important for CDV
- Drawback of having a virus that is easy to kill

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Time to Onset of Immunity



- Sterile Immunity for most adults and susceptible pups in 3-5 days
 - (if they are not exposed before then)



We've known this for a while

 Twenty-one susceptible puppies in 10 litters were vaccinated with a single dose of combined canine distemper-infectious canine hepatitis modified live virus tissue culture vaccine, Tissuvax-DH (Pitman-Moore Division of the The Dow Chemical Company), simultaneously with introduction into a canine distemper contaminated environment. One of 21 vaccinated puppies and 14 of 16 nonvaccinated littermates died of a canine distemper infection.

Schroeder, J. P., D. W. Bordt, et al. (1967). "Studies of canine distemper immunization of puppies in a canine distemper-contaminated environment." <u>Vet Med Small Anim Clin</u> **62**(8): 782-7.



Onset of immunity?

 "In my study at the University of Wisconsin, designed to mimic an animal shelter environment, I wanted to find the answer to the question "Will puppies vaccinated with 1 dose of Recombitek C6 four hours before being placed in a room with dogs shedding virulent CDV virus be protected?"

RD Schultz, University of Wisconsin

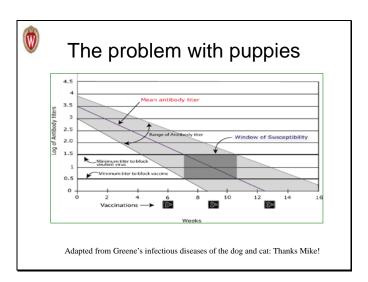
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Onset of immunity?

 "All of the Recombitek vaccinated puppies were protected from development of clinical distemper...My study was designed to test the efficacy of a single dose or rCDV. The results indicate that protection was provided as soon as 4 hours after vaccination, something previously known to occur only with MLV CDV."

RD Schultz, University of Wisconsin





Types of vaccines



- MLV
- Canarypox vectored (Merial)
 - Designed to be more effective at overcoming MDA
 - RecombitekTM



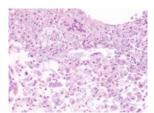
Vaccination recommendations



- MLV or rCDV vaccination immediately on intake
 OR SOONER
- Repeat at two week intervals for pups under 16 weeks of age
- Recommend revaccination post adoption
- Community vaccine clinics



Diagnostics



- Collection of clinical signs, history, and herd history
- · Diagnostic testing
- Community information



Evaluate Risk Factors



- · No vaccines
- Late or postponed vaccination
- Puppies
- Crowding
- Co-mingling (doubling up)
- Some in / some out housing
- Minimal or no isolation for respiratory disease
- Dogs need to move out during cleaning
- · Transfer from high risk sources



Evaluation of Clinical signs

- · Individual illness
- · Signs in the group **
- Is it an outbreak?
 - Severity of RDC
 - Ages affected
 - Numbers affected
 - Timing
 - Vaccination polices and PRACTICES
 - Reported disease in the community



Diagnostic Testing

- rtPCR *
 - WVDL
 - IDEXX
- Shelter pricing for both
- IFA
 - May be more specific, less sensitive
- · Serology?
 - Best used to evaluate susceptibility in a shelter setting
 - Very sensitive test, but limited value due to time and vaccination
 - Especially in unvaccinated dogs
- · Negative tests do NOT rule out disease
- May be variations between labs



Is that positive from vaccination?

Understanding quantitative PCR

- · Low viral load may suggest:
 - Early infection
 - Late infection
 - Vaccine shedding
 - Low viral shedding
 - Poor virus recovery
- · Clinical judgment call based on history and context
- There is no direct means to differentiate vaccine virus vs. field stain with PCR alone



Vaccine Interference

- Most likely to interfere with testing if blood cells are present
- Less likely to interfere with testing from swab samples
- Most likely to interfere 1-3 weeks postvaccination
- Interference / False positives are usually RARE



Other testing

- CSF Antibody detection
 - Acute encephalopathic disease
 - Compare antibody levels to serum
- Caution with neurologic disease in shelter dogs and dogs with unknown history!!
 - Rabies risk
 - Poor prognosis
 - Welfare concerns



Necropsy and Histopathology

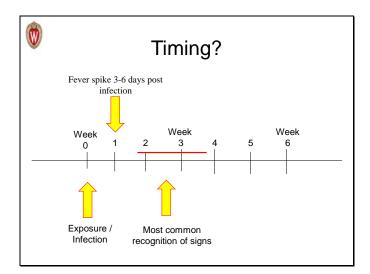
- · Best way to rule out disease
 - Evaluate risk for the group
- Explore other potential causes for disease
- Check with the lab before sending samples

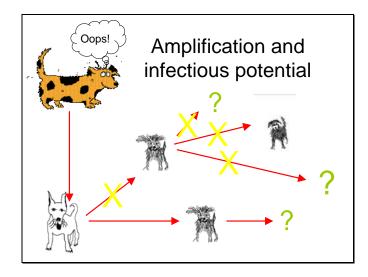
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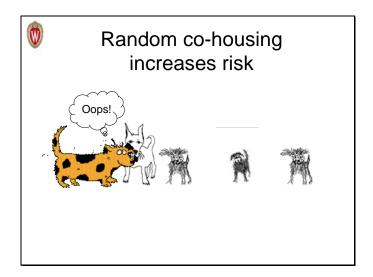
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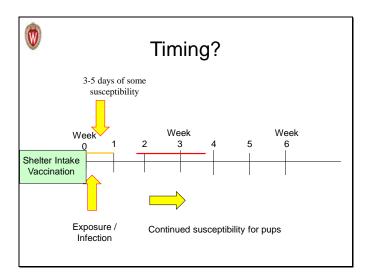
- Community acquired?
- Shelter acquired?
- Source shelter acquired?

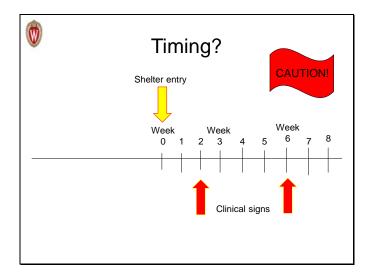


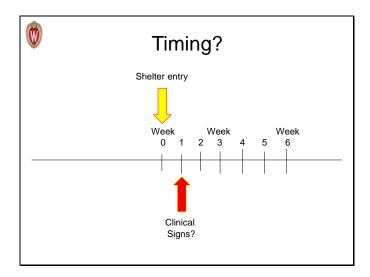


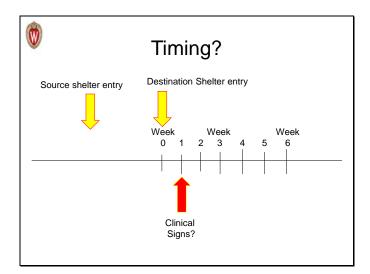
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Prevention: Eliminate Risk Factors

- Vaccinate on INTAKE or sooner!!
 - Community outreach vaccine clinics
- Protect the puppies, but get them out quickly
- Isolate / separate sick dogs promptly
- Avoid intake co-housing for dogs
 - Plan co-housing for dogs who stay longer than 1 week
- Monitor closely for illness
- Test periodically or when clinical signs indicate
- · Take respiratory disease seriously



Fighting Back: Response to Illness:

Things are changing!

...but prevention is still key.



Individual Animal Illness

- Individual health and welfare
- · Group health and welfare
- · Potential for spread or an outbreak to occur
- · Potential for adoption
- · Available isolation
- Capacity to provide treatment and supportive care
- Clinical signs prognosis
- Numbers of other susceptible animals
- Resources!
- Do you need an outbreak response plan?



Outbreak Response?



Key Concept:

• Stop the cycle of transmission.

Problems:

- · LONG incubation period
- · Ease of transmission
- Clinical signs overlap with CRDC
- "Reservoir" dogs
- Susceptible puppies
- · Long "recovery" period
- Resources!



Response



- "Clean Break"
- Please don't do nothing

PLEASE, Don't go this alone



- Veterinary assistance is essential to response implementation
- Maximize life saving
- Minimize resource investment



Communication!

- Communicate early and often
- Ask for help
- Explain the life saving work you're doing



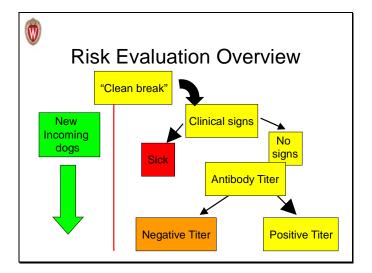
Understanding Risk Assessment and Immunity

- Risk group designation
 - Based on controlled challenge studies in dogs with known active immunity
- Active immunity vs. Passive immunity



Risk group evaluation and "Clean Break"

- General principles:
- ✓ Stop the cycle of transmission
- ✓ Send low risk dogs on their way
- ✓ Isolate or separate sick dogs
- ✓ Identify susceptible dogs





Start: Get Ready



- Vaccinate ON INTAKE or sooner!
- Repeat at two-week intervals if puppies stay that long
- Get them out sooner
- Evaluate potential for adoption
- Consider every dog in current population
- · Evaluate capacity



Step one: "CLEAN BREAK"



- New, incoming dogs must be separated from exposed dogs
- Clean and disinfect the area first
- Evaluate expected intake
- Plan any co-mingling
- Clean and care for new arrivals first
- · Separate staff if possible



Step Two: Evaluate Clinical Signs



- Carefully evaluate each dog
- ANY suspect clinical signs = High Risk
 - Respiratory disease
 - Unexplained GI disease
 - "ADR"
 - PCR testing?
- Assessment by veterinarian to rule out clinical signs



Step Three: Antibody titers



- High Risk and Low Risk groups
- Can't evaluate dogs with clinical signs*
- Evaluating pups
- In House testing
 - Faster
- Positive / Negative
- · Diagnostic Lab testing
 - More quantifiable
 - Longer turn around
 - Needs to validated against challenge data



In house kits

- · Canine VacciCheck
- Synbiotics TiterCheck
- Carefully follow instructions
- · Experienced technicians
- · Tests validated by VN
- Cost = approx. \$20 / dog tested



Antibody TEST Interpretation



- · Positive is GOOD
- Positive test in an adult dog with no clinical signs indicates low risk
- Low risk does not equal NO risk
- Negative test indicates high risk
- High risk does not equal disease
- Clinical sings means high risk – no testing needed



Puppies?

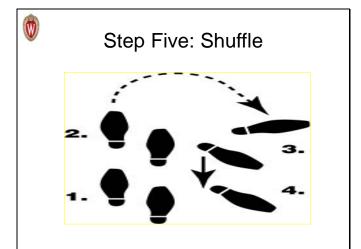


- Negative titer = High Risk
- Low Risk? only for now
- Interpreting positive antibody levels in puppies is less clear
- Prevention!



Step Four: Evaluate Risk

- How high is the risk?
- Vaccination practices?
- Sanitation practices?
- Co-mingling practices?
- · Level of current disease?
- Age?
- Not Stray vs. Surrender
- Not all friendly dogs

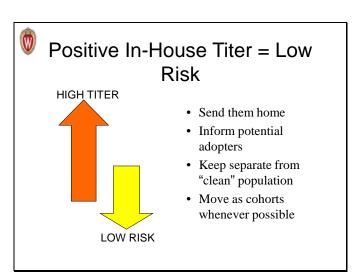


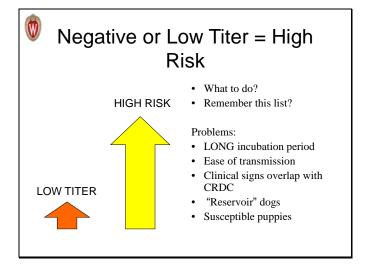


Clinical Signs



- Isolate or remove sick dogs
- Carefully weigh risks of keeping sick dogs in the shelter
- Can you care for sick dogs?
- Post-recovery shedding can be prolonged
- Ideally, two negatives before release







Quarantine and release?

- · Risk evaluation often allows many (most) dogs to be saved.
- Quarantine alone would be 6 weeks
- · Challenges to capacity and welfare
- · Begin quarantine -
- · Cleared when no clinical signs plus
- · Antibody positive and pcr negative
- · Consider impact on capacity and crowding
- · Consider maintenance of health and emotional well-being



Can you safely send them somewhere else?



- Prioritize Healthy High Risk Dogs**
- · What is safe?
- · Well vaccinated adult dogs
- Resilient humans
- No puppies
- No uninformed adopters



Depopulation

"The **Association of Shelter Veterinarians** believes that depopulation in response to a disease outbreak should only be considered as a last resort, when morbidity and mortality of disease are uncommonly severe. While depopulation may create a break between exposed and unexposed populations and lead to quicker resumption of normal sheltering activities, it may result in the euthanasia of healthy animals. Along with stakeholders such as shelter administrators, board members, and staff members, veterinarians experienced in outbreak management should be consulted for guidance before deciding to depopulate. "



Long Term Response Plan

- · Eliminate risk factors
- Vaccinate ON INTAKE
- · Protect the pups
- · Disease detection at intake and ongoing
- · Isolate or separate sick dogs
- All in / all out
- Planned co-mingling (if unavoidable)
- · Encourage vaccination in your community



Summary



- CDV is one of the most preventable infectious diseases we battle.
- Help work toward a community solution.
- Don't wait for an outbreak to put good practices in place.
- Outbreaks can be managed in life saving ways.



Thanks to you, everyday.