Canine Distemper: Management for Shelters

Erin Katrine, DVM, MS
Medical Director
Best Friends Animal Society
Who has ___ a dog with distemper?
BARC closed until further notice due to distemper, other illnesses among animals

The shelter is now seeking foster for low-risk pets

TULSA ANIMAL WELFARE DEALS WITH CASES OF DISTEMPER VIRUS

Thursday, March 3rd 2022, 3:13 pm

TULSA, Oklahoma. The Tulsa Animal Welfare shelter is dealing with more cases of the canine Distemper virus. The shelter had to close a few months ago because of an outbreak of Distemper.

Staff at Tulsa Animal Welfare said two dogs have tested positive for the virus. They said they’re not treating the cases because there are no effective treatments.

Distemper is a highly contagious viral disease that can be deadly for dogs. It can also affect cats, ferrets, and other animals.

Pine Bluff animal shelter

Distemper outbreak shuts Pine Bluff animal shelter

By Byron Tite | October 2, 2022 at 3:54 a.m.
Overview

• Background on the disease
• Management in the shelter
• Exciting new research!
• Transport
• Real shelter and transport examples
• Questions
Canine distemper virus
Canine distemper virus

- **Incubation period:**
  - Time from exposure to clinical signs
  - Usually 1-2 weeks
  - Up to 1 month

- **Contagious BEFORE clinical signs start**
Canine distemper virus

- **Clinical signs:**
  - Upper respiratory (cough, nasal/ocular discharge)
  - Lower respiratory (pneumonia)
  - GI
  - Neurological (tremors, seizures, pain)
  - Ocular
  - Urinary
  - Skin lesions
  - **Or asymptomatic**

- **Infects ALL organ systems**
Disease progression

**Early**
- CIRD signs
- Or none!

**Mid-stage**
- Pneumonia
- Decreased appetite
- Vomit, diarrhea

**Late**
- Neurological: Tremors, Seizures
- Wasting, GI phase
Canine distemper virus

- **Diagnosis**: PCR
  - Detects viral DNA
  - Vaccine interference possible with MLV vaccines

- **CANNOT** diagnose on signs alone
Canine distemper virus
Canine distemper virus

- Not all labs are created equal
- Reputable lab options
  - Idexx
  - University of Wisconsin
  - Cornell
- Need a quantitative result to make decisions
Canine distemper virus

• **Transmission:**
  – Direct
  – Respiratory particles *(if coughing)*
  – Urine
  – Feces
  – **FOMITES**

• **Shedding** after recovery: PCR+ for weeks to **months**...but maybe not contagious?

• **Disinfection:**
  – Lives for a few hours in the environment
  – Easily killed by routine disinfectants
How many have received veterinary advice recommending immediate euthanasia?
Treatment

Mild signs
• Doxycycline
• +/- Cough suppressants

Moderate signs
• SC or IV fluids
• Additional antibiotics
• GI meds
• Nursing care

Severe signs
• Oxygen
• Feeding tube
• Anti-convulsants
• Muscle relaxants
New Castle vaccine?

• Use your resources elsewhere
Prognosis

- Neurological: 10%
- Pneumonia: 10-20%
- Many dogs show minimal to NO signs
- Survival
  - Harvey response shelter (adult dogs): >93%
  - Young puppies: ~50%

Euthanasia decisions?
Management in the shelter environment
Unprotected at intake

All dogs
Presence of Protective Antibody Titers

% NOT PROTECTED

Protective Antibody Titers By Age

Lechner, E. S., et al. (2010)
Time to reach immunity

Percent of dogs that *are* protected

Up to HALF of adults and 83% of puppies: If exposed within ~2 weeks of intake (LONGER for puppies) they will become infected with CDV

Prevention

- **Vaccinate on intake**
  - Modified live vaccines
  - Adults: second dose in 2 weeks
  - Puppies: start at 4 weeks of age, multiple doses

- **Storage and handling**
  - Mixing
  - Temperature
Guidelines for shelter-housed dogs

- DHPP
  - Puppies:
    - Intake or 4 weeks of age
    - Repeat every 2 weeks until 18-20 weeks of age
  - Adults:
    - Intake
    - Second dose 2 weeks later

- Intranasal Bordetella/PI
Prevention

• Reduce animal movement
• All in, all out
• Identify and isolate
• Quarantine?
• Reduce length of stay
Challenges

• Similar presentation to other (less serious) respiratory pathogens
• Shedding prior to signs
• Asymptomatic shedders
• Solution:
  – PCR testing to diagnose
Challenges with testing

• MLV vaccines can interfere with PCR testing
  – False positives with recent vaccination
  – <20% of healthy dogs during first 2 weeks post-vaccination
In the face of an outbreak or confirmed disease, EVERY positive result must be treated as infection.

**CDV VACCINE STRAIN**
CDV viral load is low, within the range expected for vaccine interference. If the dog has been vaccinated with a modified-live CDV strain within the past few weeks, the positive CDV result may be due to detection of the vaccine strain. If the...
Virus quantity in infected dogs

648 samples

Vaccine cutoff

University of Florida Maddie’s Shelter Medicine Program
Virus quantity (PCR)

Graph showing the virus quantity for 48 dogs over 98 days, with a vaccine cutoff line.

University of Florida Maddie’s Shelter Medicine Program
Vaccine interference

• Low viral counts can be:
  – Vaccine-induced (if MLV)
  – Early or recovery phase of infection

• Isolate and retest in one week
  – Will be negative if vaccine-induced
Indications for testing

- Increase in number of cases
- Increase in severity of disease
- Routine surveillance
Testing challenges

• Cost

• Turnaround time for testing
  – Send directly to Idexx Sacramento lab
  – State labs?
  – Shelter discounts
Outbreak management

Don’t depopulate!
Outbreak management

• **ASK FOR HELP!**
• Every outbreak is different
• More efficient use of resources
• Organizations that can help
  – Best Friends
  – Shelter medicine academic programs
  – San Diego HS – Ask an Expert
Outbreak management

- Evaluate resources and community
- Isolate the sick
- Quarantine the exposed
  - Risk assessment
  - For entire incubation period
- Clean break
- Treat individual animals
Outbreak management

1. +/- CDV (+)
2. Sick dogs, CDV (-), exposed
3. Exposed but appear healthy
4. Unexposed

CLEAN BREAK
Distemper outbreak shuts Pine Bluff animal shelter

ACCT Philly Alert

Paris Animal Shelter closes due to distemper outbreak

ACCT Philly recently had an increase in upper respiratory cases, and also saw a stronger strain called pneumovirus, infect several dogs. Despite our best efforts to decrease the spread, we have not seen the decrease we need to, and our veterinarian determined that a clean break was necessary. Guidance that was confirmed by disease management experts at the University of Florida Maddie's Shelter Medicine program.

As of Tuesday, May 2nd, ACCT Philly will not be accepting any intakes unless they are a public safety risk, injured, or suffering and in need of humane euthanasia.
Risk assessment

• Based on age and vaccine history
  – Puppies ALWAYS high risk
  – Lower risk
    • > 6 months of age
    • Have 2 vaccines *at the time of earliest exposure*
Risk assessment

• Using antibody titers
  – Point-of-care kits or lab
  – Only if early in the outbreak
    • Does NOT differentiate infection from vaccine-induced
  – Useful for adults, NOT as useful for puppies
    • Maternal antibodies

• Paired Ab titer + PCR testing
Clearing dogs

1 month or less

1 - 2 months

4+ months!
Plan for recovered dogs

• Recovered, but *maybe* contagious for weeks?
• **Conservative approach:** Two negative tests, one week apart
• House with fully vaccinated adults
  – Foster homes ideal
  – Education for staff, foster caregivers and adopters
Prolonged persistence of canine distemper virus RNA, and virus isolation in naturally infected shelter dogs

Carolyn Allen, Alexandre Ellis, Rubi Liang, Allam Lim, Sandra Newbury

Published: January 20, 2023 • https://doi.org/10.1371/journal.pone.0280186

Abstract

Canine distemper virus remains an important source of morbidity and mortality in animal shelters. RT-PCR is commonly used to aid diagnosis and has been used to monitor dogs testing positive over time to gauge the end of infectious potential. Many dogs excrete viral RNA for prolonged periods which has complicated disease management. The goal of this retrospective study was to describe the duration and characteristics of viral RNA excretion in shelter dogs with naturally occurring CDV and investigate the relationship between that viral RNA excretion and infectious potential using virus isolation data. Records from 98 different humane organizations with suspect CDV were reviewed. A total of 5,920 dogs were tested with 1,393; 4,452; and 75 found to be positive, negative, or suspect on RT-PCR respectively. The
New research!

- PCR+ may not = contagious
- Shedding for 2 weeks after peak viral count
- Clear positive dogs 2 weeks after peak viral count AND no clinical signs
New research!

• Important points
  – Study limitations
  – Requires isolation for 2-4 weeks
  – Requires multiple rounds of PCR testing

• Shelters using this approach
Foster care

• Foster options
  – No other dogs
  – Fully vaccinated, adult dogs

• Reduce the fear and stigma
Community or shelter-acquired?

- Incubation period usually 7-14 days
- Community:
  - Targeted vaccination program
- Shelter:
  - Contact tracing
  - Review protocols and compliance
Key points

- Vaccinate on intake
- **Don’t depopulate**
- Must test to know CDV vs. CIRD/kennel cough
- Can be successfully treated
Transport implications
The rationale for transport

- 81% national save rate
- 57% of U.S. shelters are no-kill
- 63% reduction in the number of pets killed since 2016
- 43% of U.S. counties are no-kill

Map showing the distribution of no-kill shelters and counties across the United States.
800 Pups Project
800 Pups challenges

- Breaking with clinical signs during and after transport
- Resistance to transfers
- Reluctance to treat
- Need education!
Reducing risk with transport

• Quarantine before transport
  – Foster
  – **NOT** in the shelter
• Reduce risk
  – No time in shelter for high-risk dogs
  – Choose “safe” dogs
• Testing prior to transport
  – Receiving org subsidizes
• Follow-up from partners
• Provide support for partners
For receiving organizations

- We need help!
- Quarantine on the receiving end (14 days)
  - Foster with fully vaccinated dogs
  - Consider testing
  - Lessens burden on sending org
- Evaluate risk in individual dogs
- Have a plan in case of illness
- Provide education
Shelter examples
Case 1: Hurricane Harvey
### CANINE DISTEMPER VIRUS

**CDV QUANTITY**

<table>
<thead>
<tr>
<th>Result</th>
<th>Reference Range</th>
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<tbody>
<tr>
<td>POSITIVE</td>
<td>THOUS/SWAB</td>
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**FOLD DIFFERENCE ABOVE CUTOFF**

<table>
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<tr>
<th>CDV INTERPRETATION</th>
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Outbreak response

No clinical signs (apparently healthy) → Clinical signs → CDV negative or pending → CDV Positive
Treatment

Cost per dog: $0 to $2

Cost per dog: $100 to $150

Cost per dog: $500 to >$2,000
Outcomes

• 124 distemper dogs
• **Survival:**
  – 93% of all CDV+
  – 85% without ICU care
• **Factors**
  – Mostly adult dogs
  – Intensive treatment for every dog
Lessons learned

- Biosecurity
- Importance of isolating sick dogs
- Decrease animal movement
- Successful foster of CDV+ dogs
- We CAN save CDV dogs
Case 2: Sanctuary puppies

• 3 moms, their 21 puppies, 2 additional pups
• Transferred to Utah sanctuary
• Initial testing: **All positive**
• Concurrent illness
  – Heavy parasitism
  – Anemia necessitating blood transfusions
Outcomes

- Puppies (23)
  - PCR positive for 2-4 months
  - 7 with neuro signs → euthanized
  - 14 total died/euthanized

- Moms (3)
  - Upper, mild lower respiratory signs
  - All survived
  - PCR positive for 4-5 months
Outcomes
Case 3: Palm Valley Animal Center

- Edinburg, Texas
- Multiple municipal contracts
- Annual intake of 30,000
- Save rates:
  - 2017: 34%
  - 2018: 54%
The reality at PVAC

- CDV in the community: 3 of 7 positive
- CIRD in the shelter: 10 of 11 CDV+
- Dog movement in the shelter
- Born in care
- Limited isolation space
- Limited resources
Shelter practices leading to distemper

• Ineffective vaccination
• Intake room cross-contamination
• LOTS of dog movement
• High density housing
• CIRD dogs left in place
• Inconsistent sanitation
• Large numbers of at-risk dogs
Solutions

- Timely vaccination
- Modified live vaccines
- Staff training for sanitation
- Intake in kennel
- Change in flow
- Vaccinate at/before intake
Solutions

• Reducing the number of most at-risk
  – Fast-track
  – Reduce born in care
• Rapid identification of sick dogs
• Isolation and testing
Progress

- Decrease to 50% distemper in CIRD dogs
- SAVING non-CDV respiratory dogs!
- Dog adoption doubled, transport up
- Community cat program ramping up
Outbreak response in 2019

- Still endemic in shelter population
- Temporarily halted intake
- Tested every dog
- Eliminated in-shelter transmission

LOCAL NEWS
Palm Valley Animal Center reduce dog intake to combat disease

Palm Valley Animal Center officials are taking action to end a contagious dog disease.

“Distemper is endemic to the area, so it just keeps coming into our facility and we’ve tried a lot of other treatments to kind of nullify that but it’s been very difficult,” said Animal Center Executive.
Progress in 2020

• Pandemic shutdowns → breathing room!
• Began saving CDV+ dogs
  – Isolation or foster
• 2021: more challenges

Reggie, CDV+ foster
Ongoing management

- **Surveillance**
  - Initially, testing *every* CIRD dog
  - Scale back to sampling only?
    - Appropriate for most shelters

- **Prevention**
  - Shelter strategies
  - Targeted community vaccination
Key Points

Vaccination
- On intake
- Timely second doses
- Modified live vaccines

Population management
- Reduce LOS
- Reduce overcrowding
- Reduce movement

Disease management
- Rapidly identify and isolate
- Must test to know for sure

Outbreaks
- Don’t depopulate
- Ask for help!

Don’t depopulate
Must test to know for sure
• Network.bestfriends.org
  – Distemper playbook
  – Reducing disease in transport playbook
  – Webinar: Disease prevention in the shelter
Resources

• Handouts
  – Slides
  – Protocol examples
  – Adopter/foster info sheets and agreements
  – Links to resources