



**Best
Friends**[®]
Save Them All[®]

Canine Distemper: Management for Shelters

Erin Katribe, DVM, MS
Medical Director
Best Friends Animal Society





seen

transported out

euthanized

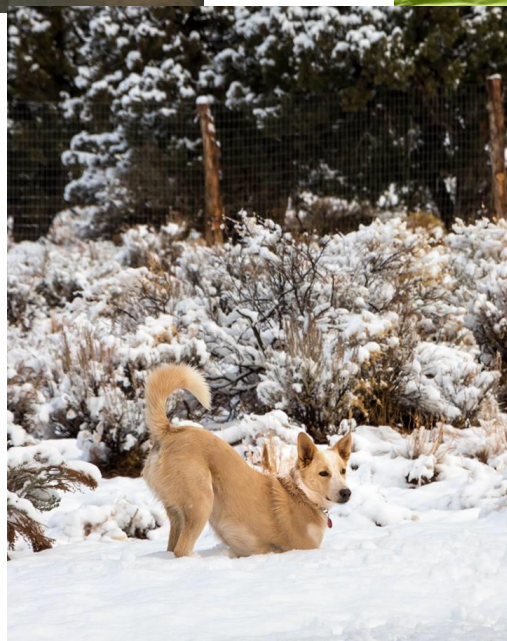
Who has ____ a dog with distemper?

fostered

sheltered

transferred in

SAVED



LOCAL NEWS

Ana Gonzalez, Digital Associate Producer

Published: July 6, 2021 at 1:01 PM

Updated: July 9, 2021 at 6:14 PM

Tags: BARC, City Of Houston, Animals, Animal Shelter, Closure

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BARC closed until further notice due to distemper, other illnesses among animals

The shelter is now seeking foster for low-risk pets



HOUSTON - The City of Houston's BARC announced further notice due to a high number of illness cases

The animal shelter is now seeking foster for low-risk pets

LATEST NEWS

3 HOURS AGO

BARC: City of Houston



News Weather Videos Sports | Trending: Okla. Drought HS Football

TULSA ANIMAL WELFARE DEALS WITH CASES OF DISTEMPER VIRUS

Thursday, March 3rd 2022, 5:13 pm
By: [Matt Rahn](#)



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

Distemper outbreak shuts Pine Bluff animal shelter

by [Byron Tate](#) | October 2, 2022 at 3:54 a.m.



Follow



Distemper was detected last week in the dog population last week, and the decision was made on Monday to close the facility. Shown here are the shelter's front doors. (Pine Bluff Commercial/Byron Tate)

Rec
Hog
Stat
Puti
brid
Dea
Tow
wat



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

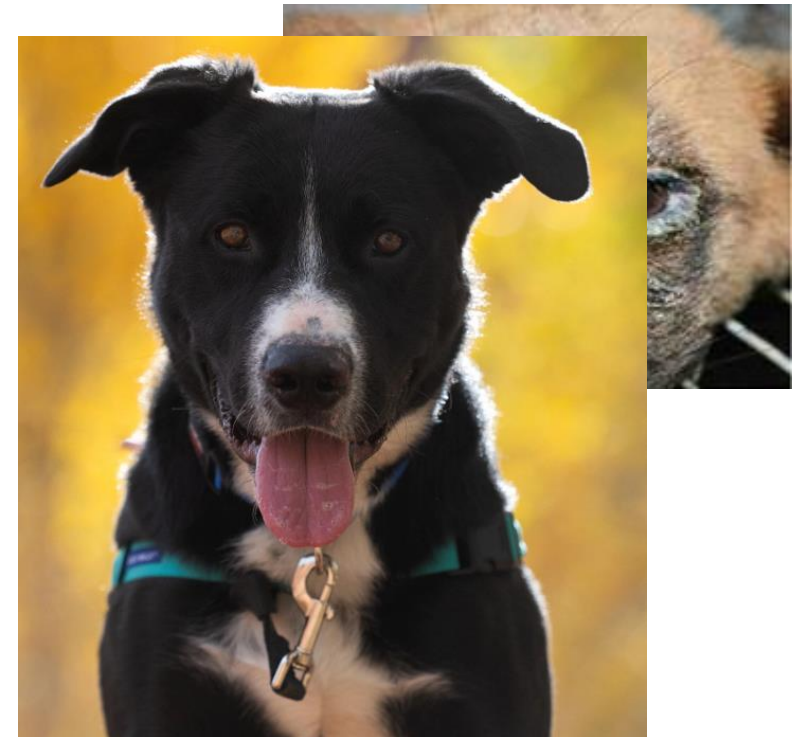
- **Incubation period:**
 - Time from exposure to clinical signs
 - Usually 1-2 weeks
 - Up to 1 month
- **Contagious BEFORE clinical signs start**





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**

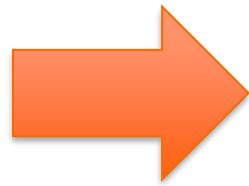




Disease progression

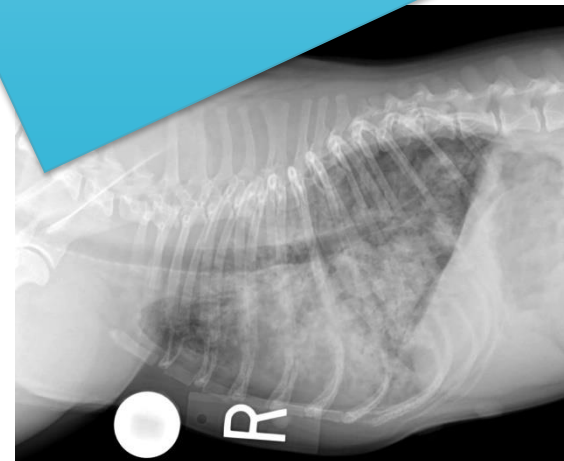
Early

- CIRDC signs
- Or none!



Mid-stage

- Decreased appetite
- Seizures
- GI phase





Canine distemper virus

- **Diagnosis: PCR**
 - Detects viral DNA
 - Vaccine interference possible with MLV vaccines
- **CANNOT** diagnose on signs alone



Walmart



Departments



Services

Search everything at Walmart online and in store



How do you want your items?



Sacramento, 95829



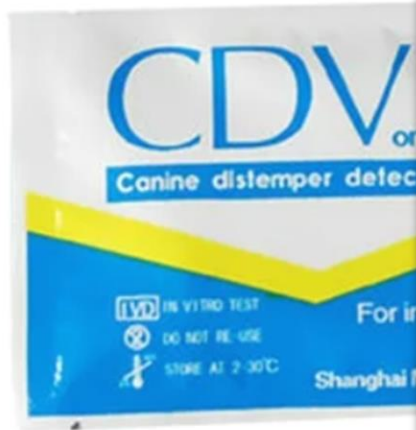
Sacramento Supercenter

Deals

Grocery & Essentials



Step 5: Judge the result
Infected with the virus results
For each 15 minutes
For each 15 minutes
Uninfected virus results
Negative: only C line
Invalid detection



virus

AliExpress



I'm shopping for...



10 Packs Canine CDV Rapid Test Kit Home Tests Test Paper Dog Distemper Detection Card Canine Home Health Detection Test

\$40.90

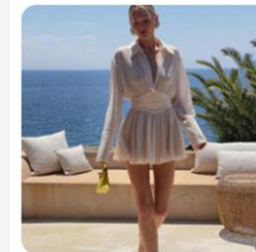
0 orders

Similar items



\$17.51 \$35.03

Sexy Cut Out Backless



\$25.24 \$50.47

women dress



\$21.44 \$43.76

Luxury Transparent Ca



\$84.12

MongGo Q1



Canine distemper virus

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



College of
Veterinary Medicine



Shelter Medicine
SCHOOL OF VETERINARY MEDICINE
UNIVERSITY OF WISCONSIN-MADISON

IDEXX
LABORATORIES



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





Audience poll

How many have received veterinary advice recommending immediate euthanasia?



Treatment

Mild signs

- Doxycycline
- +/- Cough suppressants



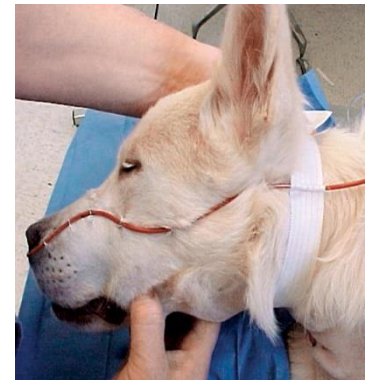
Moderate signs

- 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?



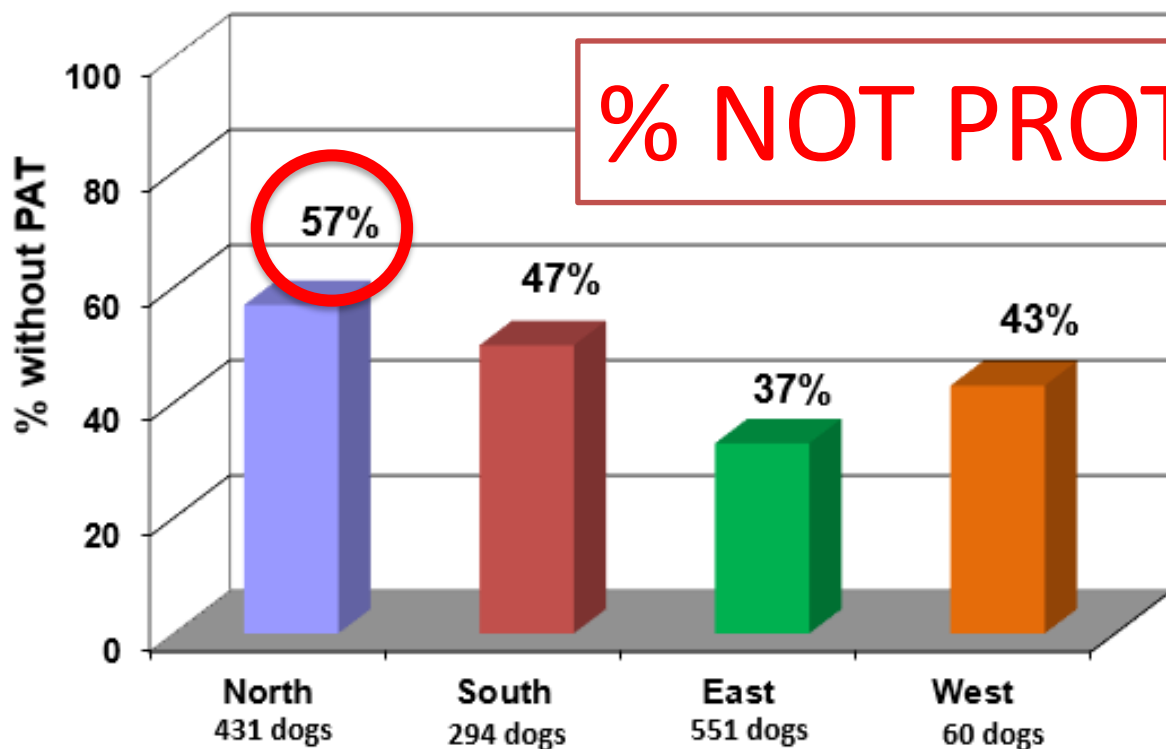
Management in the shelter environment



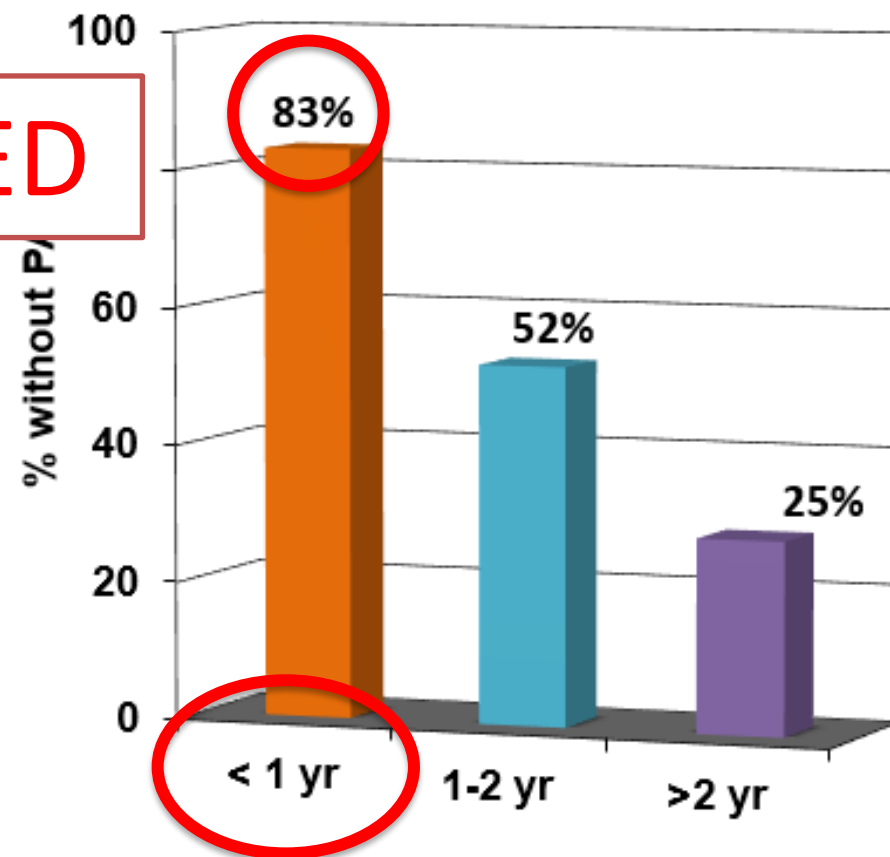
Unprotected at intake

All dogs

Presence of Protective Antibody Titers



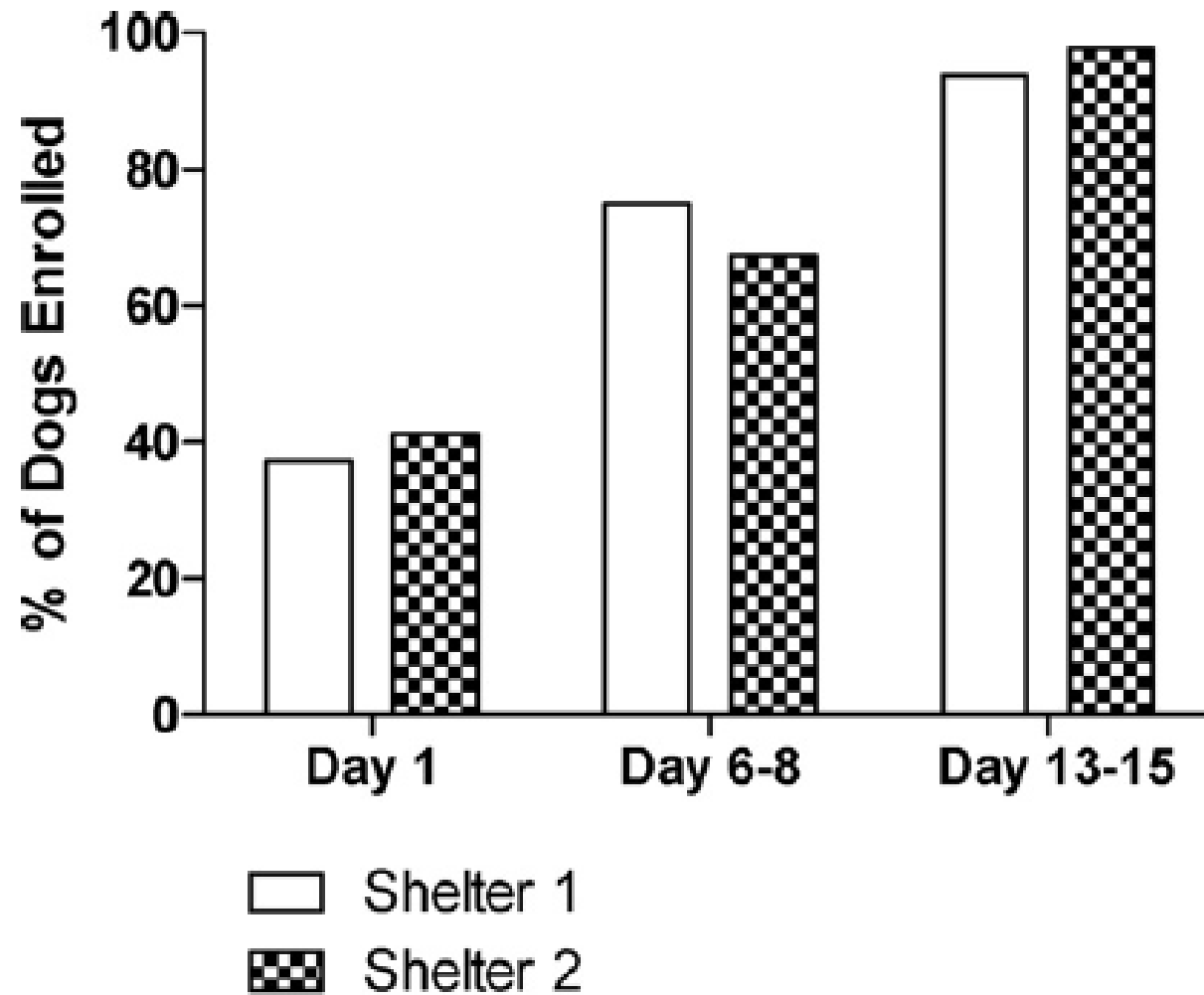
Protective Antibody Titers By Age





Time to reach immunity

Percent
of dogs
that **are**
protected





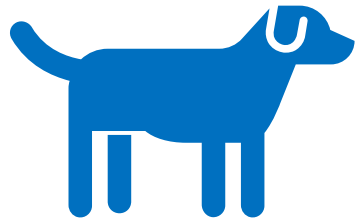
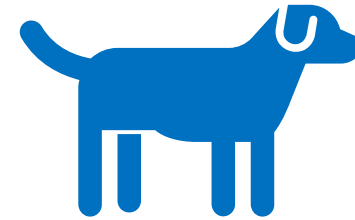
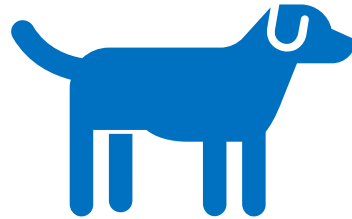
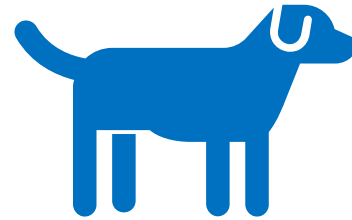
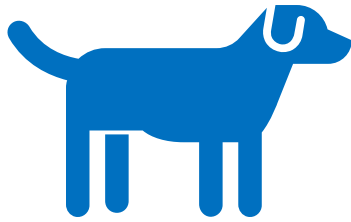
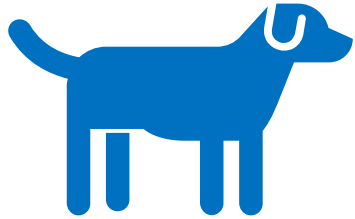
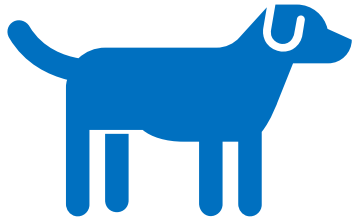
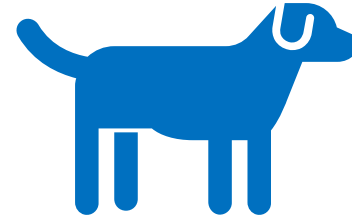
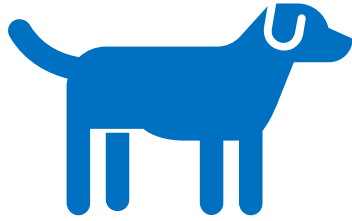
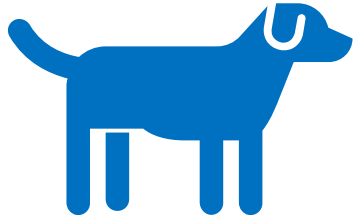
Time to immunity

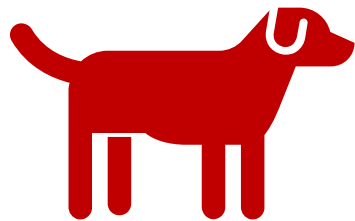
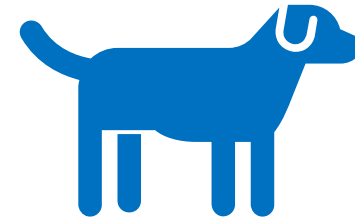
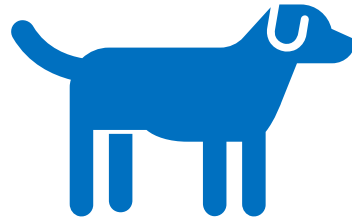
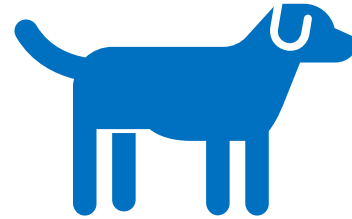
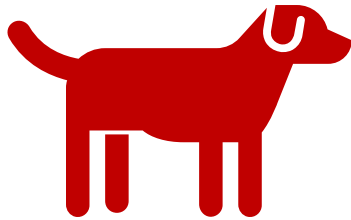
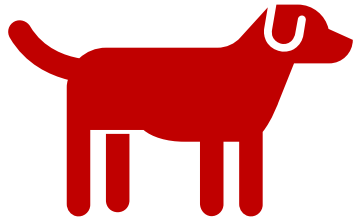
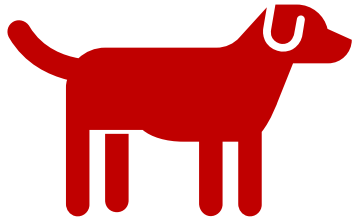
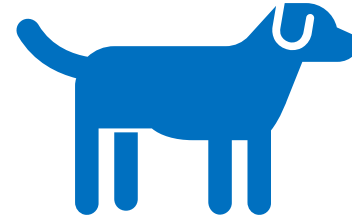
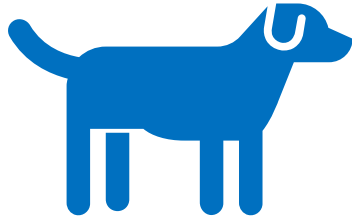
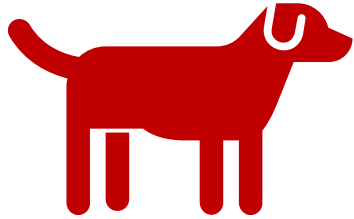
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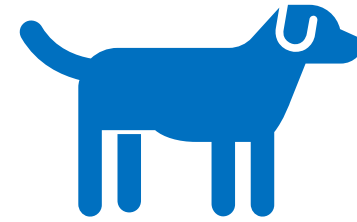
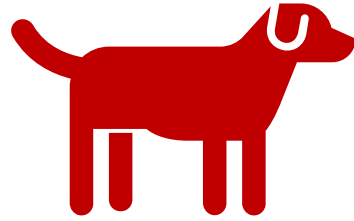
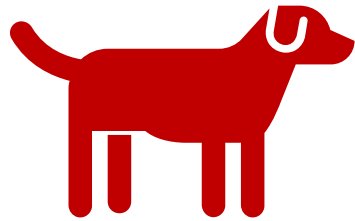
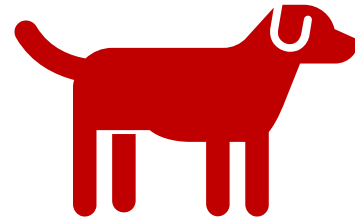
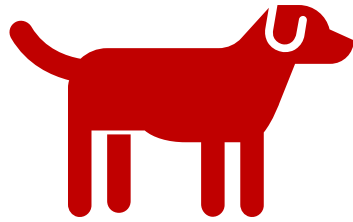
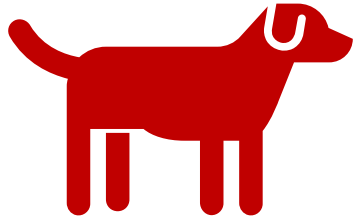
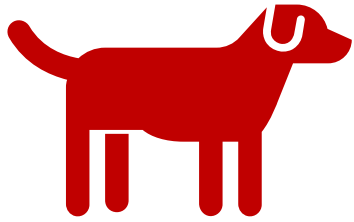
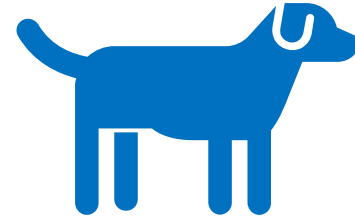
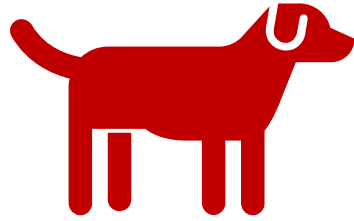
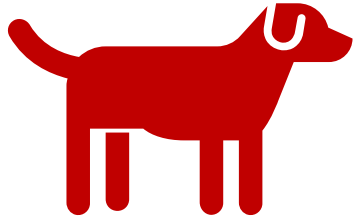
**Up to HALF of adults and 83% of puppies:
*If exposed within ~2 weeks of intake
(LONGER for puppies)
they will become infected with CDV***



- Shelter 1
- ▣ Shelter 2









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



2022 AAHA Canine Vaccination Guidelines

- 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



Vaccine interference

DISTEMPER QUANT RealPCR

Test	Result	Reference Range	Low	Normal	High
CANINE DISTEMPER VIRUS	POSITIVE				
CDV QUANTITY	7	THOUS/SWAB			
FOLD DIFFERENCE ABOVE CUTOFF	0.06				

CDV INTERPRETATION

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 dog has not been vaccinated recently or received the recombinant CDV vaccine, the positive CDV result is consistent with the early or recovery phases of a wild-type infection, particularly if there is known exposure or compatible clinical signs; re-testing in 1 to 2 weeks is recommended.

A POSITIVE CANINE DISTEMPER VIRUS (CDV) result indicates that CDV RNA was present in the sample. In animals with clinical signs this supports infection. Dogs with a mild form of illness show respiratory signs that can be indistinguishable from other causes of "kennel cough." Dogs which become systemically ill can have respiratory, gastrointestinal and/or neurological signs. Vaccination with a modified live vaccine may result in positive results for up to a

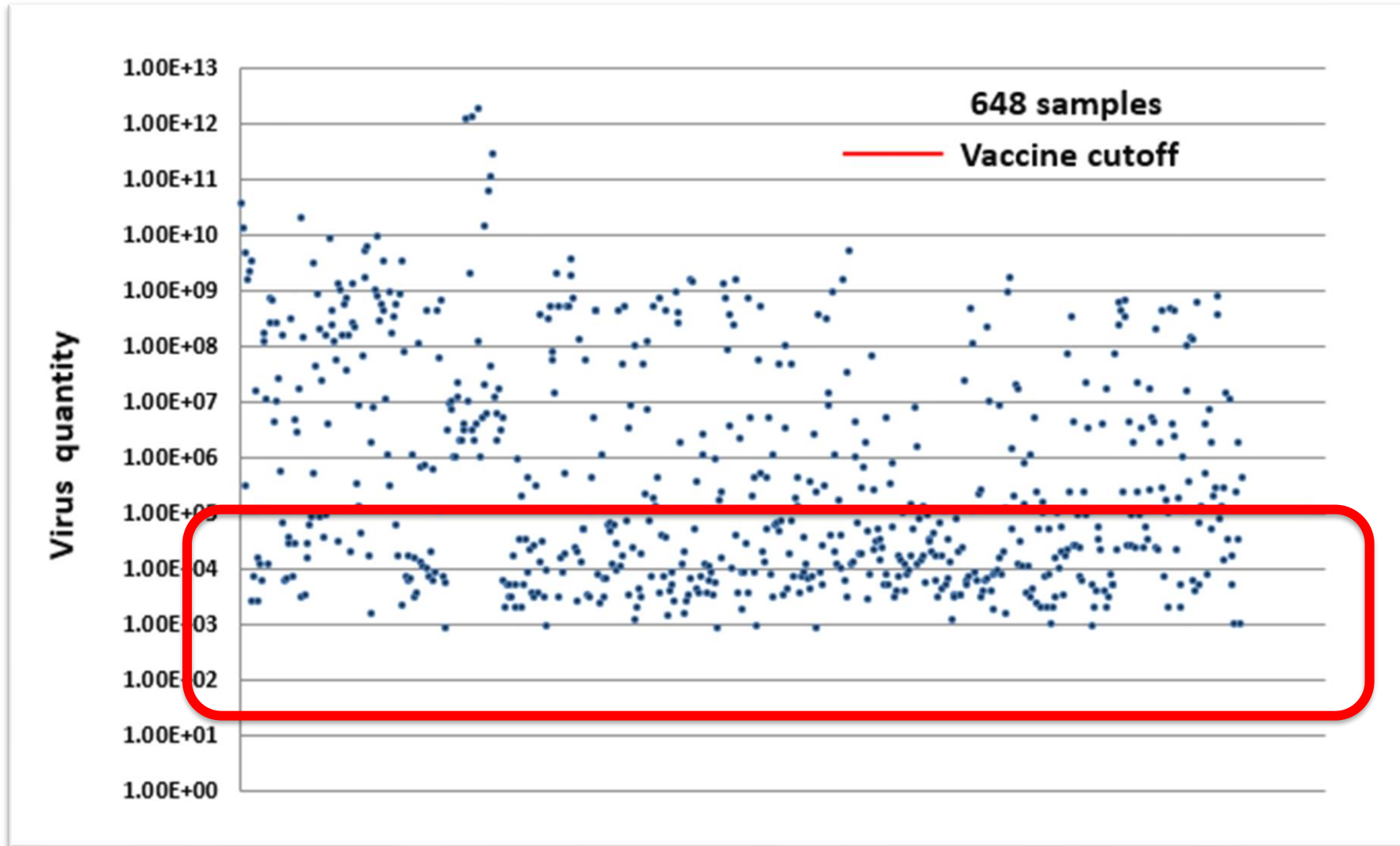
In the face of an outbreak or confirmed disease, EVERY positive result must be treated as infection.

CDV VACCINE STRAIN

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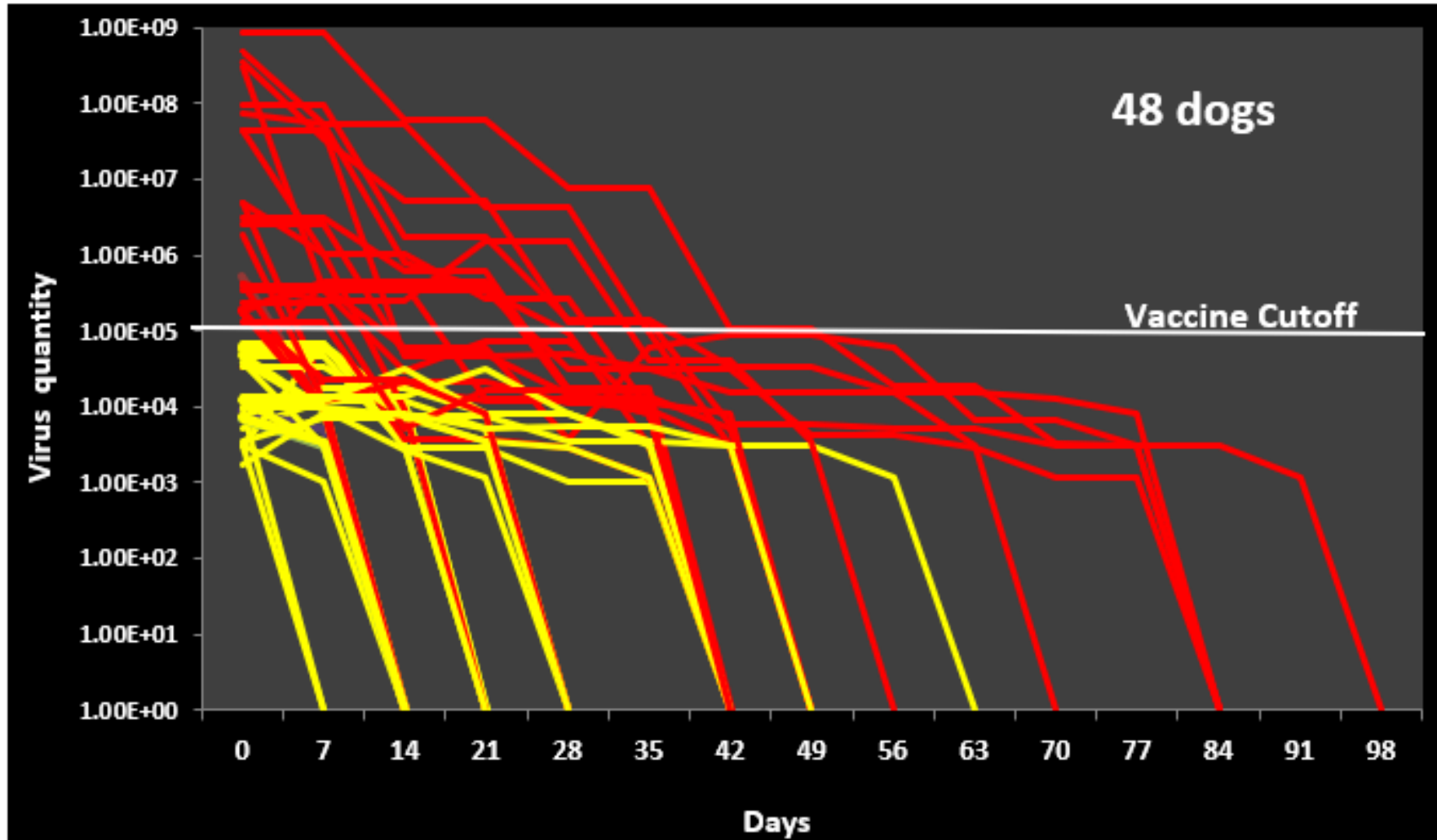


Virus quantity in infected dogs





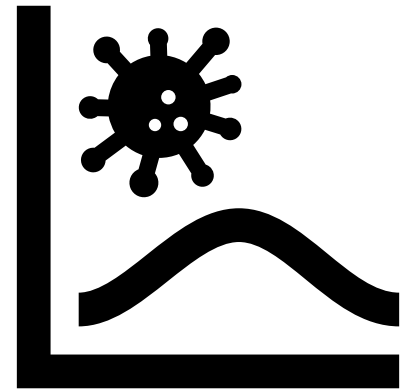
Virus quantity (PCR)





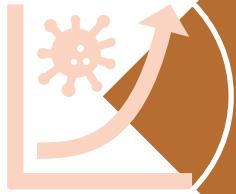
Vaccine interference

- 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

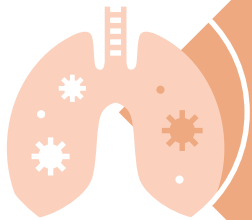




Indications for testing



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

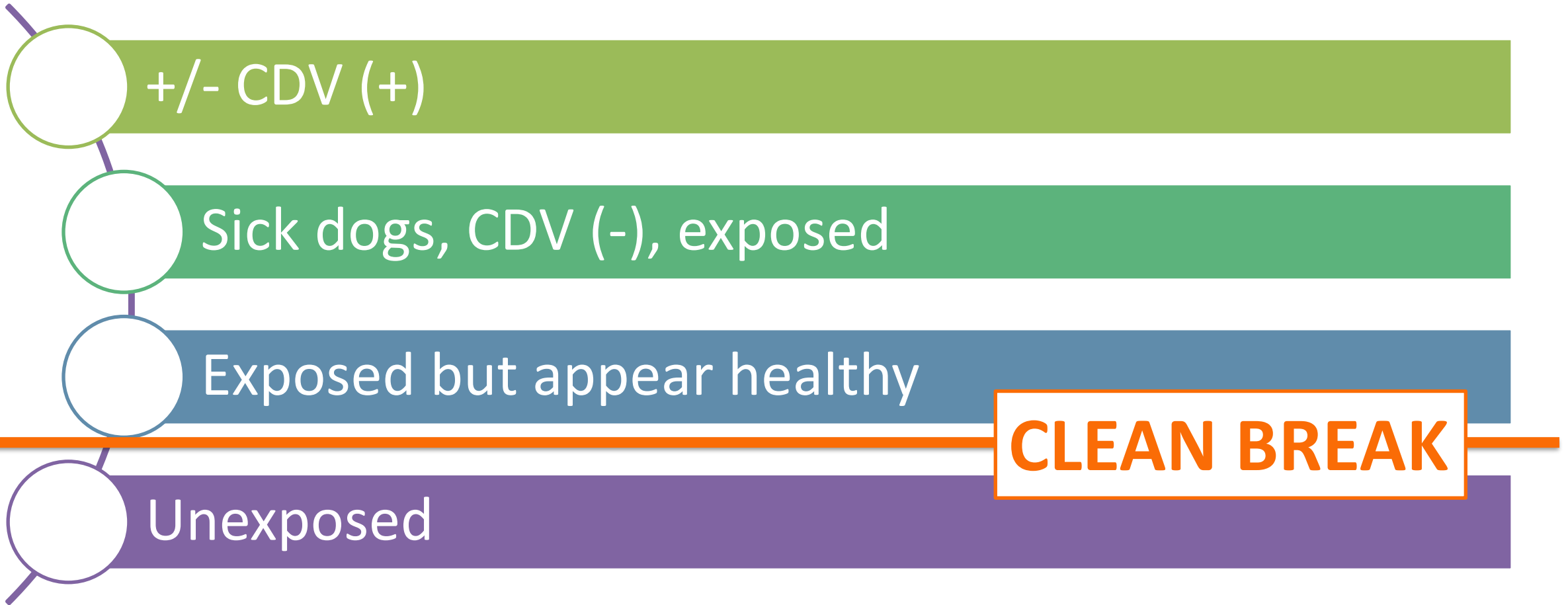


Outbreak management

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



Outbreak management





Distemper outbreak shuts Pine Bluff animal shelter

by Byron Tate | October 2, 2022 at 3:54 a.m.



Follow



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BARC closed until further notice due to distemper, other illnesses among animals

The shelter is now seeking foster for low-risk pets



HOUSTON – The City of Houston's BARC announced they have closed further notice due to a high number of illness cases among animals in

LATEST NEWS

3 HOURS AGO



Rec... pt ▾ Programs & Services ▾ How to Help ▾ Love Local Partnership

ACCT Philly Alert

May 2, 2022 | News |

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.

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gomacro 100% plant-based. 100% delicious.

Shop

Paris Animal Shelter closes due to distemper outbreak

🕒 1 month ago Amanda Cutshall

Until Sept. 12, the shelter will no longer accept new animals and will be performing a deep clean while officials continue to monitor the outbreak.



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



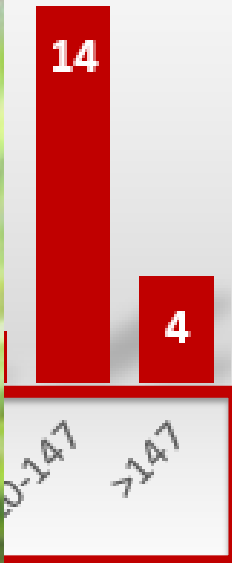


1 month

Number of Dogs



14 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



New research!

PUBLISH ABOUT BROWSE

PLOS ONE

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Prolonged persistence of canine distemper virus RNA, and virus isolation in naturally infected shelter dogs

Carolyn Allen , Alexandre Ellis , Ruibin Liang, Ailam Lim , Sandra Newbury

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

Article	Authors	Metrics	Comments	Media Coverage

Abstract

Introduction

Material and methods

Results

Discussion

Conclusions

Supporting information

Acknowledgments

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!

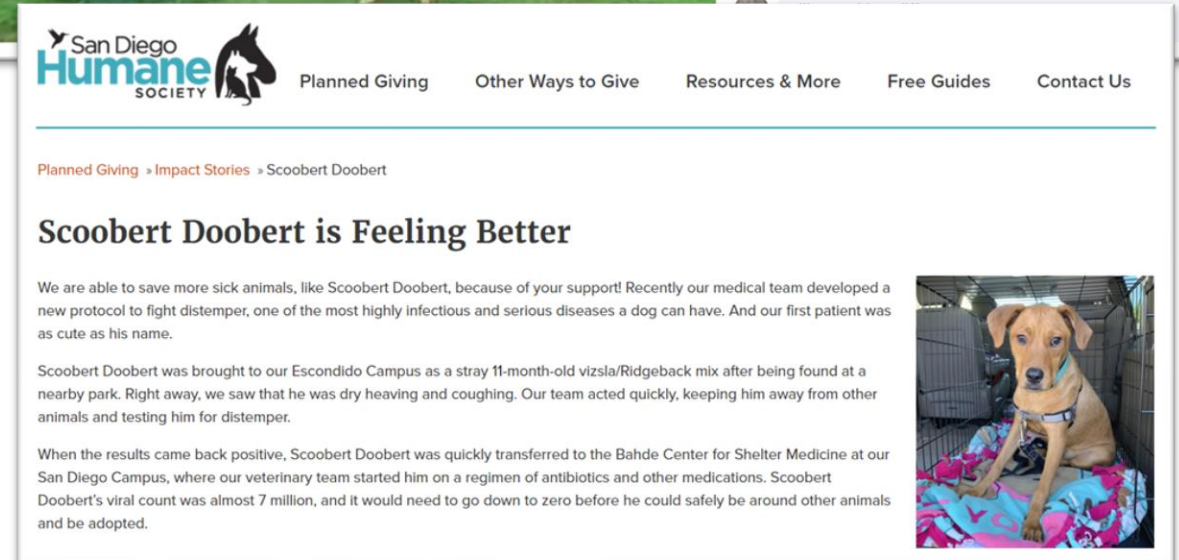
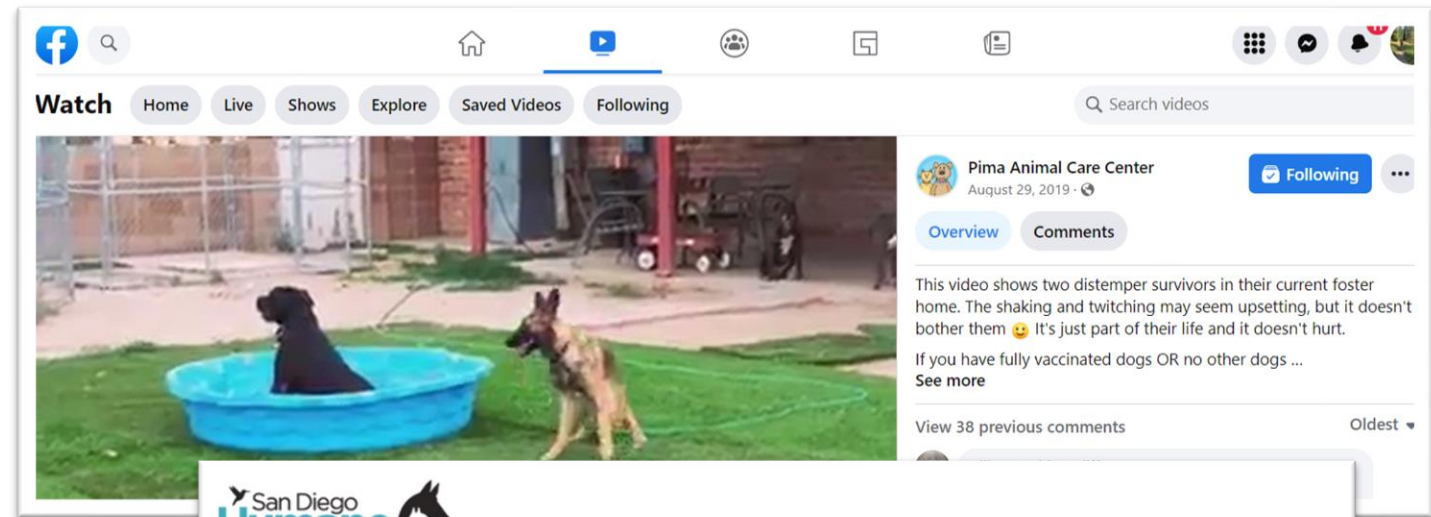
- Important points
 - Study limitations
 - Requires isolation for 2-4 weeks
 - Requires multiple rounds of PCR testing
- Shelters using this approach





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. CIRDC/kennel cough
- Can be successfully treated



Transport implications



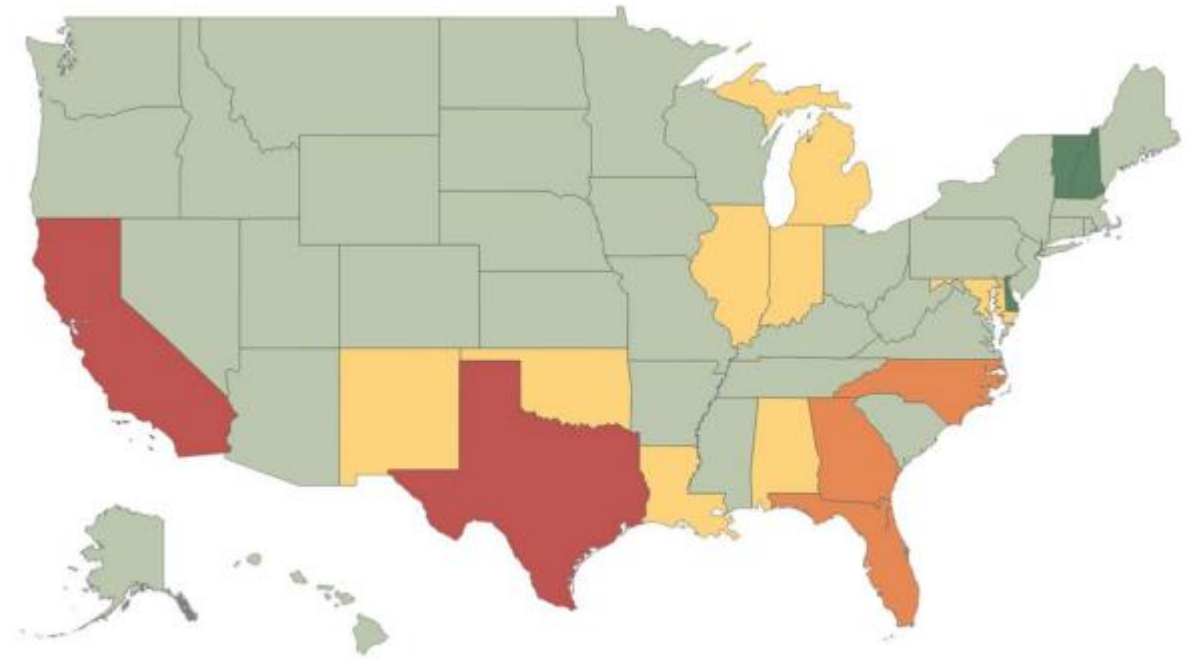
The rationale for transport

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



Over 31k 15.5k – 31k 6.8k – 15.5k <6.8k No-Kill



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

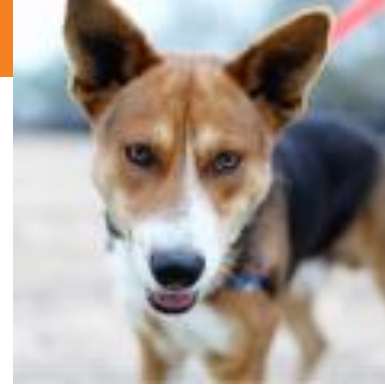
- We need help!
- Quarantine on the receiving end (14 days)
 - Foster with fully vaccinated dogs
 - Consider testing
 - Lessens burden on sending org
- Evaluate risk in individual dogs
- Have a plan in case of illness
- Provide education



Shelter examples



Case 1: Hurricane Harvey



IDEXX VetConnect 1-888-433-9987

Client: BFR
Patient: STRAY 1
Species: CANINE
Breed: MIXED_BREED_CAN
Gender: MALE
Age: 2Y

Date: 09/12/2017
Requisition #: 8101508516
Accession #: 8101508516
Ordered by: NOT SPECIFIED

WESTSIDE VETERINARY HOSPITAL
[6034 WEST BROADWAY](#)
[PEARLAND, Texas 77581](#)
2814855618

Account #45077

CANINE RESPIRATORY PCR (2524)

Test
CANINE DISTEMPER VIRUS
CDV QUANTITY
FOLD DIFFERENCE ABOVE CUTOFF
CDV INTERPRETATION

Result
POSITIVE
7163 ¹
68.27 TIMES
~ ²

Reference Range
THOUS/SWAB

LowNormalHigh

CANINE DISTEMPER VIRUS
CDV QUANTITY
FOLD DIFFERENCE ABOVE CUTOFF

POSITIVE
7163 ¹
68.27 TIMES

THOUS/SWAB

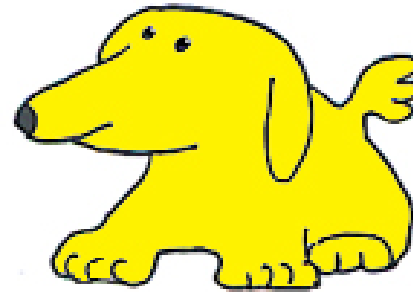
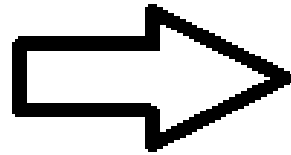


Outbreak response



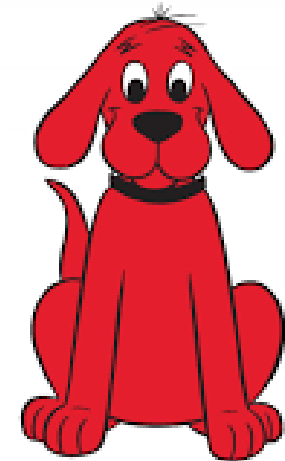
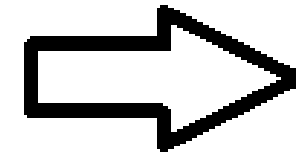
No clinical signs
(apparently healthy)

Clinical signs



CDV negative
or pending

CDV Positive

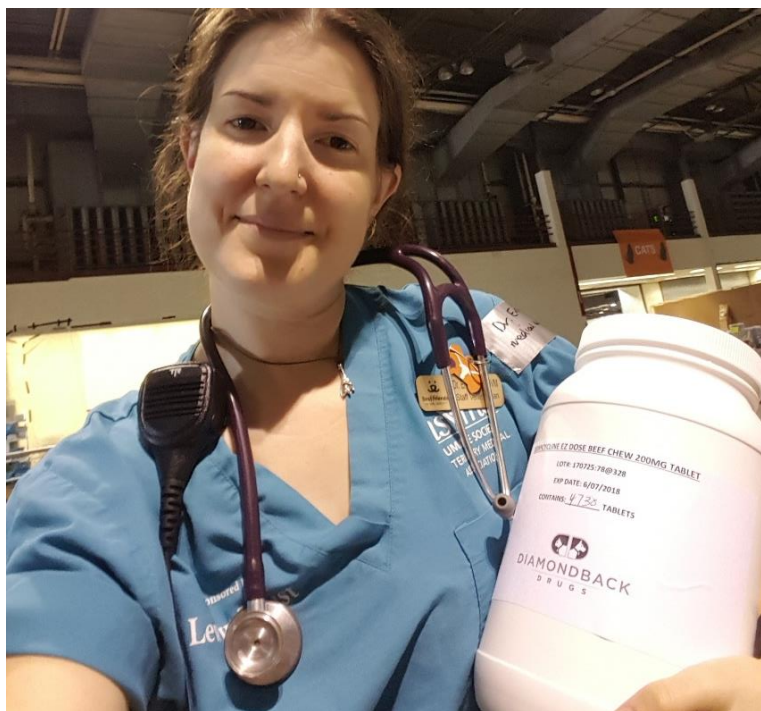




Treatment

**Cost per dog:
\$100 to \$150**

**Cost per dog:
\$500 to >\$2,000**



Cost per dog: \$0 to \$2





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 of 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 Laurie P. Andrews

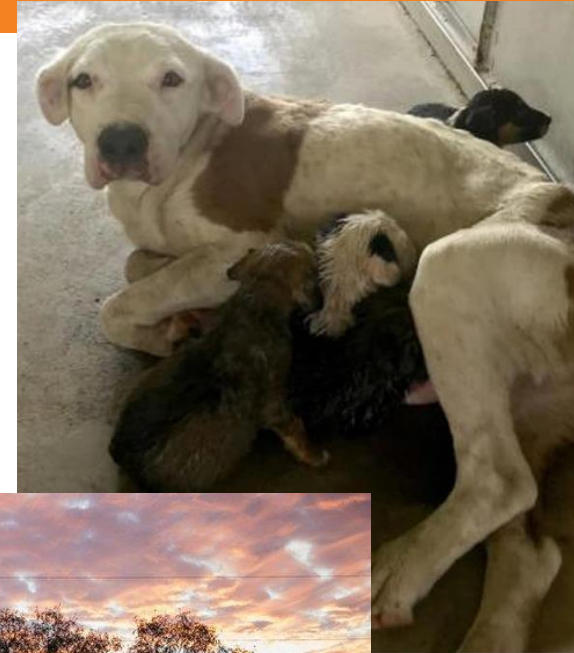


Pet Adoption and Wellness Services



The reality at PVAC

- CDV in the community: 3 of 7 positive
- CIRRD 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
- CIRRD 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 CIRRD 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**

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LOCAL NEWS

Palm Valley Animal Center reduce dog intake to combat disease

by: Allysa Cole
Posted: Aug 4, 2019 / 12:38 PM CDT
Updated: Aug 4, 2019 / 12:38 PM CDT

SHARE ...

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

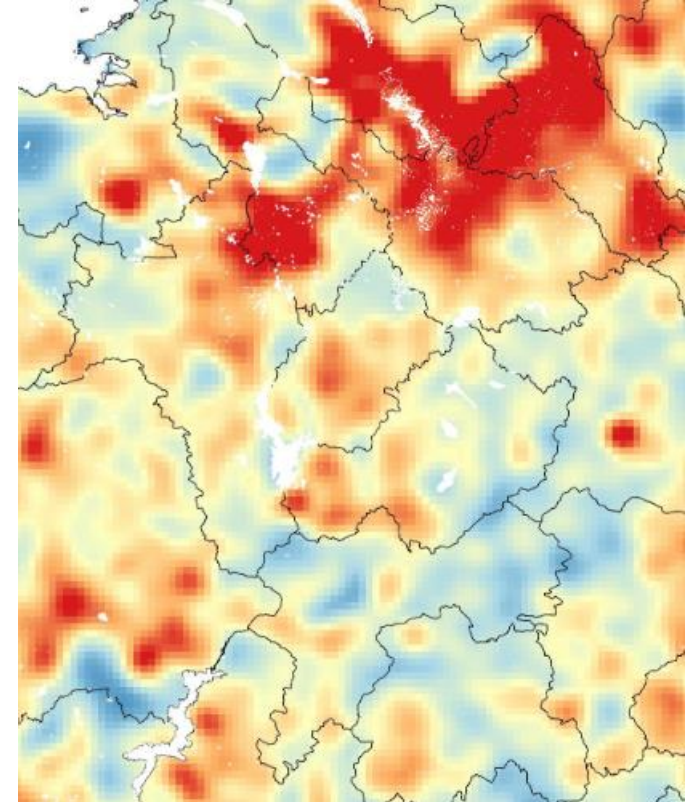


Reggie, CDV+ foster



Ongoing management

- Surveillance
 - Initially, testing **every** CIRDC 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



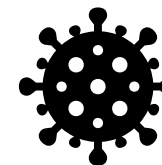
Population management

- 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!





Resources

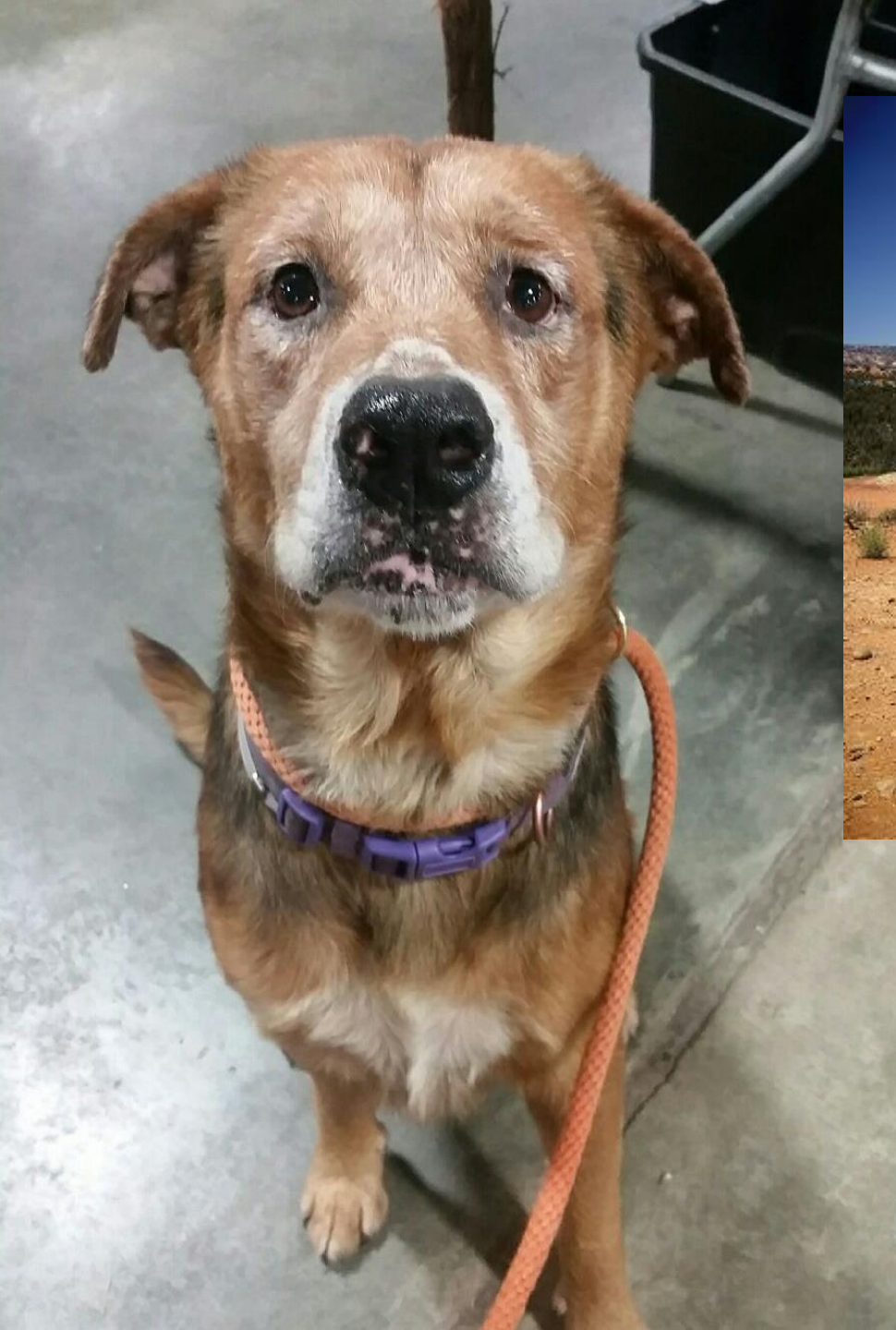
- **Network.bestfriends.org**
 - Distemper playbook
 - Reducing disease in transport playbook
 - Webinar: Disease prevention in the shelter

The screenshot shows the website for Best Friends Network Partners. The header includes the logo and navigation links: WHO WE ARE, JOIN US, RESEARCH & DATA, PROVEN STRATEGIES, and EDUCATION. The main content area is titled "Education" and includes a breadcrumb trail: Education / Manuals, Handbooks, & Playbooks / Canine Distemper Playbook. A sidebar on the left lists categories: UPCOMING TRAININGS, OPERATIONS, DIVERSITY, EQUITY & INCLUSION, FUNDRAISING, and 2022 FALL WEBINAR SERIES REGISTRATION. The main content features a photograph of a veterinarian in scrubs examining a golden retriever in a clinical setting. Below the photo, the title "Canine Distemper Playbook" is displayed, followed by the sub-section "Introduction" and a partial sentence: "Canine distemper is a highly contagious viral disease that can affect dogs of all ages, and it is endemic in".



Resources

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



erink@bestfriends.org