Canine Parvovirus Prevention and Management

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A Preview

• Clinical Signs
• History
• Transmission

• Management and Prevention
  – Vaccination
  – Disinfection
• Diagnosis and Antigen Testing
• Incubation
• Antibody Testing
• Treatment
• Outbreak Control
What is it?

• Un-enveloped virus
  – Hard to kill

• Antigenically stable
  – Vaccines generally work well
Clinical Signs of Infection

- Diarrhea
- Vomiting
- Dehydration
- Lethargy
- Inappetance
- Sudden death
- None
Systems Affected

- Gastrointestinal
- Heart
  - Myocarditis
- Brain?
Why?

- Rapidly dividing cells
- Host susceptibility
Who?

• Any age dog can be affected!
• Puppies 6 weeks to 6 months most susceptible
• All susceptible dogs
  – Any unvaccinated dog
  – Any dog with no previous exposure
Course of disease

- **Incubation**: 3-14 days
  - Usually 5-7
- **May shed virus 2-3 days before signs**
- **Shed usually < 2 weeks after recovery**
  - Snap test to help verify full recovery
- **No ‘carrier state’**
- **Many inapparent infections**
How frequently do you see it?

- Constant level
- Many isolated cases
- Outbreaks
- Rare Isolated cases
History

- CPV-2 was not reported before 1978
- Word-wide spread was rapid
- Intense collaborative research efforts
- Effective vaccines were developed fairly quickly
- Spread was slowed

Diary of a Virus

- **CPV-2**
  - Species specific for dogs
- **CPV 2a, 2b, 2c**
  - Wider host range
  - Cats
  - Varying incubation

- **Host range evolution**
  - Cats, raccoons, foxes, mink
  - $\rightarrow$ dogs $\rightarrow$ cats
Transmission
How?
Transmission

- Dog to dog
- Shed in feces, vomit
- Very easily spread by fomites
- Fur, feet, arms, hands, clothing, equipment, common walkways and play areas
Environmental Persistence

*“The infectivity in vitro was unchanged for the first 5 months, but after mid-summer it decreased abruptly to below the detection level. The transmission of the infection to the experimental animals was successful for all samples showing infective virus by cultivation. We conclude that parvovirus can survive for at least 5-10 months (or during the winter period) under natural conditions, but complete drying out seems to lead to its inactivation. Mechanical cleaning of the premises is thus as critical as disinfection since virus can only survive the dry summer period if protected by protein or buried in moist soil on the premises.”

*Uttenthal, A., Mink enteritis parvovirus. Stability of virus kept under outdoor conditions, Apmis1999
Innoculation at Intake?

- CPV is often shed in feces of infected dogs at viral titers of $1 \times 10^7$ to $1 \times 10^9$ TCID$_{50}$ per gram.
- Virus is stable in the environment.
- “We have previously demonstrated that susceptible animals, when placed in a room with small amounts of sand or clay soil experimentally contaminated with CPV-2 a year earlier become infected and diseased in approximately two weeks” (R.D. Schultz unpublished observations).
Dose effect

• Greater likelihood of infection
• Shorter time to onset
  – Less chance for vaccine to protect
• More severe disease

Systemic spread

Thresh-hold for infection
Dose effect

- Increased chances for disease introduction
- Increased contact rate
- Reduced quality of care
  - Housing
  - Husbandry

Where is the threshold?
Management and Prevention
Vaccination

- Essential preventative tool
- Many shelter dogs are susceptible.

ALMOST
What to choose?

- DHPP
- DA2PP
- DAP
- Keep it simple
- MLV injectible
Who to choose?

• All dogs over 4 weeks of age.

• Vaccine vs. virulent virus
  – Pregnant?
  – Injured?
  – Sick?

• All dogs over the age of 4 weeks!
Limited Resources

• If you absolutely can’t, vaccinate all dogs you might want to put up for adoption.

• Evaluation at Admission

• Isolate unvaccinated animals and remove promptly from the population.
Puppies

- Avoid potential exposure
- Isolate from the general shelter population whenever possible.
- Clean foster homes
- Puppy ward
When to Vaccinate?

- Vaccinate immediately, at admission ….or sooner
- Immunity within 72 hours (3-5 days) without a booster
- Time of vaccination vs. exposure
- Exposure isn’t always immediate
We’ve known this for a while

- The time necessary to obtain the immunity of cats against Panleukopenia has been studied by means of a modified live vaccine. This vaccine makes it possible to obtain a very early post-vaccinal immunity: the full immunity is reached 72 hr after the inoculation of the vaccine by the subcutaneous route. Furthermore, we have demonstrated that a sensitive kitten can be admitted in a contaminated environment immediately after vaccination without showing any clinical evidence of the disease.

Dogs

“Dogs vaccinated with modified live CPV develop high hemaglutination inhibition titers within four days of inoculation and antibody persisted.”

Why does this help?

• Vaccines take time to provide complete protection
• BUT…
  – Disease takes time to get established
  – Vaccine virus itself may compete with real virus
  – Some responses are within minutes
• Immediate vaccination helps you win the race MUCH OF THE TIME
Re-vaccination

• Puppies
  – Repeat at 2 week intervals until over 16 weeks of age

• Adults
  – Recommend re-vaccination after leaving the shelter
  – Re-vaccinate animals that were sick, injured, or pregnant at admission
Summary Core Vaccination Protocol

- Vaccinate all dogs and pups over 4 weeks on intake
- Revaccinate pups every two weeks until over 16 weeks
- Revaccinate dogs who were sick on intake
- Recommend re-vaccination post adoption
Why Revaccinate: Maternal Antibodies

Affected by:

• The mother’s antibody level during pregnancy
• The mother’s ability to make colostrum
• How often the newborn nurses
• The newborn’s intestinal absorption
• Litter size
• Half-life 9.5 days
The problem

Adapted from Greene’s infectious diseases of the dog and cat: Thanks Mike!
Sitting ducks

Puppies must be protected through mechanical isolation as well as (more than) vaccination
Why revaccinate: Failure to Respond

- Temperature > 103.6
- Concurrent infection
- Stress, malnutrition?
- Incorrectly administered vaccine
- Most animals WILL respond
- Revaccination after adoption is a safety net
Testing and Diagnosis
Antigen Testing
CPV antigen testing: Sensitivity

- University of Wisconsin SVM - RD Schultz canine study
  - More than 600 dogs tested
  - No post-vaccination positives seen on Idexx (yet)
  - Witness™ was more sensitive than Idexx™, picked up more positives but not many

- HA only picks up about 10%.
- VI picks up only a bit more than 10%, but still mostly negatives.

- Dogs housed with recently vaccinated dogs will seroconvert.
Fecal Antigen Testing and Vaccination

- Vaccine related positives are **RARE**.
- **Levy et al, 2006**
  - 648, 10 wk old SPF kittens tested post-vaccination
  - Less than 2.8% (n= 18) of SPF kittens tested positive
  - **Only 1 positive on Idexx™**
  - Weak positives
  - Strong positives only in one kitten on two occasions

- **Schultz et al. May, 2006**
  - 600 cats tested post-vaccination, 1 animal positive 3 repeated times (0.16%)
  - Queen of that kitten, died acutely after vaccination

- **Idexx™** tests had the fewest post-vaccine positives
- A positive test should be considered positive!
Incubation, Vaccination and Testing

Intake vaccination?

Days since exposure
The Bottom Line

• Treat all positives as positive
• Use Idexx brand tests
• Post-vaccine positives are most likely pre-vaccine infection.
Timing for your organization?

- At intake
- Just after intake
- After shelter stay
- After adoption
Other diagnostics

- CBC
  +/- Low wbc count
- Necropsy
  - Segmental enteritis
  - histopathology
Sanitation and Disinfection
What are we aiming for?

Parvo
Why wait?

- No way to out wait parvo
- Kill the virus
- Repeated mechanical removal
- Foster homes
- Contaminated areas
What works against parvo?

Bleach and Trifectant®
What works?

• Bleach
  – 1:32 dilution
  – 4oz. (1/2 cup) in a gallon
  – Applied to a pre-cleaned surface
  – Mixed fresh daily

• Trifectant (Virkon-S)
  – Potassium peroxymonosulfate
  – Works relatively well in the face of organic material

• 0.5% formalin
Alternate Option?

- BruClean TbC
  - Sodium dichloroisocyanurate (NaDCC)
  - The Froamer™
What doesn’t?

- Quaternary Ammoniums
  - Examples (Triple Two, Parvosol, Rocal)
  - Independent studies
  - Toxicity

- Alcohol
  - Hand Sanitizers

- Chlorhexadine

- Disinfecting in the face of organic matter

- Freezing
Kennel Cleaning Procedures

- Where do I put the dog?
- Guillotine doors
  - best
- “Move down one”
- Consider feet, hoses and other equipment
- Clean before disinfecting
Parvo disinfection

- Carefully clean
- Apply effective disinfectant
- Leave on for recommended contact time
- Repeat at least once
- Be aware of fomites
- No need to lock down cage or area for certain time period

Biohazard
Clean Carefully
Minimize run entry when parvo concern is high
Separate Equipment
Hoses?
Outdoor spaces

- Prevent contamination of dirt/grass areas
- Trifectant/Virkon-S?
- Irrigation and drying
- Puppy play yards?
Indoor spaces

- Careful cleaning followed by commercial steam cleaning
- Limit puppy access for 1-3 months (longer if repeated problems or severe contamination)
Disease Recognition
Shelter Source or Community Source more common?
Early Detection

- Identifies potentially infectious animals
- Helps reduce transmission
- Prevents post-adoption heartache
Admitting exams

- Admission is the control point for infectious disease
- Training to check for signs of disease
- Use standardized exam forms
- Fecal parvo test for suspects
- Deworming at intake
Monitoring for Illness

- Daily rounds
- Vigilance may vary with level of disease
- Response to suspects?

I thought you were talking about dogs?
Detection Difficulties

• Incubation
  – Infection may precede clinical signs

• Inapparent infections
  – There may never be clinical signs
Plan for Intervention

- Written protocols for how to respond
- Care and welfare of sick animals
- Protecting your “herd”

- Community interactions?
Isolation, Separation and Removal

- Plan animal placement to help prevent transmission.
- Isolate sick animals as soon as possible after signs are noted.
- Remove or euthanise sick animals when adequate isolation or treatment is not an option.
Intake Quarantine?
Intake Quarantine

- Consider where disease is most likely to be transmitted
- Minimizing time in shelters is most often preferable
- Risk of disease on intake varies by community
Protection vs. Socialization
Antibody Testing

Positive is good.
Synbiotics Titercheck Kits

- 98% accurate for detecting at-risk dogs
- If positive at time of exposure, very low risk no matter what vaccine history
- ~ $10 per test if 14 at once
- ~ $30 per test if one at a time
- May be cheaper and better than quarantine
Antibody Titers

- Use a well qualified lab
- Over 1:80 generally considered protective
- Over 1:10 enough to block vaccination
Treatment

• Supportive care
  – **Hydration!!!**
  – Hygiene

• Prophylactic antibiotics
• Anti-emetics
• Transfusion
• Plasma
• IgG

• Not fasting
• Not tamiflu
To treat or not to treat?

• Intake vs. Adoptions
• Herd Immunity?
• Isolation?
• Prognosis?
  – Depends on many factors
  – Improves after 3-4 days

Consider risk to the group as a whole!!
Re-introduction

- Most dogs will no longer be shedding virus 2-3 weeks post recovery
- Fecal parvo tests
- Baths
Outbreak Management

• Part of daily planning

• Risk of introduction is constant

• Increased monitoring and screening

• Stick with what you know
Considerations

• Evaluate source
  – Time to onset
  – Segregation?

• Evaluate exposure
  – Mapping disease incidents

• Evaluate susceptibility
  – Vaccination status
  – Age
  – Antibody titer
Post-exposure quarantine or euthanasia-when is it necessary?

- Very low risk: fully vaccinated adults
- Pretty low risk: adults and puppies > 16 weeks vaccinated at least 1 week before exposure
  - Lower risk with increasing age of pups
- Moderate risk: vaccinated puppies < 16 weeks
- High risk: ALL unvaccinated puppies and dogs, no matter what age
- Highest risk (but not 100%): littermates of affected puppies
- Titer test to verify risk level
Outbreak Response

- Remove or Quarantine at risk animals for 14 days
- Re-evaluate risk
- Baths before re-introduction
In Summary

• Vaccinate all dogs over 4 weeks at intake
• Use effective disinfection practices
• Separation / Segregation
• Disease Recognition (at least daily)
• Isolation or removal of infected animals
Thanks!

We were eating pizza.