Management of Parvovirus in Animal Shelters

Staci Cannon, DVM, MPH, DACVPM DABVP (Shelter Medicine Practice)
Metro Animal Care and Control, Nashville, TN
A History Lesson…

• Feline Panleukopenia identified in 1962
• Canine Parvovirus emerged in 1970s
  • CPV-2c first detected in Italy in 2000
• Expectations are higher than ever
• Rescue transport programs
The culprit…

- Non-enveloped DNA virus, persistent in environment
- Vaccines are reliable and effective
- Can infect any naïve, unvaccinated animal
  - Irrespective of age or breed
- Clinical signs
  - Gastrointestinal (vomiting, diarrhea, anorexia)
  - Lethargy, fever, sudden death
  - Leukopenia
- Subclinical or mild signs possible with partial protection (may see in littermates)
Course of disease

- Incubation: 3-14 days, usually 4-6 days
- Shed virus 2-3 days before clinical signs and up to 14 days after recovery
- No “carrier state” in dogs
Multiple Methods of Prevention

- Sanitation
- Monitoring/Housing
- Vaccination
- Decrease Length of Stay

Minimize Risk
Prevention – Vaccination

- AAHA and AAFP published guidelines contain shelter specific recommendations
- Vaccinate juveniles every 2 weeks until 20 weeks
- Vaccinate adults once at intake and again in 2 weeks if resources permit
- Vaccinate at or before intake
“Results suggest that many dogs entering a shelter will have insufficient antibody titers against fatal but preventable diseases. Restricting vaccination to some dogs while excluding others on the basis of source, health status, potential outcome, or any other criteria contributes to the risk of transmission of infectious diseases within the shelter.”

Maternal Antibody Interference

There is no magic number of vaccines!
Prevention – Sanitation

Remember common use areas! Intake processing, vehicles, carriers, scales, clinic areas
Prevention – Monitoring/Housing

Remove symptomatic animals from the general population to isolation immediately
Use guillotine doors as designed

Avoid random comingling, do not mix litters

Evaluate before cleaning, during feeding

Monitor appetite with canned food
Prevention – Decrease Length of Stay

• Safest place is out of the shelter!
• Managed intake
• Foster homes
• Intake diversion
• Eliminate hold periods for juveniles
• Remove standard intake quarantines
• Institute daily rounds and pathway planning
“Standard” Intake Quarantines

- Challenge the status quo
- True quarantine is achieved by housing animals in a secure environment in “all-in, all-out” fashion
- Reality in shelters is “trickle-in, trickle-out”
- Expose each animal to a larger number of animals
- Limit use to high-risk animals
Multiple Methods of Prevention

- Sanitation
- Monitoring/Housing
- Vaccination
- Decrease Length of Stay

Minimize Risk
Diagnosis

- Symptoms and history
- In-house canine parvovirus ELISA tests
  - Can have false negatives
  - Trust a positive in symptomatic animals
  - Can be used for FPV as well as CPV
- CBC or blood smear
- PCR testing at reference laboratory
- Necropsy
Myth: Testing every dog will prevent parvo

- High predictive value when used on symptomatic animals
- Can be helpful to screen very high-risk individuals, like littermates of affected animals
- Frequency of **FALSE POSITIVES** increases when testing animals without clinical signs that are not high-risk
- Resource-intensive strategy
- Not recommended
Disease response

Positive test – now what?

- Population Response
  - Risk Assessment
  - Decontaminate
  - Clean Break
  - Outbreak Response
- Individual Response
What is an outbreak?

- Greater number of cases of a particular disease than normally expected
- Significant increase in severity of clinical signs
Outbreak Management

• **Diagnosis and Isolation:** Isolate all sick dogs
  • Incubation time = 3-14 days
  • Shedding or contagious time = up to 14 days after recovery
  • Bathe thoroughly when moving out of isolation
  • Do not isolate or house with cats/kittens

• **Identification and Management of Exposed Animals:**
  • Quarantine all exposed high risk dogs for 2 weeks

• **Environmental Decontamination:**
  • Must use a parvocidal disinfectant (not a quat)

• **Protection of Newly Admitted Animals:** Prevent exposure of new dogs to sick dogs and dogs already exposed (quarantine population)

• **Documentation and Communication**
Quarantine vs. Isolation

- **Isolation** = physical separation of infected/symptomatic animals from the general population

- **Quarantine** = physical separation of susceptible animals that have been exposed to an infectious disease but are not yet symptomatic or infected.

- Quarantine period = incubation period
  - 14 days for parvoviruses
  - Reset quarantine clock to zero any time another animal tests positive and moves to isolation
Practical considerations

• Segregate clinically ill animals immediately
• Revaccinate all asymptomatic animals
• Strictly adhere to cleaning protocols (ensure parvocidal products in use!)
• Establish rational traffic patterns
  • Healthy to vulnerable
  • Young to old
  • Clinically ill animals have their own staff whenever possible
• Provide PPE to care staff – dedicated boots, not footbaths
• Consider stopping intake
Quarantine challenges

- Strain on housing capacity
- Strain on capacity for care
  - Strict biosecurity
- Concerns for deterioration of behavioral health and welfare for animals held in shelter quarantine
  - Impacts their potential for a live release
- Risk assessment is a humane and cost-effective strategy to quickly move animals out of quarantine
<table>
<thead>
<tr>
<th>Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very Low Risk</strong></td>
</tr>
<tr>
<td>• Adult, fully vaccinated dogs</td>
</tr>
<tr>
<td><strong>Low Risk</strong></td>
</tr>
<tr>
<td>• Adults and puppies greater than 5 months old with vaccine on board for 7 days prior to exposure</td>
</tr>
<tr>
<td><strong>Moderate Risk</strong></td>
</tr>
<tr>
<td>• Vaccinated puppies under 5 months of age</td>
</tr>
<tr>
<td><strong>High Risk</strong></td>
</tr>
<tr>
<td>• All unvaccinated puppies and dogs or those with vaccine on board less than 7 days</td>
</tr>
<tr>
<td><strong>Very High Risk</strong></td>
</tr>
<tr>
<td>• Littermates of affected animals</td>
</tr>
</tbody>
</table>
Action Steps for exposed animals

- **Very Low Risk**
  - Adopt or transfer, do not quarantine

- **Low Risk**
  - Transfer with full disclosure, Quarantine, ideally in foster care

- **Moderate Risk**
  - Quarantine for 14 days, Monitor closely

- **High Risk**
  - Bathe, separate into pairs
  - Quarantine for 14 days, Monitor closely

- **Very High Risk**
  - Quarantine for 14 days, Monitor closely
Parvo outbreak simulator

Join our Mailing List!

Sign up to receive the latest news and information about sheltering issues and special events. Stay informed with our quarterly newsletter and learn how you can support our life saving efforts.

Learn more >

Parvo outbreak simulator guide

Have you ever wanted to try your hand at managing a parvo outbreak, without all the mess and trauma of the real thing? Well, now you can! Not a horror amusement park ride as you might surmise from the name, the PARVO OUTBREAK SIMULATOR allows you to work through a real life outbreak scenario as many times as you like until you're confident of your risk assessment skills. It also lets you get a sense for the fallibility of risk analysis — every once in a while, in the simulator as in life, you will do everything right and an infected animal will slip past your radar. However, you can also clearly see how many more lives are saved through careful risk assessment than through population or failure to respond at all. For a quick guide to risk analysis as a tool for outbreak management and some intriguing questions to help you get the most out of the parvo outbreak simulator experience, download the parvo outbreak simulator guide below. For more detailed information, feel free to look around our website (the information sheets, under the Shelter Health Portal above are a good place to start) and of course the textbook Infectious Disease Management in Animal Shelters. And for those of you who want to skip ahead to the answers or check your work, a sample set of answers to the simulator guide are also below.

Document:
- parvo outbreak simulator guide_9_2013.docx
- parvo outbreak simulator guide_sample answer key.docx

<table>
<thead>
<tr>
<th>Patient</th>
<th>Date Arrived</th>
<th>Signalement</th>
<th>Clinical Signs</th>
<th>SNAP Test</th>
<th>Antibody Titer</th>
<th>Action</th>
<th>Correct Action</th>
<th>Animal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>12/27</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 2</td>
<td>12/29</td>
<td>Puppy</td>
<td>GI Signs</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 3</td>
<td>1/8</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 4</td>
<td>12/27</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 5</td>
<td>1/4</td>
<td>Adult</td>
<td>GI Signs</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 6</td>
<td>12/27</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 7</td>
<td>1/6</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 8</td>
<td>1/6</td>
<td>Puppy</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 9</td>
<td>12/26</td>
<td>Puppy</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 10</td>
<td>1/9</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 11</td>
<td>1/6</td>
<td>Adult</td>
<td>GI Signs</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 12</td>
<td>1/9</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 13</td>
<td>1/7</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 14</td>
<td>12/22</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 15</td>
<td>12/26</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 16</td>
<td>1/9</td>
<td>Puppy</td>
<td>GI Signs</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 17</td>
<td>12/28</td>
<td>Adult</td>
<td>Healthy</td>
<td>Run Test $15</td>
<td>Run Test $15</td>
<td>SELECT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Behavioral vs. Physical Health

Frequency of CPV Infection in Vaccinated Puppies that Attended Puppy Socialization Classes

Meredith E. Stepita, DVM†, Melissa J. Bain, DVM, DACVB, MS, Philip H. Kass, PhD, DVM, DACVP

ABSTRACT
Socialization is one method of preventing behavior problems in dogs; however, some oppose socialization before 16 wk of age due to the risk of contracting infectious diseases. The objectives of this study were to determine if puppies that attended puppy socialization classes and were vaccinated by a veterinarian at least once were at an increased risk of confirmed canine parvovirus (CPV) infection compared with puppies that did not attend classes and to determine the frequency of suspected CPV infection in puppies vaccinated at least once that attended classes with trainers. Twenty-one clinics in four cities in the United States provided information regarding demographics, vaccination, CPV diagnosis, and class attendance for puppies ≤ 16 wk of age. In addition, 24 trainers in those same cities collected similar information on puppies that attended their classes. In total, 279 puppies attended socialization classes and none were suspected of or diagnosed with CPV infection. Results indicated that vaccinated puppies attending socialization classes were at no greater risk of CPV infection than vaccinated puppies that did not attend those classes. (J Am Anim Hosp Assoc 2013; 49:95-100. DOI 10.5326/JAAHA-MS-5825)

“Results indicated that vaccinated puppies attending socialization classes were at no greater risk of CPV infection than vaccinated puppies that did not attend those classes.”
Treatment

• Supportive Care
  • Treat dehydration, hypoglycemia
  • Prevent sepsis
  • Provide antiemetics, pain relief, and nutrition
• Options for treatment – on-site, off-site clinic, foster home, transfer partner
• Monitoring is key! Status can change rapidly
• More evidence to support outpatient based therapy – prognosis is similar
New Protocol Gives Parvo Puppies a Fighting Chance When Owners Can’t Afford Hospitalization

Canine parvovirus is a serious and often fatal viral illness that most commonly affects puppies, though unvaccinated adult dogs can be infected as well. While treatment for parvovirus is available, it can be cost prohibitive for many families. Now, a new protocol developed at the Colorado State University Veterinary Teaching Hospital may help save “pano puppies” and give their families a chance to give their dogs a healthy life.

“Parvovirus is one of the most common and deadliest viruses that unvaccinated dogs tend to get,” said Dr. Lauren Sullivan, an Assistant Professor in the Department of Clinical Sciences and a veterinarian with the Critical Care Unit at the Veterinary Teaching Hospital. “While a vaccine is available, puppies can be exposed to the disease before their vaccinations are complete, or if they haven’t received puppy wellness care due to their owner’s financial limitations.”

Parvovirus, which is spread through exposure to feces from infected dogs, has a wide range of symptoms including lethargy, vomiting, fever, and diarrhea. It primarily impacts the gastrointestinal tract and the circulatory system, where it suppresses the bone marrow and causes the white blood cell count to drop. Veterinary care focuses on supporting the puppy with IV fluids and antibiotics, and close monitoring, while the puppy weather the viral storm. Without intensive veterinary intervention, parvovirus is almost always fatal due to dehydration and/or a severely compromised immune system.

Intervention, while effective, requires inpatient care ranging from $1,500 to $3,000 — a cost some owners simply can’t afford. Euthanasia often becomes the only other option for severely affected dogs.

CSU researchers are showing that there is another possibility – intensive at-home care at a fraction of the cost ($200-$300), but with similar outcomes when compared to the inpatient “gold standard” of care. The treatment relies on two drugs recently released by Pfizer Animal Health (which funded the CSU parvovirus study): Maropitant, a strong anti-nausea medication given under the skin once a day, and Comerxa, an antibiotic given under the skin once, and lasting two weeks, as well as administration of fluids under the skin three times daily.

“Rather than being hospitalized, our research shows that puppies can be successfully treated with a protocol that can be replicated at home,” said Dr. Sullivan. “We still recommend inpatient care as the best practice, but in some cases that simply isn’t financially possible.”

The study, which began June 4, was conducted by Drs. Sullivan, David Twedt, Pedro Boscian, Emilie Venn (a resident in critical care); Karolina Preisner (student coordinator), and veterinary students interested in the research experience. The study was advertised to veterinarians in the greater Colorado community, who referred cases from their practices. A total of 40 dogs were admitted to the study group, randomized to one group that received traditional gold standard care and one group that received the at-home protocol.

Clinical signs present, parvo diagnosis confirmed

Population Response

Individual Response

Do you have:
Medical supplies
Trained staff/volunteers
Dedicated isolation facility with excellent biosecurity

Yes
Follow Parvovirus Protocol
Perform patient assessment
Isolate and Treat
Monitor Carefully

No
Are resources available to support treatment at private clinic or foster home? Is patient stable for transfer? Is a reputable rescue willing to transfer the patient immediately?

Yes
Immediate transfer

No
Humane euthanasia
Isolation space

- Ideally, physically separate building, or at least restricted access
- At minimum, must be separate, easily disinfected area with dedicated equipment
- Sufficient staffing for monitoring and care is mandatory
- PPE – full body protection, boots, gloves, ideally separate staff
- No crossover with juveniles and new intakes
Post-treatment, now what?

- Follow your protocol
  - Clinical signs have resolved, Negative ELISA test
- Thorough bathing, including toenails!
- Move ‘em out!
- What about vaccination?
  - Return to regular vaccination schedule as soon as completely recovered from clinical signs
Communication is Key

• All staff, volunteers, foster parents should be well educated
• Counsel adopters!
Take home points

• Parvovirus is a continual threat
• Prevention through vaccination, sanitation, monitoring and population management
• Vaccines and diagnostics are effective for CPV-2c
• Perform risk assessment on exposed animals
• Carefully consider capacity to treat
• Routine testing may yield false positives and drain resources
• Eliminate intake quarantines in high volume facilities
Excellent Resources

www.sheltermedicine.com
www.sheltermedicine.vetmed.ufl.edu
www.animalsheltering.org
www.maddiesinstitute.org
www.sheltervet.org
www.aspcapapro.org
Questions?

Staci Cannon, DVM, MPH, DACVPM, DABVP (Shelter Medicine Practice)

Metro Animal Care and Control, Nashville, TN
615-862-7928

Staci.Cannon@nashville.gov