

# RATIONALITY, RISK, AND UNCERTAINTY: LESSONS FROM A PARVO PANIC

By Nancy P. Melone, Ph.D.

Calm rationality in evaluating disease risk is an important concept for all dog owners to embrace. The recent disease outbreak in Michigan offers an interesting example of the importance of understanding risk and uncertainty when it comes to our dogs and disease. Indeed, quiet reflection on such a vivid event can give us insight on how to prevent such outbreaks, what questions to ask when we face the next disease outbreak and how to think more rationally about outbreaks.

## RATIONAL WAYS TO THINK ABOUT DISEASE OUTBREAKS

Disease outbreaks happen from time to time. Sometimes it is a familiar disease caused by a general failure of a population to do routine vaccinations or to keep them current. At other times it is something entirely new. In the case of viruses, they constantly change through mutation, and sometimes these mutations result in a new variant of the virus. At other times, investigation reveals it is a known virus or if there is a mutation it is a minor one that does not materially affect current testing or vaccination protocols. In the early stages of outbreaks or epidemics, there is typically uncertainty, and risk can be hard to assess.

When faced with a disease outbreak, identifying the cause and assessing the risk are important tasks for scientists, veterinarians and even dog owners. These constituent groups, at varying levels of detail and expertise, must evaluate the available data that could tip the scale in favor of or against the worst-case scenario being promoted in the mass and social media. Where there are discrepancies in the available data, these groups, again at varying levels of expertise, must consider the most probable explanations (not necessarily the most exotic or vivid) for those discrepancies. Finally, the most important task for everyone in such a situation is to keep a cool head regardless of what social media whips up. Remember, social media's business is to get you to use their service so that they can sell ads to businesses that want to sell you products. They are not in the science or news business.

## INITIAL APPROACHES TO INVESTIGATING UNDIAGNOSED CANINE DISEASE OUTBREAKS

In canine disease outbreaks, a bottom-up approach is

typical. The state veterinarian is notified by practicing veterinarians in the state who are seeing animals they are unable to diagnose clearly or in frequencies they have not previously seen. This information may be communicated via various reporting mechanisms depending on the state. Working collaboratively with state laboratories, universities, veterinary colleges, and practicing veterinarians, the state veterinarian focuses on identifying the cause of the outbreak and containment. If state resources are not sufficient to do that, out-of-state resources with specialized technologies or expertise may be requested. In some cases, there is also international cooperation since diseases rarely stay in one place. An example of international cooperation was the case of a small breed rescue dog who died of a mysterious disease in western Canada. The dog had been rescued from an alleged "meat factory" in Korea by a Canadian rescue group. Stumped and without a diagnosis, Canadian veterinary officials requested the help of a team from Cornell University who, after some time, identified the virus as a form of Asian canine distemper never-before-seen in North America.

Typically, these investigations start by looking for known diseases presenting similar symptoms, and if none are found, then other explanations such as a new virus variant are entertained. The line of questioning used might be: Is the cause of the outbreak a known disease, a toxin, a combination of viruses/infections or a new disease variant? These are all questions for which answers are sought and that in time will be answered.

Tracking, tracing, testing and containment are part of this investigatory process. If a disease is "reportable" to the state, the search for a cause and efforts to contain the disease are much easier (not easy, but easier). These cases are tracked and traced, and populations at risk are tested, quarantined or euthanized. For example, in most agricultural states, canine brucellosis, a devastating disease for dog breeders, is a reportable disease to the state, so tracking, tracing, testing, quarantining and removal of infected animals from the population are facilitated. Unfortunately, as in this recent case of canine parvovirus, many diseases are not reportable to the state and so the job becomes one of both identifying cases and following up those cases with testing, etc.

## WHAT IS THE ROLE OF TESTING?

Testing is part of the path to understanding cause and eventually assessing risk. Various levels of testing are used from quick and usually less precise in-house tests such as the SNAP test to more sophisticated and reliable laboratory tests such as the polymerase chain reaction (PCR) test.

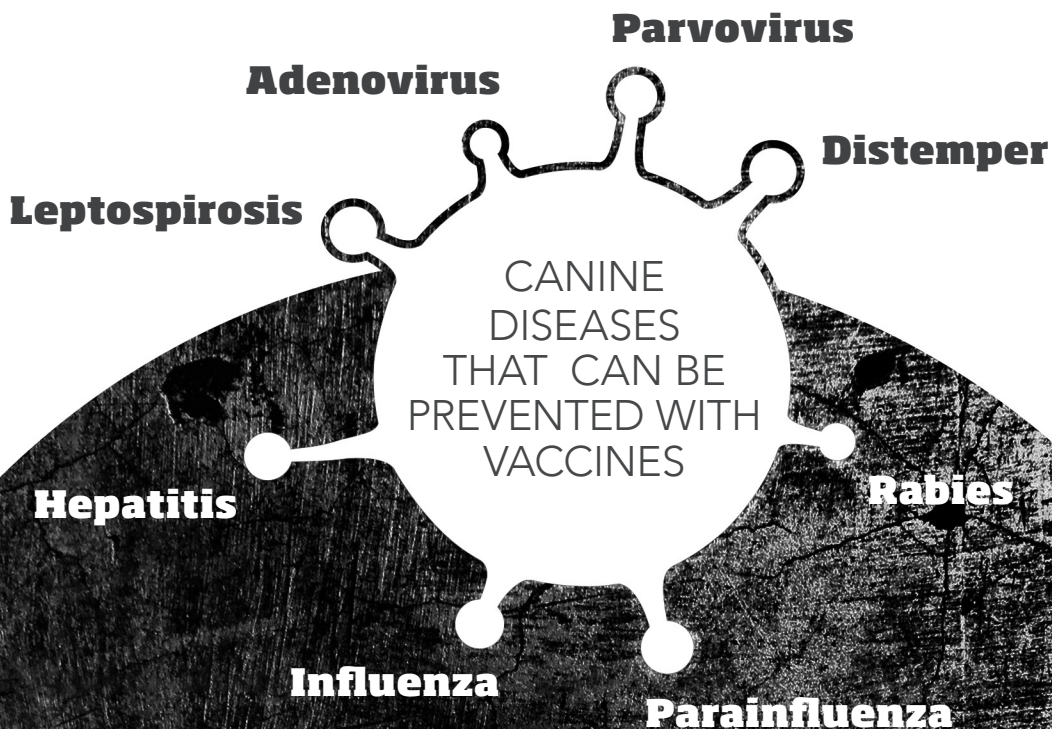
People watching the Michigan story unfold expressed frustration when the SNAP tests used initially by veterinarians did not identify cases that were later confirmed as positive for disease. Keep in mind that although tests are very good, they are generally not 100% accurate for various technical, statistical and human reasons. We saw this also with COVID.

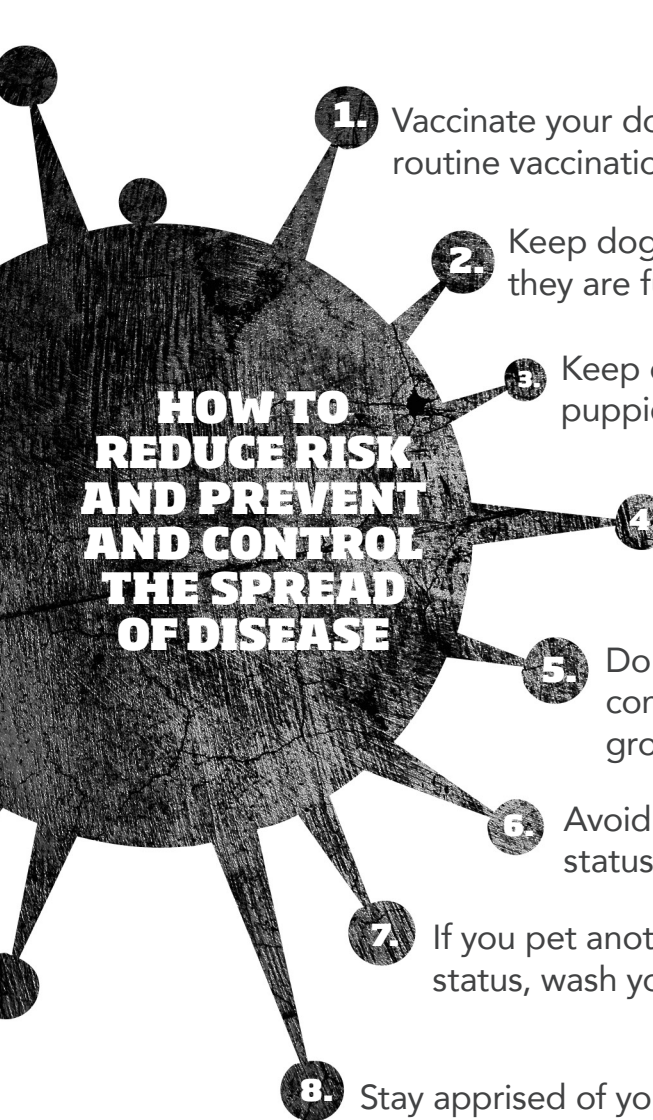
The SNAP test in the recent outbreak is an initial diagnostic test that produces immediate in-office results but is less accurate (like the COVID rapid antigen test). However, the more immediately available result is often useful with upfront clinical decision making, even though it could be refuted later. For example, in the situation of possible/probable parvovirus both the veterinarian and dog owner can find themselves needing to make critical care decisions upfront and in need of as much information as possible early on. Waiting a few days for results from the more accurate PCR test may not be the ideal option in many situations as this disease is often rapidly fatal.

Tests that are still very useful in practice can fail for several reasons. These reasons include but are not limited to:

- the incorrect result is still within the statistically predicted test error rate
- the test is administered too early or too late in the course of the disease
- antibodies in the sample bind to the virus making it unavailable to bind to the assay/test
- there is a procedural error in administering the test (e.g., poor sampling technique, not enough sample)
- test design characteristics or properties
- a minor mutation in the virus that causes some cases not to be recognized by that specific test.

A 2021 study (Walter-Weingärtner, et al.) published in the journal *Viruses* compared eight in-office, point-of-care-parvo tests (of which the SNAP parvo test was one). They found that the tests all have a good record with positive results (i.e., when the test says the dog is positive for parvo, you can be confident that the dog has parvo). In contrast, the study found that negative test results are much less reliable (i.e., when the test says the dog is negative for disease, he could still be positive for the disease).





## HOW TO REDUCE RISK AND PREVENT AND CONTROL THE SPREAD OF DISEASE

1. Vaccinate your dog. Make sure your dog is up to date on all routine vaccinations.
2. Keep dogs/puppies away from other dogs/puppies until they are fully vaccinated.
3. Keep dog/puppies at home and away from other dogs/puppies if they are exhibiting any symptoms of illness.
4. Clean up after your dog/puppy when walking them in public. Wash your hands thoroughly with soap and water after doing so.
5. Do not allow your dog/puppy to drink or eat from communal bowls, sniff the ground or sniff anything on the ground while walking.
6. Avoid public spaces where dogs of unknown vaccine status frequent or defecate (e.g., dog parks).
7. If you pet another dog/puppy with unknown vaccine status, wash your hands before touching your own dog.
8. Stay apprised of your local veterinary disease situation.



The conclusion from this study was as follows: "A positive POCT (point of care test) result confirmed the infection with CPV (parvo) in unvaccinated dogs, whereas a negative POCT result did not definitely exclude CPV infection due to the low sensitivity of all POCT." In technical terms, the test specificity was 100.0% for all eight tests (i.e., the fraction of true positives that were correctly identified as positive for parvo was 100%), whereas the test sensitivity for the eight tests varied from 22.9%–34.3% (i.e., the fraction of true negatives that were correctly identified as negative for parvo was only between 22.9% and 34.3%). The researchers concluded, "...the sensitivity of all POCT was too low and must be improved to avoid false negative test results."

In lay terms, the research is saying you can likely trust a positive test result (the dog probably has the disease), but be skeptical of a negative test result, particularly if the dog is exhibiting symptoms. This is a good example of test fallibility and why there were discrepancies in the test data. A good science reporter with a computer might have discovered this research study and asked a

scientist about this, which could have gone a long way to calm a frightened public.

### WAS THE DATA ON VACCINATED DOGS CONSISTENT?

By and large, the data on vaccines was also easy to explain. If nothing else, the recent outbreak demonstrated the effectiveness of quality vaccines. No dog properly vaccinated acquired disease or died of it. Despite the views of some, vaccines have spared many dogs from severe illness or death from diseases such as parvovirus, distemper, parainfluenza, adenovirus, leptospirosis, influenza, hepatitis and rabies. While there are risks to vaccines for a few dogs, the benefits for most dogs outweigh those risks.

Vaccines are highly effective in preventing or mitigating disease, nevertheless effectiveness can vary based on technical, statistical or human reasons. The purpose of the vaccine must also be considered by the user. Is it designed to prevent infection in individuals,

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prevent infection across individuals and/or mitigate the seriousness of illness? Issues that could influence any vaccine's effectiveness, include but are not limited to:

- failure to properly complete the entire series or not administering it at the appropriate times
- administering the vaccine to a dog that is already infected with disease
- failure of the manufacturer, retailer, or purchaser to properly store the vaccine to preserve its effectiveness
- use of an expired product. On very rare occasions for whatever reason, there can be a rare breakthrough case

### **CAN DOG OWNERS MITIGATE RISK OF DISEASE?**

The old phrase “Be calm and carry on” applies here. In most cases, a calm approach on the part of scientists, veterinarians and dog owners obtains far better results than a panicked one. Given that some degree of risk/uncertainty exists in virtually all situations we encounter in our lives, can we do anything to reduce risk? The simple answer is usually yes.

In addition to scientists and veterinarians, dog owners have a role in reducing risk and in preventing and controlling the spread of disease among canine populations as well as among human ones. Here are a few suggestions that apply in many disease situations:

- Vaccinate your dog. Make sure your dog is up to date on all routine vaccinations.
- Keep dogs/puppies away from other dogs/puppies until they are fully vaccinated.
- Keep dog/puppies at home and away from other dogs/puppies if they are exhibiting any symptoms of illness.
- Clean up after your dog/puppy when walking them

in public. Wash your hands thoroughly with soap and water after doing so.

- Do not allow your dog/puppy to drink or eat from communal bowls, sniff the ground or sniff anything on the ground while walking.
- Avoid public spaces where dogs of unknown vaccine status frequent or defecate (e.g., dog parks).
- If you pet another dog/puppy with unknown vaccine status, wash your hands before touching your own dog.
- Stay apprised of your local veterinary disease situation.

### **THE TAKEAWAY**

All of us must play our parts in keeping our dogs healthy and happy. We do this by behaving rationally in the face of uncertainty, acting before the fact to prevent disease, asking good questions when faced with an outbreak to assess our dogs' risk, seeking data from reliable sources, looking for consistencies and inconsistencies and seeking to explain those in the most probable manner (i.e. when you hear hoof beats, think horses, not zebras), and throughout the process by remaining calm.

### **REFERENCE**

Walter-Weingärtner J, Bergmann M, Weber K, Truyen U, Muresan C, Hartmann K. “Comparison of Eight Commercially Available Faecal Point-of-Care Tests for Detection of Canine Parvovirus Antigen.” *Viruses*. 2021 Oct 15;13(10):2080. doi: 10.3390/v13102080. PMID: 34696513; PMCID: PMC8540396.

### **NOTE**

This article was published simultaneously in the Nederlandse Kooikerhondje Club of the USA's The Kooiker Chronicle.

*About the Author:* Nancy P. Melone, Ph.D., is a graduate of the University of Minnesota in Information and Decision Sciences. Her articles and editorial work on canine health have won multiple Dog Writers Association of America Maxwell Medallions, a Morris Animal Foundation Advances in Canine Veterinary Medicine Award, and multiple American Kennel Club Publication Excellence Awards. She serves on the board of the Nederlandse Kooikerhondje Club of the USA (NKCUSA) and is chair of the NKCUSA Health and Genetics Committee. She breeds and shows Bernese Mountain Dogs under the kennel name ThornCreek Bernese, Reg'd. and Nederlandse Kooikerhondjes under the kennel name Eendenkooi Kooikers.