PEER REVIEWED

# CANINE VACCINATION GUIDELINES

## *Key Points for Veterinary Practice*

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In 2011, the Canine Vaccination Task Force, sponsored by the American Animal Hospital Association (AAHA), revised vaccination guidelines for dogs.[1]

These canine vaccination guidelines have an immediate impact in private practice, with emphasis on 3 key areas:

1. Developing vaccination protocols
2. Vaccine adverse reactions
3. Fundamental legal concerns surrounding vaccine administration.

Highlighted throughout this article are key points that represent some of the most important and new recommendations relative to developing and implementing a vaccination protocol.

### DETERMINING PROTOCOLS

Within the U.S. and Canada, veterinarians who administer vaccines must select from among a wide variety of proprietary (trade name) products, each of which is backed by technical data defining safety and efficacy; then promoted through a robust marketing message.

Interestingly, the ultimate decision regarding selection and use of vaccines is frequently reduced to a reasonable assessment of exposure risk and determination of product cost. It is not surprising, therefore, that considerable diversity exists among companion animal practices regarding vaccine administration.

To facilitate implementation of *rational* vaccination protocols in individual practices, a task force comprised of practicing veterinarians, specialists, academicians, and legal experts, with input from each of the major vaccine manufacturers, created revised canine vaccination guidelines in 2011.[1] Whenever possible, the recommendations are based on the most current scientific studies; recommendations not backed by published studies are based on unpublished studies, sound immunologic principles, or expert opinion.

### CLASSIFYING VACCINES

The vaccination guidelines separate vaccines into 2 groups:

- **Core:** Vaccines that offer protection against highly contagious, life-threatening infections or infections that pose a significant threat to human health (eg, rabies).
- **Noncore:** Vaccines that offer protection against less serious health threats to dogs or threats that pose a regional health risk.

**Table 1** summarizes core and noncore canine vaccines as represented in the vaccination guidelines. The oral *Bordetella bronchiseptica* vaccine was not available at the time the guidelines were published but is categorized by the author as a noncore vaccine based on available information.[2]

Remember that the *2011 AAHA Canine Vaccination Guidelines* are recommendations; they are not requirements. It is ultimately the decision of the individual veterinarian or practice to establish which vaccines in a protocol are designated core or noncore.

## TABLE 1. CANINE CORE & NONCORE VACCINES

| | |
|---|---|
| **CANINE CORE VACCINES** | • Canine distemper virus (MLV)<br>• rCanine distemper virus (recombinant)<br>• Canine parvovirus (MLV)<br>• Canine adenovirus-2 (MLV)<br>• Canine rabies virus (killed) |
| **CANINE NONCORE VACCINES** | ***Bordetella bronchiseptica***<br>• Intranasal *Bordetella bronchiseptica* (avirulent live bacteria)<br>• Parenteral *Bordetella bronchiseptica* (cellular antigen extract)<br>• Oral *Bordetella bronchiseptica* (avirulent live bacteria)<br>***Note:*** *Intranasal products may be combined with:*<br>• Parainfluenza virus (MLV) only *or*<br>• Parainfluenza virus (MLV) + adenovirus-2 (MLV) |
| | **Leptospirosis**<br>• Leptospirosis (killed)<br>***Note:*** *The use of a 4-serovar vaccine is recommended over a 2-serovar product.* |
| | **Lyme Disease**<br>• *rBorrelia burgdorferi* (recombinant OspA)<br>• *Borrelia burgdorferi* (killed whole cell bacterin) |
| | **Canine Influenza Virus**<br>• Canine influenza virus (killed) |
| | **Rattlesnake Envenomation**<br>• *Crotalus atrox* (toxoid)<br>***Note:*** *For use in dogs at risk for Western diamondback rattlesnake envenomation.* |

MLV = modified-live virus; OspA = outer surface protein A

## CORE VACCINES

Vaccines designated as core should be administered to all dogs. The AAHA Canine Vaccination Task Force defines the following vaccines as core:

- Distemper virus (CDV)
- Parvovirus (CPV)
- Adenovirus-2 (CAV-2)
- Rabies (RV).

### Initial Vaccination of Young Dogs

#### *Vaccination Other Than Rabies*

**Current recommendations for initial vaccination of young dogs stipulate that, *with the exception of rabies*, 3 doses of a combination core vaccine be administered between 6 and 16 weeks of age.** In practice, a single combination dose is typically recommended for administration at 2, 3, and 4 months of age (**Table 2**).

**Dosing Interval.** Today, most manufacturers offer combination core vaccines with the recommendation to administer 2 doses by 12 weeks of age.[3] The guidelines, however, emphasize the importance of administering a third dose (or the final dose) between 14 and 16 weeks of age. This recommendation is based on observations that, in some dogs, the level of maternally derived antibody may be sufficiently high to interfere with vaccines administered at 12 weeks of age, particularly CPV.

**Recombinant Technology.** The recombinant canine distemper virus (rCDV) vaccine can be used interchangeably with the modified-live canine distemper virus (MLV CDV) vaccine in practice. Characteristics unique to recombinant technology have been addressed in the guidelines:

- The rCDV vaccine is incapable of replicating in dogs and, therefore, reversion to a virulent CDV is not possible.[1]
- In addition, the rCDV vaccine uniquely immunizes young dogs as much as 2 weeks earlier than conventional MLV CDV vaccines.[4-7] For this reason, rCDV vaccination may have significant advantages over MLV vaccination in young dogs at risk for exposure to CDV.

**KEY POINT:** *Regardless of the product used,* all dogs should receive a final dose of the initial series of core vaccines (CDV/CPV/CAV-2) between 14 and 16 weeks of age.

#### *Rabies Vaccination*

**The first dose of rabies vaccine should be administered in accordance with state or local statute.**

- Within the U.S., rabies vaccination should not occur in any dog (or cat) less than 3 months of age.[3]
- Initial vaccination is generally not regarded to confer immediate immunity against rabies. In most states, a dog is not legally immunized against rabies until 28 days following initial vaccination.[8]
- Rabies vaccination requirements for dogs vary significantly among states: In some states, rabies vaccination for dogs is not specifically required. Within these states, however, a local (city or county) rabies vaccination ordinance may be in effect.
- Where no state or local ordinance exists, veterinarians are encouraged to recommend rabies vaccination in accordance with guidelines from the National Association of State Public Health Veterinarians;[8] a suggested protocol is outlined in **Table 2**.

**KEY POINT:** In most states, a dog is not legally immunized against rabies until 28 days following initial vaccination.

### Revaccination Intervals in Adult Dogs

#### *Revaccination Other Than Rabies*

**A single dose of combined core vaccines (CDV/CPV/CAV-2) should be administered within 1 year of initial core vaccination, regardless of the product used.**[1] This recommendation ensures that a patient receives core vaccines at an age when maximum (protective) response to the antigens can be expected.

***With the exception of rabies vaccine,* adult dogs should be revaccinated with a single dose of core vaccines (CDV/CPV/CAV-2) every 3 years or longer, *regardless of the product used*.**[1] This recommendation highlights 2 principal facts:

1. The duration of protective immunity conferred by administration of core vaccines in adult dogs extends at least 5 years, and probably longer.[2,9-14]
2. *With the exception of rabies vaccination,* veterinarians have considerable latitude in recommending vaccination booster intervals.[1]

While vaccine manufacturers may recommend administration of "annual boosters" for adult dogs, the recommendation does not constitute a legal mandate to do so. Most manufacturers include *minimum* duration of immunity data on product package inserts, which meets or exceeds 3 years.[3]

**KEY POINT:** *Regardless of the product used,* a single dose of core vaccines (CDV/CPV/CAV-2) should be administered within 1 year of initial core vaccination; thereafter, the recommended interval for revaccination of adult dogs with core vaccines is every 3 years or longer.

## TABLE 2. SUMMARY RECOMMENDATIONS FOR VACCINATION OF DOGS

| Vaccine | Initial Vaccination | Revaccination |
|---|---|---|
| **CORE VACCINES** | | |
| **Distemper (MLV or r) + Parvovirus (MLV) + Adenovirus-2 (MLV)** | • Administer 3 doses between 6 and 16 weeks of age.<br>• Single dose at 8, 12, and 16 weeks of age is commonly recommended. | • Administer a single dose no later than 1 year following the last dose in the initial series; then, every 3 years or longer thereafter. |
| **Option:** Although parainfluenza virus vaccine is commonly administered parenterally in combination with the above vaccines (DA2PP), parainfluenza has been classified as a noncore vaccine *(see below).* | | |
| **Rabies (killed)** | • Single dose usually given at 12 or 16 weeks of age (local/state statutes apply). | • Administer a single dose of vaccine within 12 months (a 3-year rabies vaccine may be administered at this time); then every 3 years thereafter or as required by law.<br>• In the U.S., all states now recognize 3-year labeled rabies vaccines. |
| **NONCORE VACCINES** | | |
| ***Intranasal***<br>***B bronchiseptica* (AvLB)**<br><br>*May be combined with:*<br>• **Parainfluenza virus (MLV)** *or*<br>• **Parainfluenza virus + Adenovirus-2 (MLV)** | • Administer a single dose (intranasal only) at 12 or 16 weeks of age (some authors recommend a dose at 12 and 16 weeks).<br>• Maternal antibody interference is not a factor for vaccines administered intranasally; manufacturers may recommend initial vaccination as early as 3 or 4 weeks of age. | • Where risk of exposure is sustained, administer a single dose annually. |
| ***Parenteral***<br>***B bronchiseptica* (KB)** | • Administer 2 doses, 2 to 4 weeks apart, regardless of age. | • Annual booster recommended by manufacturer (duration of immunity data has not been published). |
| ***Oral***<br>***B bronchiseptica* (AvLB)** | • Administer a single dose into the buccal pouch as early as 8 weeks of age. | • Administer a single dose into the buccal pouch annually. |
| **Leptospirosis (KB) 4-serovar**<br><br>*Administration of 2-way vaccine is currently NOT recommended* | • Administer 2 initial doses, 2 to 4 weeks apart; do NOT administer the first dose prior to 12 weeks of age.<br><br>*Note: In small breed dogs, delay initial dose until after completion of initial CORE series.* | • Where risk of exposure exists, administer a single dose annually. |
| **Lyme disease (recombinant OspA or KB)** | • Administer 2 initial doses, 2 to 4 weeks apart; do NOT administer first dose prior to 12 weeks of age unless risk of exposure is high.<br><br>*Note: In small breed dogs, consider delaying initial dose until after completion of initial CORE series.* | • Where risk of exposure exists, administer a single dose annually. |
| **Canine influenza virus (killed)** | • Administer 2 initial doses, 2 to 4 weeks apart. | • Manufacturer recommends annual revaccination where risk of exposure exists.<br>• Duration of immunity has not been established. |

***Crotalus atrox* (toxoid)** is conditionally licensed to aid in prevention of signs following envenomation by Western diamondback rattlesnake.
**Canine coronavirus vaccine** is NOT recommended.
AvLB = avirulent live bacteria; KB = killed bacterins; MLV = modified-live virus; r = recombinant

### *Rabies Revaccination*

**Where rabies revaccination is required for dogs, a single dose is typically required within 1 year following the initial dose, *regardless of the dog's age when the initial dose was administered*.**[8] Generally, a dog that is not revaccinated within 1 year following the initial dose is legally not immunized.

In most states, the second dose of rabies vaccine in the initial 2-dose series may be labeled as a 1- or 3-year rabies vaccine; the duration of immunity following administration is contingent on this product labeling. In some states, however, local statutes may impose requirements that are stricter than state requirements (eg, annual rabies vaccination). Veterinarians should be familiar with local rabies immunization requirements for dogs.

## NONCORE VACCINES

Vaccines designated as noncore, or optional, are those that a veterinarian may recommend for individual patients in the event there is reasonable risk for exposure to the infectious virus or bacteria. Unfortunately, comprehensive guidance on which locations pose the highest risk for exposure to specific pathogens is not available. Therefore, the decision whether to administer a particular noncore vaccine is left to the veterinarian. Such decisions should be based on known geographical risk for exposure to a pathogen combined with knowledge of lifestyle factors unique to the individual dog. **Table 1** lists noncore vaccines for dogs.

### Initial Vaccination

**With the exception of vaccines licensed for intranasal administration to dogs (eg, those containing *Bordetella bronchiseptica* avirulent live bacteria) and the oral *B bronchiseptica* vaccine, all noncore vaccines require at least 2 initial doses, administered 2 to 4 weeks apart, to immunize.**

A single dose of a parenterally administered noncore vaccine is not expected to induce a protective immune response. If a dog is presented for the second dose 6 weeks or longer after the initial dose, it is generally recommended to repeat the initial series by administering 2 additional doses, 2 to 4 weeks apart.

**KEY POINT:** Regardless of a dog's age or the vaccines used, the minimum administration interval for noncore vaccines is 2 weeks.

### Adult Revaccination

Following completion of the initial 2-dose series of a noncore vaccine, and assuming a reasonable risk for exposure is sustained, annual revaccination with the appropriate noncore vaccine is recommended. There are no recommendations for intervals extending beyond 1 year for noncore vaccines.

**KEY POINT:** The revaccination interval for noncore vaccines is every 12 months as long as a reasonable risk for infection exists; there are no extended interval recommendations.

### Not Recommended

The AAHA Canine Vaccination Task Force recommends NOT using either the killed or MLV canine coronavirus (CCoV) vaccine. This designation is not based on safety issues pertaining to any licensed product; instead, it is based on the facts that (1) dogs derive limited to no protective immunity from the vaccine and (2) CCoV does not cause significant disease. However, CCoV vaccines are licensed by the USDA and may be administered at the discretion of the individual veterinarian.

## VACCINE ADVERSE REACTIONS

A vaccine adverse reaction (or adverse event) refers to any undesirable, or unintended, effect associated with the administration of vaccines, including failure to immunize. Unfortunately, vaccine adverse reactions in veterinary medicine are significantly *underreported*, making it impossible to determine actual adverse event rates. However, considering the number of vaccines administered yearly, it is generally agreed that adverse reactions are relatively uncommon in dogs.

Despite lack of data, certain risk factors have been identified. The guidelines include recommendations on:

- Mitigating risk
- Treatment of acute-onset reactions
- Revaccination of patient with known or suspected vaccine adverse event history.

### Adverse Reactions

Because vaccines are biologically active products and potent immunostimulants, minor reactions can be expected in any dog. Common adverse reactions reported to manufacturers include:

- Postvaccinal lethargy
- Pain (discomfort)
- Inappetance
- Lumps at the injection site.

Owners should be advised to anticipate minor reactions such as these for 1 to 2 days after vaccination.

Advise clients to contact the practice if the following signs develop: vomiting, diarrhea, seizures, difficulty breathing or rapid respirations, facial swelling, or collapse. If a patient's condition worsens or shows no improvement within 48 hours, follow-up examination is recommended.

### Revaccination & At-Risk Patients

In general, revaccination of patients with a known or suspected history of a serious adverse vaccine reaction is not recommended.

In addition, patients with prior diagnosis of immune-mediated disorders (eg, immune-mediated hemolytic anemia, thrombocytopenia) should probably not receive additional vaccines due to the belief that vaccine administration may reactivate the disorders; however, this concern has not been validated in scientific studies.

In these patients, determining the antibody titer of the core vaccines (especially CDV and CPV) will provide reliable information on the individual's immune status. Several states give veterinarians the authority to exempt rabies vaccination in patients that have a diagnosed illness or a prior history of a vaccine adverse event. However, if a patient is exempted from rabies vaccination, it is important to inform the client that, if the dog bites someone, it will be treated as a nonvaccinated dog.

### Small Breed Dogs

For the first time, the guidelines have addressed administering vaccines to small breed dogs (≤ 20 pounds at the estimated adult weight). Published studies and practitioner experience support the fact that small breed dogs may have increased risk of experiencing vaccine adverse reactions, especially when multiple vaccines are administered at the same time.[15-18]

It is now recommended that, in small breed dogs of all ages, noncore vaccines be administered 2 or more weeks after core vaccine administration.[1] While this recommendation requires additional appointments, reports from veterinarians indicate that owner compliance is high, particularly when owners are told that the reason for additional visits is patient safety.

**KEY POINT:** To mitigate the risk of adverse reactions in small breed dogs, administer noncore vaccines at least 2 weeks or longer after administration of core vaccines.

## VACCINATION LIABILITY

Veterinarians are concerned about potential liability associated with following recommendations other than those from the manufacturer. For example, is a veterinarian legally liable if a dog, not vaccinated annually in accordance with manufacturer label recommendations, develops an infection preventable by vaccine (eg, CDV) after revaccination at a 3-year interval?

### Legal Considerations

The reader is encouraged to review the Legal Considerations section of the *2011 AAHA Canine Vaccination Guidelines*.[1]

- Critical information concerning professional discretion in use of vaccines, medical negligence related to vaccine administration, *consent* versus *informed consent*, and medical record documentation are discussed in detail.
- Although the guidelines may differ from statements on product labels, veterinarians practicing in the U.S. and Canada do have considerable discretion in the selection and use of vaccines; rabies vaccination is an obvious exception.
- Adopting recommendations outlined in the guidelines is consistent with scientific principles of immunization and good medical practice.
- As highlighted in the guidelines, practitioners must determine the vaccination protocols that best suit their practices and level of risk tolerance.

While all USDA-licensed vaccines, regardless of minimum or maximum duration of immunity, have a package insert that says, "annual revaccination recommended," this statement does not imply that annual revaccination is necessary to maintain immunity.

**KEY POINT:** *With the exception of rabies vaccine,* veterinarians have considerable ability to use biologics (vaccines) in a discretionary manner.

### Client Discussions

Discussing potential risks associated with vaccine administration with clients is not inherently different than discussing the risks of a medical procedure or treatment.

- During an initial vaccine appointment, a thorough discussion of potential adverse reactions should be presented and documented in the medical record. On subsequent vaccination visits, a less extensive discussion is appropriate.
- If a veterinarian believes significant health risks may be associated with vaccine administration to an individual patient and elects to recommend against vaccination, the reasons for the recommendation should be discussed with the client and clearly noted in the medical record.[1]
- In some states/municipalities, veterinarians may not have the option to recommend against rabies vaccination, regardless of the patient's health status or perceived risk for an adverse reaction.

## COMING UP

In the upcoming November/December issue of *Today's Veterinary Practice*, the *2012 AAFP Feline Vaccination Guidelines* will be reviewed. The January/February 2013 issue will present the first article in our new vaccination column, which will address vaccination concerns raised by practicing veterinarians. ■

CAV-2 = adenovirus-2; CDV = distemper virus; CCoV = coronavirus; CPV = parvovirus; MLV = modified-live virus; MLV CDV = modified-live canine distemper virus; rCDV = recombinant canine distemper virus; RV = rabies

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