2017 AAHA Canine Vaccination Guidelines*

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Executive Summary

The American Animal Hospital Association (AAHA) is pleased to introduce this revision of the Canine Vaccination Guidelines published, for the first time, as an online educational resource for the veterinary medical profession. This format will allow for frequent online updates as necessary. The revised AAHA Canine Vaccination Guidelines offer important updates to the 2011 Guidelines. The content of the Guidelines has been significantly expanded to facilitate efforts by practicing veterinarians to meet patient and client needs in a complex infectious disease environment. The Guidelines are an authoritative source of evidence-based recommendations and expert opinion provided by the AAHA Canine Vaccination Guidelines Task Force. The Task Force includes individuals with extensive experience in primary care practice, academia, shelter medicine, public health, and veterinary law related to clinical practice.

While there is often consensus on which canine vaccines fall into core and noncore categories and when they should be administered, in practice, the vaccination protocol should always be individualized based on the patient's risk factors, life stage, and lifestyle. For this reason, these Guidelines are not intended to represent a universal vaccination protocol applicable to all dogs. Instead, the Guidelines offer a range of recommendations that will aid practitioners in making rational decisions on vaccine selection for their individual patients.

The AAHA Canine Vaccination Guidelines offer important updates to previously published guidelines as well as new, relevant information that directly impacts the practicing veterinarian:

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* These guidelines were prepared by a task force of experts convened by the American Animal Hospital Association. This document is intended as a guideline only, not an AAHA standard of care. These guidelines and recommendations should not be construed as dictating an exclusive protocol, course of treatment, or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to each individual practice setting. Evidence-based support for specific recommendations has been cited whenever possible and appropriate. Other recommendations are based on practical clinical experience and a consensus of expert opinion. Further research is needed to document some of these recommendations. Because each case is different, veterinarians must base their decisions on the best available scientific evidence in conjunction with their own knowledge and experience.

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† R.B. Ford was the lead editor of the AAHA Canine Vaccination Guidelines Task Force.

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- Updated, quick-reference tables summarizing vaccination recommendations for client-owned and shelter-housed dogs.
- Internet links that provide ready access to regularly updated online sources of information that will supplement the Guidelines themselves, for example, state-by-state information on rabies vaccination law and regulations, and comprehensive information on vaccine storage and handling.
- Algorithms outlining indications for antibody testing (serology) as well as recommended actions for patients with a "positive" or "negative" test result.
- Product information on the emerging class of immunotherapeutics approved for use in veterinary medicine.

As one of the safest and most cost-effective means of infectious disease prevention, vaccination has long been a focal point of canine practice. This revision of the entire AAHA Canine Vaccination Guidelines is presented in an online format at aaha.org/CanineVaccinationGuidelines. Termed an "Online Educational Resource," this iteration of the AAHA Canine Vaccination Guidelines offers readers immediate accessibility to current, "must-know" information that directly impacts clinical practice on a daily basis.

The table on vaccination recommendations in practice is an up-to-date, master reference that functions as a stand-alone resource covering all commercially available canine vaccines licensed in the United States and Canada. Core and noncore vaccines are listed along with recommendations for revaccination intervals and various precautions. The table contains links to sections in the Guidelines that provide additional, relevant detail. This is the only section available in print in *JAAHA*. The remainder of the sections listed below can be found at aaha.org/CanineVaccinationGuidelines.

Rabies vaccines are the only vaccines administered by veterinarians that are required by law. Because rabies laws may vary from state to state (or jurisdictions within states), a new section on rabies vaccination provides access to current state-by-state information on rabies and rabies vaccination law, and regulations that directly impact decisions veterinarians make in practice.

Another new section offers recommendations for dogs that are overdue for vaccination. Vaccine-specific guidance is provided for what is often an ambiguous aspect of veterinary practice, i.e., the canine patient that presents with an unknown or out-of-date vaccination history. Recommendations for core and noncore vaccines are presented.

Shelter-housed dogs represent a sizeable population of animals at increased risk of exposure to vaccine-preventable infectious diseases. The Guidelines include an updated table on recommendations for vaccination of shelter-housed dogs, including those in long-term housing facilities.

Another novel component of the Guidelines is a section on antibody testing (serology) as an adjunct to vaccination. Information is included that addresses not only the indications for testing, but also provides recommended actions based on whether the test results are "positive" or "negative." Antibody testing represents a selective approach to assessing an individual dog's response to vaccination. Determination of antibody status is especially relevant for the assessment of patients that have an unknown vaccination history, are overdue for vaccination, those undergoing chemotherapy, those receiving immunosuppressive drugs, as well as patients with a history of vaccine adverse reactions.

As noted in the section on legal considerations, veterinarians can exercise some professional discretion in deviating from vaccine label recommendations, such as determining appropriate revaccination intervals based the patient's risk. On the other hand, the protocol for administering rabies vaccinations is not discretionary. Decisions surrounding the administration of rabies vaccines require strict adherence to statutory requirements.

The section on vaccine storage and handling summarizes "must know" information related to the storage and use of vaccines within the practice. Included are tips for avoiding misidentification of vaccines, monitoring storage conditions, and the consequences of subjecting vaccines to out-of-range temperatures. A link to comprehensive Center for Disease Control (CDC) guidelines for proper vaccine storage and handling of vaccines is provided.

Immunotherapeutic products represent a rapidly emerging class of biologics licensed for use in veterinary medicine. The Guidelines include a new section entitled therapeutic biologics specifically directed at informing veterinarians about the availability and intended use of these novel adjunctive immune-based therapies.

In the section on frequently asked questions, readers will find informative recommendations for dealing with an assortment of commonly encountered, vaccine-related situations seen in clinical practice.

The AAHA Canine Vaccination Guidelines support the implementation of effective, individualized pathways for the prevention of infectious diseases of dogs. Implicit in the Guidelines is the integral role vaccination plays in the veterinary profession's emphasis on preventive healthcare and regular exams as the foundation of a long, active, and rewarding relationship between pets and their human companions. To read these guidelines in their entirety, visit aaha.org/CanineVaccinationGuidelines.

NOTE: Vaccines designated as CORE should be administered to all dogs. However, because exposure risk to vaccine-preventable disease varies, selected NONCORE vaccines may be recommended as CORE in individual practices depending on geographic region, patient lifestyle, age, etc.

TABLE

Vaccination Recommendations—Practice

CORE Vaccinations	Initial Vaccination (Dogs ≤16 Wk of Age)	Initial Vaccination (Dogs >16 Wk of Age)	Revaccination (Booster)	REMARKS
Combination vaccine administered as: **MLV *or* Recombinant Canine Distemper Virus** + **MLV Parvovirus** + **MLV Adenovirus-2** ± **MLV Parainfluenza Virus** The recommendations listed apply whether or not CPiV vaccine is included. Administer by the subcutaneous (SQ) route.	Beginning as early as 6 wk of age, administer sequential doses of a combination vaccine at an interval of 2 to 4 wk until at least 16 wk of age. Dogs that are ~16 wk of age when presented for initial vaccination should receive a second dose 2 to 4 wk later. **NOTE:** Dogs residing in a HIGH-RISK environment may benefit from receiving a final dose at 18 to 20 wk of age. HIGH RISK *is a subjective assessment applicable to dogs residing at locations in which the incidence of CDV and/or CPV is considered to be high; it may also include puppies known to have significant exposure to other dogs or contaminated environments.*	Administer 1 or 2 doses of a combination vaccine (see below): **NOTE:** Dogs residing in a HIGH-RISK environment and between 16 and 20 wk (4–5 mo) of age when presented for initial vaccination may benefit from administration of 2 doses of a combination vaccine 2 to 4 wk apart. **NOTE:** Dogs residing in a HIGH RISK environment and over 20 wk (5 mo) of age when presented for initial vaccination are expected to derive protective immunity from a single dose of a combination vaccine. HIGH RISK *is a subjective assessment applicable to dogs residing at locations in which the incidence of CDV and/or CPV is considered to be high; it may also include puppies known to have significant exposure to other dogs or contaminated environments.*	Administer a single dose of a combination vaccine within 1 yr following the last dose in the Initial Vaccination series. Administer subsequent boosters at intervals of 3 yr or longer. Measuring antibody levels (quantitative or qualitative) provides a reasonable assessment of protective immunity against CDV, CPV, and CAV2. Visit aaha.org/CanineVaccineTiters for more information on antibody testing.	- Following completion of the Initial Vaccination series and the initial booster dose, MLV and Recombinant Core vaccines will provide a sustained protective response lasting beyond 3 yr. - The rCDV and MLV-CDV vaccines perform similarly with regard to onset of immunity following vaccination (in the absence of MDA) and duration of immunity. - Parvovirus (CPV): All MLV-CPV vaccines available as of 2017 are expected to provide immunity from disease caused by any field variant currently recognized (including CPV-2b and -2c[†]). - Canine Adenovirus-2 (CAV2): Primarily intended to protect against canine infectious hepatitis virus caused by CAV-1 (infectious canine hepatitis virus) but also offers protection against the respiratory CAV-2 (one of the pathogens associated with canine infectious respiratory disease syndrome). - Canine Parainfluenza Virus (CPiV): CPiV vaccine administered by the intranasal route may provide superior protection compared to vaccine administered by a parenteral route. - Following reconstitution, vaccine loss of potency may occur within hours. CORE vaccines should be administered within 1 hr following reconstitution; it is recommended that reconstituted vaccines held longer than 1 hr should be properly discarded. (Visit aaha.org/CanineVaccineResources for more information on Vaccine Handling & Storage.) For recommendations on managing dogs who are overdue for these vaccines, visit aaha.org/CanineVaccinesOverdue

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CORE Vaccinations	Initial Vaccination (Dogs ≤16 Wk of Age)	Initial Vaccination (Dogs >16 Wk of Age)	Revaccination (Booster)	REMARKS
Rabies virus (killed*) 1-yr & 3-yr labeled vaccines are available. Administer by the SQ or intramuscular (IM) route (see Manufacturer's Package Insert for the vaccine selected) For state-specific information on rabies immunization and law, visit aaha.org/CanineVaccineResources	Administer a single dose not earlier than 12 wk of age. A second dose is required within 1 yr following the initial dose. Most, but not all, states and provinces allow discretion in the use of a 1-yr or a 3-yr labeled rabies vaccine when administering the initial dose. (Local requirements may vary.) A majority of states and jurisdictions require the owner of a young dog to have the initial rabies vaccine administered between 12 and 16 wk of age. (Local requirements may vary.) State/local/provincial law applies.	Administer a single dose of vaccine. Regardless of the age of the dog at the time the *initial* rabies vaccine is administered, a second dose is required within 1 yr following the initial dose of rabies vaccine. In most states and provinces, veterinarians are allowed discretion in administering either a 1-yr or a 3-yr labeled rabies vaccine. Vaccination requirements may vary for dogs imported from other countries/states. State/local/provincial law applies.	Administer a single dose of vaccine. In most states and provinces, veterinarians are allowed discretion in administering either a 1-yr or a 3-yr labeled rabies vaccine. The interval between subsequent doses is determined by the product label of the last vaccine dose administered (i.e., either 1 yr or 3 yr). NOTE: Some states and some jurisdictions within states do NOT recognize a 1-yr labeled rabies vaccine, in which case a 3-yr labeled vaccine must be administered. State/local/provincial law applies.	- Although some states and most provinces do not have a rabies vaccination requirement/law for dogs (or cats), rabies vaccination is recommended as a CORE vaccine in all states and provinces. - Most states (and jurisdictions within states) do NOT permit veterinarians to exempt the requirement for rabies vaccination even in dogs having medical contraindications to vaccination. For state-specific information on rabies immunization, vaccine exemption, and law, visit aaha.org/CanineVaccineResources For recommendations on managing dogs who are overdue for this vaccine, visit aaha.org/CanineVaccinesOverdue
NONCORE Vaccinations	**Initial Vaccination (Dogs ≤16 Wk of Age)**	**Initial Vaccination (Dogs >16 Wk of Age)**	**Revaccination (Booster)**	**REMARKS**
***Bordetella bronchiseptica* +canine parainfluenza virus** Administer by the intranasal (IN) route. OPTION: some IN products may also contain CAV2 vaccine.	A single IN dose is indicated for dogs at risk of exposure and is generally administered between 8 and 16 wk of age. The IN vaccine may be administered as early as 3 to 4 wk of age in puppies at risk of exposure to infected dogs (maternally derived antibody does not interfere with the immune response following mucosal vaccination).	A single IN dose of vaccine is indicated for dogs at risk of exposure.	Where risk of exposure is sustained, administer a single dose 1 yr following the last dose administered, then annually thereafter. There is no known value in administering the IN vaccine bi-annually (every 6 mo).	- Onset of protective immunity has been shown to be as early as 48 to 72 hr following a single inoculation. - The duration of immunity, based on challenge studies (*B.bronchiseptica*), is 12 to 14 mo following a single dose of IN vaccine. - Canine Parainfluenza Virus (CPiV): Parenterally administered CPiV vaccine may not provide a level of protection that is comparable to CPiV vaccine administered by the IN route. - The duration of immunity for the IN CPiV vaccine component is expected to exceed 1 yr. - The IN CAV2 vaccine is not intended for use in the prevention of canine infectious hepatitis. - DO NOT ADMINISTER IN VACCINE PARENTERALLY or ORALLY. For recommendations on managing dogs who are overdue for this vaccine, visit aaha.org/CanineVaccinesOverdue

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NONCORE Vaccinations	Initial Vaccination (Dogs ≤16 Wk of Age)	Initial Vaccination (Dogs >16 Wk of Age)	Revaccination (Booster)	REMARKS
Bordetella bronchiseptica only (monovalent) Three options are available: • Parenteral (CAe) Administer by the SQ route. -or- • Intranasal (avirulent live) Administer by the intranasal (IN) route. -or- • Intraoral (avirulent live) Administer orally (buccal pouch).	Parenteral (SQ): Two initial doses are required, 2 to 4 wk apart beginning as early as 8 wk of age. IN: Administer a single dose intranasally. The IN vaccine may be administered as early as 3 to 4 wk of age. Oral: Administer a single dose into the buccal pouch as early as 8 wk of age.	Parenteral (SQ): Two initial doses are required, 2 to 4 wk apart, regardless of the patient's age. IN: Administer a single dose intranasally. Oral: Administer a single dose into the buccal pouch.	Where risk of exposure is sustained, administer a single dose 1 yr following the last dose administered, then annually thereafter.	- The duration of immunity following a single dose of *B bronchiseptica* vaccine administered by the IN route is 12 to 14 mo. - Maternally derived antibody does not interfere with the immune response following mucosal vaccination. - Although the IN vaccine may be administered as early as 3 to 4 wk of age, it is conventional in practice to administer a single dose between 8 and 16 wk of age. - Duration of immunity studies, based on challenge, have not been published for the parenteral (SQ) or the oral *B. bronchiseptica* vaccines. For recommendations on managing dogs who are overdue for this vaccine, visit aaha.org/CanineVaccinesOverdue
Leptospira (killed) 4-serovar serovar *canicola;* serovar *icterohaemorrhagiae;* serovar *grippotyphosa;* serovar *pomona* Administer by the SQ route.	Two initial doses, 2 to 4 wk apart., are required; the initial dose may be administered as early as 8 to 9 wk of age.	Two initial doses, 2 to 4 wk apart, are required regardless of the dog's age.	Where risk of exposure is sustained, administer a single dose 1 yr following completion of the initial 2-dose series, then annually thereafter.	- Because there is limited cross-protection among serovars in the vaccine, administration of a 4-serovar leptospirosis vaccine is recommended over a 2-serovar vaccine. - 4-serovar leptospirosis vaccines are available in combination with CORE vaccines and as a 4-serovar (only) product that is not combined with other vaccines. For recommendations on managing dogs who are overdue for this vaccine, visit aaha.org/CanineVaccinesOverdue
Borrelia burgdorferi (canine Lyme disease) Four vaccine types are currently available: • killed whole cell bacterin (OspA), • killed whole cell bacterin (OspA+C), • recombinant OspA, • chimeric-recombinant OspA+OspC Administer by the SQ route.	Two initial doses, 2 to 4 wk apart, may be administered as early as 8 or 9 wk of age (as labeled); (see REMARKS).	Two initial doses, 2 to 4 wk apart, are required regardless of the dog's age (see REMARKS).	Where risk of exposure is sustained, administer a single dose 1 yr following completion of the initial 2-dose series, then annually thereafter.	- Dogs traveling into Lyme-disease-endemic areas from nonendemic areas may be at increased risk for exposure and infection. Vaccination may be indicated: administer 2 doses of vaccine, 2 to 4 wk apart, such that the last dose is administered approximately 2 to 4 wk prior to travel. For recommendations on managing dogs who are overdue for this vaccine, visit aaha.org/CanineVaccinesOverdue

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NONCORE Vaccinations	Initial Vaccination (Dogs ≤16 Wk of Age)	Initial Vaccination (Dogs >16 Wk of Age)	Revaccination (Booster)	REMARKS
Canine Influenza Virus-H3N8 (killed) Administer by the SQ route.	Two initial doses, 2 to 4 wk apart, are required. The first dose may be administered to dogs 6 to 8 wk of age or older (see package insert for specific information).	Two initial doses, 2 to 4 wk apart.	Where risk of exposure is sustained, administer a single dose within 1 yr following completion of the initial 2-dose series, then every year thereafter.	- When vaccination is recommended, dogs intended to be housed in boarding kennels or day-care facilities should BEGIN the initial vaccination series 4 wk prior to entry (2 wk between the initial vaccines plus 2 wk to allow time for a humoral immune response to develop). - Any dog deemed at risk for exposure to influenza virus should be vaccinated against both H3N2 and H3N8 strains. - Vaccinated dogs may still become infected following exposure, develop mild clinical signs, and transiently shed virulent virus. For recommendations on managing dogs who are overdue for this vaccine, visit aaha.org/CanineVaccinesOverdue
Canine Influenza Virus-H3N2 (killed) Administer by the SQ route.	Two initial doses, 2 to 4 wk apart, are required. The first dose may be administered to dogs 6 to 8 wk of age or older (see package insert for specific information).	Two initial doses, 2 to 4 wk apart.	Where risk of exposure is sustained, administer a single dose within 1 yr following completion of the initial 2-dose series, then every year thereafter.	- When vaccination is recommended, dogs intended to be housed in boarding kennels or day-care facilities should BEGIN the initial vaccination series 4 wk prior to entry (2 wk between the initial vaccines plus 2 wk to allow time for a humoral immune response to develop). - Any dog deemed at risk for exposure to influenza virus should be vaccinated against both H3N2 and H3N8 strains. - Vaccinated dogs may still become infected following exposure, develop mild clinical signs, and transiently shed virulent virus. For recommendations on managing dogs who are overdue for this vaccine, visit aaha.org/CanineVaccinesOverdue
Crotalus atrox (Western Diamondback Rattlesnake) Administer by the SQ route.	Dosing requirements and frequency of administration vary among dogs depending on body weight and exposure risk. Follow the manufacturer's label recommendations for dosing and administration.			- The vaccine should only be administered to dogs with a defined risk for exposure.

*Killed, inactivated.
†CPV-2b and CPV-2c, field variants of canine parvovirus recognized in the United States today.
+"combined with" the vaccine that follows. ± "with or without" the vaccine(s) that follow.
CAe, cellular antigen extract (*Bordetella bronchiseptica*); CAV2, canine adenovirus-2; CCV, canine coronavirus; CDV, canine distemper virus; CPiV, canine parainfluenza virus; CPV, canine parvovirus; CPV-2b and CPV-2c, field variants of canine parvovirus recognized in North America today; IM, intramuscular; IN, intranasal; MDA, maternally derived antibody; MLV, modified-live virus or attenuated; oral, specifically administered into the buccal pouch (*Bordetella bronchiseptica*); OspA, outer surface protein A (*Borrelia burgdorferi*); OspC, outer surface protein C (*Borellia burgdorferi*); rCDV = recombinant canine distemper virus; SQ, subcutaneous
MEASLES VACCINATION: Attenuated Measles Vaccination is a heterologous, single-dose (do not booster) vaccine for administration to young dogs (not less than 6 wk of age *and* not older than 12 wk of age) as a means of protecting young dogs (only) against canine distemper virus. The measles vaccine must be administered by the intramuscular (IM) route.
NOTE: Canine coronavirus (CCV) vaccination is not recommended on the grounds that infection: (1) causes mild or subclinical disease, (2) generally occurs in dogs 6 wk of age and younger, and (3) is typically self-limiting.
NOTE: Administration of multiple doses of parenteral vaccine at the same appointment, particularly among small breed dogs (≤10 kg), may increase the risk of an acute-onset adverse reaction. Alternative vaccination schedules may be indicated, e.g., delaying administration of a noncore vaccine by 2 wk following administration of core vaccines.

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