

# 2013 AAHA Dental Care Guidelines for Dogs and Cats\*

Steven E. Holmstrom, DVM, DAVDC, Jan Bellows, DVM, DAVDC, DABVP, Stephen Juriga, DVM, DAVDC, Kate Knutson, DVM, Brook A. Niemiec, DVM, DAVDC, Jeanne Perrone, CVT, VTS (Dentistry)

## ABSTRACT

Veterinary dentistry is constantly progressing. The purpose of this document is to provide guidelines for the practice of companion animal dentistry for the veterinary profession. Dental care is necessary to provide optimum health and optimize quality of life. Untreated diseases of the oral cavity are painful and can contribute to local and systemic diseases. This article includes guidelines for preventive oral health care, client communication, evaluation, dental cleaning, and treatment. In addition, materials and equipment necessary to perform a medically appropriate procedure are described. (*J Am Anim Hosp Assoc* 2013; 49:75–82. DOI 10.5326/JAAHA-MS-4013)

## Introduction

Veterinary medical dental care is an essential component of a preventive healthcare plan. Quality dental care is necessary to provide optimum health and quality of life. If left untreated, diseases of the oral cavity are painful and can contribute to other local or systemic diseases.<sup>1,2</sup> The purpose of this document is to provide guidelines for the practice of companion animal dentistry. A list of definitions to enhance the understanding of this article is provided in **Table 1**.

The dental health care team is obligated to practice within the scope of their respective education, training, and experience. It is imperative that the dental health care team remains current with regard to oral care, operative procedures, materials, equipment, and products. The team members must attain appropriate continuing education through courses such as those offered by the American Animal Hospital Association, the American Veterinary Medical Association, the annual Veterinary Dental Forum, industry and private facilities; by reading the *Journal of Veterinary Dentistry*; and by reading other appropriate journals and medical texts.<sup>3–7</sup>

## Facility Requirements

Dental procedures result in aerosolized bacteria and particulate matter. Using a dedicated space is recommended for non-sterile dental procedures. The dedicated dental space must be separate from the sterile surgical suite and needs to be placed in a low-traffic area. New practices and those planning on remodeling should incorporate a separate dental suite into the blueprint.

Appropriate ventilation and anesthetic scavenging systems must also be used. Low-heat, high-intensity lighting, and equipment for magnifying the target area are required to adequately and safely visualize the oral cavity and its structures. The operating table must allow for drainage and be constructed of impervious, cleanable material.

## Materials, Instruments, and Equipment

As with dental techniques, it is important to keep the dental materials up-to-date and veterinarians must be aware of what

From the Animal Dental Clinic, San Carlos, CA (S.H.); All Pets Dental Clinic, Weston, FL (J.B.); Veterinary Dental Center, River Heights Veterinary Hospital, Oswego, IL (S.J.); Pet Crossing Animal Hospital & Dental Clinic, Bloomington, MN (K.K.); California Veterinary Dental Specialties, San Diego, CA (B.N.); and Tampa Bay Veterinary Dentistry, Largo, FL (J.P.).

Correspondence: [Toothvet@sbcglobal.net](mailto:Toothvet@sbcglobal.net) (S.H.)

\*This document is intended as a guideline only. 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 and actions on the best available scientific evidence, in conjunction with their own expertise, knowledge, and experience. These guidelines are supported by generous educational grants from Hill's Pet Nutrition, Merial, Ltd., Virbac Animal Health, and PDx BioTech, and are endorsed by the American Veterinary Dental College.

**TABLE 1****Definitions that Pertain to Dental Guidelines\***

| Term                   | Definition                                                                                                                                                                                                                                                  |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dental chart           | A written and graphical representation of the mouth, with adequate space to indicate pathology and procedures (see Table 5 for included items)                                                                                                              |
| Dental prophylaxis     | A procedure performed on a healthy mouth that includes oral hygiene care, a complete oral examination, and techniques to prevent disease and to remove plaque and calculus from the teeth above and beneath the gum line before periodontitis has developed |
| Dentistry              | The evaluation, diagnosis, prevention, and/or treatment of abnormalities in the oral cavity, maxillofacial area, and/or associated structures. Nonsurgical, surgical, or related procedures may be included                                                 |
| Endodontics            | The treatment and therapy of diseases of the pulp canal system                                                                                                                                                                                              |
| Exodontia (extraction) | A surgical procedure performed to remove a tooth                                                                                                                                                                                                            |
| Gingivitis             | Inflammation of the gingiva without loss of the supporting structure(s) shown with X-ray                                                                                                                                                                    |
| Oral surgery           | The surgical invasion and manipulation of hard and soft tissue to improve/restore oral health and comfort                                                                                                                                                   |
| Orthodontics           | The evaluation and treatment of malpositioned teeth for the purposes of improving occlusion and patient comfort and enhancing the quality of life                                                                                                           |
| Periodontal disease    | A disease process that begins with gingivitis and progresses to periodontitis when left untreated                                                                                                                                                           |
| Periodontitis          | A destructive process involving the loss of supportive structures of the teeth, including the periodontium, gingiva, periodontal ligament, cementum, and/or alveolar bone                                                                                   |
| Periodontal surgery    | The surgical treatment of periodontal disease. This is indicated for patients with pockets > 5 mm, class II or III furcation exposure, or inaccessible areas                                                                                                |
| Periodontal therapy    | Treatment of tooth-supporting structures where periodontal disease exists. This involves the nonsurgical removal of plaque, calculus, and debris in pockets; and the local application of antimicrobials                                                    |
| Periodontium           | The supporting structures of the teeth, including the periodontal ligament, gingiva, cementum, and alveolar and supporting bone                                                                                                                             |
| Pocket                 | A pathologic space between supporting structures and the tooth, extending apically from the normal site of the gingival epithelial attachment                                                                                                               |

\*Some of these definitions were derived from descriptions in Holmstrom *et al.* (2004).<sup>3</sup>

materials are considered appropriate for the treatment of dental conditions. Commonly used materials can be found by consulting a dental text and attending continuing education programs presented by a dental specialist.

Instruments and dental equipment require routine and frequent maintenance. Maintenance information can be found in some dental texts and through the manufacturer. Instruments must be sharp and properly stored, and instruments in poor condition need to be replaced. A written protocol needs to be established and followed for equipment and instrument care.

As with human dentistry, instruments that enter the oral cavity should be sterilized. Packets organized by dental procedure (e.g., examination, extraction, periodontal surgery) should be prepared and sterilized before use.

Recommended materials, instruments, and equipment for performing dental procedures are listed in **Tables 2** and **3**. Consult the reference list associated with these guidelines for recommendations and information on ordering equipment.<sup>3-7</sup>

## Operator Protection

Pathogens and debris such as calculus, tooth fragments, and prophy paste are aerosolized during dental procedures. Irrigating the oral cavity with a 0.12% chlorhexidine solution before dental scaling decreases bacterial aerosolization.<sup>8</sup>

The safety of the operator must be ensured during dental procedures by using radiographic, oral, respiratory, skin, eye, and ear protective devices (**Table 4**). Ergonomic considerations include proper seating, fatigue mats for standing, and proper positioning of both the patient and materials to minimize immediate and chronic operator injuries. Provide the operator with instruction on proper instrument handling techniques.

## Patient Assessment

### History and Physical Examination

The history must include prior home dental hygiene delivered by the client; diet; access to treats and chews; chewing habits; current and previous dental care and procedures; prior and current diseases, including any behavioral issues and allergies; and medications or supplements currently administered. Perform a physical examination of all body systems based on the species, age, health status, and temperament of the animal. If the patient is presented for a complaint not related to dentistry, give due consideration to the primary complaint, performing the diagnostic tests and treatments indicated. Establish priorities if multiple procedures are indicated.

### Assessment by Life Stage

Focus on age-related dental conditions and common abnormalities in the dog and cat. From birth to 9 mo of age, evaluate the patient

**TABLE 2****Materials Needed for the Practice of Veterinary Dentistry\*****Necessary materials**

- Antiseptic rinse
- Prophylaxis paste/pumice
- Prophylaxis angle and cups
- Hemostatic agents
- Sealant
- Needles and syringes
- Intraoral digital system or radiographic film
- Measures to prevent hypothermia (e.g., conductive blanket, hot air blanket, circulating water blanket, towels, blankets)
- Gauze and sponges
- Antimicrobial agent for local application
- Suture material (4-0 and smaller)
- Bone augmentation material
- Local anesthetic drugs

**Necessary equipment**

- Equipment to expose and process intraoral digital radiograph system or intraoral films
- Suction
- A high- and low-speed delivery system for air and water
- Fiber optic light source
- Equipment for sterilizing instruments
- Low- and high-speed hand pieces (minimum two of each)
- Various sizes of round/diamond and cross cut fissure burs
- Powered scaler with tips for gross and subgingival scaling (ultrasonic, subsonic, or piezoelectric)
- Head or eye loupes for magnification

\*Please note that disposable items are for single use only.

for problems related to the deciduous teeth, missing or extra teeth, swellings, juvenile diseases (such as feline juvenile onset periodontitis), occlusion, and oral development. From 5 mo to 2 yr of age, evaluate the patient for problems related to developmental anomalies, permanent dentition, and the accumulation of plaque and calculus. Periodontal diseases may begin during that time period, especially in cats and small-breed dogs. The onset and severity of periodontal diseases varies widely depending on breed,

**TABLE 3****Instruments to Include in the Dental Surgical Pack\***

- Scalers
- Curettes
- Probes/explorer
- Sharpening materials
- Scalpel
- Extraction equipment (e.g., periosteal elevators, luxating elevators, periodontal elevators, extraction forceps, root tip picks, root tip forceps)
- Thumb forceps
- Hemostats
- Iris, LaGrange, Mayo, or Metzenbaum scissors
- Needle holders
- Mouth mirror
- Retraction aid (e.g., University of Minnesota retractor)

\*Instruments must be sterilized by accepted techniques prior to each use. Hand instruments must be properly sharpened and cared for.

**TABLE 4****Minimum Protective Devices to be used During Dental Procedures**

- Cap or hair bonnet
- Mask
- Goggles, surgical spectacles, or face shield
- Smock
- Gloves
- Earplugs
- Dosimeter
- Protection from radiation (e.g., lead shield)

diet, and home dental care. In a small-breed dog without home dental care, periodontal diseases can start as early as 9 mo of age. In a large-breed dog, periodontal diseases may not start until later. Many small-breed dogs have periodontal diseases by 3 yr of age.<sup>9–12</sup> Beyond 2 yr of age, evaluate the progression of periodontal diseases, damage to tooth structures, occurrence of oral masses, and the existence and adequacy of preventive home dental care. As the animal ages, continue to evaluate the patient for progressive periodontal diseases, oral tumors, and other aspects of dental pathology.<sup>13</sup>

**Oral/Dental Examination in the Conscious Patient**

Record all findings in the medical record (Table 5). Evaluate the head and oral cavity both visually and by palpation. Changes in body weight, eating habits, or other behaviors can indicate dental disease. Specific abnormal signs to look for may include pain; halitosis; drooling; dysphagia; asymmetry; tooth resorption; discolored, fractured, mobile, missing, or extra teeth; inflammation and bleeding; loss of gingiva and bone; and changes in the range of motion or pain in the temporomandibular joint. In addition, the practitioner should assess the patient's occlusion to ensure it is normal, or at least atraumatic. Evaluate the patient's eyes, lymph nodes, nose, lips, teeth, mucous membranes, gingiva, vestibule (i.e., the area between the gum tissue and cheeks), palatal and lingual surfaces of the mouth, dorsal and ventral aspects of the tongue, tonsils, and salivary glands and ducts. Note all abnormalities such as oral tumors, ulcers, or wounds. A diagnostic test strip for the measurement of dissolved thiol levels can be used as an exam room indicator of gingival health and periodontal status.<sup>14</sup>

The oral examination performed on a conscious patient allows the practitioner to design a preliminary diagnostic plan. Take into consideration potential patient pain. Do not offend the patient by probing unnecessarily when such manipulations can be better achieved under anesthesia. Also, realize in many instances that the examiner will underestimate the conditions present because it is impossible to visualize all oral structures

**TABLE 5****Items to Include in the Dental Chart and/or Medical Record**

- Signalment
- Physical examination, medical, and dental history findings
- Oral examination findings
- Anesthesia and surgery monitoring log and surgical findings
- Any dental, oral, or other disease(s) currently present in the animal
- Abnormal probing depths (described for each affected tooth)
- Dentition chart with specific abnormalities noted, such as discoloration; worn areas; missing, malpositioned, or fractured teeth; supernumerary, tooth resorption; and soft-tissue masses
- Current and future treatment plan, addressing all abnormalities found. This includes information regarding initial decisions, decision-making algorithm, and changes based on subsequent findings
- Recommendations for home dental care
- Any recommendations declined by the client
- Prognosis

when the patient is awake. It is only when the patient has been anesthetized that a complete and thorough oral evaluation can be accomplished successfully. The complete examination includes a tooth-by-tooth visual examination, probing, and radiographic examination. Only then can a precise treatment plan and fees for proposed services be tabulated and discussed with the pet owner(s).

## Making Recommendations and Client Education

Discuss the findings of the initial examination and additional diagnostic and/or therapeutic plans with the client. Those plans will vary depending on the patient; the initial findings; the client's ability to proceed with the recommendations; as well as the client's ability to provide necessary, lifelong plaque prevention.

When either an anesthetic examination or procedure is not planned in a healthy patient, discuss preventive healthcare, oral health, and home oral hygiene. Options include brushing and the use of dentifrices, oral rinses, gels and sprays, water additives, and dental diets and chews. Discourage any dental chew or device that does not bend or break easily (e.g., bones, cow/horse hooves, antlers, hard nylon products). The Veterinary Oral Health Council lists products that meet its preset standard for the retardation of plaque and calculus accumulation.<sup>15</sup> Illustrate to the owner how to perform oral hygiene, such as brushing, wiping teeth, application of teeth-coating materials, and the use of oral rinses and gels. Allow the client to practice so they will be able to perform the agreed-upon procedure(s) at home.

All home oral hygiene options, from diet to the gold standard of brushing, along with any of their potential limitations need to be discussed with the client. It is essential that the oral health medical plan is patient-individualized to attain the greatest level of client

compliance. For example, "dental" diets and chews can be used until the client is comfortable either brushing or applying an antiplaque gel, rinse, or spray with a wipe. The gold standard is brushing the pet's teeth using a brush with soft bristles either once or twice daily. If the client is either unable or unwilling to persevere with brushing, use any of the other oral hygiene options that the patient will tolerate.

Explain the two-part process involved in a diagnostic dental cleaning and patient evaluation to the client. It is critical that he/she understand the hospital protocol to minimize miscommunication and frustration. The procedure involves both an awake component and an anesthetized component for a complete evaluation. It is not until the oral radiographs have been evaluated that a full treatment plan including costs of the anticipated procedure(s) can be successfully made with any degree of accuracy.

Evaluation of a patient for dental disease involves the awake procedure as the first step. This is where an initial assessment is made. Although many problems may be seen at this point of the evaluation, a thorough diagnosis and treatment plan cannot be determined until charting, tooth-by-tooth examination of the anesthetized patient, and dental radiographs have been taken and evaluated. Studies have demonstrated that much of the pathology in a patient's oral cavity cannot be appreciated until dental radiographs are taken and assessed; therefore, have protocols in place within the practice to give clients ample time to make an informed decision on how they want to proceed with the proposed treatment plan.<sup>16</sup>

Some hospitals may want to do the awake examination and the anesthetic component (charting, cleaning, and dental radiographs) as the first procedure. They can then stage the treatment plan as a second procedure. This will give the hospital staff adequate time to explain to the client the treatment plan, including giving educational information on the diagnosis, reviewing radiographic findings, and going over costs. Other hospitals may want to perform the treatment plan during the first anesthetic event so everything is done at that procedure. Whichever way the hospital chooses, there must be a client communication plan in place so the client is involved and feels comfortable going forward with the proposed treatment plan.

Perform the anesthetized portion of the dental evaluation of charting, cleaning, and radiographs when abnormalities are seen on the awake exam (such plaque or tartar at the free gingival surface of the maxillary canines or fourth premolars) or at least on an annual basis starting at 1 yr of age for cats and small- to medium-breed dogs and at 2 yr of age for large-breed dogs. Details on the recommended frequency of examinations are discussed under Progress or Follow-Up Evaluation (below).

## Planning the Dental Cleaning and Patient Evaluation

Use well-monitored, inhalation anesthesia with cuffed intubation when performing dental cleanings. Such techniques increase safety, reduce stress, decrease the chances of adverse sequelae (e.g., inhalation pneumonia), and are essential for thorough and efficient evaluation and treatment of the patient. Attempting to perform procedures on an awake patient that is struggling, under sedation, or injectable anesthesia reduces the ability to make an accurate diagnosis, does not allow adequate treatment, and increases stress and risks to the patient.

### Prior to Anesthesia

Preoperative evaluation includes a preanesthetic physical examination. It is crucial to follow the most up-to-date recommendations for preoperative laboratory testing based on the patient's life stage and any existing disease. Preoperative care includes IV catheterization to facilitate administration of IV fluid therapy, preemptive pain management, and antibiotics (when indicated). Review the most up-to-date guidelines on anesthesia, antimicrobial use, fluid therapy, feline life stage, canine life stage, preventive healthcare, pain management, and referral for specific recommendations.<sup>17–25</sup>

### Anesthesia

General anesthesia with intubation is necessary to properly assess and treat the companion animal dental patient. It is essential that aspiration of water and debris by the patient is prevented through endotracheal intubation. Cleaning a companion animal's teeth without general anesthesia is considered unacceptable and below the standard of care. Techniques such as necessary immobilization without discomfort, periodontal probing, intraoral radiology, and the removal of plaque and tartar above and below the gum line that ensure patient health and safety cannot be achieved without general anesthesia.<sup>26</sup>

During anesthesia, one trained person is dedicated to continuously monitoring and recording vital parameters, such as body temperature, heart rate and rhythm, respiration, oxygen saturation via pulse oximetry, systemic blood pressure, and end-tidal CO<sub>2</sub> levels *q* 5 min (or more frequently if sudden changes are noted).<sup>27,28</sup> IV fluid therapy is essential for circulatory maintenance. Customize the type and rate of fluids administered according to the patient's needs.<sup>29,30</sup>

Prevention of hypothermia with warming devices is essential because the patient may become wet, and dental procedures can be lengthy.<sup>31,32</sup> Additionally, suction and packing the caudal oral cavity with gauze can prevent aspiration and decrease hypothermia. If packing materials are used, steps must be taken to ensure there is no chance of the material being left behind following

extubation. Regardless of whether packing is used, the last step prior to extubation is an examination of the caudal oral cavity to make certain no foreign material is left behind. Proper positioning of the patient by placing them in lateral recumbency can also help prevent aspiration. Provide safe immobilization of the head.

If oral surgery is planned, the institution of an intraoral local anesthetic is warranted in conjunction with the general anesthesia. This decreases the amount of general anesthetic needed and reduces the amount of systemic pain medication required post-operatively.<sup>1,27,33</sup> Local anesthetic blocks can last up to 8 hr, and they decrease hypotension and hypoventilation caused with inhalant anesthetics by reducing the amount of gas needed to maintain a safe anesthetic plane.<sup>3,6,34,35</sup>

## Dental Procedures

The terms *prophy*, *prophylaxis*, and *dental* are often misused in veterinary medicine. A professional dental cleaning is performed on a patient with plaque and calculus adhered to some of the teeth, but otherwise has an essentially healthy mouth or mild gingivitis only. The intent of dental cleaning is to prevent periodontitis. Patients with existing disease undergo periodontal therapy in addition to professional dental cleaning. Dental procedures must be performed by a licensed veterinarian, a credentialed technician, or a trained veterinary assistant under the supervision of a veterinarian in accordance with state or provincial practice acts. Practice acts vary from jurisdiction to jurisdiction, and the veterinarian must be familiar with those laws. Surgical extractions are to be performed only by trained, licensed veterinarians. All extractions need to have postextraction, intraoral radiographs. All dental procedures need to be described properly (Table 1), and a consistent method should be used to record findings in the medical record (Table 5).

Positioning and safety of the patient is important. Manually stabilize the head and neck when forces are being applied in the mouth. Avoid using mouth gags because they can cause myalgia, neuralgia, and/or trauma to the temporomandibular joint. If a mouth gag is necessary, do not fully open the mouth or overextend the temporomandibular joint. Never use spring-loaded mouth gags. Do not overinflate the endotracheal tube. Always disconnect the endotracheal tube when repositioning the patient to prevent trauma to the trachea.

### Essential Steps for Professional Dental Cleaning

The essential steps for a professional dental cleaning and periodontal therapy are described in the following list:

1. Perform an oral evaluation, as described above, for the conscious patient.

2. Radiograph the entire mouth, using either intraoral or digital radiographic systems. Radiographs are necessary for accurate evaluation and diagnosis. In one published report, intraoral radiographs revealed clinically important pathology in 27.8% of dogs and 41.7% of cats when no abnormal findings were noted on the initial examination.<sup>16</sup> In patients with abnormal findings, radiography revealed additional pathology in 50% of dogs and 53.9% of cats.<sup>16</sup> Standard views of the skull are inadequate when evaluating dental pathology. If full mouth films are not taken, the client must be informed that they were not done.
3. Scale the teeth supra- and, most importantly, subgingivally using either a hand scaler or appropriate powered device followed by a hand instrument (i.e., scaler, curette). Do not use a rotary scaler, which excessively roughens the tooth enamel.<sup>36</sup>
4. Polish the teeth using a low-speed hand piece running at no more than 300 revolutions/min with prophylactic paste that is measured and loaded on a disposable prophylactic cup for each patient (to avoid cross-contamination).
5. Perform subgingival irrigation to remove debris and polishing paste and to inspect the crown and subgingival areas.
6. Apply antiplaque substances, such as sealants.
7. Provide instructions to the owner regarding home oral hygiene.

### Additional Steps for Periodontal Therapy and Other Conditions

8. Evaluate the patient for abnormal periodontal pocket depths using a periodontal probe. The depth that is considered abnormal varies depending on the tooth and size of the dog or cat.<sup>3,4,6,37</sup> In medium-sized dogs, the probing depth should not be > 2 mm, and in the mid-sized cats, the depth should not be > 1 mm.
9. Perform periodontal therapy (Table 1) based on radiographic findings and probing.<sup>38–40</sup>
10. Administer perioperative antibiotics when indicated, either parenterally or locally.<sup>41,42</sup>
11. Perform periodontal surgery to remove deep debris, eliminate pockets, and/or extract teeth. When either pockets or gingival recession is > 50% of the root support, extraction or periodontal surgery is indicated and should be performed by trained veterinarians or referred to a specialist.
12. Biopsy all abnormal masses that are visualized grossly or noted on radiographs. Submit all samples for histopathology to be analyzed by a pathologist qualified in oral tissues analysis.<sup>43</sup>

13. Take postoperative radiographs to evaluate the treatment applied. This is especially important in extraction cases.
14. Examine and rinse the oral cavity. Remove any packing or foreign debris.
15. Recommend referral to a specialist when the primary veterinary practitioner does not have the skills, knowledge, equipment, or facilities to perform a specific procedure or treatment.

## Postoperative Management

Maintain an open airway via intubation until the animal is either swallowing or in sternal recumbency. Maintain body temperature and continue IV fluid support as needed. Continuously monitor and record vital signs until the patient is awake. Assess and record pain scores throughout the recovery period, continuing pain management while the pet is in the hospital and upon discharge.<sup>34,44</sup>

## Client Education and Follow-up

### Postoperative Communication

Client communication is fundamental to the maintenance of oral health. At the time of discharge, discuss all operative procedures and existing/potential complications (e.g., sedation, vocalization, bleeding, coughing, dehiscence, infection, neurologic signs, halitosis, vomiting, diarrhea, anorexia, signs of pain). Discuss immediate postoperative home oral hygiene, including medications and their side effects. Provide antibiotics and medication for inflammation and pain as indicated.<sup>41,42</sup> Discuss any change in diet that might be necessary, such as a change to either soft or pre-moistened food or to a prescription dental diet. Also indicate the duration of those changes. Provide individualized oral and written instructions at the time of discharge. Establish an appointment for a follow-up examination and further discussion.

### Home Oral Hygiene

Home oral hygiene is vital for disease control. Telephone the client the day after the procedure to inquire about the pet's condition, to determine the client's ability to implement the medication and home oral hygiene plan, to answer questions, and address any concerns the client might have. The home oral hygiene plan includes the frequency, duration, and method of rinsing and brushing; applying sealants; and the use of dental diets and dental chews.<sup>45</sup> The Veterinary Oral Health Council has a list of products that are reportedly effective in retarding the accumulation of dental plaque and/or calculus.<sup>46</sup> Some of the details regarding the home oral hygiene plan might best be left for discussion with the client at the first postoperative follow-up evaluation.



## Progress or Follow-up Evaluation

With each follow-up examination and telephone communication, repeat the home dental care instructions and recommendations to the client. Set the number and timing of regular follow-up visits based on the disease severity. Although few studies have been performed in dogs and cats, extrapolation from the human literature and guidelines about aging in dogs and cats leads to the following recommendations:<sup>14</sup>

- Dental health care needs to be part of the preventive healthcare examination discussion and should begin at the first appointment at which the patient is seen and continue routinely throughout subsequent exams.
- Examinations *q* 6 mo can help ensure optimal home oral hygiene. At a minimum, evaluate animals with a healthy mouth at least *q* 12 mo.
- Evaluate pets with gingivitis at least *q* 6 mo.
- Evaluate pets with periodontitis at least *q* 3–6 mo.
- Advanced periodontal disease requires examinations *q* 1 mo until the disease is controlled.

Evaluate disease status, such as periodontal disease, on the conscious patient with products that allow an assessment of periodontal health without placing the patient under anesthesia.<sup>14</sup> During subsequent examinations, evaluate client compliance, revise the treatment plan as needed, and redefine the prognosis.

## Nutrition

Nutrition plays an important role in oral health; therefore, it is important for the healthcare team to have an understanding of the impact of nutrition on their patients. A properly balanced diet is essential for good general health, including health of oral tissues. For good oral health, it is the form of the diet, not the nutritional content, that is critical for good oral health. A diet that provides mechanical cleansing of the teeth is an excellent way of retarding the accumulation of dental plaque and calculus. Dental diets and chews can be very effective if the owner is unable to brush the teeth. Dental diets work either by “brushing” the crowns of the teeth as the animal chews or by coating an anticalculus agent on the surface of the teeth. Nutrition becomes even more critical in dental health when the client is unable to provide home oral hygiene by brushing.<sup>47</sup> During subsequent examinations, evaluate client compliance, revise the treatment plan as needed, and redefine the prognosis.

## Conclusion

Pets can live more comfortable lives if oral health care is managed and maintained. All members of the veterinary team must strive to increase the quality of dental care delivered. Clients must be given

options for the optimal care and treatment available for their pets. Dentistry is becoming more specialized, and referral to a veterinary dental specialist or a general practitioner with advanced training and proper equipment is recommended if the necessary expertise and/or equipment are unavailable at the primary veterinarian's office. ■

## REFERENCES

1. Beckman BW. Pathophysiology and management of surgical and chronic oral pain in dogs and cats. *J Vet Dent* 2006;23(1):50–60.
2. Carpenter RE, Manfra M, Maretta S. Dental patients. In: Tranquilli WT, Grimm KA, Thurmon J, eds. *Lumb and Jones' veterinary anesthesia and analgesia*. 4th ed. Philadelphia (PA): Wiley-Blackwell; 2007: 993–5.
3. Holmstrom SE, Frost-Fitch P, Eisner ER. *Veterinary dental techniques for the small animal practitioner*. 3rd ed. Philadelphia (PA): WB Saunders; 2004.
4. Holmstrom SE. *Veterinary dentistry: a team approach*. 2nd ed. St. Louis (MO): Elsevier; 2012.
5. Wiggs RB, Lobprise HB. *Veterinary dentistry: principles and practice*. Philadelphia (PA): Lippincott-Raven; 1997.
6. Bellows J. *Small animal dental equipment, materials and techniques*. 1st ed. Ames (IA): Blackwell; 2004.
7. Mulligan T, Aller MS, Williams CA. *Atlas of canine and feline dental radiography*. Trenton (NJ): Veterinary Learning Systems; 1998.
8. Logothetis DD, Martinez-Welles JM. Reducing bacterial aerosol contamination with a chlorhexidine gluconate pre-rinse. *J Am Dent Assoc* 1995;126(12):1634–9.
9. Grove TK. Periodontal disease. In: Harvey C, ed. *Veterinary dentistry*. Philadelphia (PA): WB Saunders; 1985:59–78.
10. Harvey CE, Emily PP. *Small animal dentistry*. St. Louis (MO): Mosby Year Book; 1993:89–144.
11. Hennes PR, Harvey CE. Natural development of periodontal disease in the dog: a review of clinical, anatomical and histological features. *J Vet Dent* 1992;9(3):13–9.
12. Harvey CE, Shofer FS, Laster L. Association of age and body weight with periodontal disease in North American dogs. *J Vet Dent* 1994;11(3):94–105.
13. Niemiec BA. Systemic manifestations of periodontal disease. In: Niemiec BA, ed. *Veterinary periodontology*. Ames (IA): Wiley-Blackwell; 2012:81–90.
14. Manfra M, Marretta S, Leesman M, Burgess-Cassler A, et al. Pilot evaluation of a novel test strip for the assessment of dissolved thiol levels, as an indicator of canine gingival health and periodontal status. *Can Vet J* 2012;1260.
15. Veterinary Oral Health Council. Available at: [www.vohc.com](http://www.vohc.com). Accessed January 24, 2013.
16. Verstraete FJ, Kass PH, Terpak CH. Diagnostic value of full-mouth radiography in cats. *Am J Vet Res* 1998;59(6):692–5.
17. Epstein M, Kuehn N, Landsberg G, et al. AAHA senior care guidelines for dogs and cats. *J Am Anim Hosp Assoc* 2005;41(2): 81–91. Available at: [www.aahanet.org/Library/Guidelines.aspx](http://www.aahanet.org/Library/Guidelines.aspx). Accessed January 24, 2013.
18. Bednarski R, Grimm K, Harvey R, et al. AAHA anesthesia guidelines for dogs and cats. *J Am Anim Hosp Assoc* 2011;47(6):377–85. Available at: [www.aahanet.org/Library/Guidelines.aspx](http://www.aahanet.org/Library/Guidelines.aspx). Accessed January 24, 2013.

19. AAHA/AAFP Basic guidelines of judicious therapeutic use of antimicrobials. Available at: [www.aahanet.org/Library/Guidelines.aspx](http://www.aahanet.org/Library/Guidelines.aspx). Accessed January 24, 2013.
20. Bartges J, Boynton B, Vogt AH, et al. AAHA canine life stages guidelines. *J Am Anim Hosp Assoc* 2012;48(1):1–11. Available at: [www.aahanet.org/Library/Guidelines.aspx](http://www.aahanet.org/Library/Guidelines.aspx). Accessed January 24, 2013.
21. Hoyumpa Vogt A, Rodan I, Brown M, et al. AAFP-AAHA feline life stages guidelines. *J Feline Med 378 Surg* 2010;12(1):43–54. Available at: [www.aahanet.org/Library/Guidelines.aspx](http://www.aahanet.org/Library/Guidelines.aspx). Accessed January 24, 2013.
22. AAHA/AAFP Fluid Therapy Guidelines. 2013. In press.
23. Hellyer P, Rodan I, Brunt J, et al. AAHA/AAFP pain management guidelines for dogs and cats. *J Am Anim Hosp Assoc* 2007;43(5):235–48. Available at: [www.aahanet.org/Library/Guidelines.aspx](http://www.aahanet.org/Library/Guidelines.aspx). Accessed January 24, 2013.
24. Development of new canine and feline preventive healthcare guidelines designed to improve pet health. American Animal Hospital Association-American Veterinary Medical Association Preventive Healthcare Guidelines Task Force. *J Am Anim Hosp Assoc*. 2011 Sep-Oct;47(5):306–11.
25. AAHA referral guidelines. Available at: [www.aahanet.org/Library/Guidelines.aspx](http://www.aahanet.org/Library/Guidelines.aspx). Accessed January 24, 2013.
26. American Veterinary Dental College. American Veterinary Dental College position statement: companion animal dental scaling without anesthesia. Available at: [http://avdc.org/Dental\\_Scaling\\_Without\\_Anesthesia.pdf](http://avdc.org/Dental_Scaling_Without_Anesthesia.pdf). Accessed January 24, 2013.
27. Pascoe P. Anesthesia and pain management. In: Verstraete F, Lommer M, eds. *Oral and maxillofacial surgery in dogs and cats*. WB Saunders; 2012:26–7.
28. Stepaniuk K, Brock N. Anesthesia monitoring in the dental and oral surgery patient. *J Vet Dent* 2008;25(2):143–9.
29. Thurmon JC, et al. Acid-base balance and fluid therapy. In: *Essentials of small animal anesthesia and analgesia*. Philadelphia: Lippincott, Williams & Wilkins; 1999:339–74.
30. Seeler D. Fluid, electrolyte, and blood component therapy. In: *Veterinary Anesthesia and Analgesia*. Blackwell Publishing; 2007:185–96.
31. Hale FA, Anthony JM. Prevention of hypothermia in cats during routine oral hygiene procedures. *Can Vet J* 1997;38(5):297–9.
32. Stepaniuk K, Brock N. Hypothermia and thermoregulation during anesthesia for the dental and oral surgery patient. *J Vet Dent* 2008;25(4):279–83.
33. Chapman PJ, Ganendran A. Prolonged analgesia following preoperative bupivacaine neural blockade for oral surgery performed under general anesthesia. *J Oral Maxillofac Surg* 1987;45(3):233–5.
34. Tranquilli WJ, Grimm KA, Lamont LA. *Pain management for the small animal practitioner*. Jackson (WY): Teton New Media; 2000:13–30.
35. Lantz GC. Regional anesthesia for dentistry and oral surgery. *J Vet Dent* 2003;20(3):181–6.
36. Brine EJ, Marretta SM, Pijanowski GJ, et al. Comparison of the effects of four different power scalers on enamel tooth surface in the dog. *J Vet Dent* 2000;17(1):17–21.
37. Niemiec BA. *Veterinary periodontology*. Ames (IA): Wiley-Blackwell; 2012.
38. Beckman BW. Patient management for periodontal therapy. In: Niemiec BA, ed. *Veterinary periodontology*. Ames (IA): Wiley-Blackwell; 2012:305–12.
39. Niemiec BA. Advanced non-surgical therapy. In: Niemiec BA, ed. *Veterinary periodontology*. Ames (IA): Wiley-Blackwell; 2012:154–69.
40. Niemiec BA. The complete dental cleaning. In: Niemiec BA, ed. *Veterinary periodontology*. Ames (IA): Wiley-Blackwell; 2012:129–53.
41. Hennet P. Periodontal disease and oral microbiology. In: Crossley DA, Penman S, eds. *Manual of small animal dentistry*. 2nd ed. Shurdington (England): British Small Animal Veterinary Association; 1995:105–13.
42. Sarkiala E, Harvey C. Systemic antimicrobials in the treatment of periodontitis in dogs. *Semin Vet Med Surg (Small Anim)* 1993;8(3):197–203.
43. Huffman LJ. Oral examination. In: Niemiec BA, ed. *Small animal dental, oral and maxillofacial disease: a color handbook*. London: Manson; 2010:39–61.
44. Quality of Care. *Pain Management*. Lakewood (CO): American Animal Hospital Association Standards of Accreditation; 2003.
45. Niemiec BA. Home plaque control. In: Niemiec BA, ed. *Veterinary periodontology*. Ames (IA): Wiley-Blackwell; 2012:175–85.
46. Veterinary Oral Health Council. Available at: [www.vohc.org/accepted\\_products.htm](http://www.vohc.org/accepted_products.htm). Accessed January 24, 2013.
47. Jensen L, Logan E, Finney O, et al. Reduction in accumulation of plaque, stain, and calculus in dogs by dietary means. *J Vet Dent* 1995;12(4):161–3.

#### SUPPLEMENTARY REFERENCES

- Bellows J. *Feline Dentistry*. Ames (IA): Wiley; 2010
- Dupont GA, DeBowes LJ. *Atlas of dental radiography in dogs and cats*. St. Louis (MO): WB Saunders; 2009.