

PEER-REVIEWED CE

Preoperative Roles and Responsibilities of the Veterinary Surgical Nurse

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Successful surgical outcomes rely on more than the operative procedures themselves. Veterinary surgical nurses play critical roles in preparing the patient, the surgical suite, and the owner.

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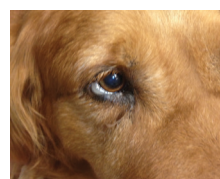
FEATURES

Go With the Flow: The Basics of Fluid Therapy for Small Animal Veterinary Technicians

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Fluid therapy is one of the most common therapies in small animal medicine, and knowing what, why, and how to deliver it is a core competency for veterinary technicians. This article provides a brief overview of each aspect.

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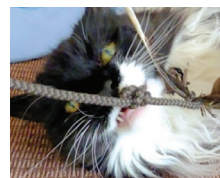


Behavioral Aspects of Caring for Elderly Cats

VICKY HALLS, RVN, DIP COUNS MBACP

This article from the British journal *Feline Focus* reviews common behavioral changes in senior and geriatric cats and provides recommendations that clients can use in enriching and adapting the home environment for their older pets.

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Crash Carts: Preparation and Maintenance

PAULA PLUMMER, LVT, VTS (ECC, SAIM)

Emergencies cannot be predicted, but they can be anticipated. Learn how to create and stock a crash cart to prepare for the kinds of emergencies your clinic typically handles.

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PATIENT POSITIONING is key for any surgery, and communication with the surgeon is important to ensure proper placement of the patient and team.



Preoperative Roles AND Responsibilities OF THE Veterinary Surgical Nurse

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Successful surgical outcomes rely on more than the operative procedures themselves. They also depend on patient health; preparation of the patient, surgical suite, and owner; and anticipation and prevention of perioperative complications. Veterinary surgical nurses (VSNs) play critical roles in all these areas.

TEAM COMMUNICATION

Effective communication throughout the veterinary team is imperative to ensure a successful surgical outcome. Because owner compliance is also crucial to a successful outcome, the patient's caregiver must be considered part of the veterinary team.

Before Admission

The VSN might be responsible for recording a complete patient history. The client should be asked about any concurrent health issues the pet has, previous anesthetic episodes or surgeries, prior and current medications, any episodes of allergies or adverse reactions to medications, past or recent infections, unexpected bleeding, difficulty breathing or exercise intolerance, and vaccination and preventive health care status. Breed-specific questions, such as von Willebrand status in Doberman pinschers and palate surgery in brachycephalic breeds, are also important.

The owner must be properly advised on the surgical procedure and associated potential risks. Gathering information about the patient's environment (e.g., does the animal live outdoors, are there other pets in the home) helps the veterinary surgeon outline appropriate instructions for postsurgical home care. Even the caregiver's profession may be significant: for example, colonization with antimicrobial-resistant bacteria is more common among health care workers, pig farmers, competitive sports participants, and military personnel,^{1,2} and these bacteria can be transmitted to pets.

Most medications can be given on the morning of surgery, but a good guideline is for the VSN to provide the veterinary surgeon with a list of the patient's medications several days before the scheduled procedure. This allows the surgeon to determine whether any medications should be discontinued before surgery. For example, if a dog undergoing a palate resection is expected to receive dexamethasone at the time of surgery, nonsteroidal antiinflammatory drugs (NSAIDs) should be discontinued several days before the procedure. Dogs that have received glucocorticoids and NSAIDs within 24 hours of each other have an increased risk for gastrointestinal tract perforations.³ Additionally, the VSN should specifically ask the owner what medications were administered the morning of surgery,

since abrupt discontinuation of some medications (e.g., glucocorticoids) could be life threatening.⁴

Typically, the VSN relays appropriate fasting instructions to owners before their arrival. Some patients, such as those that are diabetic, hypoglycemic, or pediatric, need special feeding instructions as determined by the veterinary surgeon. These patients should be scheduled for the first operative time of the day to minimize effects of fasting. Diabetic patients may also require adjustment of morning insulin doses. In one study, a reduced dose of insulin (25% of normal) before surgery was shown to decrease the risk of postoperative hypoglycemia in dogs undergoing cataract removal.⁵

Veterinary literature supports the notion that an overnight fast before anesthesia is outdated. In one study, prolonged preoperative fasting was associated with increased gastric acidity and risk of reflux: none of the dogs that were fed 2 to 4 hours before anesthetic induction had reflux, while reflux was noted in 15% of dogs fasted 12 to 18 hours.⁶ In another study, dogs that ate a small meal of canned food (half their daily ration) 3 hours before anesthesia had gastric volumes similar to dogs that had fasted for 10 hours, and they had higher gastric pH than dogs receiving kibble or low-protein canned dog food 10 hours before anesthesia.⁷ A more updated protocol is to withhold food for 6 hours before surgery but to continue offering water until the patient has been premedicated. Antiemetic and prokinetic drugs can be administered to aid in gastrointestinal motility and help relieve nausea during premedication; for instance, administration of maropitant (Cerenia; 1 mg/kg IV) 45 minutes to 1 hour before premedication with hydromorphone and acepromazine reduced the incidence of vomiting and retching in dogs at the time of sedation, although it did not prevent gastroesophageal reflux during surgery.⁸ The veterinary surgeon should establish the hospital's standard presurgical fasting instructions for patients that are not diabetic, hypoglycemic, or pediatric.

At Admission

The importance of introducing the veterinary team to owners and their pets should not be underestimated, and every effort should be made to mitigate stress in veterinary patients in the preoperative period. Human literature has reported better surgical outcomes in patients with lower anxiety levels.⁹ Use of family-centered preoperative behavioral intervention reduces children's anxiety before surgery and decreases postoperative delirium, hospital stays, and analgesic consumption.¹⁰ Such programs consist of distribution of instructions and preparation materials in



Intubation allows for protection of the airway and delivery of inhalant anesthesia during the procedure.

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the preoperative visit, telephone coaching calls 1 and 2 days before surgery, and presence of a parent during induction and recovery. Family dogs read and react to the nonverbal signals exhibited by their owners,¹¹ so reducing owner anxiety may help to decrease the stress perceived by the pet.

Characteristics of canine anxiety include trembling, cowering, lip licking, yawning, dilated pupils, and increases in heart rate, cortisol levels, and adrenocorticotrophic hormone concentrations.¹² Stress in dogs can be reduced by gentle stroking and petting; in a study of young and adult shelter dogs, dogs that were petted had lower cortisol concentrations during venipuncture than those that were not.¹³ For some animals, an urgent need to void can also be a source of stress. Before anesthesia induction, dogs should be walked to encourage urination and defecation, but manual bladder expression under anesthesia is occasionally required to help alleviate postoperative discomfort and prevent inadvertent soiling and/or contamination of bedding, fur, and (sometimes) bandages or wounds. Nevertheless, some patients will require anxiolytic medications (e.g., trazodone), which can be administered before admission or anesthesia to decrease anxiety. In terms of perioperative cardiovascular effects, no difference is seen in healthy dogs receiving acepromazine or trazodone before undergoing elective

surgery.¹⁴ Trazodone also facilitates canine tolerance to postsurgical confinement.¹⁵

Before or during admission, all owners should be educated about the risks of anesthesia and should give written consent to the procedure. The VSN should also document the patient's resuscitation code. In the event cardiopulmonary resuscitation (CPR) is required, owners must choose which code status they want assigned to their pets:

- **Red**—DNR (do not resuscitate)
- **Yellow**—Full resuscitation with closed-chest CPR
- **Green**—Full resuscitation with open-chest CPR

A detailed estimate should be provided so the client is well informed about all anticipated costs associated with the surgical procedure and subsequent rechecks. Before the client departs, the VSN should direct the owner to the client service representative, who will ensure financial deposits have been collected, contact information is up-to-date, and all required documents have been signed.

At admission, the patient should be fitted with an identification neck band and placed in appropriate housing (cage/run) labeled with the patient's identifying and pertinent medical information. The VSN should use the identification band to verify the patient's identity before administering any premedication drugs or preparing the animal for surgery. Critical information (e.g., known

Effective communication throughout the veterinary team is imperative to ensure a successful surgical outcome.

allergies to medications) should be clearly documented in the record, on the patient, and/or on its flow sheet or cage. The VSN may also ask the owner to confirm masses to be removed or surgical site locations, such as appropriate limb to be amputated; the appropriate area(s) can be identified by permanent marker or by shaving a very small area over the location.

After Admission

A surgical checklist is invaluable for tracking preoperative diagnostics and procedures. Use of surgical checklists has been shown to improve preoperative teamwork and patient outcomes, thereby increasing patient safety and reducing morbidity.¹⁶ Checklists are used at 3 points: before anesthesia induction, before making the incision, and before leaving the operating room (OR). Each checklist should be completed within 60 seconds to encourage compliance and effectiveness.¹⁷ Surgical checklists may encompass topics such as special pre- or intraoperative diagnostics (e.g., laryngeal function examination), anesthetic requests (e.g., administration or avoidance of local blocks or epidural), sample collection (e.g., culture, biopsy), or perioperative requirements (e.g., jugular or arterial catheter, feeding tube placement) so that critical tests and treatments

are not missed. The VSN should also confirm that preoperative diagnostic images are readily available in the OR for viewing before or during the procedure.

Once in the OR, before the first skin incision is made, the circulating VSN facilitates a conversation between anesthesia and surgery personnel referred to as a *time-out*. The purpose is for the team to collaborate, making sure all members are briefed on the procedure and possible critical events. During the time-out session, each member introduces him- or herself and his/her role (e.g., “Danielle Browning, circulating nurse”; “Karen Tobias, head surgeon”). After introductions are completed, the patient and procedure are once again verified, including confirmation that the proper side/area has been prepped.



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A LAB COAT or other covering should be worn during clipping to prevent hair contamination of the scrubs to be worn in the surgical suite.



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CLEAN SURGICAL SCRUBS and a cap and mask are worn during patient preparation.

Verifications are also obtained regarding administration of the first dose of antibiotics (if applicable), completion of the final aseptic patient skin prep, and counts of all gauze and laparotomy pads.

DIAGNOSTIC TESTS

Diagnostic blood tests are determined by the surgeon, and the VSN is often responsible for obtaining the blood sample. It is important to confirm that the venipuncture site will not compromise the surgical field. For example, blood should not be collected from a jugular vein in a patient undergoing thyroidectomy or parathyroidectomy because hematoma formation in that area may distort normal tissue architecture. This knowledge is also helpful before placing intravenous catheters: a peripheral catheter should be avoided in the affected limb in patients undergoing orthopedic procedures or digit or limb amputation.

All patients should undergo a complete physical examination on the day of surgery. Each patient's record should contain current weight, temperature, heart rate, respiratory rate, pain score (e.g., on a numerical rating scale, whereas 0 = no pain and 10 = most severe pain), body condition score, mucous membrane color, capillary refill time, and results of heart and lung auscultation.

Patients with heart murmurs may require additional imaging of the thorax or an echocardiogram to evaluate the structure and function of the heart. Patients at risk of hypertension, such as those with an adrenal mass, may require a blood pressure reading before anesthesia. Ideally, blood pressure measurements should be performed by the same person each time, in a quiet room, and using the same instrument and cuff size. The cuff should be at the level of the heart and, ideally, placed in the same location on the same limb (i.e., proximal or distal to tarsus/carpus) to ensure consistent, accurate results.¹⁸

Presurgical assessment and diagnostic testing can be routine among certain groups of patients, including those undergoing elective procedures such as ovariohysterectomy or castration. These patients are often young, healthy animals, and evaluating packed cell volume, total protein, blood glucose, and blood urea nitrogen (using a reagent strip) may be adequate. However, to determine an increased anesthetic risk associated with a particular breed, additional diagnostic tests and/or procedures may be necessary. For example, toy breeds such as Yorkshire terriers have an increased risk for portosystemic shunts or other congenital liver diseases¹⁹ and thus may warrant a more complete diagnostic evaluation. It is not the responsibility of the VSN to decide what laboratory work is appropriate; however, the VSN often performs the ordered test(s) and must be able to recognize abnormal values so the surgeon may be properly informed.

Although blood loss is a potential complication associated with any surgery, it can have devastating consequences in patients with preexisting anemia or coagulopathies (e.g., those associated with von Willebrand or hepatobiliary disease). Additional blood work considerations for these patients may include a platelet count, prothrombin and activated partial thromboplastin times, von Willebrand factor measurement, and buccal mucosal bleeding time. Normal buccal mucosal bleeding times range from 34 to 105 seconds in cats,²⁰ 100 to 285 seconds in non-greyhound dogs, and 53 to 235 seconds in greyhounds.²¹ If significant blood loss is possible or the animal is severely anemic, a crossmatch should be performed beforehand and results logged in the patient's record. The VSN is responsible for ensuring that any anticipated blood products or autotransfusion supplies are available and in-date before the patient is anesthetized.

Predicting and preventing postoperative hemorrhage in greyhounds presents a special conundrum. Retired racing greyhounds have a 26% to 30% risk for delayed postoperative bleeding (36–48 hours after surgery) despite



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THE NURSING TEAM plays a vital role in the administration and monitoring of general anesthesia.

having normal preoperative platelet counts and coagulation times.^{22,23} However, the rate of delayed postoperative bleeding is reduced to 10% for greyhounds treated with epsilon-aminocaproic acid, a potent antifibrinolytic agent, for 3 days after surgery.²³

Each patient should be assigned an American Society of Anesthesiologists (ASA) status grade (TABLE 1).²⁴ Knowledge of ASA status may help the surgical team predict and prepare for perioperative complications. For example, cats with an ASA status III or greater are 4 times as likely to develop serious perianesthetic complications as those with a lower ASA status,²⁵ and, in one study, dogs and cats with an ASA status III or greater had a perioperative mortality rate 40 times that of pets with ASA status I or II.²⁶

CLIPPING AND SKIN PREPARATION

If an inadequate area of hair is removed, hair may creep into the sterile field after the patient has been draped. However, the VSN must always confirm the correct surgical site before removing any hair. The VSN is responsible for preparing the surgical site and must anticipate the needs of the surgeon by ensuring that the clip margins are wide enough for expected, and even unexpected, procedures (e.g., an extension of the incision, placement of drains, need for skin flaps). Hair removal the day before surgery has been associated with surgical site infections (SSIs). Clipping produces tiny nicks in the skin in which bacteria can embed and proliferate over time; ideally, hair removal should be performed after induction of anesthesia or no more than 1 hour before surgery.^{27,28}

Clipping should always be performed outside of the OR, with loose hair thoroughly vacuumed from the patient and gurney so it is not brought into the OR during transport. A clean #40 electric clipper blade is ideal for

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removing hair from most surgical sites; electric clippers can harbor infectious agents and contaminate other patients, so the blades should be cleaned and disinfected with an approved clipper disinfectant before and after each use.²⁹ Safety razors cause microlacerations that can lead to infection and therefore should be used sparingly, if at all.³⁰ Clipping should be performed in slow precise strokes, with the flat surface of the blade touching the skin. The blade should be checked frequently during clipping to make sure it does not get too hot, which could result in burns.

During clipping, the VSN should inspect the skin for evidence of pyoderma (skin infections) on or around the incision site. At the discretion of the surgeon, patients with pyoderma may need to be recovered from anesthesia and have their procedure postponed until the condition resolves.

Once the hair is removed, the skin must be aseptically prepped. A preliminary scrub of the patient is performed before entering the OR to remove organic debris and allow adequate contact time of antiseptics. Patient skin preparation is important because many SSIs result from contamination of the incision from the patient's own resident bacterial flora. The bacteria typically associated

TABLE 1 American Society of Anesthesiologists Status Grades²⁴

GRADE	DEFINITION	POSSIBLE EXAMPLES
I	Normal, healthy patient	No discernible disease; animals undergoing ovariohysterectomy, ear trim, castration
II	Mild systemic disease	Skin tumor, fracture without shock, uncomplicated hernia, cryptorchidectomy, localized infection, compensated cardiac disease
III	Severe systemic disease	Fever, dehydration, anemia, cachexia, moderate hypovolemia
IV	Severe systemic disease that is a constant threat to life	Uremia, toxemia, severe dehydration and hypovolemia, anemia, cardiac decompensation, emaciation, high fever
V	Moribund patient not expected to survive without surgery	Extreme shock and dehydration, terminal malignancy or infection, severe trauma

with SSI are *Staphylococcus pseudintermedius*, *Enterococcus* spp, and *Escherichia coli*.²⁷ Proper preparation of the skin is an important step in avoiding such infections.

Antiseptic Choice

Ideally, antiseptics should be nonirritating, be effective against multiple pathogens, and require only a short contact time. Prolonged residual activity, which is necessary in long surgeries, ensures the prevention of bacterial regrowth.²⁸ Chlorhexidine, povidone–iodine, and isopropyl alcohol are the most common surgical antiseptics used to prepare surgical sites. Chlorhexidine, a biguanide, is a broad-spectrum antiseptic effective against both gram-positive and gram-negative bacteria, as well as viruses and fungi. Chlorhexidine has a fast onset but requires a minimum 2-minute contact time when used as a 4% concentration.³¹ Organic debris must be removed before contact time is measured because chlorhexidine may be inactivated by organic debris. Chlorhexidine can cause corneal damage, deafness, and other neurotoxicities and therefore should be avoided around the eyes or in patients with ruptured eardrums or exposed meninges.³²



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CAREFUL ORGANIZATION of the surgical table is important to ensure all important equipment is accessible and available as needed.

Povidone–iodine is a broad-spectrum, fast-acting bactericide with a residual activity of up to 6 hours. Povidone–iodine is thought to work by affecting protein synthesis and altering the cell wall of bacteria. It is deactivated by organic debris and blood. Povidone–iodine requires a 2-minute contact time and should be allowed to dry thoroughly on the skin. The use of povidone–iodine with alcohol lowers the necessary contact time but shortens residual activity. Clinically, effectiveness of povidone–iodine is comparable to that of chlorhexidine in veterinary patients.²⁸ Povidone–iodine is often used for prepping around the ears and eyes. When used as an ophthalmic preparation, the 10% solution is diluted with sterile saline to create a 0.1% or 0.2% concentration.²⁸ Povidone–iodine can stain the skin, and adverse skin reactions have been noted in up to 50% of canine patients.²⁸

Isopropyl alcohol (60%–90% concentration) rapidly kills bacteria but is not effective against bacterial spores. It has no residual activity and is harsh to mucous membranes. Because of its limited residual activity, alcohol is best used in conjunction with povidone–iodine or chlorhexidine. It is often avoided when prepping skin because of its potential to cause hypothermia, especially in smaller patients.³³ Additionally, it is extremely flammable and thus must be used with caution, if at all, when lasers, electrocautery, or vessel-sealing devices will be used.^{28,34} Commercial one-step preparations containing alcohol and either chlorhexidine or povidone–iodine are available to “paint” on the skin and leave to dry. One-step preparations are applied to the skin after a preliminary scrub to remove surface contaminants; manufacturer recommendation guidelines must always be followed for application and dry times.

Antiseptic Application

The antiseptic is usually applied to the skin using a concentric circle (target) pattern that starts in the center of the proposed incision and works outward to the edges (cleanest to dirtiest). It may be necessary to use a towel clamp to hold loose skin off the table when prepping a wide area ventrally and laterally. Surgeries involving the perineal region may require a purse-string suture or gauze packing in the anus to prevent fecal contamination; such procedures should be performed outside of the OR, before the preliminary prep. Antiseptic scrubs (soaps) are irritating to mucous membranes, so when the preputial cavity of a male dog or the vaginal region of a female is included within or near the surgical site, use of diluted solutions is recommended to flush the genital area. When using a hanging leg prep, an impervious layer (e.g., examination glove) is placed on distal limb, which is then

suspended for the prep. The VSN should ensure the distal limb wrap and suspended tape are free of hair, which could fall into the surgical field.

In the Surgical Suite

Once the VSN has completed the preliminary surgical scrub in the prep room, the patient is transported on a gurney to the surgical suite. The VSN should ensure that the OR table has the desired warming device and, if monopolar electrocautery is to be used, the contact plate is in place and moistened as required. Contaminants can be circulated in the OR by air movement, such as during transport or with warming devices, or introduced during hookup of monitoring equipment. Often these breaks in asepsis go unrecognized, increasing the risk for SSIs. A final antiseptic prep is performed in the OR after the patient has been positioned and monitoring equipment hooked up. Areas treated with alcohol should be allowed to dry completely (at least 3 minutes) before draping because use of electrocautery equipment near alcohol can spark a fire.^{28,34} Hot-air warming devices are usually left off until after the patient has been completely draped to avoid the potential increase in surgical site contamination from moving air.

Family dogs read and react to the nonverbal signals exhibited by their owners, so reducing owner anxiety may help to decrease the stress perceived by the pet.

PERIOPERATIVE ANTIBIOTICS

Assuming the surgical site has been prepared properly, patients with healthy immune systems should be able to resist infection by most surface contaminants. VSNs can help reduce the incidence of SSIs by preventing hypothermia, using proper atraumatic hair removal techniques, and administering any prescribed antibiotics.³⁵ Prophylactic perioperative antibiotics are recommended in patients receiving an implantable device, (e.g., bone plate, pacemaker), undergoing prolonged (≥ 90 minutes) surgery,

A preliminary scrub of the patient is performed before entering the OR to remove organic debris and allow adequate contact time of antiseptics.



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or undergoing a contaminated procedure (e.g., enterotomy). For patients undergoing clean procedures, the risk of infection is increased when antibiotics are given incorrectly (e.g., at the wrong time, using the wrong drug).²⁷ Furthermore, previous antimicrobial treatments increase the likelihood of colonization with antimicrobial-resistant bacteria,³⁶ and dogs with previous clinically apparent infections of methicillin-resistant *S. pseudintermedius* can carry those bacteria for 11 months or more, even when the infection has resolved.³⁷

If perioperative antibiotics are given, they should be administered within 1 hour before the first incision to ensure that peak blood and tissue concentration are reached before the incision is made. Most surgeons will readminister antibiotics every 90 to 120 minutes during

anesthesia based on the half-life of the antibiotic. Prophylactic antibiotics should be discontinued within 24 hours after surgery.²⁷

CONCLUSION

The VSN plays a major role in successful surgical outcomes. Responsibilities begin with effective communication with owners before their pet's appointment and gathering a complete history and patient information. The VSN must adequately perform the patient's aseptic preparation and understand the associated surgical risks, including anticipated bleeding and infection. The VSN can reduce the risk for SSIs with the effective administration of antibiotics and improve overall patient safety by using a surgical checklist. ■

References

1. Aubry-Damon H, Grenet K, Sall-Ndiaye P, et al. Antimicrobial resistance in commensal flora of pig farmers. *Emerg Infect Dis* [serial online] 2004;10. wwwnc.cdc.gov/eid/article/10/5/03-0735. Accessed April 2016.
2. Weber JT. Community-associated methicillin-resistant *Staphylococcus aureus*. *Clin Infect Dis* 2005;41:S269-S272.
3. Lascelles DX, Blikslager AT, Fox SM, et al. Gastrointestinal tract perforation in dogs treated with a selective cyclooxygenase-2 inhibitor: 29 cases (2002-2003). *JAVMA* 2005;227:1112-1117.
4. Plumb DC. *Plumb's Veterinary Drug Handbook*. 8th ed. Ames, IA: Wiley-Blackwell; 2015.
5. Kronen PWM, Moon-Massat PF, Ludders JW, et al. Comparison of two insulin protocols for diabetic dogs undergoing cataract surgery. *Vet Anaesth Analg* 2001;28:146-155.
6. Galatos AD, Raptopoulos D. Gastro-esophageal reflux during anesthesia in the dog: the effect of preoperative fasting and premedication. *Vet Rec* 1995;137:479-483.
7. Savvas I, Rallis T, Raptopoulos D. The effect of pre-anesthetic fasting time and type of food on gastric content volume and acidity in dogs. *Vet Anesth Analg* 2009;36:539-546.
8. Johnson RA. Maropitant prevented vomiting but not gastroesophageal reflux in anesthetized dogs premedicated with acepromazine-hydromorphone. *Vet Anaesth Analg* 2014;41:406-410.
9. Komolafe C, Csernus M, Fülöp E. Patients' anxiety during the perioperative care from the point of view of the nursing staff and patients. *Kontakt* 2015;17(2):e80-e88.
10. Kain ZN, Caldwell Andrews AA, Mayes LC, et al. Family-centered preparation for surgery improves perioperative outcomes in children: a randomized controlled trial. *Anesthesiology* 2007;106:65-74.
11. Gyori B, Gaszsi M, Miklosi A. Friend or foe: context dependent sensitivity to human behavior in dogs. *Appl Anim Behav Sci* 2010;128:69-77.
12. Beaver BV. *Canine Behavior*. 2nd ed. Philadelphia, PA: Elsevier; 2009.
13. Hennessy MB, Williams MT, Miller DD, et al. Influence of male and female petters on plasma cortisol and behavior: can human interaction reduce the stress of dogs in a public animal shelter? *Appl Anim Behav Sci* 1998;61:63-77.
14. Mathews L, Reichl L, Graham L, et al. Comparison of the cardiovascular effects of acepromazine versus trazodone pre-medications in dogs anesthetized for TPLO or TTA surgical procedures. *Int Vet Emerg Crit Care Symp* 2011.
15. Gruen ME, Roe SC, Griffith E, et al. Use of trazodone to facilitate postsurgical confinement in dogs. *JAVMA* 2014;245:296-301.
16. Gasson J. Improving patient safety in the perioperative period: surgical safety checklists. *Vet Nurse* 2013;4:322-327.
17. Gawande A. *The Checklist Manifesto: How to Get Things Right*. New York, NY: Metropolitan; 2010.
18. Bosack AP, Mann FA, Dodam JR, et al. Comparison of ultrasonic Doppler flow monitor, oscillometric, and direct arterial blood pressure measurements in ill dogs. *J Vet Emerg Crit Care* 2010;20:207-215.
19. Tobias KM, Rohrbach BW. Association of breed with the diagnosis of congenital portosystemic shunts in dogs: 2400 cases (1980-2002). *JAVMA* 2003;223:1636-1639.
20. Alatzas DG, Mylonakis ME, Kazakos GM, et al. Reference values and repeatability of buccal mucosal bleeding time in healthy sedated cats. *J Feline Med Surg* 2014;16:144-148.
21. Sato I, Anderson GA, Parry BW. An interobserver and intraobserver study of buccal mucosal bleeding time in greyhounds. *Res Vet Sci* 2000;68:41-45.
22. Lara-Garcia A, Couto CG, Iazbik MC, et al. Postoperative bleeding in retired racing greyhounds. *J Vet Intern Med* 2008;22:525-533.
23. Marin LM, Iazbik MC, Zaldivar-Lopez S, et al. Epsilon aminocaproic acid for the prevention of delayed postoperative bleeding in retired racing greyhounds undergoing gonadectomy. *Vet Surg* 2012;41:594-603.
24. Grimm KA, Lamont LA, Tranquilli WJ, et al, eds. *Veterinary Anesthesia and Analgesia, The Fifth Edition of Lumb and Jones*. Ames, IA: Wiley-Blackwell; 2015:12.
25. Hosgood G, Scholl DT. Perianesthetic morbidity and mortality in the cat. *J Vet Emerg Crit Care* 2002;12:9-15.
26. Bille C, Auvinne V, Libermann S, et al. Risk of anesthetic mortality in dogs and cats: an observational cohort study of 3546 cases. *Vet Anaesth Analg* 2012;39:59-68.
27. Brown DC. Wound infections and antimicrobial use. In: Tobias KM, Johnston SA, eds. *Veterinary Surgery: Small Animal*. Philadelphia, PA: Elsevier; 2012:135-139.
28. Renburg WC. Preparation of the patient, operating team, and operating room for surgery. In: Tobias KM, Johnston SA, eds. *Veterinary Surgery: Small Animal*. Philadelphia, PA: Elsevier; 2012:164-166.
29. Mount R, Schick AE, Lewis II TP, Newton HM. Evaluation of bacterial contamination of clipper blades in small animal private practice. *JAAHA* 2016;52(2):95-101.
30. Alexander JW, Solomkin JS, Edwards MJ. Updated recommendations for control of surgical site infections. *Ann Surg* 2011;253:1082-1093.
31. Stinner DJ, Krueger CA, Masini BD, et al. Time-dependent effect of chlorhexidine surgical prep. *J Hosp Infect* 2001;79(4):313-316.
32. Harrop JS, Styliaras JC, Ooi YC, et al. Contributing factors to surgical site infections. *J Am Acad Orthop Surg* 2012;20(2):94-101.
33. Redrode S. Soft tissue surgery of rabbits and rodents. *Semin Avian Exotic Med* 2002;11:4:231-245.
34. Batra S, Gupta R. Alcohol based surgical prep solution and the risk of fire in the operating room: a case report. *Patient Saf Surg* 2008;2:10.
35. Brendle TA. Surgical Care Improvement Project and the perioperative nurse's role. *AORN J* 2007;86(1):94-101.
36. Leite-Martins L, Mahu MI, Costa AL, et al. Prevalence of antimicrobial resistance in faecal enterococci from vet-visiting pets and assessment of risk factors. *Vet Rec* 2015;176:674.
37. Windahl U, Reimegard E, Stron Holst B, et al. Carriage of methicillin-resistant *Staphylococcus pseudintermedius* in dogs—a longitudinal study. *BMC Vet Res* 2012;8:34.

CE Test Preoperative Roles and Responsibilities of the Veterinary Surgical Nurse

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1. **A presurgical fast of 10 hours or more would be most appropriate for a(n)**
 - a. diabetic poodle undergoing cataract removal.
 - b. 7-year-old Labrador undergoing a thyroid mass removal.
 - c. 6-week-old kitten undergoing wound debridement.
 - d. adult rabbit undergoing a dental procedure.
2. **Which one of the following statements is true?**
 - a. Yawning can be a sign of stress and anxiety in dogs.
 - b. Stroking and petting increases cortisol concentrations during venipuncture.
 - c. Trazodone is more likely to lower blood pressure during surgery than acepromazine.
 - d. Diabetic dogs should receive their full dose of insulin the morning of surgery.
3. **Which professional is least likely to be colonized with an antimicrobial-resistant bacterial strain?**
 - a. Pig farmer
 - b. Nurse
 - c. Football player
 - d. Waitress
4. **Which of the following is a normal buccal mucosal bleeding time for a greyhound?**
 - a. 50 seconds
 - b. 150 seconds
 - c. 250 seconds
 - d. 350 seconds
5. **The rate of delayed postoperative _____ is reduced to 10% for greyhounds treated with epsilon-aminocaproic acid for 3 days after surgery.**
 - a. infection
 - b. bleeding
 - c. pain
 - d. regurgitation
6. **A dog with an uncomplicated inguinal hernia is usually considered an ASA grade _____ patient.**
 - a. I
 - b. II
 - c. III
 - d. IV
7. **Which antiseptic is best recommended for ophthalmic preparations?**
 - a. Chlorhexidine gluconate
 - b. Povidone–iodine
 - c. Isopropyl alcohol
 - d. Baby shampoo
8. **Which of the following statements is true with regard to prophylactic perioperative antibiotics?**
 - a. They are recommended for patients receiving implants or undergoing long surgeries.
 - b. They should be administered 90 minutes before the incision is made.
 - c. They should be repeated every 60 minutes during the operation.
 - d. They should be continued for 48 hours after surgery.
9. **Which of the following statements about antiseptic skin preparations is true?**
 - a. Chlorhexidine is effective when organic debris is present.
 - b. Povidone–iodine has a 6-hour residual activity.
 - c. A 10% povidone-iodine solution can be used for ophthalmic preparation.
 - d. Isopropyl alcohol is effective against bacterial spores.
10. **Risk of gastrointestinal perforation is increased in dogs that receive NSAIDs and _____ within 24 hours of each other.**
 - a. maropitant
 - b. hydromorphone
 - c. trazodone
 - d. glucocorticoids

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