Manual of Clinical Procedures in Dogs, Cats, Rabbits, & Rodents, THIRD EDITION

Manual of Clinical Procedures in Dogs, Cats, Rabbits, & Rodents, Third Edition offers readers expanded coverage of small exotic mammals, such as gerbils, hamsters, and guinea pigs, alongside a thorough revision of frequently used procedures for dogs, cats, and rabbits. Using the same accessible format of earlier editions, the third edition maintains its status as a classic veterinary clinical manual.

The Manual covers practical, up-to-date information on common veterinary procedures. The text includes details on restraint and positioning, anesthesia, surgical technique, and medical management. The essential knowledge for each section is presented clearly and concisely: purposes of the procedure, possible complications, equipment needed, and preparations. Procedures new to this edition include blood transfusions, placement of intraosseous catheters, and tracheostomy. Detailed line drawings demonstrate not only pertinent anatomical relationships, but also operational motions.

Manual of Clinical Procedures in Dogs, Cats, Rabbits, & Rodents serves as a valuable reference and is an essential purchase for small and exotic animal veterinarians and veterinary technicians.

KEY FEATURES:
• Exhaustive revision of classic veterinary clinical manual
• Up-to-date clinical procedures
• Expanded coverage of rodents, including gerbils, hamsters, and guinea pigs

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Manual of
CLINICAL PROCEDURES
IN DOGS, CATS, RABBITS, AND RODENTS

Third Edition
DEDICATIONS

Since the publication of the second edition in 1997, written in 1996, I have mourned the loss of four men, each of whom meant a great deal to me both personally and professionally. I am honored to have known and shared many wonderful life experiences with each of them. I think of them often and always fondly. With love and great respect, I dedicate this edition to them.

Matthew Steven Crow, beloved son and teacher

Lover of sports, rock, and outstanding women! A courageous, inspirational, persistent, compassionate, and intelligent young man. He built a Field of Dreams. Special doesn’t come close to covering it. We lost an important citizen much, much too early.

Donald Low, DVM, PhD, DACVIM

Sage advisor, boss, mentor, role model, joke teller extraordinaire, fellow beignet lover, and instigator of the first edition of the Manual.

Mark Bloomberg, DVM, MS, DACVS
Brian Hill, DVM, MS, DACVIM

Friends across the miles, valued colleagues, exemplary teachers for veterinary students and residents, lovers of life and basketball, confidantes. Both gone way too early!

Gentlemen, thanks for sharing your lives with me. You are greatly missed!

SC

I would like to thank Dr. Steve Crow for the opportunity to participate in this project and my friends, family, and colleagues for their endless support.

JB
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The *Manual of Clinical Procedures in Dogs, Cats, Rabbits, and Rodents* is intended as a textbook for veterinary technology and veterinary medical students, as well as a useful clinical tool for veterinarians and veterinary technicians in small animal practice or laboratory animal care facilities. As in the first two editions, the text is organized by procedure, with each technique described in detail using a step-by-step approach. The *Manual* may be used as a clinical handbook in addition to being a teaching instrument. Features that make this manual most useful are the rationale/amplification segments, which answer the reader’s how and why questions, and the illustrations, which show exactly how to physically manage the patient, equipment, and assistants. Many new drawings have been added as well as photographs of equipment and materials used in the procedures.

As in previous editions, the scope of the *Manual* has been deliberately limited to procedures that can be completed in most modern veterinary facilities and that require only modest surgical skills. In most techniques, no expensive or complicated equipment is required; thus, they can be cost-effective even in small practices. As veterinary practice becomes more sophisticated in the 21st century, most progressive small animal practices have added valuable diagnostic and therapeutic tools: sonography, digital radiography, computed tomography, magnetic resonance imaging, point-of-care hematology and chemistry analyzers, laparoscopy, and video-endoscopy. These valuable clinical tools help us to do our job better every day and can be excellent adjuncts for completing many of the procedures described in this manual. Fiberoptic otoscopes have greatly improved visualization of the ear canal, tympanum, and ossicles. Cystocentesis is now most often done with ultrasound guidance. Blind biopsy techniques described in the first two editions of the *Manual* have been replaced by ultrasound-guided needle biopsy or laparoscopic biopsy techniques, allowing the clinician to provide larger, more conclusive biopsy specimens for pathologists. Although the *Manual* does not demonstrate those technology-enhanced procedures, we heartily support using the most advanced methods available.

The four chapters in our new Section III describe important techniques that are particularly of value in emergency clinics and intensive care facilities: proper technique to prepare for and administer transfusions; placement of intraosseous catheters,
a technique especially valuable in puppies, kittens, and other neonates; and detailed instructions on the placement and management of multilumen catheters.

The safety of personnel and patients in the veterinary workplace continues to be a high priority for employers, employees, and the general public. Chapter 1, Restraint of Dogs and Cats, is as timely today as in the first two editions. Today, many entering veterinary students have very little practical experience in holding and working with animals in a clinical or laboratory setting. Chapters 35 through 37 focus on safe and effective methods of restraint of rabbits and other small mammals. Adequate restraint of animals by trained employees is vital in providing humane care for these small animals. In addition, knowing how to handle animals is essential for the safety of veterinary health care team members and animal owners. Throughout the Manual we describe proper disposal of medical waste. Careful use and disposal of sharp items is encouraged. It is our hope that proper knowledge of the clinical procedures in the Manual will enhance workplace safety as well as contribute to animal health.

We recommend that the reader use the Manual in the following ways:

• When first learning a procedure, the entire chapter or segment should be studied, including purposes, indications, contraindications, possible complications, equipment needed, restraint and positioning, and preparations. This background is essential if proper application of each procedure is to be achieved.
• Careful attention to comments in the rationale/amplification sections will help the operator avoid common errors of omission or commission.
• For subsequent cases, the reader may use the technical action guidelines in a cookbook fashion; however, periodic review of other sections of the procedure/description is recommended.
• Careful attention should be paid to Notes that appear in italics throughout the Manual.
• To ensure proper positioning of needles, catheters, and hands, the reader must attempt to duplicate the orientation shown in the line drawings.

If these guidelines are followed, we are confident that the user of the Manual can become proficient in a wide variety of diagnostic and therapeutic techniques.

While we try to instruct our readers in the “how to” of clinical procedures, we hope our equally important message of “whether to” also is understood by the reader. As animal advocates, we have carefully scrutinized each of the procedures with respect to the degree or risk of pain and injury versus expected benefits. No animal was injured in the production of this manual. We implore our readers to respect the feelings of animals (and their owners) and the contributions of animals in all aspects of their professional activities.

Steven E. Crow, DVM
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Jennifer E. Boyle, RVT, VTS

*Primum non nocere (first of all do no harm)*
HIPPOCRATES

*This is like déjà vu all over again.*
YOGI BERRA
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Manual of
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AND RODENTS

Third Edition
The procedures described in this section are those commonly performed in small animal practices or laboratory animal facilities. Busy veterinary practitioners are likely to employ these techniques one or more times daily. Proficiency in these procedures will allow veterinarians and technicians to perform their duties more efficiently.

Many readers will have considerable experience with these routine procedures; however, attention to indications, contraindications, and preparations should help even the most experienced clinician to select and apply these techniques more appropriately.

*Experience enables you to recognize a mistake when you make it again.*

FRANKLIN P. JONES
Chapter 1

RESTRAINT OF DOGS AND CATS

Don’t be impatient with your patients.
CARL OSBORNE

Restraint is the restriction of an animal’s activity by verbal, physical, or pharmacologic means so that the animal is prevented from injuring itself or others.

NOTE: Restraining a dog or cat forcibly is dangerous to both the handler and the animal. Most privately owned dogs and cats can be handled safely and humanely with gentle and minimal physical restraint; however, we strongly recommend the use of pharmacologic agents to assist in proper restraint for:

- procedures that are painful
- procedures that require holding an animal in a position that compromises its respiration
- severely frightened or aggressive animals

Purposes

1. To facilitate physical examination, including ophthalmic and rectal examinations
2. To administer oral, injectable, and topical materials
3. To apply bandages
4. To perform certain procedures (e.g., urinary catheterization)
5. To prevent self-mutilation (Elizabethan collar)

Complications

1. Dyspnea
2. Hyperthermia
3. Tissue trauma (e.g., muscle strain)
4. Stress

**Equipment Needed**

- Strips of gauze or cloth, 100 to 150 cm in length, 2 to 5 cm in width; or commercially available nylon or rayon muzzles
- Elizabethan collar of appropriate size

**VERBAL RESTRAINT**

**Procedure**

**Technical Action**

1. In general, begin with the least severe restraint technique and proceed to more severe methods if necessary.
2. Speak to the dog or cat when approaching it.
3. Use the animal’s name.
4. If necessary, speak firmly to the animal.
5. Assistant: Stand on opposite side of animal from person performing procedure.

**Rationale/Amplification**

1. The amount of restraint needed will depend on the environment, the animal’s behavior, and the degree of discomfort caused by the procedure.
2. Speaking to the animal initially in a calm, soothing voice helps to prevent startling it. This is especially important if the animal is blind or is looking in another direction.
3. Pet animals are usually conditioned to respond to their names.
4. Say “no” in a sharp, clear tone of voice. Verbal restraint can be a useful adjunct to the physical restraint of pet animals.
5. The intended site for treatment or examination must be easily accessible.

**PHYSICAL RESTRAINT WITH DOG IN STANDING POSITION**

*(Fig. 1-1)*

**Procedure**

**Technical Action**

1. Place one arm under dog’s neck so that forearm holds dog’s head securely.

**Rationale/Amplification**

1. The dog’s head should be positioned so that it is virtually impossible for the dog to bite either the person
PHYSICAL RESTRAINT WITH DOG SITTING OR IN STERNAL RECUMBENCY (Fig. 1-2)

Procedure

Technical Action

1. Place one arm under dog’s neck so that the forearm holds dog’s head securely.
2. Place other arm around dog’s hindquarters.

Rationale/Amplification

1. Adequate restraint of the dog’s head is important for all procedures.
2. An arm underneath or around dog’s hindquarters will prevent it from restraining it or the person performing the procedure.
PHYSICAL RESTRAINT WITH DOG IN LATERAL RECUMBENCY (Fig. 1-3)

Procedure

Technical Action

1. With the dog in standing position, reach across dog’s back and take hold of both forelegs in one hand and both hind legs in other hand.

Rationale/Amplification

1. If the dog is a giant breed, it will suffice to reach across the dog’s back and take hold of the foreleg and the hind leg that are closer to the person doing the restraint.
**Technical Action**

2. Place index finger of each hand between the two legs being held.

3. Gradually lift dog’s legs off table (or floor) and allow its back to slowly slide against your body to a position of lateral recumbency.

4. To immobilize head, exert pressure on side of dog’s neck with forearm.

5. Hold legs proximal to carpus and tarsus, if possible.

**Rationale/Amplification**

2. Placing the index finger between the legs ensures a good grip if the dog tries to move its legs.

3. The dog should be shifted from a standing position to lateral recumbency gently and gradually.

4. Adequate restraint of the dog’s head is important for all procedures.

5. Holding the animal in this manner provides better control of the legs.

---

**USE OF A MUZZLE ON THE DOG (Fig. 1-4)**

**Procedure**

**Technical Action**

1. Place commercial muzzle of appropriate size on dog. Alternatively, cut strip of gauze or cloth approximately 125 cm in length for a 40- to 50-lb. dog.

**Rationale/Amplification**

1. Use of sturdy or double-thickness gauze is recommended for large dogs. A weak or poorly made muzzle leads to a false sense of security and the possibility of one’s being bitten.
Figure 1-4  (A, B, C, D, and E) Applying muzzle to dog.
Technical Action

2. Before approaching animal, make loop with one half of a square knot so that diameter of loop is about twice the diameter of dog’s snout.

3. Slip loop over dog’s nose and mouth with the half square knot on dorsal surface of dog’s snout (Fig. 1-4A), then tighten quickly by pulling on ends (Fig. 1-4B).

4. Cross (but do not tie) free ends of muzzle under dog’s lower jaw (Fig. 1-4C).

5. Bring ends of muzzle up behind dog’s ears (Fig. 1-4D) and tie in a bow (Fig. 1-4E).

Rationale/Amplification

by the dog. Commercially available nylon or rayon muzzles should be disinfected between uses in order to avoid disease transmission.

2. Preparation of the muzzle in advance helps to ensure rapid placement and minimizes the length of time the operator’s hands must be near the dog’s mouth.

3. The hands should be kept as far away from the dog’s mouth as possible while the muzzle is applied. Placing a muzzle on a fractious dog requires at least two people; one person holds the leash and distracts the dog while the other applies the muzzle.

4. Each step of this procedure must be done quickly if the animal is fractious. If the ends are crossed but not tied under the mandible, the muzzle can be removed quickly in case of emergency (see No. 6 below).

5. The bow should be placed directly behind the dog’s ears and tied tightly. The dog will be able to open its mouth if the muzzle is tied loosely.
Technical Action
6. To remove muzzle quickly from a fractious dog, untie bow and pull on one end of muzzle material.

Rationale/Amplification
6. A muzzle prevents panting and must be used judiciously in heavy-coated animals or in warm environments. A muzzle should be removed immediately if an animal has difficulty breathing or starts to vomit.

USE OF ELIZABETHAN COLLAR (Fig. 1-5)

Procedure

Technical Action
1. Select or make an Elizabethan collar of appropriate size and strength for the animal.

2. Place Elizabethan collar on neck of fractious dog or cat to prevent animal from biting while it is being handled (Fig. 1-5A) or to prevent the animal from biting or licking itself.

3. To ensure that collar will remain on animal, use prefabricated attachment loops on commercially available types, or place three holes in container so that a triangular-shaped opening is created for animal’s head when cord is passed through three holes (Fig. 1-5B).

Rationale/Amplification
1. In general, Elizabethan collars should be made of tough, flexible materials like plastic rather than easily torn substances like cardboard. Ideal length is approximately 2–3 cm longer than the animal’s snout, with the base of the collar pushed caudally against the shoulders.

2. Some advantages of the Elizabethan collar as a restraint device are that the animal can pant with the collar in place; the collar can be left on the animal when it is returned to a hospital kennel, facilitating later removal of the animal for further treatments; the collar is reasonably well tolerated by most animals.

3. Most collars are sturdy, reusable, and easily cleaned. Several companies supply a variety of sizes of Elizabethan collars, and most of these can be cut to size for animals that fall between the standard sizes. For do-it-yourself enthusiasts, Elizabethan collars for cats and very small dogs can be constructed out of empty dessert topping containers. Collars for dogs can be fashioned from plastic buckets of appropriate sizes.
PHYSICAL RESTRAINT WITH CAT IN LATERAL RECUMBENCY (Fig. 1-6)

Procedure

Technical Action

1. Clip curved end of cat’s claws if it must be restrained for lengthy or uncomfortable procedure or if it is fractious (Chapter 11).

Rationale/Amplification

1. Restraining a cat can be more difficult than restraining a dog because cats: a) can move very quickly; b) are agile and strong; c) may use their claws as well as their teeth to defend themselves; d) are small animals that can be injured by indiscriminate use of force.
Routine Clinical Procedures

Technical Action

2. With cat in standing position, reach across cat’s back and take hold of both forelegs in one hand and both hind legs in other hand.

3. Gradually pull cat’s legs off table and allow its back to slide against your body to a position of lateral recumbency.

4. After placing cat in lateral recumbency, use one hand to hold all four legs (Fig. 1-6).

5. Place other hand so that palm of hand surrounds the top of cat’s head and cat’s jaws are held closed by fingers and thumb (Fig. 1-6).

Rationale/Amplification

3. The cat should be shifted from a standing position to lateral recumbency gently.

4. If necessary, separate strips of 1-inch-wide adhesive tape can be used to bind together the front legs and the hind legs, respectively.

5. Placing an Elizabethan collar on a fractious cat before beginning the restraint procedure eliminates the necessity of holding the cat’s mouth closed with one hand while holding all four legs with the other hand. A cat’s small size and great agility make immobilization of its head with the restrainer’s forearm virtually impossible.

Figure 1-6 Restraint with cat in lateral recumbency.
PHYSICAL RESTRAINT WITH CAT IN STERNAL RECUMBENCY (Fig. 1-7)

Procedure

Technical Action

1. Apply gentle, firm pressure to cat’s back to encourage it to assume position of sternal recumbency.
2. Place one forearm against each side of cat’s body with cat’s head facing away from restrainer.
3. Immobilize cat’s head using both hands.

Rationale/Amplification

1. Sternal recumbency is a position to which few cats object.

3. The person doing the procedure can approach from the side or from the cat’s rear so as to remain out of reach of the front claws, should the cat attempt to strike.

PHYSICAL RESTRAINT OF MODERATELY FRACIOUS CAT (Fig. 1-8)

Procedure

Technical Action

1. Close all doors and windows of the room.

Rationale/Amplification

1. If the cat gets away from the restrainer, it will not escape from the building.
Technical Action

2. Take scruff of cat’s neck in one hand.

3. Wrap fingers of other hand around and through cat’s hind legs.

4. Gently stretch the cat out by separating your hands.

Rationale/Amplification

2. It is important to grasp as much of the loose skin as possible along the cranial portion of the cat’s neck, beginning between its ears. Otherwise the cat may be able to turn its head around and bite.

4. A cat restrained in this manner may be held in lateral recumbency or in vertical position. Most fractious cats will raise strong vocal protests to this procedure. The necessary procedure should be done quickly. If the restrainer begins to lose control of the cat, he or she should alert other people involved in the procedure, then let go of the cat with both hands at the same time.

NOTE: An alternate method of restraint for a moderately fractious cat is to grasp the zygomatic arches with thumb and fingers of one hand while resting the top of the cat’s head against the palm of the same hand. Meanwhile, an assistant wraps a thick terrycloth towel snugly around the cat’s neck and torso, being sure to enclose all 4 legs in the towel. The cloth is wrapped around...
several times before folding over the bottom end. The body of the cat can then be held under the arm of the person restraining the head. This form of restraint is particularly useful for drawing blood from or inserting a catheter into the jugular vein or for administering oral medications.

Vicious dogs and cats require special restraint techniques, for example, rabies poles and pharmacologic agents. Such procedures carry significant risks for animals and persons involved.

PHARMACOLOGIC RESTRAINT OF DOGS AND CATS

Complications

1. Respiratory distress
2. Anaphylactic reaction
3. Excessive or inadequate sedation
4. Cardiac arrhythmias
5. Hypotension
6. Vomiting

Equipment Needed

• Sterile syringes and needles of appropriate size
• Elizabethan collar and/or muzzle
• Oral or injectable pharmacologic agents appropriate for patient and procedures planned

Procedure

Technical Action

1. Weigh animal.
2. Review animal’s history and perform complete physical examination prior to administering any drugs, if possible.

Rationale/Amplification

1. All chemical restraint drugs must be dosed carefully to avoid improper dosage.
2. Choice of the appropriate drug or drugs requires careful attention to detail, including drug interactions, contraindications and complications, and the health status of the animal. If the animal is fractious and may