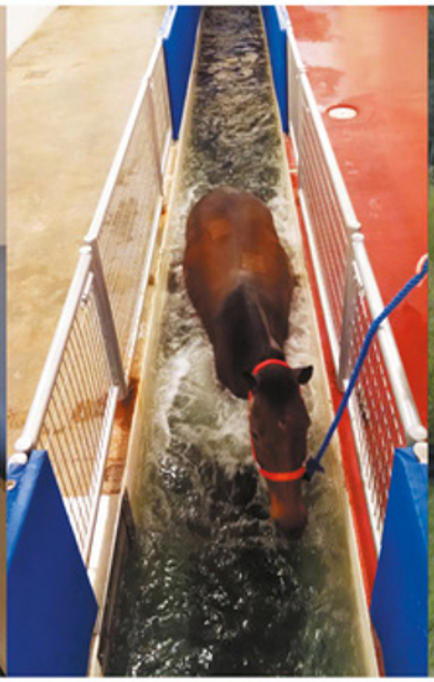
Physical Rehabilitation

for Veterinary Technicians and Nurses

Edited by Mary Ellen Goldberg and Julia E. Tomlinson



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Physical Rehabilitation for Veterinary Technicians and Nurses

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This book is dedicated to my Granddaddy and my Mother.

My paternal Grandfather, John G. Richardson Sr, taught me about loving animals. When I was a little girl, I followed Granddaddy everywhere. We went on walks to feed horses, mules, dogs, cats, squirrels, ducks and birds. He told me about animals he had owned. Granddaddy died on August 9, 1970. I was 13 years old. I wish he could have seen how his influence affected me.

My Mother, Eleanor Straub Richardson, was a nurse during WWII. She used her GI bill to get degrees in Nursing Education so she could teach. She met my Daddy, moved to Richmond, VA and taught for 31 years at St. Luke's Hospital School of Nursing. My Mother was the kindest, most loving person I have ever known. I could never even hope to provide care that Mother did for her patients, but I could have no better role model of what a nurse provides and advocates for her charges. Her students loved her and told me over the years that Mother represented all the traits a nurse embodies. Mother never knew that I teach, lecture and write because she passed away before witnessing any of this. I hope in some small measure, I would have made her proud.

Contents

List of Contributors *vii*
Acknowledgements *ix*

1 Introduction to Physical Rehabilitation for Veterinary Technicians/Nurses *1*
Mary Ellen Goldberg

2 Joining a Rehabilitation Team *11*
Julia E. Tomlinson

3 The Veterinary Technician and Rehabilitation Pain Management *26*
Mary Ellen Goldberg

4 Communicating the Treatment Plan *49*
Tracy A. Darling and Cynthia M. Otto

5 Manual Therapy Treatment *59*
Judy Coates

6 Home Exercises *79*
Abby Rafferty and Jacqueline R. Davidson

7 Supporting the Client and Patient *95*
Robin Downing and Mary Ellen Goldberg

8 Nutritional Counseling *109*
Kara M. Burns

9 Motivating Your Patient *127*
Megan Nelson and Julia E. Tomlinson

10 The Disabled Patient Part 1: Assistive Devices and Technology *145*
Mary Ellen Goldberg and Julia E. Tomlinson

11 The Disabled Patient Part 2: The Neurological Patient *163*
Stephanie Kube and Mary Ellen Goldberg

12 **The Disabled Patient Part 3: Special Considerations for Geriatrics** *187*
Mary Ellen Goldberg and Julia E. Tomlinson

13 **The Disabled Patient Part 4: Home Nursing Care** *205*
Julia E. Tomlinson and Elizabeth E. Waalk

14 **Modalities Part 1: Thermotherapy** *218*
Julia E. Tomlinson and Mary Ellen Goldberg

15 **Modalities Part 2: Laser Therapy** *231*
Kristin Kirkby Shaw and Liz Brown

16 **Modalities Part 3: Electrotherapy and Electromagnetic Therapy** *241*
Shari Sprague and Mary Ellen Goldberg

17 **Modalities Part 4: Therapeutic Ultrasound** *262*
Carolina Medina and Wendy Davies

18 **Modalities Part 5: Shockwave Therapy** *273*
Douglas Stramel and Angela Stramel

19 **Therapeutic Exercises Part 1: Land Exercises** *286*
Janice L. Huntingford and Jessy Bale

20 **Therapeutic Exercises Part 2: Hydrotherapy (Aquatic Therapy)** *308*
Pádraig Egan and Noel Fitzpatrick

21 **Troubleshooting as a Team** *329*
Amie Hesbach, Julia E. Tomlinson, and Erin White

22 **Equine Rehabilitation** *347*
Steve Adair and Dawn Phillips

23 **Adjunctive Therapies Part 1: Acupuncture and Traditional Chinese Medicine** *377*
Carolina Medina and Mary Ellen Goldberg

24 **Adjunctive Therapies Part 2: Veterinary Chiropractic** *390*
Robin Downing

25 **Adjunctive Therapies Part 3: Myofascial Trigger Point Therapy** *398*
Douglas Stramel and Angela Stramel

Index *407*

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Lastly, without our daily patients who give us purpose and meaning in our careers, where would we be? I have been a licensed veterinary technician since 1976. Over 41 years have passed since I graduated and passed state boards. In those years, I have been blessed to work with every conceivable species that you can imagine from companion animals, to horses, livestock, laboratory animals and zoo animals. I developed an interest in physical rehabilitation because of my intense passion for veterinary pain management. My hope is that this text can provide education and guidance to those that have a similar interest in a world that I honestly love.

Mary Ellen Goldberg

1

Introduction to Physical Rehabilitation for Veterinary Technicians/Nurses

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CHAPTER MENU

What is Rehabilitation?, 1
History of Human Physical Therapy, 2
History of Veterinary Physical Rehabilitation, 2
Specifics About Veterinary Physical Rehabilitation, 3
How do Veterinary Technicians and Nurses fit in?, 4
Where Can I Become a Certified Rehabilitation Veterinary Technician?, 5
What is Involved in Becoming a CCRA, CCRP, CVMRT, CERA, or CERP?, 5
Practice Regulations for Veterinary Technicians, 6
Working in the Physical Rehabilitation Field, 6
Therapeutic Exercises, 7
Manual Techniques, 7
Physical Modalities, 7
Conditions that can Benefit from Physical Rehabilitation, 8
Conclusion, 9
References, 9

As veterinary technicians, we vow to further our knowledge and competence through a commitment to lifelong learning (NAVTA, 1987). Over the past decade, awareness of animal physical rehabilitation has increased, and rehabilitation has become a rapidly growing service within veterinary specialty hospitals, referral centers, and primary care practices. Every day, we hear about laser therapy and underwater treadmills, equipment that was not traditionally covered in the veterinary technician's college curriculum. Learning more about rehabilitation enables the veterinary technician to better assist the supervising veterinarian when physical rehabilitation therapies are recommended. This chapter aims to answer some questions about rehabilitation for veterinary technicians and nurses.

What is Rehabilitation?

Physical rehabilitation is the treatment of injury or illness to decrease pain and restore function (AARV, 2015). Rehabilitation is used

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to address acute injuries and chronic injuries or diseases that have been affecting a patient for a long time. Rest alone after injury usually does not relieve the problems caused by inflammation and spasm; for example, a muscle in spasm may not have adequate blood supply to heal. Protective mechanisms in place in the body following injury alter movement of the whole musculoskeletal system and increase strain on other areas. Physical rehabilitation should commence as soon as is possible for the patient and caregiver.

History of Human Physical Therapy

International History

Physicians such as Hippocrates and, later, Galenus are believed to have been the first practitioners of physical therapy, advocating massage, manual therapy techniques, and hydrotherapy (Physiosite, 2015). In Ancient Greece in around 460 BC, Hector practiced a technique called "hydrotherapy" (derived from the Greek words for water treatment). In 1894, physiotherapy was recognized in Great Britain as a specialized branch of nursing regulated by the Chartered Society of Physiotherapy. The first emergence of physiotherapy as a specialist discipline was in Sweden in 1913 when Per Henrik Ling founded the Royal Central Institute of Gymnastics (RCIG) for massage, manipulation, and exercise. In the following two decades, formal physiotherapy programs were established in other countries, led by the School of Physiotherapy at the University of Otago in New Zealand in 1913. From 1950, chiropractic manipulations were also introduced; this was initially most common in Great Britain. A subspecialty of orthopedics, within physiotherapy, also emerged at about the same time.

Developments in the United States

In the United States, physical therapists formed their first professional association, called the American Women's Physical Therapeutic Association, in 1921 (Moffat, 2003; APTA, 2015). In 1922, the association changed its name to the American Physiotherapy Association (APA) and in the 1930s, it introduced its first "Code of Ethics." At this time men were admitted and the membership grew to just under 1000. With the advent of World War II and a nationwide polio epidemic during the 1940s and 1950s, physical therapists were in great demand. The association's membership grew to 8000. By the late 1940s, the association had changed its name to the American Physical Therapy Association (APTA). The APTA represents more than 90 000 members throughout the United States. A national professional organization, APTA's goal is to foster advancements in physical therapy practice, research, and education. Currently 213 institutions offer physical therapy education programs and 309 institutions offer physical therapist assistant education programs in the United States.

History of Veterinary Physical Rehabilitation

Physical rehabilitation for animals has been practiced since the 1980s. In biomedical research, the use of animal models in treatment protocols is common, and this includes research in the field of physical rehabilitation. From the late 1980s and throughout the 1990s several groups helped to increase interest in canine and equine physical rehabilitation. These groups include the American Veterinary Medical Association (AVMA), the American College of Veterinary Surgeons (ACVS), and the formation of the Animal Physical Therapist Special Interest Group (APT-SIG) within the APTA. Success with human patients receiving postoperative physical therapy has galvanized the veterinary community into developing physical rehabilitation techniques that can be implemented for animal patients (McGonagle *et al.*, 2014). In June 1993, the APTA issued a

position statement that "endorses the position that physical therapists may establish collaborative, collegial relationships with veterinarians for the purposes of providing physical therapy services or consultation" (APTA, 1993). In 1996, "Guidelines for Alternative and Complementary Veterinary Medicine" were adopted by the AVMA House of Delegates (AVMA, 2000) and new guidelines were adopted in 2001 (AVMA, 2001). Training in animal physical rehabilitation was establish by a group at the University of Tennessee (McGonagle *et al.*, 2014). This training and certification course was, and still is, provided for veterinarians, veterinary technicians, physical therapists, and physical therapy assistants.

The International Association of Veterinary Rehabilitation and Physical Therapy (www.iavrpt.org) became an official association in July 2008 and is a collaborative association of veterinarians, technicians, physical therapists, and other allied health professionals. Veterinarians interested in rehabilitation in the United States are encouraged to join the American Association of Rehabilitation Veterinarians (AARV), founded in 2007 (www.rehabvets.org). Veterinary technicians can become members of the AARV as associate members, as can other allied health professionals.

In 2010, the American College of Veterinary Sports Medicine and Rehabilitation was approved by the American Association of Specialty Veterinary Boards (AASVB), in order to establish and maintain credentialing and specialty status for veterinarians who excel in sports medicine and rehabilitation. A veterinarian can become board certified in either canine or equine specialties under this college (www.vsmr.org).

Veterinary technicians can take one of several certification courses in animal rehabilitation, as explained further in Chapter 2. For those technicians that are already certified in physical rehabilitation, a veterinary technician specialty group is under formation. This group is under the umbrella and direction of the National Association of Veterinary Technicians in America (NAVTA), and is called the Academy of Physical Rehabilitation Veterinary Technicians. This specialty certification will allow veterinary technicians and nurses to possess the credential VTS-physical rehabilitation. The mission statement of the academy is: "We are credentialed rehabilitation veterinary technicians providing assistance in physical rehabilitation, encouraging veterinary technicians to further education, while improving the quality of animals' lives."

Specifics About Veterinary Physical Rehabilitation

The AARV has produced a model set of guiding principles for the ideal practice of veterinary physical rehabilitative medicine (AARV, 2014) These model standards state:

- Patient care in the rehabilitation facility should be under the authority, supervision or approval of a licensed veterinarian certified in rehabilitation therapy.
- Initial examination and diagnosis should be determined by a licensed veterinarian with rehabilitation certification.
- The rehabilitation treatment plan should be formulated and the case managed by a licensed veterinarian with rehabilitation certification, or a combination of this veterinarian in consultation with an appropriately licensed physical therapist certified in animal rehabilitation.
- No technician/assistant (certified or otherwise) shall manage a rehabilitation patient.
- There shall be a formal policy in place to monitor and evaluate patient response to care.
- The practice shall use individualized rehabilitation and therapy plans including fitness plans.
- For patients with concurrent conditions: Clients shall be advised early in the course of care of the opportunity to request a second opinion or referral to a specialist for treatment of these conditions.

- The rehabilitation practice shall regularly update the patient's primary care veterinarian as well as any other veterinarian involved with the patient's current care.
- A summary of the initial rehabilitation evaluation findings should be sent to the referring veterinarian at the earliest opportunity, preferably within 24 hours of the evaluation.
- The patient shall be discharged back to the care of the primary veterinarian once therapy is complete.
- When referring a patient for additional workup, appropriate referral communication (such as letter, email, phone conversation) shall occur and should be properly documented in the patient's record.
- Evaluation for pain shall be part of every patient visit.
- Practice team members shall be trained to recognize pain and work in collaboration with the veterinarian to provide appropriate pain management including physical and pharmaceutical modalities.
- Since medical and emergent issues may arise during treatment, and pain management monitoring needs to be addressed by a veterinarian, having the rehabilitation veterinarian on site is ideal. A plan must be in place to address emergent care medical issues and pain management in the absence of direct (on site) veterinary supervision.
- Practice team members should be trained to identify causes of pain, levels of pain, medications and physical methods used to control pain.
- Pain scores should be documented in the medical record at each visit.
- Pain management techniques should be used when the presence of pain in a patient is uncertain.
- Clients should be adequately educated to recognize pain in their pet.
- Clients should be adequately educated about the possible effects of any dispensed analgesic, including adverse events.
- Tentative diagnoses and medical plans, or their subsequent revisions shall be communicated to clients at the earliest reasonable opportunity.
- A rehabilitation veterinarian should have current knowledge of veterinary approved diets, nutraceuticals and supplements as well as knowledge and skills in weight loss and weight-management programs.
- Nutritional assessment and counseling should be part of routine care.
- Recommended continuing education requirements:
  - Each veterinarian should have a minimum of 15 hours continuing education every 2 years specifically in veterinary rehabilitation topics.
  - Each veterinarian should have a minimum of 20 hours per year of documented continuing education in the field of veterinary medicine.
  - Each veterinary technician should have a minimum of 10 hours of documented continuing education in the field of veterinary rehabilitation every 2 years.
  - Each veterinary technician should have a minimum of 10 hours of documented continuing education in the field of veterinary technology every two years.
  - Each physical therapist should have a minimum of 15 hours of documented continuing education in the field of veterinary rehabilitation every 2 years.
  - Each physical therapist should complete continuing education in their own field as recommended by their governing state board.

How do Veterinary Technicians and Nurses fit in?

Veterinary technicians must complete either a 2-year (associate's degree) or a 4-year program (bachelor's degree) in the United States. Veterinary nurses are the primary

para-veterinary workers in the United Kingdom and assist vets in their work, and have a scope of autonomous practice within which they can act for the animals they treat. This can include minor surgery. Registered veterinary nurses (RVNs) are bound by a code of professional conduct and are obliged to maintain their professional knowledge and skills through ongoing continuing professional development (RCVS, 2015). In the United States, in approximately 40 states, veterinary technicians are certified, registered, or licensed (Levine *et al.*, 2014). Veterinary technician programs do not include extensive coursework in physical rehabilitation.

Most continuing education courses offered at international, national, and local meetings offer physical rehabilitation lectures and hands-on laboratories. The AARV provides a full day of lectures at the North American Veterinary Conference, the American College of Veterinary Sports Medicine and Rehabilitation (ACVSMR) offers lectures (canine and equine) at this conference and also a program in conjunction with the ACVS annual symposium.

Where Can I Become a Certified Rehabilitation Veterinary Technician?

The greatest asset for effective physical rehabilitation is an educated veterinary team (Sprague, 2013). A rehabilitation technician is a certified, licensed or registered veterinary technician who has completed a prescribed curriculum to receive the title of CCRA (Certified Canine Rehabilitation Assistant), CCRP (Certified Canine Rehabilitation Practitioner), or CVMRT (Certified Veterinary Massage and Rehabilitation Therapist). There are currently four certification programs in the United States that offer these titles.

Canine Rehabilitation Institute

The Canine Rehabilitation Institute (www.caninerehabinstitute.com) offers the CCRA program for veterinary technicians and the Certified Canine Rehabilitation Therapist (CCRT) program for veterinarians and physical therapists at training facilities in Florida and Colorado.

NorthEast Seminars

NorthEast Seminars (www.canineequinerehab.com) offers the CCRP or Certified Equine Rehabilitation Practitioner (CERP) for veterinarians, physical therapists, and veterinary technicians at the University of Tennessee.

Healing Oasis

Healing Oasis (www.healingoasis.edu) offers the CVMRT program for licensed veterinarians, licensed or certified veterinary technicians, licensed physical therapists, licensed nurses, and or licensed/certified massage therapists at their facility in Wisconsin.

Animal Rehabilitation Institute

The Animal Rehabilitation Institute offers the Certified Equine Rehabilitation Assistant (CERA) to veterinary technicians and physical therapist assistants. Veterinary continuing education units are currently being applied for through the AVMA (http://animalrehabinstitute.com/).

What is Involved in Becoming a CCRA, CCRP, CVMRT, CERA, or CERP?

Formal educational courses and wet labs are involved for all the certification courses. Each school has its own curriculum. The cost is relatively expensive for a veterinary technician, but this certification may allow the veterinary technician to command a higher salary. You must be a licensed veterinary technician (LVT), certified veterinary technician (CVT), or registered veterinary technician (RVT) in order to attend most of the courses. Veterinary

assistants are not accepted in all but the Healing Oasis course. The best way to investigate the programs is to visit the Canine Rehabilitation Institute website (www.caninerehabinstitute.com) and look for Certified Canine Rehabilitation Assistant.

Practice Regulations for Veterinary Technicians

Candidates for certified or registered veterinary technician are tested for competency through an examination which may include oral, written, and practical portions. Every state is different and maintains its own regulations with respect to the practice of veterinary medicine. Practice acts, legislated by states and provinces, often define the responsibilities of the veterinary technician. These responsibilities and duties are dependent in part on the type of employment the individual chooses. Here are links to standards for practice acts provided by NAVTA and the American Association of Veterinary State Boards:

- http://www.navta.net/?page= state_resources1
- https://www.aavsb.org/PDF/Practice%20Act%20Model_FullDocument_9-6-10.pdf

Each person needs to investigate their own state practice act to see what encompasses practicing as a veterinary technician.

A rehabilitation veterinary technician should be working under the direct supervision of a credentialed rehabilitation veterinarian who directs therapy. The larger team may be made up of a credentialed physical therapist, the referring veterinarian, a veterinary specialist (surgeon, neurologist, etc.), a veterinary chiropractor, acupuncturist, hospital support staff, the owner, and other trained veterinary professionals.

Working in the Physical Rehabilitation Field

The duties of the rehabilitation veterinary technician include assisting their supervising veterinarian in evaluations and in performing therapies. Therapies that the technician can provide include application of prescribed physical modalities and therapeutic exercises. Part of patient care is ensuring patient records are up-to-date and accurate. Proper documentation of treatments should be completed each day. Any member of the rehabilitation team should be able to refer back to the record and understand the needs and past treatments of each patient. Clear client communication and education is also necessary. Chapter 2 Joining a Rehabilitation Team goes into detail about the role of each team member.

Pain plays a role in any patient's willingness and motivation. A patient's pain score should be assessed and documented in the medical record during each visit (AARV, 2014). A detailed history should indicate the degree of pain and the disability (Davies, 2014). How does the patient cope with the disability? If changes in a patient's pain level are noted, the supervising veterinarian should be notified. It is very important for the rehabilitation veterinary technician to remain in open communication with their supervisor about anything abnormal or any changes in progress.

Much of the certified veterinary rehabilitation technician's day is like that of any other LVT, RVT, or CVT. Animal patients are admitted, housed properly, and kept clean. Often during the day patients are taken outside so they can relieve themselves. Technicians may be required to pull records for the therapist (veterinarian or physical therapist) and to keep patient forms and records sent from the referring veterinarian in order and available. Equipment should be kept clean, orderly and ready for use. Assisting the therapist with their patients and listening to them is all part of the routine. At this point, any veterinary technician could fill this

position. What sets the veterinary technician apart that is certified in rehabilitation?

Therapeutic Exercises

Therapeutic exercises are a daily part of the veterinary technician's routine. The owner/handler must be well educated on the exercise program, especially the home exercise program (HEP). The supervising veterinarian chooses the exercises and the technician carries them out. Exercises target proprioception and balance, specific muscle groups, overall pattern of gait, and overall strength and endurance. Therapeutic exercise equipment may include physioballs, cavaletti rails, balance blocks and discs, weights, tunnels, rocker boards, wobble boards, treadmills, air mattresses, or planks (Coates, 2013). Patient considerations such as motivation, footing, assistive devices, and leash/harness control must be assessed prior to beginning any exercise program, and the therapist/handler body mechanics must be monitored to prevent injury. Exercises are designed to address specific impairments and each is described with a goal, a technique, and a progression (McCauley and Van Dyke, 2013). In order to fully understand the therapies, certification at one of the rehabilitation schools is necessary.

Manual Techniques

Specialized manual techniques are used in evaluating and treating the patient. One of the techniques the technician is trained in is massage, as described by Coates (2013):

> Massage – Effleurage consists of long slow strokes, generally light to moderate pressure, usually parallel to the direction of the muscle fibers. Petrissage involves short, brisk strokes, moderate to deep pressure, parallel, perpendicular, or diagonally across the direction of the muscle fibers. It may include kneading, wringing, or skin rolling. Tapotement is rhythmic, brisk percussion often administered with the tips of the fingers, primarily used as a stimulating stroke to facilitate a weak muscle and cross-friction massage involves applying moderate pressure perpendicularly across the desired tissue. Pressure is maintained in such a way that the finger does not slide across the skin, but rather takes the skin with it.

Normal range of motion (ROM) is the full motion that a joint may be moved through. Passive range of motion (PROM) of a joint is performed without muscle contraction within the available ROM, using an external force to move the joint (Millis and Levine, 2014a).

Stretching techniques are often performed in conjunction with ROM exercises to improve flexibility of the joints and extensibility of peri-articular tissues, muscles, and tendons (Millis and Levine, 2014b).

Physical Modalities

Physical modalities are often used as part of the patient's treatment plan. They are used as tools to manage pain, weak muscles, inflexibility, limited joint ROM, and to aid in tissue healing (Niebaum, 2013). Physical modalities include the following:

- Superficial thermal agents – hot (thermotherapy) and cold (cryotherapy)
- Neuromuscular electrical stimulation (NMES) – usually used to address muscular weakness
- Transcutaneous electrical nerve stimulation (TENS) – used for pain relief
- Therapeutic ultrasound – a deep heating technique used for rehabilitating musculoskeletal conditions (Levine and Watson, 2014)
- Low-level laser therapy (LLLT) – using (not surgical) lasers to accelerate wound healing, promote muscle regeneration, treat acute and chronic pain, chronic and acute edema and neurologic conditions (Millis and Saunders, 2014)

- Extracorporeal shockwave therapy (ESWT) – to increase bone, tendon, and ligament healing, accelerate wound healing, and provide antibacterial properties and pain relief (Niebaum, 2013)
- Pulsed electromagnetic field therapy (PEMF) – to induce biological currents in the tissue. PEMF is approved by the US Food and Drug Administration (FDA) as safe and effective for the treatment of fractures and their sequelae (Rosso *et al.*, 2015). The main therapeutic purpose is for enhancement of bone or tissue healing and pain control (Millis and Levine, 2014a).

Additional areas of education include topics such as aquatic therapy, canine orthotics and prosthetics, rehabilitation of the orthopedic and neurologic patient, canine sports medicine, pain management, nutrition and geriatric patients.

Conditions that can Benefit from Physical Rehabilitation

A range of therapies are used to achieve one or more of the following functional goals:

- To speed recovery from injury or surgery
- To increase mobility and flexibility
- To mprove endurance and agility
- To decrease pain (Goldberg, 2016)
- To maintain function and prevent further problems
- To enhance quality of life.

Physical rehabilitation helps an individual that has had an illness or injury to achieve the highest level of function, independence, and quality of life as possible (Sharp, 2008). The success or otherwise of any surgery is as much down to the rehabilitation carried out as to the surgical technique performed. Some of the conditions that benefit from physical rehabilitation are listed in Box 1.1.

Rehabilitation offers numerous physiological benefits to patients, including:

- increased blood flow and lymphatic drainage to the injured area,
- reduction of pain, swelling, and complications,
- increased production of collagen,
- prevention of contractions and adhesions,
- promotion of normal joint biomechanics (Goldberg, 2016),
- prevention of other injuries,
- prevention of or reduction in muscle atrophy, and
- improved function and quality of movement.

Box 1.1 Sample conditions benefiting from physical rehabilitation

Orthopedic

- Postoperative rehabilitation (e.g., stifle or hip surgery, arthrodesis, amputation, ligament/tendon repair)
- Acute and chronic soft tissue injuries, involving muscle and fascia, tendon, joint capsule, or ligament (limbs or trunk)
- Arthritis (long-term management)
- Developmental orthopedic diseases (e.g., hip dysplasia, elbow dysplasia)
- Trauma and wound care

Neurological

- Postoperative rehabilitation (e.g., decompressive surgery, reconstructive surgery)
- Central or peripheral nerve injuries
- Fibrocartilaginous embolism, spinal shock
- Degenerative nerve disease (e.g., myelopathy, polyneuropathies)
- Balance/vestibular problems
- Nervous system trauma

General

- Pain management
- Athletic/working dogs (performance problems, improving strength and endurance)
- Obesity
- Depression
- Senior care

Source: Adapted from Sharp (2008).

Conclusion

A rehabilitation veterinary technician's job is complex and fulfilling. There are advancements in veterinary medicine daily, and animal physical rehabilitation is on the cutting edge. Specialized rehabilitation equipment is helpful, but a lot can be achieved without it. Physical rehabilitation is rewarding, even with minimal equipment; all you need is a rehabilitation team.

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2

Joining a Rehabilitation Team

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CHAPTER MENU

Introduction, 11
Becoming a Rehabilitation Technician (Nurse), 13
The Rehabilitation Patient, 14
Your Team Role as Rehabilitation Veterinary Technician, 15
Working Under Supervision, 20
Future Directions for the Rehabilitation Technician, 22
Conclusions, 24
References, 25

Introduction

People who Work in a Veterinary Rehabilitation Facility

A veterinary rehabilitation facility, like any veterinary clinic or hospital, relies on a team of people working together with a common goal. The common goal in a veterinary rehabilitation facility is to improve the quality of life of patients by improving the ability of the animal (and owner) to perform the activities of daily living necessary for the animal's life to be fulfilling. Activities of daily living are daily self-care activities in the patient's home.

A useful approach in explaining who works in a veterinary rehabilitation facility is to look at it from the point of view of the patient and caregiver (client) entering the facility for the first time.

The patient and caregiver will be greeted and welcomed by a receptionist, technician, or manager. The patient and caregiver will then either be directed to take a seat in the waiting room or be guided to an examination room where intake paperwork (and treats) will be handed out.

The receptionist's responsibilities are answering the phone, scheduling, admitting, and discharging patients and facilitating the flow of traffic in the building. They may also explain treatment plans and estimates. This person should have a good knowledge of the process of veterinary rehabilitation and the flow of the facility. In our clinic, Twin Cities Animal Rehabilitation and Sports Medicine (www.tcrehab.com), we do not have a conventional receptionist; instead our rehabilitation veterinary technicians and

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office manager (also a veterinary assistant) take turns acting as receptionist. This way, each time a current or potential client calls, they are able to speak to someone who is familiar with all aspects of the clinic and can schedule our complicated array of therapies with the appropriate person at the appropriate time.

For most patients, the rehabilitation technician will be the first to enter the examination room and will put the patient and client/caregiver at ease. History taking may be performed by the technician or the rehabilitation veterinarian. Once a complete and detailed history has been taken, the physical and observational examination begins.

The rehabilitation veterinarian (along with any other professionals) will make functional and physical diagnoses; using this information they will develop a treatment plan. This plan will include at-home and in-clinic therapy. The rehabilitation technician will take part in explaining the home and in-clinic therapy plan to the client/caregiver in an easy-to-understand way.

In-clinic therapies will be performed by a combination of the rehabilitation veterinarian, rehabilitation veterinary technician, physical therapist, and other professionals, such as a veterinary acupuncturist, animal chiropractor, or massage therapist. The person performing the therapy depends on the therapy recommended and on that person's skill set. Many rehabilitation veterinarians have additional training in manual therapies (including manipulations) and in acupuncture. Both physical therapists and chiropractors are trained manual therapists and in order to work in the veterinary world will need to have had additional training and certification in working with animal patients.

Team Members

The Rehabilitation Veterinarian

The rehabilitation-trained veterinarian will examine the patient and assess pain level, injured tissues, concurrent disease, and functional limitations. If further diagnostics are needed, they will be performed in order for an exact diagnosis to be made. The rehabilitation veterinarian will develop a treatment plan including at-home and in-clinic therapy, medications, and recommended nursing care. Other professionals, if present, will contribute to this plan. The rehabilitation veterinarian may be a Diplomate of the American College of Veterinary Sports Medicine and Rehabilitation or be certified in rehabilitation.

The Rehabilitation Veterinary Technician

The rehabilitation technician will assist with the examination. The technician will assist in handling the patient, and with taking and recording measurements and observations, such as vital signs and pain scoring. The rehabilitation technician will take part in educating the client and explaining the home care and in-clinic therapy plan. The rehabilitation technician will also take part in in-clinic therapies under the supervision of the rehabilitation veterinarian. The rehabilitation technician should have received specific training in veterinary rehabilitation.

The Physical Therapist

A physical therapist, trained in animal rehabilitation, can evaluate the animal patient with the rehabilitation veterinarian. A specific diagnosis needs to be made by a veterinarian. Together with the rehabilitation veterinarian, the physical therapist will develop and institute the treatment plan. Physical therapists who work in animal rehabilitation should be certified in veterinary rehabilitation.

The Physical Therapist Assistant

The physical therapist assistant works under the supervision and direction of the physical therapist and does not evaluate, but is able to perform many therapeutic treatments. Physical therapist assistants who work in animal rehabilitation should be trained and certified in animal rehabilitation.

Adjunct Team Members

Other team members can include veterinarians who are trained in acupuncture or spinal manipulative therapy (veterinary term for chiropractic) and other veterinarians including specialists (surgeon, oncologist, neurologist, primary care veterinarian and pain specialists). Chiropractors who have received additional training and certification in animal chiropractic along with massage therapists may be involved in care of the rehabilitation patient.

Becoming a Rehabilitation Technician (Nurse)

A rehabilitation veterinary technician or nurse is a skilled individual who has devoted time, study, and energy into training in the art and science of veterinary rehabilitation. A rehabilitation technician or nurse will be instrumental in the execution of the rehabilitation therapy plan and will often be the first line in noting a change in patient status and advocating for them. Before becoming a rehabilitation veterinary technician an individual will qualify as a veterinary technician or nurse.

According to the National Association of Veterinary Technicians in America (NAVTA):

> veterinary technicians and technologists are educated to be the veterinarian's nurse, laboratory technician, radiography technician, anesthetist, surgical nurse and client/caregiver educator. A veterinary technician is a graduate from a two-year, American Veterinary Medical Association (AVMA) accredited program from a community college, college or university. A veterinary technologist has graduated from an AVMA accredited bachelor degree program. Almost every state requires a veterinary technician/technologist to take and pass a credentialing exam.

More information is available on the website of the NAVTA (http://www.navta.net/default.asp?).

This training includes education in veterinary anatomy and physiology, pathology, pharmacology, and disease processes. All of this information is essential for someone working in the field of veterinary rehabilitation.

Becoming a veterinary nurse in the United Kingdom involves either taking vocational training or a degree course. More resources and information can be found on the website of the Royal College of Veterinary Surgeons (RCVS) at (www.rcvs.org.uk) and the website of the British Veterinary Nurses Association (www.bvna.org.uk).

Each country will have its own regulating body, and contacting the main veterinarian-regulating body of your country will be the best initial approach to finding out more.

Training in veterinary rehabilitation is available at several educational facilities in the United States (Northeast Seminars partnering with the University of Tennessee, Canine Rehabilitation Institute, Equine Rehabilitation Institute, Healing Oasis Education Center). For more information, see Chapter 1. Healing Oasis Education Center and Canine Rehabilitation Institute also run courses in other countries (e.g., Canada, Switzerland, UK, Australia, and Brazil). These courses average 121 hours of education in the format of didactic (lecture) teaching in person and online along with interactive, practical training. This training is followed by a certification examination. It is important to note that these certification courses are self-regulating and may differ in content. There is no overseeing body ensuring that information is correct and applicable. Some courses have sought approval from state educational boards (Healing Oasis, for example). After certification, the technician/nurse candidate gains a certificate in canine rehabilitation (CCRA (Certified Canine Rehabilitation Assistant), CCRP (Certified Canine Rehabilitation Practitioner), or CVMRT (Certified Veterinary Massage and Rehabilitation Therapist)). These courses are

available to veterinarians, veterinary technicians, physical therapists, physical therapy assistants, and, in some cases, chiropractors, massage therapists, and veterinary assistants. The certification gained from these courses should always be interpreted in the light of the individual's other qualifications and degrees and does not provide a blanket qualification to practice rehabilitation medicine, or to make a diagnosis and to prescribe therapy.

Completion of the certification process and emerging as a certified rehabilitation technician is only the beginning of the journey into this rewarding and fulfilling field in veterinary medicine. The next steps are on-the-job training and continuing education, just as a veterinarian always continues their education and learning. Continuing education lectures, laboratories, and seminars in this subject are currently available at many major veterinary conferences. There are also stand-alone meetings entirely devoted to rehabilitation, such as the International Association of Veterinary Rehabilitation and Physical Therapy meeting (www.iavrpt.org) which occurs every 2 years and alternates between European and American locations, and the Symposium for Therapeutic Advances in Animal Rehabilitation (STAAR) (www.staarconference.com) in New Jersey annually.

The Rehabilitation Patient

Surgical Patients

Surgical patients often make up a large proportion of cases in an animal rehabilitation facility. Many rehabilitation facilities are housed in, or adjacent to veterinary surgical facilities. The surgical patient may be seen by the rehabilitation technician/nurse and the supervising rehabilitation veterinarian both before and after surgery. A patient may need to lose weight before undergoing anesthesia or the surgeon may have advised some pre-surgical strengthening. Most surgical patients that are referred for rehabilitation will have already had orthopedic surgery, or surgery aimed to improve neurologic dysfunction. The aim of rehabilitation therapy for these patients is to assist in recovery of strength and function; function includes flexibility and coordination. The specialist surgeon will give input to the rehabilitation practitioner about restrictions in activity relative to stability of the surgical repair/procedure. This input is from a unique perspective as only the surgeon has seen the full extent of tissue damage and the relative success (or struggle) in repairing and minimizing the effects of that damage. The surgeon will be principally concerned about healing of the surgical site and may want to be more conservative than the rehabilitation team. Understanding the surgeon's point of view and acting with collegiate respect is important, however the surgeon may need to be enlightened about the process of rehabilitation and the appropriate qualifications of the people he or she is working with pertinent to case management. Restricting activity and motion of the affected area unduly can transform the detrimental effects of immobilization from a temporary to a permanent one. In human medicine, mobilization of a patient after repair of a complex spinal fracture begins immediately post operatively (J Yeater, personal communication, 2015). A rehabilitation veterinarian should be the person to govern communications with the surgeon.

The Injured Non-surgical Patient

These are patients with a physical injury or disease affecting mobility and comfort for which surgery is not indicated, or in some cases not possible for reasons such as the risks of anesthesia. Many soft tissue injuries are treated this way. Having a specific diagnosis of tissue pathology as well as a diagnosis of functional limitations is of paramount importance. An exact diagnosis still needs to be reached in order to formulate an appropriate rehabilitation plan. Lame patients referred for "strengthening" should

be carefully evaluated and diagnosed by the veterinarian before the onset of rehabilitation therapy; for example, exercising a patient with a severely damaged tendon can cause further pathology. The aim of rehabilitation therapy for the injured patient is to manage pain and restore maximal function.

Patients with Chronic Degenerative Disease

Chronic degenerative diseases (e.g., osteoarthritis, immune-mediated polyarthritis, degenerative myelopathy, spinal stenosis, obesity) all affect mobility and strength. The aim of rehabilitation therapy for these patients is to improve function in the light of their disability, to manage pain and to improve quality of life. Even an unstable neurologic patient with permanent nerve damage can improve gait with improved strength, because they can overcome the forces of motion while ataxic, and improve forward momentum and stabilization if their muscles are working well. Balance and proprioceptive exercises can result in a relative improvement in overall stability.

Geriatric Patients

As individuals age, they lose muscle (this muscle loss is termed sarcopenia) and fine motor control/balance along with strength. The relatively immobile patient is also prone to obesity. Aging is not a disease process, but the incidence of systemic disease does increase with age. The aim of rehabilitation therapy for these patients is to improve their quality of life through pain management, improvements in mobility, and regaining the ability to perform the activities of daily living – even if this requires the use of assistive devices (see Chapter 10). Concurrent morbidity (e.g., bladder infections from incomplete emptying in the weak patient) must be taken into account and, of all the rehabilitation patient populations, this aged one needs the most frequent veterinary intervention.

The Canine Athlete/Working Dog

Working with canine athletes is an extremely rewarding process. Trainers/caregivers are motivated and generally knowledgeable. These patients cannot self-advocate and yet they have the drive of a human professional athlete; injuries are common. The aim of rehabilitation therapy for these patients is return to sport or work. A survey of agility owners found the injury rate of agility dogs to be 32% at the time of survey (Cullen *et al.*, 2013). Injury rates in young human athletes vary from 12% to 28% depending on sport. This is of great concern to doctors because conditioned adult athletes have only a 2–3% injury rate (AOSSM, 2009; Ganse et al., 2014). Part of the problem for young human athletes is their open growth plates when training; part is thought to be due to inadequate conditioning and relative overload. Conditioning plans have the potential to reduce injury rates in sporting dogs along with maintenance therapies (usually manual therapies and acupuncture, possibly therapeutic modalities). The goal of conditioning is to optimize the performance of the athlete and minimize the risk of injury and illness. Training adaptations are specific to the nature of the exercise (e.g., muscle contraction type and mechanics) and so conditioning should be appropriate for the demands of the sport. For example, long periods of trotting or walking exercise are an inappropriate conditioning plan for a sprinting athlete.

Your Team Role as Rehabilitation Veterinary Technician

Being a Patient Advocate

As a rehabilitation veterinary technician/nurse, you will be one of the team members who interacts most with both patient and client/caregiver. As you provide veterinarian-prescribed therapies, the time that you spend with the patient and client/caregiver

will give you a unique insight into the personalities of both, and this will help you to quickly recognize changes in patient status.

When you encounter a patient for the first time, there will need to be an immediate assessment of patient demeanor (all people experienced with working on animals tend to do this automatically) and an understanding of how this particular patient may respond to novel situations and touch. Clients may not be immediately forthcoming or even honest with themselves about how their loved one reacts to unfamiliar situations. Taking time to put the patient at ease, no matter how long that takes, is crucial to enable a full examination and functional assessment. The rehabilitation examination is extensive and relies on a lot of touch, including physically moving the patient around. If pain is an issue, the patient may react in an aggressive manner. It is therefore paramount that proper pain management be included in the final analysis. A relatively relaxed patient is easier to examine from the point of view of compliance but also from the point of view of identifying areas of discomfort. Understanding animal behaviors, including signs of stress and fear, and having fundamental training skills will go a long way towards enabling an easy examination and a low stress process. Animal behavior is a branch of veterinary medicine that extends into everything we do. If we can put our patients at ease, future therapy visits will go well.

History taking may be performed by the technician or the rehabilitation veterinarian. History taking is often a lengthy process and includes questioning the client about the exact home environment (e.g., flooring and stairs in the home, pain scoring using home behaviors, patient activity level, and number of walks each day), timeline of the problem, any current or previous treatments and medications, other concurrent disease and activity level before the issue (owner expectations of return to normalcy). The examination is a full physical and functional assessment. Once a complete and detailed history has been taken, the physical and observational examination begins. The rehabilitation examination looks for areas of dysfunction and pain. The examination includes subjective and objective observations, Examples of subjective observations include conformation and posture, stance and sit position, transitions between postures, ability to hold posture, and response to palpation (both static palpation and palpation during movement of a joint, stretch of a muscle. etc.). Objective observations are those that can be measured, for example measurement of thigh girth with a spring-weighted tape measure, using a stance analyzer to assess the weight put through each paw, and gait analysis. As rehabilitation technician, you will assist the rehabilitation veterinarian and any adjunct professionals with their examination. The rehabilitation technician assists in handling the patient, applying restraint, if needed, using a minimal restraint approach. The technician may also be responsible for taking and recording measurements and observations, pain scoring the patient, and charting. The rehabilitation examination takes longer than a routine clinical examination and keeping the patient and client relaxed and focused can be a challenge.

The rehabilitation veterinarian will make a physical diagnosis and a functional assessment. Using this information, they will develop a treatment plan. This plan will include at-home and in-clinic therapy. The rehabilitation technician will take part in explaining the home and in-clinic therapy plan to the client/caregiver in an easy-to-understand way. Communication skills and empathy are essential parts of being a rehabilitation veterinary technician, just as they are for a veterinary technician or nurse working in general practice. The technician is often the translator of words from medical terminology to accessible terms, and can repeat an explanation of the diagnosis in a different way. In many cases, the visit to the rehabilitation veterinarian is the last in a long list of visits to several veterinarians, and so clients may be frustrated with the long process and need time and a sympathetic ear to

vent these frustrations. Part of the skill of communication is the ability to listen without interrupting and to help the client feel heard before moving on with a full explanation of the treatment plan which engages the client as part of the therapy team.

The rehabilitation technician will go over the recommended plan with the client/caregiver using a step-by-step approach. This will include a financial estimate for the in-clinic plan, explaining the in-clinic therapy plan along with prescribed medications and supplements, and then covering the home therapy plan. The client/caregiver should gain a thorough understanding of the initial plan, therapeutic goals, and the potential for changes in the plan. They should be educated about the time-consuming nature of therapy, along with having an understanding of reasonable benchmarks for improvement (expectations) and how long it can take for even small improvements to occur.

Any questions that arise from the client/caregiver can be addressed directly by you or conveyed to the rehabilitation veterinarian. Finally, mediating the checkout at reception by scheduling a set of therapy visits before the client leaves can help to improve compliance. As one of the main people communicating with the client, the rehabilitation technician should make sure that the client knows how to contact the clinic with any follow-up questions prior to next visit – the large amount of information generated from the first visit often takes time to digest and questions can come up later.

Talking casually with client/caregivers during therapy sessions and asking gentle questions about home progress can often reveal potential pitfalls in the home care plan and other red flags: "Fluffy doesn't chase squirrels in the back yard so I decided he needed some off leash time." You are also uniquely situated to address concerns and to notice early and subtle changes in patient status: "Sam is not getting any better, I am worried that therapy isn't working" and "We had a great Christmas thanks for asking, apart from Sam did get on the kitchen counter and stole a ham; he hasn't done that in years!" Information revealed during conversations can be used to gently counsel and guide the client/caregiver regarding small positive or negative changes. Any issues of potential concern can then be discussed with the client/caregiver and with your supervising veterinarian so that you can implement any change in therapy plan. Plan changes should then be explained to the client/caregiver.

The special relationship that develops during therapy between you and a client/caregiver means that you are uniquely situated as an ally and confidant, more so than the veterinarian or other professional. You may be the only person able to gently point out to a client/caregiver that they are being non-compliant, without seeming judgmental or negative. Sometimes the technicians that I work with will use an indirect approach and "tell the dog" that they cannot go off leash yet, and even though they feel better, it does not mean that they are fully healed. The rehabilitation veterinary technician also has the opportunity to gently remind the supervising veterinarian of issues. For example, the enthusiastic home plan with 15 separate exercises devised by the veterinarian may be overwhelming an otherwise compliant client/caregiver. Perhaps the client/caregiver has downplayed a physical issue that they themselves have, which restricts their ability to implement the home plan. It may be that the owner is at risk of getting bitten and did not want to admit that to the rehabilitation veterinarian.

Observing a patient for a relatively long period during therapeutic visits may also highlight an issue that was not noted during the initial examination. The rehabilitation technician can become a skilled observer of gait and function and use this information to alert the veterinarian of the need for reassessment.

Many patients in rehabilitation are at risk of, or are already suffering from concurrent disease, this can be as simple as a mild gastrointestinal upset, a medication reaction/interaction, or it may be a more complex

systemic issue (diabetes, chronic kidney disease), or even an acute crisis such as a gastrointestinal bleed. As a veterinary technician, your skill set extends beyond rehabilitation, and using your other skills and knowledge of medicine will be needed daily. You will need to be able differentiate important issues, which require a halt in therapy and immediate veterinary attention, from mild issues that can be monitored.

Working with clients over the phone is another important part of the rehabilitation technician's job. Questions about therapy, the rehabilitation process and other medical questions can often be answered immediately, the rehabilitation veterinarian is involved only an as needed basis. This "gatekeeping and educating" job is very much a part of a rehabilitation technician's role and should not be undervalued.

Providing the Prescribed Therapies

Learning how to provide therapy takes time and teaching by an experienced rehabilitation team. Introduction to modalities and therapeutic exercises is provided at the rehabilitation courses. Most of your skill, however, will be gained on the job under supervision. Knowing when to apply therapy appropriate for the diagnosis is the job of the supervising rehabilitation veterinarian; a physical therapist trained in animal rehabilitation may also provide a therapy plan once a veterinary diagnosis has been made. Complex manual therapies are not provided by the veterinary technician and require additional training before they can be provided by a veterinarian. Physical therapists learn manual therapy techniques during their years in school, but still need additional training in specifics of animal anatomy and biomechanics before applying their skills (quadrupeds are very different to bipeds, horses are very different to dogs). Your supervisor will advise and teach you appropriate light manual therapies such as massage and stretches, you can also gain additional training such as massage. Your knowledge of veterinary anatomy and physiology will help you to understand and apply therapy to the appropriate site, for example knowing the specific origin and insertion of a muscle and the direction of the fibers can help you to apply therapeutic ultrasound and follow it with cross fiber massage. During therapy you will note any response from the patient. The subtlest signs of discomfort can be identified by a skilled veterinary technician/nurse. Signs of discomfort need to be differentiated from signs of general stress or restlessness. Halting the therapy for a moment and noting whether the patient then relaxes while still being restrained is a simple method of differentiating discomfort due to therapy from discomfort due to restraint so that you can alert your veterinarian when appropriate for a change in plan.

Bribery goes a long way during treatment sessions, high-value treats (and a variety of treats, from immediate reward to those needing some work to eat) help to ease patient tension and improve compliance. In our clinic (Twin Cities Animal Rehabilitation and Sports Medicine), we often ask that owners refrain from buying the same treats that we use in clinic. That way the patients happily visit for "special treat time." Most of our patients come into a therapy room and point their nose straight at the treat bucket.

Assessing pain level is a part of each therapy visit. Question the owners about home behaviors and note in-clinic behaviors and response to palpation. For example, when we provide laser therapy, we can palpate the treatment area before and after therapy and note whether we get some immediate pain relief.

Client/Caregiver Education

Education of the client extends from helping them to gain an understanding of the disease process or injury to helping them to be part of the rehabilitation team for their pet. The rehabilitation technician will need to teach the owner the therapeutic exercises that will be performed at home. Teaching is

Figure 2.1 Your team will have developed strategies for teaching, including handouts with pictures, posters, models, and step-by-step instructions. Explain and demonstrate the exercise, then it is time for the client to practice.

a skilled job, and your team will have developed strategies, including handouts with pictures, online video demonstrations, and step-by-step instructions to aid you (Figure 2.1). First demonstrating the exercise slowly to the owner, then watching them perform the exercise and giving gentle hints and tips is advised. Every person learns in a different way and so providing a demonstration, hands-on practice, and reminders to be used later is a good way of ensuring that everyone is on the same page. A review of home exercises should occur at regular intervals (for example weekly) during in-clinic therapy visits and, as the patient progresses, new exercises will need to be demonstrated. When teaching a home exercise, remember to take into account the fact that there may be multiple members of the household responsible for therapy and that not all clients will be skilled at teaching other household members. Clients also need to be taught to watch for postural decompensations and "cheating" during specific exercises.

Nursing Care

Part of nursing care is patient advocacy as described earlier in this chapter. Physically caring for a patient in clinic involves, for example, addressing discomfort, identifying areas at risk for pressure (bed) sores, and making sure elimination is occurring adequately at home and that the patient is clean. Having the necessary skills to express a bladder, pass a urinary catheter, and evacuate a rectum manually or via enema is part of a veterinary technician's training. Pain management involves the use of pharmaceuticals, manual therapies, and modalities and the protocol for each patient may need to be adjusted at each visit. Grooming to remove excess hair from paws to improve traction, nail trimming, and removing excess hair from the perineum is important for patients with disabilities. Counseling owners about the home environment, home modifications, assistive devices, and home nursing care is time consuming and adequate time needs to be devoted to this. For more on nursing the disabled patient, see Chapters 10–13.

Working Under Supervision

Working with a Diagnosis and Prescribed Therapies

A veterinary technician is legally obligated to work in veterinary medicine under the supervision of a veterinarian. The veterinarian is responsible for the diagnosis and for the therapeutic plan. Adjunct professionals may contribute to this plan; however, they are not suitable supervisors for veterinary technicians. Both the veterinarian and veterinary technician have skills that complement each other and so make up a team. It is sometimes the belief of general practitioners that veterinary rehabilitation is solely the practice of therapeutic exercise and that any person can quickly become skilled in veterinary rehabilitation ("there is not much to it"). This is very far from the truth. The rehabilitation examination should be one of the most extensive examinations that a veterinary patient undergoes. Patients arriving with an existing diagnosis are not an exception to this, just as a neurologic examination is different to an orthopedic examination despite some overlap, so a rehabilitation examination is very different. Patients undergo a thorough assessment of function, including pain level, muscle tone, strength, and mobility with objective measurements. The whole body is examined, not just the injured area. Compensatory issues are identified and a treatment plan covers all issues, including any systemic disease, endocrine issues, nutritional status, body condition, and body composition. Any rehabilitation patient who is not examined this way is done a disservice. Therapeutic approach changes frequently as patient status changes, if patient compliance is a challenge, or if inadequate progress is being made. The rehabilitation veterinarian and technician will be in constant communication. Daily medical rounds are recommended. Rehabilitation technicians will apply and assist with therapies and are therefore closely monitoring a patient just as a technician would monitor a hospitalized patient; parameters are set for when to change the plan and when it is necessary to consult your supervisor (Figure 2.2). The same protocol of communication with the veterinarian applies to all aspects of veterinary medicine.

Figure 2.2 Daily medical rounds are recommended. Parameters are set and recorded for the therapy, when to change the plan, and when it is necessary to consult your supervisor.

Box 2.1 Red flags – Alert the veterinarian of these changes

- Any worsening symptoms from previous sessions
- New lameness or gait changes
- Sudden muscle atrophy/weakness
- Postural changes – head tilt etc.
- Changes to balance/coordination
- Change in mentation
- Tremors, clonus, seizures
- Other neurologic changes – circling, falling, etc.
- Change in temperament
- Ocular changes
- Head shaking
- Broken nails, pad changes
- Swelling
- Pale mucous membranes
- Distended abdomen
- Increased respiratory effort
- Change in urine color or odor
- Changes in stool color or consistency
- Incontinence or change in frequency of elimination
- Gastrointestinal disturbance
- Change in skin/hair coat

Approaching a Change in Patient Status

A sudden decline in patient status is always a reason to alert the attending veterinarian. Subtle changes may take additional time to recognize. As rehabilitation veterinary technician/nurses, you will become very familiar with observing a patient's gait and behaviors. Patient status can decline due to pain, relative overload (exercise was increased too rapidly, patient jumped on and off the couch at home), infection (e.g., implant infection, urinary tract infection), systemic disease, and many other reasons. Unmasking of a previously unrecognized systemic disease can sometimes occur. For example, as we slowly increase demands on a patient's respiratory system, early laryngeal paresis may be identified by increased breath sounds and increased panting. The supervising veterinarian will then need to outline necessary precautions and change the therapeutic plan accordingly. In the case of laryngeal changes, the team will need to avoid thoracic compression during hydrotherapy and to provide frequent rest breaks while avoiding overheating.

It is important to remember and use every one of your skills, including general medicine. We use general medicine in our clinic every day, even though we are a stand-alone specialty rehabilitation clinic. Every clinic should have a list of red flags – signs that all therapists know are important indicators of a decline in patient status. Signs that indicate an emergency may not always be obvious to adjunct professionals (distended abdomen in an already obese patient, cardiovascular changes, hydration status, cool extremities) and a large rehabilitation team needs every individual to be on task in order to catch signs early (see Boxes 2.1–2.5).

Also, team members need to be aware of their own limitations in training, pay close attention to the patient throughout therapy (even during conversing with the owner), and understand that it is better to alert their supervisor than to overlook potential issues.

Box 2.2 Red flags for skin and coat

Skin

- Signs of pressure/friction
- Self-mutilation (e.g., lick granuloma)
- Wounds
- Urine scald
- Bruising
- Discharge

Coat

- Thinning/alopecia
- Thicker, coarse
- Dryness/flaking
- Pruritus

Box 2.3 Red flags to listen for

- Popping
- Clicking
- Scraping
- Vocalizing in pain
- Change in pitch of vocalization
- Breathing – stertor (heavy snoring or gasping)/ stridor
- Cough
- Change in heart rate/rhythm

Box 2.4 Red flags to feel for

- Local temperature change
- Masses
- Enlarged lymph nodes
- Change in pulse
- Joint swelling (effusion)
- Edema
- Localized muscle atrophy
- Change in end feel on passive motioning
- Crepitus
- Flinch and aversion
- Bony and/or soft tissue asymmetry
- Joint displacement

Box 2.5 Red flag odors

- Ears
- Mouth
- Urine
- Wounds
- Skin/coat

Legal Issues

Working with a rehabilitation-trained veterinarian is necessary because only a veterinarian can legally make a diagnoses and prescribe treatment. A veterinary technician must work under veterinary supervision by law in the United States, so from a legal standpoint, a rehabilitation veterinary technician must have a supervising veterinarian. Working with a primary care veterinarian with no formal training in physical rehabilitation is not recommended, veterinary schools teach little to no physical rehabilitation at this time. Working for a surgeon managing postoperative rehabilitation cases without a rehabilitation veterinarian is also not ideal, as even specialty surgery training does not generally include training in rehabilitation therapy (or sports medicine). The challenge comes due to the relative scarcity of veterinarians trained in rehabilitation in the United States; however, as this branch of veterinary medicine grows, more facilities will house appropriately trained personnel. A rehabilitation veterinarian will often have other qualifications, for example manipulative therapies, myofascial dry needling, and acupuncture. Specialists in veterinary rehabilitation and sports medicine are veterinarians who have completed residency training in the subject, experienced a large clinical caseload and have published scientific research and passed a specialty examination; they are given the qualification Diplomate of the American College of Veterinary Sports Medicine and Rehabilitation (DACVSMR). The formulation of the therapy plan may involve consultation with veterinary specialists (e.g., neurologists, nutritionists, oncologists, surgeons, pain specialists), and with other professionals (e.g., animal chiropractors, physical therapists). The rehabilitation veterinary technician will be part of a small or large team whose direct supervisor is the veterinarian. Different states (and countries) will have different laws. Be aware of the law in your region and the specifics of required veterinary supervision for a technician or nurse.

Future Directions for the Rehabilitation Technician

Cutting Edge of Rehabilitation Medicine

Rehabilitation medicine continues to grow and expand in both availability and complexity. As part of the veterinary rehabilitation team, you will be at the forefront of an exciting and expanding branch of veterinary medicine. Joining a team of trained individuals will

expand your knowledge base and experience. Setting up a rehabilitation department with no other qualified individuals in a regular veterinary practice is more of a challenge and less than ideal. Rehabilitation medicine should not be an adjunct to a regular veterinary practice, rather it is its own entity, with its own skill set, like surgery or oncology. We need to recognize the high level that rehabilitation practice can achieve and to avoid limiting ourselves to low-level therapeutic exercises and laser therapy. Focusing on best practices in veterinary rehabilitation will expand and further the field, allowing us to act in the patients' best interests and improve outcomes. Best practices are outlined in the American Association of Rehabilitation Veterinarians Ideal Standards listed in Chapter 1.

Regenerative Therapies

Regenerative medicine (stem cells and growth factors used to stimulate healing and grow new tissue) is still in its infancy. There is a large amount of ongoing research into the effects of regenerative techniques, and results are promising. As rehabilitation technician, you will need to be familiar with these procedures, from harvesting tissue and blood to extracting cells and then administering the therapy (usually by injection). You will assist with these procedures. Basic principles of collection and sterile technique are used, with the same techniques as for all sterile procedures. Stem cells and blood products are usually taken from the patient they are returned to, but research and early clinical trials are starting to use allogenic (same species, different individual) stem cells and there may eventually be "off the shelf" products available. (Parker and Katz, 2006; Black et al., 2007). Your supervising veterinarian will train you in sample handling, harvesting, and administration procedures. It is helpful to write protocols for your clinic so that all team members understand set-up and protocol. Companies such as Vet-Stem Biopharma (www.vet-stem.com) provide complete instructions for harvesting, processing and injection of the processed cells. Platelet-rich plasma (PRP) can be processed at an outside facility, or there are in-clinic systems available. It is imperative that the rehabilitation veterinarian is the one making any decisions about this therapy as different preparation methods yield very different products.

Orthotics and Prosthetics

In recent years, the field of veterinary orthotics and prosthetics has grown and continues to grow. It is no longer always routine to treat an amputee with the view that they will cope well throughout life; gait analysis studies actually show evidence to the contrary (Hogy et al., 2013; Jarvis et al., 2013). A patient with a missing limb also has minimal ability to compensate for an injury to the remaining limbs. When considering a prosthesis, the planning needs to be made preoperatively, prior to amputation. As patient advocate you will ensure that communications and planning between all veterinarians involved and with the owner go smoothly.

A patient with a limb deformity is no longer resigned to limited motion. Sophisticated devices allow for good movement at all gaits and speeds. Orthoses, braces, and prostheses are veterinary medical devices and need to be prescribed by a suitably trained veterinarian. These devices are complex and fit is custom. High-tech materials ensure close fit, minimal motion between device and limb, and low friction. This minimizes the risk of complications such as skin irritation. These devices can store the energy of motion to assist forward movement, just as the elastic tissues of the body do. Chapter 10 goes into detail about these devices.

Hospice

Hospice care is providing nursing care to a patient in the final stages of life or a disease process that will end in loss of life. Home hospice care is a relatively new field of veterinary medicine, there are mobile veterinarians that provide home-based care and many of these

veterinarians have equipment for home-based hospice (e.g., intravenous fluids, injectable analgesics). The International Association of Animal and Hospice Care (www.iaahpc.org) is an excellent resource. As rehabilitation therapists, we work with a lot of aged patients and patients with high levels of morbidity, and so hospice care is relevant to the field. Providing caregivers access to home visits and understanding the limitations and patient needs in the home is part of the scope of all veterinary medicine.

Respite care (temporary hospitalization or boarding of a high-need patient) is provided in human medicine and involves temporary institutionalized care for disabled patients and a rest for their caregivers. A similar need is present but little provided for currently in veterinary medicine. Many rehabilitation clinics provide daycare or have facilities for hospitalization and extended rehabilitation stays.

Specific Organizations for Veterinarians and Veterinary Technicians

The proposed Academy of Physical Rehabilitation Veterinary Technicians is a forming organization that is under the NAVTA Committee on Veterinary Technician Specialties (CVTS). (www.aprvt.com). The Committee provides a standardized list of criteria and assistance for societies interested in attaining Academy status. The American Association of Rehabilitation Veterinarians (www.rehabvets.org) is an advocacy group that provides membership, continuing education, and other resources for veterinarians and technicians. The International Veterinary Academy of Pain Management is an organization of veterinarians and veterinary technicians/nurses that have a special interest in the study of analgesia and pain management. There is a certification offered to both the veterinarian and veterinary nurse. Certified Veterinary Pain Practitioner (CVPP) is a credential that requires continuing education credit hours, written case studies, and a qualifying examination (http://ivapm.org/for-professionals/certification/)

Conclusions

Being part of a rehabilitation team is a highly rewarding experience. Working as a rehabilitation technician expands your horizons and

Figure 2.3 You will have the opportunity to work closely with patients on a relatively long-term basis. Rehabilitation is a rewarding career.

gives you an avenue to explore and gain skills beyond your veterinary technician certification or degree. Along with your new skills, you will use your veterinary technician training and practice conventional veterinary care every day, even in a practice that focuses only on physical rehabilitation. You will have the opportunity to work closely with patients on a relatively long term basis, often one on one, and with some autonomy. (Figure 2.3). You and your team will progress a case all the way to completion of care. Seeing your patient make a full recovery, or markedly improving their quality of life is immensely fulfilling. You end each work day knowing that you and your team are making a huge difference in your patients' quality of life and so making a difference to their whole family.

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3

The Veterinary Technician and Rehabilitation Pain Management

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CHAPTER MENU

Introduction, 26
What are the Benefits of Physical Rehabilitation?, 26
Recognition and Assessment of Pain, 28
Pain Management Protocols and Education, 32
Rehabilitation as a Treatment of Pain, 34
Canine Rehabilitation, 37
The Link Between Pain and Weakness, 38
Environmental Modifications, 39
Feline Physical Rehabilitation, 43
Equine Rehabilitation, 43
Conclusion, 45
References, 45

Pain insists upon being attended to.
CS Lewis (1898–1963)

Introduction

Pain for the typical physical rehabilitation patient can occur during postoperative recovery, post injury, because of a disease state, or because of the aging process. It is beyond the scope of this chapter to provide in-depth information about the neurophysiology of pain, neuropharmacology, and most drug doses.

What are the Benefits of Physical Rehabilitation?

The benefits of physical rehabilitation are to:

- reduce pain (Sharp, 2008),
- increase and maintain muscle strength and flexibility,
- improve joint mobility,
- promote and restore normal movement patterns,
- increase cardiovascular fitness,
- combat acute and chronic inflammatory processes (Riviere, 2007),

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- improve blood perfusion and consequently tissue repair,
- prevent adhesions, fibrosis, and tissue retraction,
- stimulate the nervous system and prevent neurapraxia (temporary loss of motor and sensory function due to blockage of nerve conduction), and
- promote the healing process.

Top of the list of benefits of physical rehabilitation is "to reduce pain." Reviewing some of the human literature in evidence-based medicine for pain reduction and physical (rehabilitation) therapy, the following reports are found:

- "There is platinum level evidence that land-based therapeutic exercise has at least short term benefit in terms of reduced knee pain and improved physical function for people with knee Osteoarthritis" (Fransen and McConnell, 2008).
- "Extended exercises in water and swimming have been shown to reduce edema, inflammation, and peripheral neuropathic pain in a research model" (Akyuz and Kenis, 2014).
- "The most effective and strongly supported treatment modality for patients with PFPS (patellofemoral pain syndrome) is a combined physiotherapy program, including strength training of the quadriceps and hip abductors and stretching of the quadriceps muscle group" (Rixe *et al*., 2013).

Research in veterinary medicine about the effects of physical rehabilitation on pain is less extensive. There have been several clinical studies, and a few notable ones are mentioned here. A study of 60 client-owned Labrador retrievers with hip dysplasia showed that exercise was associated with a decrease in the severity of lameness in dogs with hip dysplasia (Greene *et al*., 2013). Seventy-five dogs with fibrocartilaginous embolism were examined through recovery, and it was found that hydrotherapy instituted immediately after diagnosis had a major positive influence on recovery (Gandini *et al*., 2003). Therapeutic ultrasound used to treat two dogs with gastrocnemius muscle avulsions resolved lameness within one month as measured by forceplate (Mueller *et al*., 2009). A survey-based retrospective study of dogs that underwent tibial plateau-leveling osteotomy for the management of cruciate disease found that dogs that had undergone rehabilitation therapy were 1.9 times more likely to reach full function at week 8; the group that underwent cage rest and leash walking was 2.9 times more likely to have unacceptable function at week 8 (Romano and Cook, 2015).

The World Health Organization's definitions for impairment and disability are pertinent to veterinary patients. Impairment is defined as "Any loss or abnormality of psychological, physiological, or anatomic structure or function." Disability is defined as "Any restriction (resulting from impairment) of ability to perform an activity in the manner or within the range considered normal for the species" (Davies, 2014a). If modified function was just a response to nociception (a painful, injurious stimulus), then analgesic medications would be enough; however, this is often not the case (Davies, 2014a). Musculoskeletal pain can be a part of any of the rehabilitation conditions listed above. The causes of musculoskeletal pain are not fully understood but likely involve inflammation, fibrosis, tissue degradation, and neurotransmitter and neurosensory disturbances, and may include central and peripheral hypersensitivity and impairment of descending inhibition of incoming nociceptive impulses (IASP, 2009).

It is important to remember that the credentialed physical rehabilitation veterinary technician is not to diagnose, prescribe, or perform procedures that are considered to be the practice of veterinary medicine, and must obey all individual state and regional laws and regulations pertaining to the field of veterinary physical rehabilitation (White, 2014). The credentialed physical rehabilitation veterinary technician will report to their supervising rehabilitation veterinarian on initial visit, during treatments and at all follow-up visits.

Veterinary physical rehabilitation is a discipline that encompasses the application of physical therapeutic and rehabilitation techniques (developed in humans and on lab animals) to animals whose comfort and function have been compromised in some way (Fox and Downing, 2014). In general, patients that present for rehabilitation therapy are reluctant to move. One of the major factors contributing to this reluctance is pain. "It is absolutely necessary that pain be controlled prior to initiation of physical rehabilitation" (R Downing, 2013, personal communication). The credentialed rehabilitation veterinarian (CCRT/CCRP/CVMRT) gathers information that will influence the treatment choices for individual patients. Patients experiencing acute pain following orthopedic surgery have different needs than the elderly dog experiencing the chronic maladaptive pain associated with long-standing osteoarthritis (Fox and Downing, 2014). Patients may present already being administered various pain medications that the rehabilitation veterinarian may consider changing. If it is at all possible the rehabilitation veterinarian should be in contact with the surgeon before a patient is referred for rehabilitation so that they are aware of the perioperative pain management plan. Excellent reviews of multimodal pharmaceutical management of pain can be found in *Pain Management for Veterinary Technicians and Nurses* (Albino, 2015) and *Canine Sports Medicine and Rehabilitation* (Epstein, 2013).

Although it is important for the credentialed rehabilitation veterinary technician/nurse to know and understand pain neurophysiology, neuropharmacology, and most drug doses, this is not the main job that they will have as far as pain management is concerned. As quoted from the *NAVTA Journal* article by White (2014):

> Pain plays a role in any patient's willingness and motivation. A patient's pain score should be assessed and documented in the medical record during each visit. (http://www.rehabvets.org/model_standards.lasso, 2013) A detailed history should indicate the degree of pain and the disability. How does the patient cope with the disability? If changes in a patient's pain level are noted, the supervising veterinarian should be notified immediately. It is very important for the rehabilitation veterinary technician/nurse to remain in open communication with their supervisor about anything abnormal or any changes in progress.

Recognition and Assessment of Pain

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (Bonica, 1979; IASP, 2009). Pain motivates us to withdraw from potentially damaging situations, protect a damaged body part while it heals, and avoid those situations in the future (Lynn, 1984). It is initiated by stimulation of nociceptors in the peripheral nervous system, or by damage to or malfunction of the peripheral or central nervous systems (Woolf and Mannion, 1999). Most pain resolves promptly once the painful stimulus is removed and the body has healed, but sometimes pain persists despite removal of the stimulus and apparent healing of the body; and sometimes pain arises in the absence of any detectable stimulus, damage, or pathology (IASP, 2017).

Recognizing pain and assessing its intensity are both essential for its effective management. If pain is not recognized, then it is unlikely to be treated; failure to appreciate the intensity of pain will hamper the selection of an appropriately potent analgesic, raise doubts about the effectiveness of the administered dose, and result in less than optimal treatment (National Academy of Sciences, 2009). A reliable method of pain assessment allows an appropriate analgesic regimen to be used and effectively evaluated.

Assessment of Pain or Distress

Assessment of pain or distress may be based on many different criteria including (Goldberg, 2010):

- decreased activity,
- abnormal postures, hunched back, muscle flaccidity, or rigidity,
- poor grooming,
- decreased food or water consumption,
- decreased fecal or urine output,
- weight loss (generally 20–25% of baseline), failure to grow, or loss of body condition (cachexia),
- dehydration,
- decrease or increase in body temperature,
- decrease or increase in pulse or respiratory rate,
- physical response to touch (withdrawal, lameness, abnormal aggression, vocalizing, abdominal splinting, increase in pulse or respiration),
- teeth grinding (seen in rabbits and farm animals),
- self-aggression,
- inflammation,
- photophobia,
- vomiting or diarrhea, and
- objective criteria of organ failure demonstrated by hematological or blood chemistry values, imaging, biopsy, or gross dysfunction.

Some species-specific signs are listed in Table 3.1.

The most common approach to pain assessment is the use of charts and scales.

Are There Limitations to Pain Scales?

Pain scales should be used in conjunction with a thorough physical exam and history to assess every patient (Fox, 2014, pp. 27–45). The veterinary technician should recognize that all pain scales have limitations and that individual patient behavior may dictate prompt pain relief, regardless of the pain score. Caregivers should strive for low pain scores in a comfortable-appearing patient.

Pain scales can be subjective, such as visual analog scales (VAS), numerical rating scales (NRS), and simple descriptive scales (SDS) (Goldberg, 2010):

- VAS – uses a line with no markings. Numbers are at each end: 0 (no pain) and 100 (worst pain) (Figure 3.1).
- NRS – uses a number line with individual numerical markings (1–10) which are chosen as the score (Figure 3.2).
- SDS – numbers are assigned to descriptions that categorize different levels of pain intensity: 0 = no pain, 1 = mild pain, 2 = moderate pain, 3 = severe pain.

The Colorado State University Acute (Canine and Feline) are numeric and categoric, convenient pain scales that are easy to use in a clinical setting (Wiese, 2015). You can download these and an equine scale from http://csu-cvmbs.colostate.edu/Documents/anesthesia-pain-management-pain-score-equine.pdf.

Pain scales can be objective, such as the Glasgow Composite Pain Scale (Figure 3.3):

> A pain scale that takes into account the various dimensions of pain is thought to be more useful in indicating how much the pain "meant" to the animal, but VAS, NRS and SDS scales are unidimensional. A pain scale should ideally be multidimensional, in that several aspects of pain intensity & pain related disability are included and question especially the dynamic aspects. The Glasgow CPS is thought to be Multidimensional (Karas, 2011).

Several chronic pain scales have been developed for dogs, namely:

- Canine Brief Pain Inventory (CBPI) (Figure 3.4)
- Helsinki Chronic Pain Index (HCPI)
- Cincinnati Orthopedic Disability Index (CODI)
- Liverpool Osteoarthritis in Dogs (LOAD) Instrument and Questionnaire.

Table 3.1 Species-specific behavioral signs of pain.

Species	Vocalizing	Posture	Locomotion	Temperament
Dog	Whimpers, howls, growls	Cowers, Crouches; Recumbent	Reluctant to move; awkward, shuffles	Varies from chronic to acute; can be subdued or vicious; quiet or restless
Cat	Generally silent; may growl or hiss	Stiff, hunched in sternal recumbency; limbs tucked under body	Reluctant to move limb, carry limb	Reclusive
Primate	Screams, grunts, moans	Head forward, arms across body; huddled crouching	Favors area in pain	Docile to aggressive
Mice, rats, hamsters	Squeaks, squeals	Dormouse posture; rounded back; head tilted; back rigid	Ataxia; running in circles	Docile or aggressive depending on severity of pain, eats neonates
Rabbits	Piercing squeal on acute pain	Hunched; faces back of cage	Inactive; drags hind legs	Apprehensive, dull, sometimes aggressive depending on severity of pain; eats neonates
Guinea pig	Urgent repetitive squeals	Hunched	Drags hind legs	Docile, quiet, terrified, agitated
Horses	Grunting, nicker	Rigid; head lowered	Reluctant to move; walk in circles "up and down" movement	Restless, depressed
Chickens	Gasping	Stand on one foot, hunched huddled	None	Lethargic, allows handling
Cows, calves, goats	Grunting; grinding teeth	Rigid; head lowered; back humped	Limp; reluctant to move the painful area	Dull, depressed; act violent when handled

Sheep	Grunting; teeth grinding	Rigid; head down	Limp; reluctant to move the painful area	Disinterested in surroundings; dull, depressed
Pigs	From excessive squealing to no sound at all	All four feet close together under body	Unwilling to move; unable to stand	From passive to aggressive depending on severity of pain
Birds	Chirping	Huddled, hunched	From excessive movement to tonic immobility depending on severity of pain	Inactive; drooping, miserable appearance
Fish	None	Clamped fins; pale color; hiding; anorexia	None unless forced; if a schooling fish; will separate itself from others	First sign to occur is anorexia; lethargic; stressed easily
Amphibians	None	Closed eyes; color changes; rapid respirations	Immobility; lameness	Anorexia; aggressive;
Reptiles	Hiss; grunting	Hunched; hiding; color change	immobility unless forced	Anorexia; aggressive; lethargic; avoidance

This chart is meant to display some of the different signs species may exhibit if in pain. Individuals may not show any of these signs or they show signs not listed. This is meant as a general guide.
Source: Goldberg (2010).

0----------100
No pain Worst pain

Figure 3.1 Visual analog scale (VAS) – pain scale.

Numerical rating pain scale

0--------1--------2-------3-------4-------5--------6---------7--------8--------9--------10
No pain Moderate pain Worst possible pain

Drawn by ME Goldberg

Figure 3.2 Numerical rating scale (NRS) – pain scale.

To date, the only multifactorial clinical measurement instrument for chronic pain in cats is the Feline Musculoskeletal Pain Index (FMPI) (Benito *et al.*, 2013). Otherwise there are no validated chronic pain scales for cats (Sekel, 2014). There is one paper (Lascelles *et al.*, 2007) that compared a client-specific outcome measure questionnaire with an activity monitor for ability to characterize impairment in 13 cats. Additional questionnaires and studies with cats have been completed (Bennett and Morton, 2009; Zamprogno *et al.*, 2010; Slingerland *et al.*, 2011; Vainionpaa *et al.*, 2012).

Suggestions for Effective Pain Scoring

- Have the same person evaluate the patient
- Place the VAS readings on the treatment/flow sheet as a chart
- Assess behavior
- Assess body posture, activity and position in cage
- Evaluate response to approach
- Interact with patient
- Palpation of surgical site
- Ask patient to ambulate, if appropriate
- Ask patient to eat, if appropriate.

In Summary

No single pain scoring system is right for all practices or facilities. In fact, it is less important which system you choose as it is to simply choose one system to be used by the entire team. Once a pain scoring system is chosen, apply it! At every single visit, assess the animal for pain and record the finding in the medical record. Each individual pain assessment is important; for a patient with chronic pain, trends are even more important because they tell us whether the patient's pain is improving or worsening. Similarly, surgical patients with acute pain need to be assessed at regular intervals (possibly every 2–4 hours immediately postoperatively) and thereafter twice daily with the results recorded in the medical record. Trends allow the team to understand the success of a perioperative pain management plan. Owners should be educated and taught how to pain score their pet. Encourage the owner to keep a chart of their pet's pain. A very basic chart for chronic pain can be extremely helpful (Box 3.1).

Pain Management Protocols and Education

The International Veterinary Academy of Pain Management (ivapm.org) offers an intensive program for veterinarians or licensed veterinary technicians/nurses to become a credentialed certified veterinary pain practitioner (CVPP). Having one or more CVPPs in the practice is beneficial for educating clients and team members and assuring clients that the practice is doing all it can to understand and manage pain in patients (Lee, 2014).