REHABILITATION

Physical Rehabilitation for Geriatric Dogs Recovering from Injury or Surgery

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Increasing knowledge and progression of veterinary medicine have contributed to companion animals living longer than ever. Geriatric veterinary patients make up a large part of who we care for on a day-to-day basis, accounting for about 40% of a small animal practice.1 As the number of geriatric patients has increased, veterinary staff have adopted geriatric patient programs to screen and support these patients as they age.

Whether a dog is considered geriatric is determined by its weight and age (TABLE 1). However, how well an animal ages is based on many factors, including genetics, environment, and nutrition.2 As they age, geriatric patients are at increased risk for illness or injury due to declines in the body’s homeostasis, energy reserves, and strength.3

Decline is natural during the aging process but can be exacerbated by injury or surgery.

Physical rehabilitation has a positive effect on the overall quality of life for all geriatric patients but is particularly valuable after injury or surgery. The veterinary nurse can enhance function and overall quality of life as geriatric patients recover and age by understanding age-related changes in patients after injury and during postoperative recovery and by selecting appropriate modalities and exercises.

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THE GERIATRIC PATIENT AND REHABILITATION

The main goal of rehabilitation for the geriatric patient after injury or surgery is to improve quality of life and maximize the health benefits, which include decreased pain, increased daily function, improved joint mobility, and improved psychological wellbeing. To create a successful rehabilitation plan, you will need a thorough history of the primary injury or surgical procedure; history of concurrent disease, nutrition, lifestyle changes, activity changes, and behavior changes; and awareness of any signs of pain. You should also consider the increased incidence of primary and secondary conditions among geriatric patients before creating a comprehensive rehabilitation plan (TABLE 2, BOX 1).

Thus, while increasing the patient’s mobility and overall function, a successful rehabilitation plan must address signs of pain, manage concurrent disease, and include nursing care.

REHABILITATION PLAN CONSIDERATIONS

Specific considerations should be addressed when tailoring a rehabilitation plan for a geriatric patient after an injury or surgical procedure. Priorities include addressing pain, musculoskeletal changes, neurologic changes, nutrition, and psychological wellbeing. This list is not comprehensive and excludes conditions that may cause some of these physiologic changes (e.g., cardiovascular disease, hypothyroidism, cancer).

Pain Management

The first step in rehabilitation is pain management, which will increase the patient’s comfort, cooperation, and overall success in the program. Pain management must be started before the rehabilitation program begins and must continue until the specific treatment is discontinued by the veterinarian. A validated pain scale such as the Colorado State University acute pain scale can be used to assess the patient for signs of pain. Multimodal pain management consisting of medication, therapeutic modalities and treatments, and low-impact exercises will all reduce pain and improve the patient’s rehabilitation outcome.

Analgesic medications are a vital part of pain management after injury or surgery and are necessary to improve patient comfort during the recovery period. For geriatric patients recovering from acute injury or surgery, the foundation of treatment is based on medications such as nonsteroidal anti-inflammatory drugs (NSAIDs) due to their anti-inflammatory and analgesic properties. However, for geriatric patients, NSAIDs should be used sparingly and with caution due to their increased potential for gastrointestinal upset and other side effects. For chronic pain, multimodal drug therapy should be considered to reduce potential side effects.

Musculoskeletal Changes

The aging process negatively affects muscle, cartilage,
and bone via sarcopenia, decreased cartilage water content, and increased infiltration of fat into bone marrow. The decline of musculoskeletal function, integrity, and strength resulting from these processes directly affects how geriatric patients heal after injury and/or surgery. Because of these negative effects on tissues, the rehabilitation team should proceed with caution when performing manual therapies, administering therapeutic modalities, and guiding the patient in low-impact exercises aimed at relieving pain, increasing blood flow and tissue oxygenation, increasing range of motion, and improving balance and strength.

Neurologic Changes
Although serious neurologic conditions warrant further diagnostics and surgery, some geriatric patients may experience progressive weakness or ataxia that may not have a discernible cause. To re-establish neural pathways affecting sensory input and proprioception, reduce pain, retrain gait, and increase strength for patients who have a neurologic injury or have undergone surgery, rehabilitation should begin as soon as possible.

Nutrition
An integral part of the rehabilitation assessment is proper nutrition, which should be considered a priority throughout the rehabilitation process. A nutritional assessment will establish the key nutritional factors needed to facilitate healing. To establish a baseline and track progress during therapy, charting body condition score is essential.

Improper nutrition is associated with numerous health risks. For the geriatric patient, this means an increased likelihood that secondary diseases or complications may develop during recovery. Examples of health risks that can negatively affect rehabilitation after injury and/or surgery include reduced cardiac and respiratory output, delayed wound healing, and an overall slower recovery.

Creating a proper nutrition plan prior to or at the beginning of rehabilitation will improve the patient’s recovery time and experience.

Cognitive/Psychological Wellbeing
According to Landsberg et al., cognitive dysfunction is a neurodegenerative disorder of senior dogs and cats that is characterized by gradual cognitive decline over a prolonged period. A thorough rehabilitation assessment may uncover underlying cognitive changes.

<table>
<thead>
<tr>
<th>ORTHOPEDIC</th>
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<tbody>
<tr>
<td><strong>Thoracic limb</strong></td>
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<tr>
<td>● Carpal hyperextension</td>
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<tr>
<td>● Elbow dysplasia</td>
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<tr>
<td>● Fragmented medial coronoid process</td>
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<td>● Un-united anconeal process</td>
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<tr>
<td>● Osteochondritis dissecans</td>
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<td>● Shoulder dysplasia</td>
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<td>● Fracture</td>
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<tr>
<td><strong>Pelvic limb</strong></td>
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<tr>
<td>● Calcaneal tendon rupture</td>
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<td>(arthrodesis or repair)</td>
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<td>● Medial luxating patella repair</td>
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<td>● Cranial cruciate ligament repair</td>
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<tr>
<td>● Tibial-plateau-leveling osteotomy</td>
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<td>● Tibial tuberosity advancement</td>
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<td>● Lateral suture</td>
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<td>● Meniscal repair</td>
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<td>● Total knee replacement</td>
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<td>● Hip dysplasia</td>
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<td>● Femoral head ostectomy</td>
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<tr>
<td>● Total hip replacement</td>
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<td>● Fracture</td>
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<table>
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<th>NEUROLOGIC</th>
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<tr>
<td>● Hemilaminectomy</td>
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<td>● Fibrocartilaginous embolism</td>
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<td>● Acute noncompressive nucleus pulposis extrusion</td>
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<td>● Spinal fracture or luxation</td>
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<td>● Spinal or cranial tumor/mass removal</td>
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Numerous signs indicate cognitive dysfunction, including decreased mobility, change in appetite, urinary or fecal accidents, reduced alertness, increased anxiety, and changed interactions with people. A patient’s cognitive function can limit the therapies that can be implemented and performed during recovery. The rehabilitation team needs to be able to differentiate between cognitive dysfunction and a more serious underlying condition that should be treated.

Often confused with signs of cognitive dysfunction are behavior changes that accompany underlying pain and weakness. Stress and anxiety can be increased by the limited mobility that accompanies aging combined with loss of function after injury and/or surgery. Increased or prolonged stress and anxiety lead to a disruption of the body’s homeostasis. Reduced homeostasis results in immune suppression, delayed wound healing, and alterations in pain perception, which negatively affect our patients before, during, and after rehabilitation. Implementing a low-stress program with positive reinforcement strategies and multiple therapeutic exercises during rehabilitation sessions will positively affect patients, clients, and the veterinary team. A relaxed and confident patient leads to increased compliance and relieves client and veterinary team frustration. This type of program is crucial for the longevity and success of the patient.

**FIGURE 1.** Dogs performing low-impact, weight-shifting exercises using different rehabilitation tools: (A) physioball, (B) rocker board, (C) inverted bosu ball, and (D) wobble board.
**REHABILITATION THERAPY OPTIONS**

When a full rehabilitation assessment and a treatment plan have been completed, the rehabilitation veterinary nurse, under the supervision of the veterinarian, may implement the plan by using multiple therapies and modalities. Those described below may be used during rehabilitation for a geriatric patient recovering from injury and/or surgery.

**Manual Therapy**

Therapeutic exercises improve limb awareness and core and appendicular muscle strength and maintain posture.\(^\text{12,13}\) For geriatric patients who are recovering, therapeutic exercises should improve strength, stability, and comfort. Use caution to prevent increasing fatigue, worsening mobility issues, or negatively affecting any surgical correction. Caution must also be used when performing manual therapy for geriatric patients who may have increased pain resulting from limited range of motion due to injury, surgery, and previous osteoarthritis or degenerative joint disease.\(^\text{3}\)

- **Massage** is applied to muscles and corresponding tissues to relieve pain and muscle spasms while promoting relaxation, improved mobility, and circulation.\(^\text{14}\)
- **Passive range of motion** maintains muscle and joint mobility by increasing synovial fluid flow, reducing risk for muscle contracture, and maintaining joint range of motion.\(^\text{15}\)

**Low-Impact Exercises**

Low-impact exercises (FIGURE 1) can lead to slow and steady progress for geriatric patients.\(^\text{3}\) If needed, assistive devices such as slings, harnesses, lifts, and physioballs can be used to provide support for the patient.

- **Assisted/nonassisted standing** builds and maintains the postural muscles needed for balance, proprioception, and locomotion while increasing sensory and neuronal input.\(^\text{12}\)
- **Weight shifting** increases weight bearing and balance to the limbs, as well as improves circulation, strength, sensory, and proprioceptive input.\(^\text{12}\)
- **Cavaletti rails** improve range of motion (specifically flexion), proprioception, and balance while providing gait retraining.\(^\text{12}\)
- **Controlled walks (assisted or nonassisted)** improve circulation and lymphatic drainage and may help retain functional mobility. Whether assisted or unassisted, walking is also great for lungs, cardiorespiratory function, and postural balance.\(^\text{12}\)

**Therapeutic Modalities**

Therapeutic modalities consist of tools or machines that the rehabilitation veterinary nurse may use to enhance the outcome of the therapy session. Modalities that can be part of the multimodal approach to the rehab plan include:

- **Cryotherapy** is recommended for patients with any postoperative or acute inflammation. Cold results in vasoconstriction, slowed metabolic rate, reduced pain, and reduced histamine release.\(^\text{16}\)
- **Therapeutic laser therapy** (FIGURE 2) increases blood flow, decreases inflammation, and reduces pain via photobiomodulation. Be cautious when using therapeutic laser on patients who have thinner skin and/or less muscle because they are at increased risk for burns.\(^\text{3}\)
- **Extracorporeal shockwave therapy** uses high-energy soundwaves to stimulate tissue repair, reduce neuropathic pain, and stimulate bone healing.\(^\text{17}\) Although effective for geriatric patients, extracorporeal shockwave therapy may increase pain and worsen mobility for a few days after treatment.\(^\text{3}\)
- **Pulsed electromagnetic field therapy** reduces pain and inflammation while promoting wound healing via therapeutic microcurrents. Targeted signals...
enhance natural regenerative pathways used by the body.\textsuperscript{18}

- **Hydrotherapy (FIGURE 3)** minimizes weight bearing on the joints and helps decrease pain associated with limb soreness.\textsuperscript{19} By reducing concussive forces on the joints, it allows the patient to do standing exercises; improves proprioception, sensory input, and muscle strength; and aids in gait retraining.\textsuperscript{3,19} Hydrotherapy must be approached with caution for geriatric patients with comorbidities (e.g., cardiac or respiratory issues) and other medical constraints (e.g., urinary or fecal incontinence). Patients may also be easily fatigued.\textsuperscript{3} For postsurgery patients, hydrotherapy should not be started until the surgical incision is completely healed.

- **Therapeutic ultrasonography** uses mechanical vibrations conducted via sound waves to stimulate fibroblast activity, increase blood flow, increase tissue extensibility, decrease pain, and stimulate tissue and bone healing. This modality has both a thermal and chemical effect on tissues. The deep heating, thermal effects have a positive effect on patients with osteoarthritis, chronic soft tissue injuries, trigger points, and muscle spasms and contracture.\textsuperscript{20}

- **Electrical stimulation (E-stim)** increases muscle strength, tone, and range of motion; decreases pain; reduces edema; and reduces muscle spasm via electrical current/waveforms. E-stim may be broken down into specific types such as transcutaneous electrical nerve stimulation (FIGURE 4) and neuromuscular electrical stimulation.\textsuperscript{21}

**VETERINARY NURSING CONSIDERATIONS**

When performing rehabilitation on a geriatric patient, nursing care is a top priority. It is imperative that in between treatments and throughout the day, the patient’s bedding is clean, dry, and comfortable. Because of their decreased muscle mass and fragile, thinned skin, geriatric patients recovering from injury and/or surgery are at increased risk for development of decubital ulcers and generalized skin breakdown. To prevent these things from happening, some patients may need to be turned every 4 to 6 hours, and all patients should have thick bedding that is kept clean and dry. Keeping patients clean will also reflect positively on their general psychological wellbeing.\textsuperscript{3}

**CONCLUSIONS**

The growth of veterinary medicine for geriatric patients provides an opportunity to incorporate more physical rehabilitation in our veterinary hospitals. Geriatric patients recovering from injury and/or surgery come with an array of concurrent diseases and mobility issues. The rehabilitation veterinary nurse is an integral part of the rehabilitation team, helping to assess, develop, and implement the rehabilitation plan for each specific patient. Understanding physiologic age-related changes while implementing various physical therapies and modalities will help veterinary nurses improve the quality of life for their geriatric patients and provides the backdrop for rehabilitation success. TVN

![FIGURE 3. Dog receiving hydrotherapy.](image1)

![FIGURE 4. Dog receiving transcutaneous electrical nerve stimulation after surgery.](image2)
References


