General practitioners often wonder which patients are candidates for physical rehabilitation. It is appropriate to evaluate any patient with gait and/or mobility challenges for physical rehabilitation. The patient population that can benefit from physical rehabilitation, either in an outpatient or at-home setting, is highly variable. However, most patients presented for physical rehabilitation are overrepresented by stifle disease, osteoarthritis and obesity, and spinal cord diseases. The success of physical rehabilitation depends on several key factors, ranging from the type of condition/injury/disease to the client’s willingness/ability to restrict a patient’s exercise to that being recommended. This article lists and addresses 4 of the most commonly asked questions that physical rehabilitation specialists receive from general practitioners.

What are nonsurgical options for patella luxation or cranial cruciate ligament tears?
The answer is different for each condition because each has a different etiology. Patella luxation is the result of limb deformities (e.g., tibial torsion, shallow trochlear groove, femoral varus/valgus) and is thus primarily a surgical condition. Nonsurgical treatments are largely ineffective for luxation grades 2 through 4 because no amount of strengthening, taping, or modalities will overcome the malpositioning of the patella. Grade 1 and nonclinical grade 2 patella luxations may be amenable to therapeutic exercise for symptom management, particularly because they can result in chronic iliopsoas strains caused by compensatory biomechanical gait.

Abstract
Success of physical rehabilitation depends on several factors. Key factors include client willingness/ability to restrict exercise to that recommended, achieve/maintain the patient at lean body weight, adapt the patient’s environment, and administer supplements or pain medication as directed. Other factors are the type of condition/injury/disease, whether the patient first underwent recommended surgery, and willingness of the patient to participate. When performed correctly, with informed clients and willing patients, rehabilitation offers profound potential to improve patient mobility and quality of life.
changes from the patellar maltracking. When surgery is not an option, regardless of luxation grade, conservative care for comfort is an option, but any limb deformity or severe gait changes will not be reversed. The focus should be improving core strength, improving quadriceps activation/strength, and performing other postural exercises that address compensatory changes throughout the body.

Compared with patella luxation, cranial cruciate ligament (CrCL) injury is much more amenable to nonsurgical management, although surgical stabilization is the best short- and long-term option. Lameness resolves more rapidly after a tibial plateau leveling osteotomy (TPLO) procedure plus weekly rehabilitation than after rehabilitation alone. However, the rate of complications is discernably higher with surgical stabilization. Conservative management of CrCL disease focuses on the same principles of postoperative stifle stabilization: increase/maintain range of motion, normalize muscle mass, improve weight bearing, and control pain. Regardless of treatment path, the following treatment modalities should be implemented: weight loss to achieve lean body weight, joint supplementation for cartilage support/joint health, pharmacologic management of osteoarthritis pain, and environmental modifications for mobility limits (e.g., eliminating slick surfaces, avoiding stairs, reducing high-impact activity).

Rehabilitation for cruciate disease/injury that is in the acute phase (acute non–weight-bearing/severe weight-bearing lameness) is nearly identical to that immediately after cruciate repair. First-line strategies are exercise restriction, daily passive range of motion, early limb-use exercises (FIGURE 1), and oral medications for pain management. However, the duration of exercise restriction is often longer after conservative management of cruciate tears than after surgical stabilization. Nonsurgical management requires exercise restriction and controlled exercise for 6 to 12 months as the periarticular fibrous scar and muscular compensation develops. The author recommends strict exercise restrictions (no running, jumping, playing, or free activity in the home) for 6 to 8 weeks after initial cruciate ligament injury with an additional 3 to 6 months of limited exercise (no high impact or strenuous activity or jumping). Concurrent medial meniscal tears may prolong that time and cause significant lameness for a minimum of 6 months.

How do I stop a dog from slipping in the home, especially when getting up on hardwood/tile/linoleum floors? Are there ideal boots/shoes for dogs? There seem to be almost as many dog shoe options as

![FIGURE 1. Post-tibial plateau leveling osteotomy patient on 2 physiorolls for proprioceptive neuromuscular facilitation exercises to activate postural stabilizers.](image-url)
there are dogs! Selecting the best boot or shoe for dogs is not dissimilar to finding shoes for people; thus, it involves trial and error for the most part. However, with respect to slipping on slick flooring in the home, very few boots (if any) are up to the task. One indoor traction option is Pawz Dog Boots (pawzdogboots.com), which tend to stay in place longer than other boots due to their light weight and snug fit. Breathability is a concern; therefore, boots should not be worn for long periods (no more than 1 to 2 hours with diligent monitoring). Some patients may do well with an infant sock added to reduce foot sweating and help the boot remain in place.

However, more effective than boots for on-demand canine traction are products that increase grip without affecting foot function, sensitivity, or proprioception. The best options the author has found are using products that directly attach to the nails and keeping interdigital fur trimmed short at all times. Available primary nail traction products are Soft Claws/Paws nail caps (softclaws.com, softpaws.com), Dr. McHenry’s Dog Toe Treads (dogtoetreads.com), and Dr. Buzby’s ToeGrips (toegrips.com) (FIGURE 2). Each has advantages and disadvantages. For example, standard nail caps may help protect a worn-down nail as it regrows. Dr. Buzby’s ToeGrips do not need to be glued on. However, glued-on nail augmentation may be needed for dogs that have neurologic deficits and frequently drag/scuff their nails.

While walking outdoors, dogs often need additional protection. Selection of an appropriate boot depends on the patient’s neurologic status. Dogs with proprioceptive deficits struggle greatly with boots that add significant weight or have a stiff sole. For those patients, this author often recommends Original All-Weather MuttLuks (murtluks.com) because they are light but tough and affordable. However, there are many boots that may be appropriate. It is key that the size be correct as an oversized boot will increase the breakover point of the foot and increase its chances of falling off or spinning backward.

The bottom line is that boot fitting can be very frustrating. Clients may need to try several brands/styles before they find a workable solution. Also, if the patient has a degenerative condition, focusing on strength and pain management is more successful than finding a boot that will resolve the problem.

Will this dog walk again after spinal injury? Will rehabilitation help?

Return to function after a spinal injury or disease greatly depends on several factors. For the purpose of this question, the answer is limited to neurologic conditions most commonly treated in rehabilitation practices: disk disease (intervertebral disk disease [IVDD]), noncompressive disk herniations (acute noncompressive nucleus pulposus extrusion [ANNPE]), and fibrocartilaginous embolism (FCE).

After surgical treatment of IVDD, most patients should be walking independently by 4 weeks if they recover from deep pain within 2 weeks. Walking independently does not translate to walking normally. Any dog that is having difficulty walking after a hemilaminectomy is a candidate for rehabilitation, but the need for appropriate exercise restriction after
hemilaminectomy surgery must be respected. Unrestricted activity after a hemilaminectomy has been associated with reherniation at the surgical site. However, no studies have demonstrated reherniation associated with controlled therapeutic exercises.

For patients with ANNPE or FCE, the treatment of choice is rehabilitation. For dogs with ANNPE, the general timeline for return to ambulation is similar to that for IVDD. However, for patients with FCE, the timeline for return to function is highly variable; many dogs exhibit dramatic improvement at 7 to 14 days after injury, but others may take longer or may never return to normal ambulation.

For the most part, if no improvement is noted at 6 months after injury/surgery, then no additional improvement past that point is expected. However, patients that are progressing can continue to improve after 6 months if rehabilitation focuses on hind limb strength and proprioceptive exercises, which may be accomplished with regular hydrotherapy sessions and/or land-based exercises. Regardless of recovery status, weight management and regular activity (even as simple as daily walks) are crucial for long-term function for all of these patients.

Are cats candidates for rehabilitation? How on earth do you rehabilitate a cat?

Cats are undoubtedly underrepresented in rehabilitation practices, often because owners are not taught to recognize the signs of feline pain and osteoarthritis. Many times, owners actually welcome the changes associated with feline osteoarthritis because arthritic cats quit jumping on counters and dinner tables or no longer disrupt sleep routines with midnight playfulness. One study found that 91% of geriatric cats (> 14 years of age) had radiographic evidence of osteoarthritis in 1 or more joints. Although radiographic signs of osteoarthritis do not always correlate with clinically relevant arthritis, the chances are very high that a geriatric cat is affected in some way by arthritis pain. Physical activity is one of the best methods of arthritis treatment, and the benefits may equal those of anti-inflammatory medication. However, therapeutic exercise for osteoarthritis often requires long-term or indefinite activity to reap the benefits.

Feline rehabilitation can serve to “jump start” osteoarthritis management. It may be directed at achieving/maintaining lean patient weight, managing/adapting the environment, using modalities to manage osteoarthritis pain (e.g., TENS [transcutaneous electrical nerve stimulation], extracorporeal shockwave therapy, laser therapy, regenerative therapies such as platelet-rich plasma).

The key to success with therapeutic exercise in cats is selecting which cats will be good candidates. A cat’s behavior/attitude in the clinic is more critical for determining a cat’s candidacy for outpatient rehabilitation than the condition itself. In the author’s experience, rehabilitation fails only in extremely fractious cats that cannot be safely removed from carriers or in extremely fearful cats that refuse to move for any reason. Cats that do not like to be handled or restrained but are able to be motivated can still be successful outpatient rehabilitation patients. Common methods of motivation are food (e.g., squeeze cheese, canned food, chicken) and toys. However, the most successful option in the author’s practice has been an empty cat carrier. The cat is usually motivated to get into a carrier placed on the opposite side of an obstacle or at the end of a treadmill (FIGURE 3).
Aquatic therapy for cats can also be very successful, again with judgment on feline personality. Many cats will tolerate the water, and shockingly, many cats grow to love the water and may not even require harnesses or ties for walking on an underwater treadmill if appropriately motivated. Never underestimate the ability of cats to adapt to a positive environment!

SUMMARY
Rehabilitation success depends on several factors. Among hind limb conditions, rehabilitation alone is often more successful for dogs with CrCL tears than patella luxation, although exercise restriction for dogs with cruciate injuries is longer after nonsurgical management than surgical stabilization. For improving a dog’s traction on slippery surfaces, several commercially available products are helpful but often require trial and error to find what works best for each patient. Rehabilitation is beneficial for most dogs after spinal injury, whether preceded by surgery (e.g., for patients with IVDD) or alone (e.g., patients with ANNPE and FCE). Some cats, but not all, can be quite amenable to rehabilitation therapy.

References

Marti Drum
Dr. Drum’s background of riding and showing Thoroughbred horses led to her interest in veterinary sports medicine and physical rehabilitation. She received a DVM/PhD degree from Colorado State University in 2006 and began as a clinical instructor at the University of Tennessee College of Veterinary Medicine (UTCVM) the same year. While at UTCVM, she has developed a wide-ranging background in rehabilitation and sports medicine, drawing from experience with multiple species, including horses, camels, pigs, sheep, chickens, avian/exotic pets, zoo animals, dogs, and cats. In addition to teaching veterinary students, she also instructs veterinarians, veterinary nurses, physical therapists, and physical therapy assistants enrolled in the University of Tennessee Canine Rehabilitation Certificate Program. She became a diplomate of the American College of Veterinary Sports Medicine and Rehabilitation in 2012 and is currently an associate professor at UTCVM. Dr. Drum is especially interested in return to sport, working dog orthopedics, extracorporeal shockwave therapy, regenerative medicine, and myofascial trigger point therapy.