The amazing thing about the veterinary industry is that it is forever expanding and evolving as new medicine and techniques emerge. Research is happening daily and vet nurses, technicians and other support staff within a hospital setting are always wanting to improve their service to clients and their pets.

As veterinary surgical options increase, and the canine sports and competing world grows, the need for ongoing and specialised fitness, nutrition and rehabilitation knowledge is needed to support these areas. This article will introduce you to the advancing world of physical rehabilitation in dogs and how, as a veterinary nurse, you can incorporate rehabilitation into your nursing of hospitalised recumbent patients, post-operative patients and even look to utilise simple techniques in your geriatric clinics.

**What is canine physical rehabilitation?**

Physical rehabilitation is not just about putting a dog on an underwater treadmill and turning it on for 15min. Thankfully, this misconception is slowly disappearing. Between a client’s first observation of something wrong with their pet to the vet’s diagnosis, rehabilitation starts. Whether it’s activity modifications or restrictions, analgesia or cryotherapy, these are all considered aspects of the injury rehabilitation journey.

Exercise can bring great benefit to the rehabilitation patient. It can assist in increasing range of motion, stability, endurance and strength. Exercise can also improve balance, motor control, proprioception and flexibility. Rehabilitation therapists apply exercises to help normalise muscle tone, reduce pain, promote functional independence and to improve weight-bearing tolerance (Van Dyke, 2012).

All animal physical therapists should have graduated with accredited certification or university degree that allows them to develop a suitable program for the function of the dog, not the condition or disease.

Rehabilitation professionals must be able to process information related to how the musculoskeletal and nervous systems work and affect function. Understanding biomechanics, which involves the study of forces in movement and at rest, is crucial.
Depending on the forces applied to the body, musculoskeletal tissues will have different responses (Zink & Van Dyke, 2014).

The overall goal of rehabilitation is to minimise discomfort and return a dog to as close to normal function as possible. By using various modalities, whether it’s an expensive piece of LASER equipment or the hands you were born with to perform massage, we can achieve this goal.

**Types of rehabilitation**

**Cryotherapy**

Cryotherapy is the use of cold to remove energy from the tissues in the form of heat. The use of cold application can provide cooling in the tissue between 2 and 4cm deep. (Zink & Van Dyke, 2014).

Most commonly, cold therapy is used in the form of ice packs against the body, or ice massage. The patient’s tolerance, size and accessibility to the area in which to apply cold therapy needs to be considered when deciding which method of cryotherapy to use. There are many commercial packs available to purchase, however, cold packs can also be made in the clinic with crushed ice or by freezing a combination of 3 parts water to 1 part alcohol in a sealable bag (Zink & Van Dyke, 2014).

The most common goal with cryotherapy is a reduction in pain. Studies have shown that human patients receiving cryotherapy following orthopaedic surgery will often require less analgesia (Zink & Van Dyke, 2014).

It is important to note however, that despite cold therapy being one of the most convenient and readily available forms of rehabilitation, there are factors to consider, such as the duration and application techniques, to achieve the desired result.

**Hydrotherapy**

Unfortunately, with constraints such as costs, space and limited availability of qualified staff, an underwater treadmill or swimming pool can be nothing more than a dream for most clinics.

They are however, a useful physical rehabilitation tool and a lot can be achieved by having one.

Recently, hydrotherapy, or aquatic therapy, has become an important part of the rehabilitation of many small and large animal conditions, as the recognition of the importance of rehabilitation after injury grows (McGowen, Goff & Stubbs, 2007).

The buoyancy, hydrostatic pressure, viscosity, resistance, and surface tension of water increase the efficacy of the exercise. These properties of water have a positive effect, resulting in increased muscle mass, strength, and endurance, as well as decreased pain during movement. Water buoyancy significantly decreases contact force and stress on weight-bearing joints, bones, and muscles, which in turn reduces pain (Ngunvongpanit, Tansvisut, Yano, & Kongtawelert, 2013).

Because of these supportive benefits, hydrotherapy can be a suitable option to start right from suture removal.

It is important to note that having suitably qualified individuals performing hydrotherapy increases the likelihood of a positive outcome. The patient’s needs will determine the speed, duration, depth of water, and incline of the treadmill which will all be pre-determined by the case vet or qualified technician/therapist.

There are multiple factors including the breed of dog, medical conditions and temperament, which can also influence whether the use of an under-water treadmill is suitable for use in a dog’s rehabilitation program.

**Stretching/flexibility**

There is an important distinction between range of motion (ROM) and flexibility. Where ROM refers to joint osteokinematics, flexibility refers to muscle and tendon elasticity. Often, flexibility issues appear in two-joint muscles rather than one-joint muscles. Once the affected muscle has been determined, therapeutic exercise that focuses on stretching can be initiated. Stretching involves elongating the muscles and tendons to the end of the ROM. As such, applying a tensile force to a muscle results in a transient deformation, which elongates the musculotendinous unit, resulting in a stretch (Manske, 2011).

In the ambulatory patient, some form of warm-up is recommended before initiating any stretching work. In the non-ambulatory patient, electrical stimulation or therapeutic ultrasound may be used for this warm-up. Stretches can be done actively or passively. An active stretch is initiated by the patient. One of the most common forms of active stretching techniques involves the use of treats to encourage the patient to reach into positions that will stretch the affected muscle. Examples include supporting the dog while holding a treat near one hip. The dog will stretch the contralateral epaxial muscles to reach the treat. Active stretches can also be accomplished through active exercise, such as walking through weave poles or around cones set in a tight pattern.

Passive stretches are done by the therapist. The patient must be relaxed and willing to accept this stretching work. This work is gen-
erally well accepted by the patient once they gain confidence in the therapist. An example of a passive stretch is the therapist advancing the forelimb to stretch the latissimus dorsi and teres major muscles (Van Dyke, 2012).

**Indications for stretching:**
- When ROM is limited due to shortening of muscles
- Whenever soft tissue shortening interferes with daily functional activities
- When there is muscle weakness and opposing muscle tightness
- Any loss of muscle flexibility resulting from limb immobilisation

**Range of motion**

Range of motion (ROM) exercises can be applied actively or passively.

Passive exercises (PROM) are a simple and effective option for the recumbent patient within a hospital environment. By putting each joint through their full range of motion we can ensure joint stiffness and muscle contracture risks are kept to a minimum, as well as maintaining circulation to minimise oedema.

In the active ROM exercise, the patient is encouraged to perform exercises that cause the joint to assume the desired range. An example of this is the postoperative elbow fracture patient who does not want to extend the elbow. In an active ROM exercise, the patient can be lifted on to a physioball, with the forelimbs draped over the front of the ball. As the ball is gently rocked forward, the dog will extend the forelimbs to protect himself from falling on his nose, thus extending the elbow (Van Dyke, 2012).

A passive ROM exercise is one in which the therapist creates the motion, such as gentle flexion and extension of the stifle in a postoperative anterior cruciate ligament patient. To assess the success of ROM exercises, a goniometer is used before and after therapy.

A goniometer is a simple and cheap device to measure joint angles. It is used to obtain objective measurements of joint range of motion. By applying the device over specific landmarks over a joint and moving the joint into its end range of flexion or extension, we can take a measurement in degrees, record it and monitor the joint’s progression of movement.

In a study by Jaegger, Marcellin-Little and Levine (2002) the objective was to evaluate the reliability of goniometry by comparing goniometric measurements with radiographic measurements and evaluate the effects of sedation on range of joint motion. Results of their findings showed that goniometry is a reliable and objective method for determining range of motion of joints.

**Massage**

Using our hands is a cheap and exceptional way to carry out massage, giving instant relief to tight, hypertonic muscles. By providing massage, in conjunction with PROM of limbs, we can minimize pain, discomfort and secondary dysfunction to an already compromised hospital patient.

It is important to note that becoming certified or finding a suitable short course in massage will benefit the veterinary nurse/technician in learning how to provide the best treatment possible. Knowing anatomical landmarks, muscles and their origins and insertions, and massage techniques is beneficial.

**Indications for massage**
- Increase circulation
- Decrease scar adhesions
- Relieve pain associated with muscle knots, spasms, and tightness

**Contraindications for massage**
- Fever
- Over tumors or cysts
- Acute injury or contusion
- Open wounds
- Thrombosis or phlebitis
- Skin disease
- Muscle spasm caused by inflammation or irritation

**Electrical stimulation**

The most commonly used forms of electrical stimulation in canine rehabilitation are neuromuscular electrical stimulation (NMES) and transcutaneous electrical nerve stimulation (TENS) (Zink & Van Dyke, 2014).

Electrical stimulation is an effective way of activating muscles to contract which in turn reduces muscle atrophy and facilitates muscle strengthening.

Electrical stimulation units are generally battery operated and are small portable devices. It is important to have a good understanding of your unit to achieve the desired therapeutic effect. The parameters of treatment consist of:

**Amplitude** or intensity describes the total magnitude of the electrical wave and is measured in milliamperes (mA). Increased
amplitude results in a stronger contraction as more muscle fibres are recruited.

**Pulse duration**, or pulse width, is the length of pulse and is measured in microseconds (µs).

**Frequency** or pulse rate, is the number of pulses per second and is measured in hertz (Hz). Strong muscle contractions are often elicited with frequencies of 60-100Hz. Higher frequencies tend to increase muscle fatigue, and may limit the ability to participate in active exercise following NMES.

**On/off cycle** describes the time that the current is being delivered and the time the current is stopped. Both are usually measured in seconds. As the on time lengthens, muscle fatigue becomes more likely.

**Ramp** is the time during which the current is gradually increased or decreased to improve patient comfort. It is usually measured in seconds (Zink & Van Dyke, 2014).

It’s important to ensure full training has been given and an appropriate veterinary/therapist treatment plan is developed to ensure correct use and outcome without causing patient or therapist injury.

**Laser therapy**
The term LASER is an acronym for 'light amplification by stimulated emission of radiation'.

The qualities of red light allow laser light to penetrate tissues.

Light energy is absorbed by chromophores (light absorbing molecules found in the mitochondria of a cell) causing a number of biologic effects including oxygen production, ATP production and changes in the cell membrane permeability (Zink and Vandyke, 2013).

Laser phototherapy has been proven to relieve pain, resolve chronic and acute inflammation, reduce oedema, promote healing and regeneration of neural tissues, promote wound healing and tissue repair, and modulate immune responses.

**Conclusion**
The world of physical rehabilitation is huge and one that is progressing quickly.

Ensuring a thorough diagnosis from the veterinary surgeon is important, along with a suggested treatment plan.

With physical rehabilitation, OA support, slowing down muscle atrophy, improving strength, decreasing pain, and improving mobility are all areas that are better supported.

Consider incorporating some simple techniques to add value to your services and improve your patients’ recovery and daily function.

**References**