Raptor medicine and surgery is a broad topic that cannot be completely covered in this manuscript. Therefore, the purpose of this paper is to familiarize the reader with basic aspects of raptors and to direct those interested in more details to appropriate references.

Raptors are predatory birds that fall under the orders Falconiformes (hawk-like birds) and Strigiformes (owls). Vultures have been traditionally considered raptors and were listed under Falconiformes but have been reclassified under Ciconiformes along with ibis, herons, flamingos and storks. Characteristic features of raptors are a hooked beak and talons that make them capable of capturing prey, even though many are scavengers.

Raptors are encountered primarily in one of three circumstances: wild birds, captive rehabilitation or teaching birds and falconry birds.

Wild birds make up the bulk of the raptors seen in a typical private practice. As a result, triage medicine is the primary care performed on most raptors. The goal of wild raptor medicine is to return the bird to nature. Many wild raptors can be saved from their initial injuries but may not be releasable. Non-releasable birds that cannot be placed in a rehabilitation center and used for teaching purposes should be euthanized.

Raptors kept captive long-term are often used in rehabilitation centers and zoos for teaching purposes, foster birds and sometimes species preservation programs. These birds may be presented for routine examinations, management of chronic illnesses and age-related diseases. Behavioral management, internal medicine (systemic disease, cancer, etc.) and reproductive management are among the many areas of medicine that are practiced with captive raptors.

Falconers are often skilled, licensed and trained in the care and handling of raptors—especially the ones they own. Falconry is an ancient sport complete with its own set of terminology and beliefs. Many falconers are bonded to their birds and vice versa. Medical care for falconry birds is often very different than for wild raptors. Before working with falconry birds, it is recommended that the veterinarian familiarize himself with the raptor species they are interested in. Many species are very fragile and require special handling and care

The comprehensive 1981 Lacey Act has been amended several times and has evolved into a complex set of laws that prohibit trade in wildlife or their products. The amendments to the Lacey Act strengthened enforcement procedures and simply put, makes it "unlawful to import, export, transport, sell, receive, acquire, or purchase, in interstate or foreign commerce, any fish or wildlife or plant taken or possessed in violation of any state law, foreign law, treaty or regulation of the US or in violation of any Indian tribal law." These laws are primarily enforced by the US Fish and Wildlife Service (Department of the Interior). Specifically, the wildlife provisions of the Lacey Act "prohibit importation, transportation, or acquisition, without a permit, of certain animals (and their eggs) that have been determined to be injurious wildlife."

Several other acts and laws govern the possession of wild species. These acts include, but are not limited to, the Wild Bird Conservation Act of 1992, Bald Eagle Protection Act and Migratory Bird Treaty Act. Even keeping feathers, or any part, of most raptors is punishable by law. The bottom line is that native wild species are not to be kept as pets.

It is best for veterinarians treating wild raptors to become familiar with rules and regulations of their state wildlife agency. For the most part, veterinarians can treat raptors with the intent to immediately release back into the wild or transfer to a licensed rehabilitator for further care without threat of legal enforcement. Licensed falconers must have a permit to both capture and keep selected species of raptors. However all wild birds, except introduced species, are protected under the Migratory Bird Treaty Act and technically veterinarians who handle, take possession of and treat birds under the protection of this Act are in violation of federal law. Not only is it practical, but it is legally best to work with a licensed rehabilitator and/or falconer.

Raptors deserve a complete history and physical examination as with any bird. Good Samaritans often bring wild birds to rehabilitators or directly to the veterinarian. Good Samaritans can provide basic information that may help with the diagnosis—especially in relation to poisonings. Be sure to obtain as thorough a history as possible even if the person presenting the bird found the bird "on the road side" or "in a field."

Captive raptors often come with a more detailed history beginning with their capture, housing, diet, preventative medicine (vaccinations, anti-parasite medications, etc.) and prior and current problems.

The physical examination is the same with wild and captive raptors as with pet birds. One area of special importance with raptors is a thorough eye examination. Most predatory raptors (as opposed to scavengers such as vultures) need keen vision in order to capture food. The physical examination is the same with wild and captive raptors as with pet birds. One area of special importance with raptors is a thorough eye examination. Most predatory raptors (as opposed to scavengers such as vultures) need keen vision in order to capture food. The physical examination is the same with wild and captive raptors as with pet birds. One area of special importance with raptors is a thorough eye examination. Most predatory raptors (as opposed to scavengers such as vultures) need keen vision in order to capture food.
familiar with the species in question before euthanizing the raptor.

**BE PREPARED FOR TRAUMA, TOXINS AND STARVATION**

If one could sum up raptor triage in three words it would be trauma, toxins and starvation. These three areas tend to make up the bulk of raptor triage.

Trauma most commonly includes gunshot wounds, predator/prey collisions and automobile accidents. Fractures are some of the most obvious outcomes and birds that survive the initial trauma must be assessed for repair. Bird of prey are especially prone to head trauma when attempting to catch prey or feeding along a road side and subsequently getting struck by a car. Retinal lesions, traumatic cataracts, etc can be fatal lesions to a bird that requires keen sight to spot and capture food.

Toxins come in many forms and raptors are very susceptible. As raptors often represent the top of the food chain, these birds are exposed to and often bioaccumulate toxins found in their prey. Some of the more common toxins include heavy metal from shot prey, intentionally poisoned prey (including rat poisons and avicides) and unintentionally poisoned wildlife (organochlorines, DDT and other 'field' toxins). Many toxins are difficult to isolate in affected animals. State labs and Parks and Wildlife officials should be notified with massive die-offs, toxin outbreaks and/or suspected intentional poisonings. Toxins are each treated individually as needed.

Starvation is a common outcome for juvenile birds. Some of these birds are picked up by good Samaritans because they are simply too weak to run away. Some starving birds are misinterpreted as having neurological disease due to their abnormal behavior (which is often juvenile and food seeking- even in the presence of humans). These birds often respond well to food and fluid replacement.

Of course, raptor medicine is not limited to trauma, toxins, starvation and pediatrics. Wild birds are susceptible to many other problems including viral diseases (especially herpes outbreaks, West Nile virus, etc), ecto and endoparasites, nutritional diseases (especially metabolic bone disease), cancer, congenital defects and more. Some raptors require a full spectrum of diagnostics to identify their problems.

**BASIC DIAGNOSTICS AND CARE**

After the initial history and physical examination, diagnostics are performed as needed when it is determined care will be given to the raptor. Radiographs are invaluable with trauma and suspected foreign bodies and heavy metal poisonings. Stool samples are often collected for fecal floatation and direct smear to look for parasites. Bloodwork (complete blood count and serum biochemistries) may also be required when the cause of illness is not clear, to monitor an ongoing problem and give a prognosis. Ultrasound, mass cytology, etc. is also used as needed.

Therapy often begins with stabilization which includes fluids, warmth (in most cases), nutritional support, antibiotics, temporary fracture stabilization, pain control, removal of external toxins, etc as needed for triage. The author refers to field guides for species identification and basic biology and licensed rehabilitators to determine the best diet to provide raptors while hospitalized. Surgical closure of wounds and fracture repair are usually reserved for stable patients. Post-operative care is often given to licensed rehabilitators but birds may need follow-up veterinary evaluation prior to release or placement.

While the eyes must be preserved as best as possible, most raptors also need to be capable of top notch flight in order to catch prey. Unless the raptor is intended to be captive, fractures are repaired with the intent to return the bird to the wild. With this said, proper fracture alignment and joint function are vital to a high performance raptor. Once the fracture(s) is(are) stabilized, it becomes the licensed rehabilitators job to nurse the bird back to health and ensure it can effectively capture prey prior to release.

**BEHAVIOR OF RAPTORS**

The behavioral complexities of raptors are just as diverse as with many commonly kept avian species including psittacines. Understanding basic raptor behavior is important for both triage and long-term care.

Depending on the situation during triage, presented raptors may be in shock, non-responsive, fearful or aggressive. Due to the dangerous nature of raptor talons (especially for the larger species), the author recommends handling all birds or prey with leather gloves or gauntlets. The typical response for a captive raptor is to clench its foot when making contact with an object- such as a person's arm or hand. The danger is obvious and can easily be avoided with proper equipment. While some generalizations can be made about the basic nature of each raptor species, use caution when handling any bird of prey despite its 'reputation.' Also watch for the beak on the larger raptors.

Long-term captive raptors often come with a full spectrum of behaviors. While some may be raised from the egg, these are wild animals and are rarely considered 'tame.' Captive raptors can develop self destructive behaviors, reproductive related aggression, food begging, screaming, imprinting and other aberrant behaviors as are seen with other commonly kept avian species. Dr. M. Jones has written an excellent review titled "Behavioral Aspects of Captive Birds of Prey" as referenced below and is highly recommend reading for those working with raptors.

**SUMMARY**

In essence, raptor medicine is very similar to that practiced in psittacines, passerines or any other avian groups. Raptors are incredibly beautiful and rewarding to work with. By understanding physical and behavioral differences with raptors, one can apply similar standard avian medical and surgical techniques as with other birds.
References