INTRODUCTION
No matter your comfort level with other species, birds present special challenges owing to their unique anatomy and physiology. There are more similarities between birds and other companion species than differences, yet these differences can make birds difficult to treat. This section will introduce important management and therapeutic procedures commonly used in avian practice.

EXAMINATION/RESTRAINT
Avian physical exams must begin with a thorough history. Like most exotic animal problems, many bird diseases are husbandry related. Especially when dealing with novice bird owners, nothing can be assumed. Begin by asking how long the bird has been owned, where it was obtained, and what other pet species are in the home. Also ask for specifics about diet and cage environment.

Before the physical examination, observe the bird’s posture and behavior. Look for abnormal droppings. Follow a routine during the examination so that abnormalities are not missed. It is important to weigh birds at every opportunity on a digital scale that weighs in 0.1gm increments. When examining birds, scale/perch combinations sometimes work; other times you may use a towel.

Birds that don’t step up on command may be caught using a towel. Dimming the lights will also help. It is easiest to catch a bird by using a towel, against the floor or side of the cage. Wrap the bird up and make a “birdie burrito”. Once restrained in the towel, the bird can be switched over to your hands if you wish. Using a towel for the entire physical is the author’s preference for larger psittacines. With the towel providing most of the restraint, pressure at only one or two spots is needed. By placing the bird in the dorsal recumbency, the towel wrap can be switched from side to side, exposing one wing, then the other. Still wrapped, the bird can be rolled over so that the sternum is faced down, and the tail and back may be examined.

When restraining the head, you may use an encircling grip or a side-to-side grip. The encircling grip is safe in birds because they have complete tracheal rings. Stretch the neck gently, and you may use your thumb or knuckle to lock underneath the lower beak. When using a side to side grip be careful not to exert too much pressure, particularly in macaws, so as not to bruise the delicate white tissue on the sides of the head. To examine the oral cavity loops of gauze, a wire speculum, or a bivalve nasal speculum and light source may be used.

GROOMING
Routine grooming procedures are a vital aspect of any veterinary practice. Wing, beak, and nail trimming give the veterinarian and staff regular contact with the patient and the owner. These appointments allow staff members to maintain proficiency and confidence in handling birds. They also provide for a cursory examination and a record of body weight, so signs of disease can be detected and discussed early in the course. Finally, they provide a source of revenue.

When performing a wing trim, use cat nail trimmers and cut the feather shaft near the wing just above the feathers, between the clear and white portions. This hides the cut-end, thereby lessening the
likelihood of irritation to the bird. Cut the first 5-7 primaries on both sides. Alternatively, the first three primaries may be spared and the next 5-7 cut, leaving a more cosmetic appearance. Avoid cutting blood feathers. Be sure to forewarn your clients that their bird may still be able to fly and may need additional clipping. When performing a nail trim, use quick stop routinely on all nails, as some only begin to bleed after the bird has been released. Abnormal nail and beak overgrowth have been linked to nutritional, viral, or hepatic disease. Most birds do not need routine beak trimming. A Dremel tool may be employed. Use caution: overzealous beak trimming may result in bleeding and anorexia.

INJECTIONS
Subcutaneous injections are the preferred route for multiple or repeated injections such as boluses of fluids and certain drugs. For SQ injections, the patient is generally restrained in sternal recumbency or restrained upright with the ventrum exposed. Areas of loose skin can usually be found dorsally in the interscapular region, laterally on the flanks, and ventrally in the inguinal web. Smaller volumes can be injected into the patagium (wing web) or over the hips. Use caution to avoid accidental injection into air sacs found up near the neck and in the coelomic cavity. Some drugs (e.g. doxycycline) should not be given SQ, and others (e.g. enrofloxacin, calcium EDTA) should be diluted prior to SQ administration.

Intramuscular injections are the preferred route of administration for some medications (e.g. doxycycline, calcium gluconate), but multiple IM injections should be avoided. IM injections are painful and frequently unnecessary. Necropsy of birds that have received multiple IM injections of enrofloxacin, for example, will reveal extensive bruising and muscle necrosis. Intramuscular injections are usually administered in the pectoral muscles.

Intravenous injections are indicated for emergencies and some other situations. Vascular access points are the same as for venipuncture. Alcohol will help to expose the vein and make feathers lie flat. The jugular vein is the site most often utilized for venipuncture in parrots. It can be useful for IV administration, especially in smaller patients. The right jugular is much larger than the left jugular in most individuals. The patient is restrained in left lateral recumbency, with the head pointing toward the phlebotomist. Bending the needle slightly at the hub will facilitate entry into the vein. After injection, return the bird to standing position, as the resistance to leakage of blood through the venipuncture site is greater than that for blood following its gravitational direction towards the heart. If the patient cannot stand, or if there is potential for a laceration of the vein, direct pressure over the venipuncture site is recommended.

The basilic vein is located on the underside of the wing, coursing over the elbow joint. This site is especially useful for IV access during general anesthesia and surgery. It is the preferred vascular access site for baby birds, for patients that cannot tolerate stress, and whenever aspiration secondary to regurgitation is likely. The patient is maintained in sternal recumbency, and the assistant elevates the wing closest to the phlebotomist. The area is wet with alcohol, and the vessel is occluded near the shoulder joint, and the vessel is accessed anywhere along its course. Hematoma formation at this site may be substantial, therefore direct pressure over the venipuncture site is recommended. Alternatively, when administering fluids, a small bolus of fluids can be placed perivascularly as the needle is withdrawn, thus collapsing the vein and providing prolonged pressure over the venipuncture site.

The medial metatarsal vein is the vascular access site of choice for many species, especially larger birds. The vessel is located medially above the tarsal joint. The feathers and skin are wet with alcohol, and several of the small feathers overlying the vein may be plucked. This vessel is located in a relatively non-expansile region, so the risk of hematoma formation is decreased. After an injection direct pressure over
the vessel is advised since the leg lies below the level of the heart. A 25-28 ga needle is generally suitable for most injections in pet birds.

**FLUID SUPPORT**

Fluids are indicated to prevent and treat dehydration in birds, just as in other species. Critically ill or injured birds, those presenting for surgery, and birds with a HCT above 55% should receive fluid support. Isotonic fluids such as Ringer’s solution, 2.5% dextrose in 0.45% sodium chloride, and 0.09% normal saline can be administered SQ, IV, and IO. All fluids should be warmed to 100-102°F prior to administration.

Daily maintenance for most parrots is 40-60 ml/kg/day. Smaller species, such as finches, may consume up to 300 ml/kg/day. Fluid deficit (ml) may be estimated by multiplying body weight (g) by % dehydration. The author typically gives fluids at 6-9% of BWt daily, in divided boluses. The subcutaneous route is used for routine cases but is inappropriate in critically ill or severely dehydrated patients. IV or IO fluids should be used in those circumstances. One or two boluses of IV fluids frequently provide such an improvement that further IV administration is unnecessary. Orally administered fluids are indicated for maintenance and when the patient is minimally dehydrated, however oral fluids require normal GI function to be effective.

An IV catheter of the appropriate size and length can be placed in the jugular vein in a cardiac direction. It is important to place the catheter as near the thoracic inlet as possible to avoid kinking when the neck is in normal flexion. Use of a more rigid polypropylene catheter also minimizes the possibility of kinking. The catheter can be sutured in place or enclosed in a tape collar following installation. The tape collar increases the catheter’s stability but should be applied loosely to avoid constricting the crop and esophagus. A small diameter Teflon catheter can be placed in the basilic vein of larger birds as it crosses the medial aspect of the elbow. A section of tongue depressor may be taped alongside the catheter to provide stability. After the catheter is installed the wing should be placed in a figure “8” bandage to prevent dislodging.

Because of the difficulty in stabilizing an IV catheter and the small size of many patients, the intraosseous catheter has become popular among avian veterinarians. Two primary sites are used: the distal ulna and the proximal tibiotarsus. The technique simply involves installing a spinal needle through the end of the bone and into the marrow cavity. The femur and humerus are not used because they are pneumatic.

When utilizing the ulna, the most important landmark to identify is the dorsal condyle of the distal ulna. The carpus is flexed, and the ulna is identified by palpation. Once the insertion site is located a surgical prep of the area is performed. The needle is directed under the dorsal ulnar condyle and proximally into the shaft of the ulna. Once the needle is placed the stylet is withdrawn and the needle is capped and secured with tape or stay sutures.

The approach to the tibiotarsus is like that for a normograde pinning of the bone. The cranial cnemial crest is identified on the anterior aspect of the proximal tibiotarsus between and just distal to the femoral condyles. The area is prepared for sterile technique and the spinal needle is directed into the tibial plateau just posterior to the cnemial crest and distally into the marrow cavity of the tibiotarsus. The stylet is withdrawn, and the hub is then taped or sutured in place.
With either technique fluids should be administered especially slowly to avoid leakage (minimal with careful technique) and pain (significant with high pressure).

**RESPIRATORY SUPPORT**
Oxygen can be extremely beneficial in the early stages of critical care. Respiratory emergencies certainly require oxygen administration, and since many critically ill patients are acidotic their conditions can improve with oxygen supplementation. The method of administration depends on the primary problem. When possible, it is best to humidify and warm the oxygen prior to delivery to the patient. This is best accomplished by bubbling the gas through warmed isotonic or half-strength saline solution. A canister can be devised by using rigid tubing and an empty IV fluids bottle immersed in warm water.

**CHAMBER**
Any patient that can benefit from oxygen administration can initially be rested in an enclosed container into which oxygen is delivered. Although commercial chambers are available for this purpose, even a cardboard box will suffice. All that is required is that the oxygen be somewhat contained to increase its atmospheric concentration.

Commercially manufactured intensive care units offer the advantage of being able to supply heat and humidity in addition to oxygen. The unit can be kept in a “ready” configuration, so the oxygen, heat, and humidity are immediately available in an emergency. In situations where extreme hypothermia is part of the presentation, increased humidity minimizes the risk of rebound hypovolemia caused by warming the periphery of the patient before the body core. Effective warming humidity can be provided by placing the bird on a grid over a pan of moderately hot (not scalding) water in the ICU.

**MASK**
Oxygen can be supplied via a typical anesthesia mask. The cone can be placed over the heads of large birds while small birds can be placed completely into the cone as though it were a chamber. Care should be taken that the patient does not struggle and aggravate its already fragile condition.

**AIR SAC CANNULA**
Tracheal obstructions from foreign bodies, neoplasia, fungal granulomas, etc. initially require the creation of an alternate breathing passage. The existence of the air sac system in birds provides a means of ventilation not possible in mammals. Effective respiration can be achieved by intubating the caudal thoracic air sac. Anesthesia is helpful in birds that are capable of resisting restraint. Those which are severely dyspneic may offer little resistance and the urgency of establishing effective respiration may preclude anesthesia. It is critical that the patient be evaluated for the cause of the dyspnea if possible; air sac cannulation is life saving for tracheal causes of dyspnea, but it is contraindicated for pulmonary causes.

The type of tube utilized depends on the size of the patient and the urgency of the situation. In small birds a 2-3 cm section of IV tubing will suffice. In larger birds a standard 3.0 mm ID cuffed endotracheal tube can be modified for abdominal installation. The tube is trimmed just above the airline thereby preserving the integrity of the cuff. A 1 X 3 cm strip of tape is wrapped around the endotracheal tube 2-3 mm above the cuff. Inflation of the cuff after placement in the bird offers the advantage of securing the tube in place and more importantly expanding the air sac thereby improving the patency and effectiveness of the tube.
The breathing tube can be installed into the caudal thoracic air sac either between the last two ribs or just behind the last rib, just dorsal to the dorsal edge of the pectoral muscle. The patient is secured in lateral recumbency and the area is surgically prepped. The leg is flexed and abducted (not pulled cranially or caudally) to expose the last rib. A stab incision is made through the skin with the point of a #15 scalpel blade. A fine mosquito hemostat is used to bluntly dissect through the intercostal or abdominal muscles forming a hole barely large enough to insert the breathing tube. The tube is inserted and secured either by suturing or inflating the cuff, or both. Patency can be tested by holding a microscope slide at the opening to observe for breathing-induced fogging. Once secured, the bird can breathe freely through the tube or an airline can be connected for oxygen administration or anesthesia.

NEBULIZATION
Respiratory disease can be treated by nebulization of antibiotics, antifungals, mucolytics, bronchodilators, and other medications. Nebulizers use either an air compressor or ultrasonic energy to generate an ultra-fine particle mist of medication, so it can be inhaled. In humans, it is necessary for droplet size to be 2-6 microns for deposition into the tracheobronchial area of the lung, and 0.5-2.5 micron for deposition in the alveoli. It is therefore desirable to provide a nebulizer which produces the desired droplet sizes, in the 0.5 to 8-micron range. The nebulizer usually connected to a chamber or ICU cage for administration. Presumably, the smaller the chamber the greater the dose inhaled by the patient. Birds are usually treated 2-3 times daily for 15-20 minutes until the patient is stable. The author has had excellent results with a portable ultrasonic nebulizer by Lumiscope.

NUTRITIONAL SUPPORT
Maintenance of nutrient intake is critically important in avian patients. Due to their high metabolic rates, negative effects of starvation occur quickly. When a bird fails to eat due to illness or injury, it must be nutritionally supported by force-feeding directly per os, via a gavage tube, or through an indwelling alimentary catheter. Composition of supportive formulas is a matter of individual preference. Commercial products are available that provide calories and other nutrients for ill patients. Pelleted diets can be fine-ground and mixed with water or electrolyte solutions. Hand-feeding baby formulas can also be utilized. When determining a feeding schedule, it is extremely important to consider and meet the patient’s fluid needs. Birds that have been domestically hand raised often accept warmed liquid foods orally. Even untamed birds will sometimes voluntarily accept oral feeding. Often however force-feeding is necessary and use of a gavage tube or indwelling feeding device becomes inevitable.

TUBE FEEDING
The simplest way to force feed is to employ a ball-tipped metal or rubber tube to deposit liquid food into the crop. Various commercial sources are available for tubes of both types specifically designed for this purpose. The size14 French red rubber feeding tube is an ideal size for most birds over 100 grams because it can be cut at any length at it will still fit snugly on a standard syringe tip. Birds are fed by sliding the tube over the tongue toward the right side of the bird’s neck (where the esophagus proceeds) and depositing formula in the crop. An oral speculum is used when the bird has enough strength to bite and damage the tube. A safe volume of formula for feeding directly into the crop is roughly 3-5% of the bird’s normal body weight. Feeding should always proceed slowly to avoid overfilling and reflux. Force-feeding should never be performed on birds that are recumbent as regurgitation may occur leading to pulmonary aspiration and its consequences.

ESOPHAGOSTOMY
Certain situations mandate bypassing the crop and depositing food directly into the proventriculus or beyond. Babies suffering from crop burns or those with refractory crop dysfunction, and birds with
severe beak injuries benefit greatly from an indwelling proventricular feeding tube installed via an esophagostomy. A 14-French red rubber feeding tube is passed down the esophagus of an anesthetized bird, manipulated through the crop and into the thoracic esophagus, and continued to the proventriculus until resistance is felt. At that time a 1 cm longitudinal incision is made on the right side of the neck over the feeding tube identified within the esophagus. The tube is isolated and transected beneath the incision, the oral end is removed completely, and the proventricular end is extracted 2-3 cm from the incision. A 1x5 cm strip of tape is wrapped around the protruding end of the feeding tube and it is sutured in place on the neck. If the incision is large, it may be sutured, but typically suturing is not necessary. Since the ventriculus is smaller than the crop, feedings must be about half the size used for crop feeding, and twice as frequent. A male adapter plug can be used to cap the tube between feedings. This device has been left in place as long as seven weeks without complications. Removal is accomplished by simply cutting the stay sutures and extracting the tube. Surgical closure of the wound is not usually necessary.

ABDOMINOCENTESIS
Birds presenting with excessive fluid in the coelomic cavity may exhibit a pendulous abdomen and/or respiratory distress. Ascites can occur due to neoplasia, egg yolk peritonitis, and other causes. Abdominocentesis may be indicated to relieve distress, and to obtain samples for culture and cytology. The bird must be adequately restrained, either physically or chemically. A 22- to 27-ga needle is then inserted on the midline through aseptically prepared skin just caudal to the sternum. The author prefers to use a 25 ga butterfly catheter for this purpose. Direct the needle caudally and slightly to the right to avoid the ventriculus. As the sample is aspirated into the syringe, the needle may need to be rotated to free the bevel from the body wall or viscera. Cytology should be prepared immediately to reduce artifact.

CROP WASH
A crop wash is useful for obtaining samples for cytology and culture. It is sometimes also performed to remove unwanted crop contents, as with toxin ingestion. The bird is restrained in an upright position and the neck is fully extended. An appropriately sized soft rubber or metal feeding tube is passed from the left side of the oral cavity into the cervical esophagus on the right side of the neck. The tube is advanced slowly and gently. No resistance should be encountered. If there is resistance, the process should be stopped to avoid perforating the thin-walled esophagus. When properly placed, the tube should be palpable within the esophagus and crop. The tube and the trachea should both be palpable as discrete structures before introducing any material into the crop. Sterile fluid (water or saline) may be infused into the crop (1.0-2.0 ml/100g BWt). The crop should then be gently massaged as the fluid is aspirated. Excessive negative pressure may result in aspiration of the crop wall into the lumen of the tube, causing injury to the crop.