AVIAN MEDICINE - EMERGENCIES AND RESUSCITATION

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Introduction

Clinical emergencies are a daily part of avian practice. Starting at the initial phone call to the practice, emergency triage is a skill needed by every staff member within an avian practice. The receptionists need to be able to assess the degree of urgency of a case from a few, carefully selected questions over the phone. Upon arrival at the practice, they need to be able to triage whether the bird needs immediate oxygen, warmth and veterinary assessment, or whether it can wait for the scheduled appointment. The nurses must be able to make decisions as to whether general supportive care will be sufficient until a veterinary exam, or whether veterinary intervention is immediately essential.

Lastly, all stuff need to operate as a cohesive unit when emergency resuscitation is needed.

Emergency Consultations

Emergency consultations occur frequently in avian practice. Some consultations are true emergencies, with blood loss, acute trauma and seizures being some examples. Equally common are 'decompensated' emergencies. These occur when the bird that has been masking chronic disease suddenly stops being able to hide the disease. From the owner's perspective, these are often 'sudden' illnesses. From a veterinary point of view, these are chronic diseases. The patient presents, often thin or emaciated, with very little tolerance for handling. These patients often need to be assessed in stages, and excessive stress can lead to increased (and not deliverable) oxygen demand and death. Client communication needs to be optimal in these cases, as the owners may be defensive, disbelieving or even angry when told that their bird has had a chronic illness.

Scheduling emergency consultations is handled a variety of ways. The amount and availability of veterinarian time is the usual limiting factor. Some practices simply 'grey out' a certain number of emergency consultation appointments within the consultation diary, and slot emergencies into those appointment times on the day. Other practices will squeeze emergencies in and around the normal consultation blocks. That can delay the start of other surgeries, and lead to normal 'booked' appointments running late. Some clinics will allow the clients to drop off the birds for assessment later in the day. Although this can work well, it is not uncommon that clients become difficult to contact during the day, which can lead to an ethical dilemma if a patient's clinical condition requires immediate decisions to be made.

Costing for emergency consultations can also vary. Many practices charge the same consultation fee for an emergency as a normal consultation. Other practices will add a surcharge if the appointment has to be made outside of normal consultation hours, or in addition to a full appointment book. Practices with high volumes of emergency appointments may find staff overtime costs become significant. Levels of staff physical and compassion fatigue need to be monitored.

Tracking the timing, average number and distribution of emergency consultations may help practice managers to plan rosters and staffing accordingly.

Phone calls
The initial phone contact sets the tone for the entire client-clinic interaction. The receptionists must be trained to efficiently ascertain whether an emergency appointment is, in fact, required, or if that patient can be scheduled for the next available normal consultation time.

Phrases that should trigger an emergency consultation include:

- currently bleeding
- falling off the perch
- on the bottom of the cage
- unable to balance
- not eating or not drinking
- empty droppings (droppings without faecal component)
- blood in the vomit or in the faeces
- limb hanging
- possible fracture/dislocation.
- egg laying
- Tail bobbing

A good receptionist will not only assess and book the emergency consultation, but will also prepare the client's expectations of consultation cost, waiting time and procedure once they arrive. It is helpful for the clients to be aware that their pet may be removed from them and taken to the prep area if the pet's condition necessitates more urgent triage or supportive care. They will also instruct the client to bring samples of droppings, if available.

Arrival into the practice
Upon arrival at the practice, the receptionist should assess the bird. Any bird that is currently bleeding, unable to stand, seizuring or weak is immediately moved to the prep area, where the nurses will begin the initial clinical triage. It is often useful for the clients to be filling out a history form while they are waiting for the veterinarian. Not only does it speed the acquisition of essential information, it distracts them somewhat from length of time that they have waited! Many times, after reflection, the client will come into the consultation room with a different answer to the one that they have put on the form. The nursing team can input this information onto the client file.

Nurse triage
Competent, qualified, experienced nurses are essential for the handling of avian emergencies in a busy practice setting. A good nurse will be able to assess whether a patient can wait for a brief 'out the back' assessment in between consultations, or whether a veterinarian needs to be involved immediately. For avian nurses to function in this step, the avian veterinarian MUST be able to trust their nurses skills and instincts. Nurses must feel empowered enough to make certain critical decisions in a supported fashion, otherwise the veterinarian will find themselves perpetually pulled from consultations and surgery, in order to make initial assessments. Figure 1 shows a decision chart for initial nurse triage. Table 1 lists a range of common presentations of avian emergencies, along with emergency stabilisation that can be undertaken by nursing staff while waiting for veterinary assessment.

Veterinary Assessment

Once the veterinarian has arrived at the patient, a more thorough examination can occur. Again, this may need to be staged in very delicate patients. It is possible, with the additional oxygen demand during stressful restraint, for a bird to decompensate on handling. Fly by oxygen can be used to offset this concern, if present.

Birds in respiratory distress with coelomic effusion will benefit from coelomocentesis. This must be done very carefully, with the needle positioned midline to avoid penetration into the air sacs (and subsequent fluid leakage). Positioning of the bird during this procedure is crucial - it must be held, head up, as perpendicular to the ground as possible, to facilitate respiration. Care should be taken to avoid perforation of internal organs. Many times, fluid volumes approaching or exceeding 10% of body weight can be removed.

Respiratory distress due to space-occupying coelomic masses can be harder to resolve. This can include egg binding. Supplemental oxygen, as well as the normal egg binding treatment, will assist in this particular instance. Severe respiratory distress associated with egg binding may prompt fast-tracking to ovocentesis, rather than focusing on initial medical management.

Severe respiratory distress can occur with dystocia, a fractured coracoid, severe hepatomegaly, proventriculus perforation and cardiovascular disease. Radiography is therefore recommended.

Very anxious patients may benefit from mild to moderate sedation using drugs such as midazolam. This may reduce oxygen demand, and improve patient outcomes.

Emergency Resuscitation

As with any other patient, emergency resuscitation in birds involves the establishment of an airway, the support of breathing, and the maintenance of circulation.

Airway

In an acute emergency, it can be possible to use a very tight-fitting face mask over the bird's beak and get some movement of the thorax via intermittent positive pressure ventilation. However, more effective ventilation will require endotracheal intubation. In general, the tongue of the bird is grasped and pulled toward the veterinarian, while the maxilla is supported by a support person. The glottis is visualised, and a non-cuffed endotracheal tube is passed into the trachea. The tube is secured using tie. Anchor points for the tie vary depending on the species - the mandible, the maxilla, the ventral chin or the neck are variously used.

There are certain species idiosyncracies with intubation. Chickens have a very mobile glottis, which often is seated quite deep in the pharynx. Visualisation may be difficult, and endoscopy (using an ET tube threaded over the top of the endoscopy) can be helpful. Chickens often have more reflex coughing and gag response. Topical lignocaine spray on the glottis can reduce this. Achieving sufficient visual access to accomplish intubation may be difficult in small birds.

If tracheal intubation is not possible, an alternative technique is to place an air sac cannula through the coelomic wall. The technique is described elsewhere in much more detail, but basically it involves penetration of either the caudal thoracic or abdominal air sac and placement of an indwelling tube into the respiratory system. It can be secured using butterfly tape with sutures. This technique is obviously painful, so should only be performed in the insensate patient. If resuscitation is successful, then appropriate analgesia is indicated. In smaller patients, over the needle intravenous catheters can sometimes be used.

Breathing

Once an airway is established, then ventilation should be performed. There are machines that can mechanically ventilate (the SAV03 Vetronics Ventilator, UK is one example). In the initial stages of resuscitation, however, manual ventilation is preferred because it can take too long to set up the mechanical ventilator.

The ventilatory rate is at least one breath every 2-7 seconds, depending on the size of the bird. If the bird commences spontaneous respiration, then intermittent positive pressure ventilation can be gradually reduced (Echols, 2007). However, spontaneous ventilation may be insufficient to maintain normoxaemia in the compromised patient. Therefore, use of a capnograph to monitor end tidal CO_2 (and thus ventilation/perfusion matching) is useful as the resuscitation continues. Most resuscitation occurs with the patient in dorsal recumbency, but simple dorsal recumbency can reduce the efficiency of spontaneous ventilation considerably. Therefore, repositioning the patient to lie in lateral or sternal recumbency as soon as possible is advantageous

Doxapram has been used at a dosage of 0.1-0.2ml/bird to stimulate breathing (Lichtenberger, 2005).

Circulation

Once an airway and ventilation has been established, attention must turn to the maintenance of circulation. If the patient is hypovolaemic or hypotensive, then aggressive fluid resuscitation should be performed. Clinical assessment of hypotension or hypovolaemia can be made using refill of the basilic vein (or other veins) after compression. The patient may exhibit generalised depression.

Objective measurement of blood pressure can be done indirectly in birds, but the precision is likely to be poor in conscious birds (Johnstone et al, 2011). In this author's experience, the time taken to place the measurement cuff and get the doppler positioned for correct reading precludes the use of this technique in emergency situations. Clinical parameters, including those mentioned above, are more frequently used.

Intravenous access can be obtained using the jugular vein, the basilic vein or the medial metatarsal vein. A 26G intravenous catheter can be used for small birds. In states of collapse, these veins can be difficult to access, and there can be significant blood oozing from those sites even upon successful placement of the catheter. Additionally, there may be significant bleeding after catheter removal.

The author's preferred method of emergency vascular access is to place an intraosseus catheter into the distal ulna. In birds from 80g to 800g, a 23G needle can be used. Although painful in a conscious patient, this technique gives rapid, reliable vascular access and allows commencement of fluid resuscitation within minutes. There is no further blood loss upon catheter removal. Disadvantages include pain at the site during injection and after catheter removal (which can last for a a few days). If time permits, a combination of lignocaine and bupivacaine can be injected into the adjacent tissues for local anaesthesia. If not, the local anaesthetic combination can be instilled after the resuscitation event has been successfully concluded. A figure 8 piece of elastoplast is used to secure the intraosseus catheter into place.

Lichtenberger (2007) has done extensive work in the area of fluid resuscitation, and Table 2 outlines a suggested fluid resuscitation pathway as suggested by her. Patient with haemotocrit levels less than 20% may require a blood transfusion. Birds are more resilient than mammals to acute blood loss, and start to respond with new erythrocytes within 12-24 hours.

It is more problematic to address cardiac arrest. With an overlying bony sternum, and no diaphragm, it is often thought that chest compressions are ineffective at restoring circulation in cases of avian cardiac arrest.

Nonetheless, it may be that in smaller patients it is possible to get sufficient lateral compression to have some direct cardiac effect, so this author continues to attempt this technique when there is no audible heart beat.

In the case of severe bradycardia or asystole, drugs such as adrenaline (0.01-0.1mg/kg IV, IO, intratracheally) and atropine (0.04mg/kg) can be used (Lichtenberger, 2005). Positive chronotropes should be used only when clinically indicated, as the myocardium is only supplied with oxygen during diastole, which is reduced during tachycardia.

Anaesthesia

Obviously, in any resuscitation attempt involving anaesthesia, the first task is to turn off the anaesthetic gas and ventilate only with 100% oxygen. If surgery has contributed to the crisis, then attempts should be made to fully or partially address those problems as well.

In cases of excessive bleeding leading to hypovolaemia and hypotension, then the surgeon should endeavour to ligate the bleeding vessels, or otherwise control the bleeding while resuscitative attempts are made. Even simple pressure on the bleeding area may assist in the midst of a crisis. If resuscitation is successful, the surgeon should monitor the site carefully, as bleeding may recur as the blood pressure improves.

If the coelom is open, and the air sacs have been perforated, then packing the coelom temporarily with moistened swabs may improve the quality of artificial ventilation. Do not use wet swabs, as fluid may enter the respiratory system.

A common cause of anaesthetic emergency is mucous blockage of an endotracheal tube, especially in small birds. Humidifying anaesthetic gases may reduce the incidence of this problem.

The person monitoring anaesthesia should always monitor the patient's respiratory excursions as well as the movement of the reservoir bag. Congruency of movement is consistent with a patent airway, whereas large thoracic patient excursions with minimal bag movement may indicate blockage. If a blockage is suspected, then the tube may be aspirated, or the patient may be reintubated with a new ET tube to allow better ventilation.

Post-resuscitation

If the resuscitation attempt has been successful, the avian patient must be monitored very closely. Subsequent respiratory and cardiac decompensation can occur as the levels of emergency drugs in the circulation begin to drop.

Even if the patient resumes spontaneous respiration and can be extubated, it is useful to maintain a supplemented oxygen environment (but not 100% to avoid oxygen toxicity). Oxygen chambers are useful, providing that the patient is unable to chew or damage them. Large parrots can wreak a large amount of damage to delicate equipment!

The bird should be monitored for overhydration, and the total amount of resuscitation fluid used should be calculated and subtracted from the total first day daily fluid requirement. If overhydration has occurred, frusemide can be judiciously used.

Provision of warmth is extremely important, and an enclosure heated to at least 30°C is recommended in the immediate post-resuscitation period. Hypothermia will predispose to cardiac arrhythmia.

In companion animal medicine, the percentage of animals that leave alive after CPR techniques is low. Avian practitioners should have a realistic expectation that, apart from anaesthetic overdose, most patients that go into respiratory or cardiac arrest will not survive. However, some birds do respond to resuscitation, which

makes the process worthwhile.

References

Echols S (2008). Avian Anesthesia and Analgesia. International Veterinary Emergency and Critical Care Symposium. Accessed through VIN http://www.vin.com/members/proceedings/proceedings.plx?CID=IVECCS2008&PID=24652&O=VIN

Johnston MS, Davidowski LA, Rao S & Hill AE (2011). Precision of repeated, Doppler-derived indirect blood pressure measurements in conscious psittacine birds. Journal of Avian Medicine and Surgery 25, 83-90.

Lennox AM (2008). Emergency and Critical Care of Birds. AAVAC-UEP 2008. Accessed through VIN http://www.vin.com/members/proceedings/proceedings.plx?CID=UEP2008&PID=26681&O=VIN

Lichtenberger M (2005). Emergency Medicine for the Avian Patient. Association of Avian Veterinarians. Accessed through VIN http://www.vin.com/members/proceedings/proceedings.plx?CID=AAV2005&PID=11634&O=VIN

Lichtenberger M. (2007) Shock and cardiopulmonary-cerebral resuscitation in small mammals and birds. Veterinary Clinics of North America Exotic Animal Practice 10, 275-291.

Table 1 Consultation Emergencies and Initial Stabilisation

Presentation	Initial Stabilisation	Differential Diagnosis
Trauma	Stop bleeding Cover open wounds (if possible without excessive patient stress) Stabilise damaged limbs if possible Provide warmth over 30 degrees celsius Provide electrolytes/glucose orally if veterinary assessment will be delayed past one hour and bird has swallowing reflex	Predator bites/attacks Fan strikes Unsafe toys (hooks, wedging of limbs) Conspecific or cagemate trauma
Bleeding - General	Identify focus of bleeding if external Apply pressure - digital or bandage Prevent bird from reaccessing area Cover open wounds (if possible without excessive patient stress) Provide warmth over 30°C Provide oxygen if suspect anaemic	Trauma Blood quills (see below) Lead poisoning Gastrointestinal foreign body obstruction Gastrointestinal inflammation/infection
Bleeding - Blood Feather	Identify focus of bleeding, to specific feather or feathers Nurses can ligate bleeding feather proximal to the laceration while waiting for the veterinarian Veterinarians - more likely to remove it immediately	Poor wing trim Poor husbandry (not sufficient space for wing flapping) Poor nutrition

Presentation	Initial Stabilisation	Differential Diagnosis
Seizuring - active	Veterinarians must immediately assess IV (or IM if not possible) diazepam at 0.5mg/kg Dim lighting and reduce noise Provide warmth over 30 degrees celsius	Toxins, general Toxins, pyrethroid Toxins, heavy metal Septicaemia Metabolic disorders including hypoglycaemia and hypocalcaemia Cranial disorders
Seizuring - not currently active	Provide warmth over 30 degrees celsius Place on oxygen if required Dim lighting and reduce noise	Toxins, general Toxins, pyrethroid Toxins, heavy metal Septicaemia Metabolic disorders including hypoglycaemia and hypocalcaemia Cranial disorders
Decompensated, end stage disease	Provide warmth over 30 degrees celsius Place on oxygen if required Dim lighting and reduce noise	Open
Gastrointestinal Emergencies	Provide warmth over 30 degrees celsius Place on oxygen if required Dim lighting and reduce noise Collect faecal sample Collect crop wash, if possible	Gastroenteritis - general bacterial, yeast Foreign body obstructions Macrorhabdosis Trichomoniasis
Respiratory signs	Place immediately in oxygen chamber Run oxygen at 100% Minimise handling as much as possible Provide warmth up to 30 degrees celsius (not excessive as do not want to increase oxygen demand)	Pneumonia Air sacculitis Tracheal obstruction Coelomic effusion Nasal blockage Trauma Anaemia Pain

Table 2: Flow Chart for Fluid Resuscitation of the Bird (adapted from Lennox, 2008 and Lichtenberger 2007).

Step	Comments
Assessment of hypovolaemia/ hypotension using indirect doppler OR clinical assessment of same	Determine Ht if possible. If haematocrit <20%, use fluids cautiously, or consider blood transfusion
Administer Crystalloids	10 ml/kg IV or IO 1-2 boluses
Administer Colloids	3-5 ml/kg IV or IO over 10 minutes 1-2 boluses
If patient condition and BP measurements are not improving:	Administer third dose of crystalloids and colloids. Recheck Ht if initially low
If still not improving:	Administer hypertonic saline 7.5% a 5 ml/kg bolus slowly over 10 minutes
If no improvement:	Continue fluid administration via infusion pump and monitor for response to therapy