

# Wildlife critical care

## **Kerri Morgan**

New Zealand Wildlife Health Centre, IVABS, Massey University, Private Bag 11 222, Palmerston North

### **Introduction**

A sick bird will go to great lengths to mask clinical signs of illness. In the wild, a weak bird attracts the attention of predators or may be shunned by flock-mates. This 'preservation reflex' means that many pet birds are presented to the veterinary clinic when they are in an advanced state of illness and are nearing the end of their physiological reserves. The appearance of intermittent clinical signs means a bird is definitely unwell, and the presence of continual clinical signs is indicative of serious illness.

In contrast, many wild avian patients presented to the veterinary clinic are victims of an acute injury, often the result of a road traffic accident or a window strike, and detection of subtle clinical signs is less crucial.

### **Intensive-care enclosures**

Debililitated birds lack the ability to thermoregulate and often present hypothermic. Provision of warmth is indicated for most ill birds. The desirable ambient temperature for most sick birds is between 29-30°C, although care should be taken with large pelagic species (e.g. yellow eyed penguins, albatross) these are likely to overheat at these high temperatures. Kiwi also have a lower inherent body temperature and it is recommended to house them at lower temperatures (e.g. 25-26°C) (Harrison, Lightfoot and Flinchum 2006). Birds should be monitored for signs of heat stress, including open mouth breathing, flattening of feathers to the body and holding of wings/flippers away from their body.

Brooders or incubators (preferably small animal, otherwise human paediatric ones) are ideal as these allow both thermostatic and humidity control. Alternatively, simply using a heater with a thermostat (e.g. an oil heater) can heat a small room. Hot water bottles or heat pads are fine for short term warmth, however care must be taken to prevent contact burns. In addition, these quickly cool and will need to be replaced frequently. Over-head heat lamps need to be used with care if unattended, in particular with severely debilitated birds that cannot move away from the heat source.

Recovering birds should be placed in a quiet environment, away from visual and/or auditory stimulation from humans and other animals.

### **Fluid therapy**

As in other species, goals of fluid therapy in birds include replacement of lost fluids; replacement of ongoing losses; and provision of maintenance fluids to cover normal daily losses (estimated at 50ml/kg/day) (Morgan 2008). Subjective assessment of hydration status in birds is difficult, and should be based on clinical signs and history (Quesenberry and Hillyer 1994a). Birds with a filling time of the ulnar (wing) vein greater than 1-2 seconds are around 7% dehydrated, and birds with sunken eyes and tacky mucous membranes can be considered 10% dehydrated. Objective assessment of hydration status requires the knowledge of reference values for a particular species. A general rule of thumb is that dehydration may increase the PCV by 15-30% and the total plasma protein (TPP) by 20-40% of the normal reference values (Quesenberry and Hillyer 1994a). A PCV of greater than 56% is indicative of dehydration in most birds, however this may be normal for some smaller birds (Samour 2006).

For this reason, many avian veterinarians assume a loss of 5-10% of total blood volume in a debilitated bird, half of which should be replaced over the first 12-24 hours, and the rest over the following 48 hours (Morgan 2008, Quesenberry and Hillyer 1994a).

Fluids should be warmed to 38-39°C, especially for neonates, or during intravenous, intraosseous or subcutaneous administration to patients in shock or hypothermia (Quesenberry and Hillyer 1994a). Fluids can be kept in an incubator or on a heating pad so they are always available warm.

Note because of the presence of air sacs in birds, intraperitoneal fluid administration will result in fluids getting into the respiratory system, and this method should NEVER be done in birds.

### Oral administration

Oral administration of fluids are useful in mildly dehydrated birds, or for daily maintenance fluids (Harrison, Lightfoot, and Flinchum 2006, Quesenberry and Hillyer 1994a). Oral fluids are contraindicated in patients who are laterally recumbent, have gastrointestinal stasis, head trauma or in seizing patients (Quesenberry and Hillyer 1994a). This method is ineffective in patients in shock or those regurgitating (Quesenberry and Hillyer 1994a). Administration of 5% oral dextrose solutions have been shown to be more effective for rehydration than oral administration of lactated ringers solution (Martin and Kollias 1989), and oral electrolyte formulations designed for other species may be the most effective.

Knowledge about the gastrointestinal anatomy of the patient at hand is essential in order to estimate volume of oral fluids which can be administered at any one time. For example, kiwi lack a crop and have a relatively small proventriculus and ventriculus (gizzard), where as kereru (native woodpigeons) have a relatively large crop and can hold greater volumes of fluids. Seabirds also lack a crop, however their proventriculus has a very large capacity and can tolerate large volumes of fluid and food. A few suggestions of volumes (per adult bird) below may help, however it is my recommendation to start with smaller volumes and increase over subsequent administrations.

Kereru	30-35ml
Kiwi	20-25ml
Harrier hawk	25-30ml
Tui, kingfisher	3-5ml
Albatross	250-300ml
Little blue penguin	50-60ml

Oral fluids can be administered using either a metal avian crop needle (essential for parrots or other species with sharp beaks) or with soft silicone tubing attached to a syringe.

### Subcutaneous administration

Subcutaneous fluid therapy is used principally for maintenance fluid therapy or for mild dehydration, but this method is relatively ineffective for treatment of severely debilitated or dehydrated birds due to peripheral vasoconstriction (Harrison *et al.* 2006, Quesenberry and Hillyer 1994a). Sites of administration include the intrascapular, axilla and lateral flank areas, with the total volume of fluids given over several sites at 5-10ml/kg/site using a small gauge needle (Quesenberry and Hillyer 1994a). Fluid types include warmed lactated ringers solution or 0.9% NaCl. Subcutaneous dextrose is contraindicated in dehydrated birds (Martin and Kollias 1989).

### Intravenous administration

IV fluids are essential in cases of severe hypovolaemia or extreme debilitation (Harrison *et al.* 2006). Intravenous access points include the medial metatarsal vein, basilic (wing) vein or jugular veins. A light general anaesthesia (isoflurane) will aid catheter placement, however this should be weighed up against the risk of anaesthesia in a severely debilitated patient. The choice of catheter size obviously depends on the patient size – for example, a 22 gauge catheter is suitable for an adult kiwi or harrier hawk, for smaller patients a 24 gauge catheter should be used. The catheter should be taped securely and covered in a self-adherent dressing. Elizabethan collars are not essential in most cases, and will often result in further stress to the patient if used (Harrison *et al.* 2006), however they may be indicated in parrot species.

Use of a fluid pump is essential for constant rate infusion of fluids to avian patients to prevent accidental overhydration. If a fluid pump is unavailable, intermittent boluses of fluids should be given slowly at a rate of 10-25ml/kg over 5-7 minutes and repeated at 3-4 hourly intervals until rehydration is established. Thereafter, twice daily IV boluses can be used for maintenance (Harrison 1986).

Lactated Ringer's solution is recommended for replacement fluid therapy and shock therapy (Quesenberry and Hillyer 1994b). 0.9% NaCl may also be used. On their own, both LRS and NaCl are unsuitable for maintenance fluids. A good option for ongoing maintenance requirements is half strength LRS + 2.5% dextrose with 20mEq/L KCl (Morgan 2008).

For hypovolaemic shock, boluses of warmed LRS may be given by intravenous (or intraosseous) administration at 10-30ml/kg slowly over 5-7 minutes. Alternatively, hypertonic (7.5%) saline can be given as a bolus at a rate of 3-4ml/kg and followed by replacement IV crystalloids (as above) (Morgan 2008).

For severe hypoproteinaemia, colloids may be used at a dose rate of 10-20ml/kg every eight hours for 1-4 treatments, followed up by crystalloids. For severe blood loss, whole blood transfusions should be considered (Morgan 2008).

### Intraosseous administration

An alternative to IV catheterisation, intraosseous catheterisation into the distal ulna or proximal tibia is indicated in severely debilitated birds (Harrison *et al.* 2006). Pneumatic bones (the humerus and femur) should be avoided as these directly communicate with the air sac system (Quesenberry and Hillyer, 1994a). Intraosseous catheterisation is a very painful procedure which should be done under general anaesthesia, except in very moribund birds that are unlikely to survive anaesthesia but also won't survive without fluid therapy.

Aseptic preparation of the site is very important to minimise the risk of introducing infection. In young birds, an 18-22g spinal needle (1.5-2.5-inch) is ideal (Quesenberry and Hillyer 1994a), however a 20-24 gauge needle will suffice (depending on the size of the patient). Butterfly catheters are ideal as they allow suturing of the device to the patient's skin. The needle should be advanced distally into the bone marrow via the tibial crest or distal ulna by hand using pressure with a slight rotating motion. In adult kiwi, a kirschner wire and chuck may be necessary to pre-drill the hole for cannulation (Morgan 2008). Bone marrow may occlude the needle lumen and will need to be aspirated and flushed with a small amount of heparinised saline (Morgan 2008). Alternatively, the needle may need replacement with a fresh one before securing in place with a light bandage. Fluids should be given slowly, and the catheter checked for subcutaneous swelling which indicates improper catheter placement.

Uptake of intraosseous fluids is rapid and this methodology is most successful during the first 24-48 hours, after which many birds develop discomfort around the catheter site (Quesenberry and Hillyer 1994a). Usually IV access is possible after the reestablishment of blood volume and this can be replaced with an IV catheter.

### Pain management

Recognition of pain in birds is difficult, most probably due to the 'preservation reflex' discussed previously. Any injury or procedure involving tissue damage should be considered painful, or changes in posture, temperament or behaviour should be interpreted as a potential response to pain (Machin 2005).

Butorphanol is the currently recommended opioid analgesia for parrots (Paul-Murphy 2006), however few pharmacological studies have been done on other species. Recommended dose rates vary from 1-4mg/kg IM, and frequencies vary from every three hours to once daily (Marx 2006, Morgan 2008, Paul-Murphy 2006). The NZWHC at Massey University uses a dose rate of 4mg/kg IM or slow IV at least twice daily into either pectoral muscles in flighted birds, or in hindlimbs of flightless birds like the kiwi.

Non-steroidal anti-inflammatory drugs, including meloxicam and carprofen, are useful for acute musculoskeletal and visceral pain associated with trauma and surgery (Paul-Murphy 2006). However, these are contraindicated with severe hypovolaemia, or renal or hepatic dysfunction, therefore they should only be utilised in well hydrated, normovolemic avian patients. NSAIDs should always be given in conjunction with fluid therapy.

Published dose rates for NSAIDs in avian species are variable and generally anecdotal or published without reference (Morgan 2008). The liquid formulation of meloxicam makes this preferable to tablets to enable accurate dosage. The NZWHC uses a once-daily regime of oral meloxicam at a dose rate of 0.1-0.2mg/kg, with

concurrent fluid therapy. Carprofen can be administered at a dose rate of 2-10mg/kg IV, IM, sq or PO, once to twice daily (Marx 2008).

Multimodal therapy using a combination of butorphanol and a NSAID is recommended to provide a wider spectrum of analgesia (Paul-Murphy 2006).

## Wound management

Principles of wound management are very similar to that in other species, however there are some points of difference to note.

Bruising in birds results in a deep-bright greenish discolouration of the skin 2-3 days post-injury, which may persist for over a week. This occurs as the result of an accumulation of biliverdin pigment following the breakdown of haemoglobin.

When cleaning up the wound, feathers should not be cut or clipped as they will not regrow until the feather follicle moults out. Feather plucking is an extremely painful process and should be done under general anaesthesia.

Care should be taken with using oil-based topical preparations. These may interfere with feather waterproofing either by direct contamination of surrounding feathers, or as a result of the bird preening through the rest of their feathers. A water-based lubricant can be applied to flatten down surrounding feathers to allow better wound visualisation and assessment.

The use of a self adhesive bandage to (e.g. Vetrap) will prevent further feather damage which will occur with the use of an adhesive dressing.

## Other considerations

In the presence of open wounds or open fractures, broad spectrum antibiotic therapy should be instigated as soon as possible.

Consideration to the nutritional status of smaller birds should be made. For example, tui which are nectar feeders require a frequent supply of high energy food. It may be necessary to either add glucose to the fluid regime, or gavage feed with a hand rearing formula.

The use of corticosteroids should be done with caution and the use of these in avian species have been widely debated due to the potential complications including immunosuppression (Harrison *et al.* 2006).

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