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# Medical Management of Paediatric Hand-reared Psittacine Chicks

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**Introduction**

Psittacine neonates are altricial (born without feathers, with the eyes and ear canals closed, and totally dependent on the parent birds for nutrition and thermoregulation). They lack a fully competent immune system making them more prone to disease than adult individuals.

Neonates can be reared by the parents, foster parents or hand-reared. Parent-reared birds tend to show a faster initial development and have more chances to develop species-specific behaviours. Another advantage of parent-rearing is that it is less time consuming and less expensive than fostering. Disadvantages include relying on breeding pairs that are not good parents and that may traumatize the egg or the chick, a higher exposure for the chick to external hazards, and minor control of the parental and environmental factors although significant advances in nest monitoring and nest set-ups have significantly improved the control over the environment without stressing the chicks or parents.

Different methods of fostering have been used to rear psittacine chicks. Eggs (preferable) or chicks may be moved from the parent's nest to a foster's nest which may belong to the same or a different species. Fostering allows increased chick production as the reproductive couple may produce more eggs while at the same time infertile or suboptimal fertile couples can be used as foster parents. The main disadvantage of fostering is that chicks may be carriers or may be exposed to infectious diseases when relocated.

Hand-rearing tends to produce more human-socialized chicks, a higher success rate (i.e. saving weak or ill chicks, providing optimal environmental and nutritional conditions), and reduces transmission of infectious diseases. The main disadvantages of this method are the higher economical and time requirements.

**Hand-rearing Psittacine Birds**

Health and development of the chicks depends on a combination of factors including genetics, incubation, hatching success, nutrition, environmental conditions and diseases.

The ideal design of the incubation, hatching, nursery, and quarantine facilities:

Every avian collection will benefit from having well designed facilities and following strict management protocols. However, the related economical expenses may be difficult to assume for small non-commercial collections.

The incubation and hatching area should be physically separated from the nursery. Eggs arriving to the incubation area should be correctly disinfected prior to accessing it. Eggs and chicks coming from parents tested and not tested for infectious diseases should never be mixed. Also, birds hatched in nest and birds hatched in an incubator should not be mixed until tested negative for infectious diseases in which horizontal transmission has been proven.

To minimize the transmission of infectious diseases, the nursery should be physically divided in separate areas (chicks not tested, chicks tested but pending on results, and birds tested negative) and the flow of movement of chicks should always follow this order whereas the staff and air flow (filtered by bio-security filters) should flow inversely unless each room has its own individual extraction system. Two separated areas with individual ventilation systems should be created: a Quarantine area and an area for ill chicks or chicks suspected to carry transmissible diseases.

The surfaces, walls, floors, and ceilings of the nurs-

ery should be made of non-porous and easy to disinfect materials. A back-up electrical system or electric alarm system are strongly recommended. Subdividing the nursery should reduce the potential risk of transmission of infectious diseases and allow a more efficient use of the subdivisions by adjusting their designs to their specific requirements. Each subdivision needs to be separated from the others by physical barriers (including bio-security filters for air). They also should have individual ventilation, temperature and humidity control, feeding areas with feeding tools, good water quality, and adequate containers easy to disinfect.

The ideal management of the incubation, hatching, nursery, and quarantine facilities:

Nestlings from other collections should never be introduced in the nursery. Adequate pest and predator protocols should be established. Humans should not be allowed to visit the nursery after having been in contact with non-tested birds. Barrier methods to prevent transmission of diseases should be used within the facilities and should be specific for each area. Rooms must be fogged routinely with an adequate disinfectant. Birds tested negative for infectious diseases should never be mixed with non-tested birds. Potentially infectious birds should be immediately separated. Birds which leave the nursery and have not been individually isolated should never be reintroduced in it.

Adequate feeding practices should be established. The formula should contain 0-10% solids on day one, which may be progressively increased to 23-25% solids by day six or seven (Clubb, 1997). The frequency of feeding will progressive decrease from 7 times a day to 3 times a day by the time pin feathers open, which is often considered the moment in which solid food may be start to be offered. In general terms, chicks may be fed 10-12% (cockatoos may be fed 10% and macaws 12-14%) of their body weight per feeding (Clubb, 1997). The temperature of the formula may vary between 38.9 and 41.1°C (Clubb, 1997).

**Medical Care of Hand-reared Psittacine Chicks**

The diagnostic tests used to detect, diagnose, or monitor diseases in adult birds may be used in neonates and paediatric birds. The main differences to consider when interpreting their results in paediatric psittacines patients when compared with adults ones are:

***Microbiology***: Gram's stain is a fast and cheap diagnostic method but interpretation is controversial. Bacterial and fungal cultures and sensitivities are very useful diagnostic techniques as they minimize the risk of antimicrobial resistances in breeding collections but results may take days to receive.

***Haematology and serum biochemistry***: The jugular vein is, according to the author, the optimal venipuncture site. Toenail clipping has been reported as adequate for packed cell volume (PCV) but it is considered unreliable for total white blood cell count (TWBC) evaluation. Nestling psittacine birds have lower PCVs (20-30%) which may change to adult ranges by 9-11 weeks in most species. The TWBC in healthy patients is generally higher (20000-40000 cells/uL). A transition from a relative heterophilia to lymphocytosis has been reported in some species of juvenile psittacine birds. The levels of total protein (1-3 mg-dL) and uric acid in serum are lower in chicks than in adults whereas alkaline phosphatase and creatine kinase are often higher (Flammer and Clubb, 1994).

***Molecular laboratory techniques***: Viral, fungal, and bacterial PCR, serology, and viral isolation are mandatory techniques when attempting to create a colony free of infectious diseases.

***Parasitology***: Cheap and fast diagnostic technique which may be part of every initial medical examination in chicks removed from nests.

***Diagnostic imaging***: Radiography, ultrasonography, endoscopy, fluoroscopy, MRI, and CT have similar indications independently of the age of the bird. Physiological variations observed in chicks include, but are not restricted to: enlarged proventriculus and ventriculus, dilated intestinal loops, reduced air sac space due to dilatation of the gastrointestinal tract, open growth plates of the long bones, and reduced general muscle mass (Flammer and Clubb, 1994).

***Necropsy***: Gross post-mortem examination, cytology, and histopathology are extremely useful in the management of collectivities.

***Therapeutics:*** Supportive care (maintain hydration and a positive energetic balance) is mandatory until an accurate diagnosis is achieved. Medications commonly used in paediatric psittacine birds include: antibiotics (TMS, amoxicillin-clavulanic acid, enrofloxacin, metronidazole, silver sulfadiazine, and doxycycline), antifungals (nystatin, voriconazole, terbinafine, itraconazole, and amphotericin B), anti-

parasitics (fenbendazole, metronidazole, ivermectin, selamectin, fipronil, and TMS), and miscellaneous medications (metoclopramide, cisapride, calcium, silymarine (milk thistle), allopurinol, furosemide, normovite, enalapril).

**Analysis of Medical Records**

Chicks should be individually identified and examined daily. Complete medical histories for the parents, siblings, and the individual should be systematically recorded and reviewed.

Important data to be recorded includes, but it is not restricted to: daily accurate weight, environmental records (during incubation, hatching, growing), dietary records, date of eye and ears opening, date of first appearance of head, tail, and wing feathers, and individual movement records. In general terms, weight loss may occur in the first 24-42 hours due to the drying of the body immediately after hatching and the use of the contents of its yolk sac for nutrition. Slow growth is expected until the fourth day of life. From day five to weaning psittacine chicks tend to gain weight and fluctuations may be consequence of feeding or environmental techniques. Usually, prior to weaning, the weight of the chick may exceed the adult average weight for the species. During weaning, a loss of 10% of body weight is considered acceptable provided the body weight prior to weaning was adequate.

**Physical Examination and Medical Conditions Commonly Observed in Hand-reared Psittacine Birds**

Physical examination should be performed just prior to feeding. During physical examination, the chick should be kept warm and bio-security measures should be applied. Chicks with food in the crop should be carefully handled to minimize risk of regurgitation and aspiration.

The levels of brightness, activity and response to stimuli, as well as gait should be assessed prior and after handling the chick. Feeding response should also be evaluated. Weight should be systematically and accurately recorded at least once a day (prior to the first feeding). The body condition should be evaluated by assessing the degree of muscle development and the amount of subcutaneous fat.

Eyelids are first time opened between 14-28 days in macaws, 10-21 days in cockatoos, and 14-21 days in Amazon parrots (Flammer and Clubb, 1994). Congenital and acquired ocular disorders have been reported (Flammer and Clubb, 1994).

Ears open at hatching in Old World psittacine birds. Macaws and eclectus parrots have their ear canals covered with a membrane which in macaws will open at day 23 whereas in eclectus a tiny opening may be visible after a couple of days of life (Flammer and Clubb, 1994). Occluded ear opening may be diagnosed with ultrasonography and the treatment generally involves the surgical opening of the ear canal.
Integumentary system: The skin should be yellow to pink. Dehydration may be suspected in chicks with a dry, hyperaemic or sticky skin. Subcutaneous oedema, paleness or dermatitis are abnormal and should be investigated. External parasites should be treated. Integumentary disorders may be congenital (i.e. polydactilia, syndactilia) or acquired. Toe constriction is normally consequence of environmental humidities lower than 50%. Treatment includes - restore hydration and surgical removal of the skin ring compromising the blood supply to the end of the toe, DMSO, anti-inflammatories, antibiotics, and sometimes external coaptation.

The feathers of the head, wings and tail are the first ones visible. The presence of stress bars are indicative of a stressor or metabolic disturbances on the day that the portion of a feather was growing.

***Digestive system***

Beak disorders are very common in hand-reared psittacine birds and frequently related with improper feeding techniques (i.e. scissor beak). Mandibular prognathism and beak trauma are also commonly reported (Gelis, 2006).

The oral cavity should be examined paying special attention to the presence of blunted choanal papillae, choanal papillomas, or abnormal growths

The crop size is twice to three times larger in chicks when compared to adults. Motility should be observed and gently pinching the skin may promote this. Palpation is paramount in the detection of impacted content or foreign bodies. The crop should totally empty at least once a day (usually overnight). Crop stasis may be consequence of improper management, aboral delayed transit time or infectious disorders (fungal, bacterial or viral). Commonly used diagnostic techniques to investigate crop stasis include radiographs, contrast radiographs, ultrasonography, endoscopy, cytology, and microbiological cultures

and sensitivity. In the opinion of the author, the presence of few Gram negative bacteria in absence of clinical signs does not require treatment unless clinical signs are observed whereas medium to large amount of Gram negative bacteria (more than 45%) or fungus (i.e. budding yeast) should be treated. No parasitic forms should be observed. Local treatment may include the use of prokinetics, crop lavage, antibiotics, and/or antifungals. Systemic treatment may be required depending of the cause and severity of clinical signs. Common conditions observed include: ingluvitis, impactions, foreign bodies, pendulous crops, foreign body, crop wall trauma, and burns (Flammer and Clubb, 1994). Ingluviostomy tubes may be useful in the management of crop disorders. Aerophagy is commonly observed in chicks showing anxiety while fed or fed at a slower speed than required and should be differentiated from pathological gas production by bacteria in the crop (Flammer and Clubb, 1994).

The digestive tract immediately after birth should be sterile until environmental bacterial progressively colonizes it. Normal bacterial flora in chicks includes but is not restricted to: *Lactobacillus* spp., *Bacillus* spp., *Corynebacterium* spp., non-haemolytic *Streptococcus* spp., *Micrococcus* spp., and *Staphylococcus epidermidis* (Clubb, 1997). Microbial organisms in the food and water that are considered to have little effect on adult birds but can cause life-threatening infections in neonates include, but are not restricted to: yeasts, *E. coli*, *Klebsiella* spp., *Enterobacter* spp., *Pseudomonas* spp., and *Salmonella* spp. (Clubb, 1997). No more than 5-8% of Gram negative bacteria, no *Clostridium* spp., and no yeast should be observed in cloacal cytology. No parasitic forms should be observed. Intestinal disorders (gastrointestinal obstruction, intestinal torsion, intussusception, and cloacal prolapse) should be diagnosed and treated the same as in adults.

***Yolk-sac***: Most yolk should be absorbed within the first 5-7 days of life. Yolk-sac retention may be consequence of non-infectious (i.e.: improper temperature) or infectious disorders. Infectious disorders may be primary or secondary (i.e. infections of the navel not properly internalized prior to hatchling (omphalo-vitellitis), bacterial contamination following faecal contamination of the shell (i.e. often involving *E. coli*, *Proteus* spp., *Streptococcus faecalis*, and *Clostridium* spp.) (Flammer and Clubb, 1994). Diagnosis may be made by ultrasonography and treatment may be medical and/or surgical.

***Respiratory system***: The respiratory rate in most psittacine neonates is 20-60 respirations per minute (Clubb, 1997). Choanal atresia has been reported (Bowles et al., 2006). Upper respiratory infections are frequently observed as a consequence of food passing from the oral cavity though the choanal slit to the nasal cavity. Infections of the lower respiratory tract are also commonly observed. Aspiration pneumonia is more common in chicks near to weaning as they become more resistant to be hand-fed (Flammer and Clubb, 1994).

***Cardiovascular system***: The heart rate in most psittacine chicks ranges between 180 and 400 beats per minute. Congenital and acquired disorders have been reported (Clubb, 1997). Echocardiography is useful in the ante-mortem diagnosis.

Hepatic system: Congenital extra-hepatic biliary cysts have been reported in African grey parrots. Hepatomas or hepatic lipidosis are commonly reported (Flammer and Clubb, 1994).

***Renal system***: Droppings are usually polyuric due to the liquid diet fed. Renal disorders may be associated with cardiac disorders, severe dehydration or hypervitaminosis D. Renal failure and gout have been reported as common in some species (Clubb, 1997).

***Musculoskeletal system***: Chicks have a not completely developed musculature and a not completely calcified skeleton making them more prone to fractures and luxations. Musculoskeletal disorders tend to manifest as abnormal gait while sleeping or sitting. Fractures may be consequence of metabolic bone disease. Fractures and dislocations tend to be managed in a conservative way (external coaptation) but the frequency of bandage change should be shorter than in adults. Commonly observed disorders include: splay leg often due to lack of concavity of the nest, valgus of the long bones, stifle luxations and sub-luxations, and hip luxations.

Health and development of the chicks depends on a combination of factors including genetics, incubation, hatching success, nutrition, environmental conditions and diseases. Psittacine neonates are altricial and thus more dependent on the parents than precocial species. The veterinarian dealing with paediatric patients should be familiar with the physical examination and medical conditions including their diagnosis and treatment without forgetting about the importance of preventive medicine.

## References


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