



Injuries, envenomations and stings from exotic pets

Clifford Warwick • Catrina Steedman

Emergent Disease Foundation, Riverside House, River Lawn Road, Tonbridge, Kent TN9 1EP, UK

Correspondence to: Clifford Warwick. Email: cliffordwarwick@yahoo.com

DECLARATIONS

Competing interests

None declared

Funding

This work was unfunded. Data contained are from NHS publicly accessible information

Ethical Approval

Not applicable

Guarantor

CW

Contributorship

Both authors contributed equally

Acknowledgements

The authors would like to acknowledge the helpful assistance of the two reviewers

Summary

A variety of exotic vertebrate and invertebrate species are kept as 'pets' including fishes, amphibians (for example, frogs and toads), reptiles (turtles, crocodiles, lizards and snakes), birds, mammals (for example, primates, civets, and lions), and invertebrates (for example spiders, scorpions, and centipedes), and ownership of some of these animals is rising. Data for 2009–2011 suggest that the number of homes with reptiles rose by approximately 12.5%. Recent surveys, including only some of these animals, indicated that they might be present in around 18.6% of homes (equal to approximately 42 million animals of which around 40 million are indoor or outdoor fish). Many exotic 'pets' are capable of causing injury or poisoning to their keepers and some contacts prove fatal. We examined NHS Health Episode Statistics for England using selected formal categories for hospital admissions and bed days for 2004–2010 using the following categories of injury, envenomation or sting; bitten or struck by crocodile or alligator; bitten or crushed by other reptiles; contact with venomous snakes and lizards; contact with scorpions. Between 2004 and 2010 these data conservatively show a total of 760 full consultation episodes, 709 admissions and 2,121 hospital bed days were associated with injuries probably from exotic pets. Injuries, envenomations and stings from exotic pets constitute a small but important component of emerging medical problems. Greater awareness of relevant injuries and medical sequelae from exotic pet keeping may help medics formulate their clinical assessment and advice to patients.

Introduction

In England and Wales there are around 4,500 pet shops and a significant but unknown number of unlicensed commercial pet sellers.¹

A survey by the Pet Food Manufacturer's Association (PFMA)² included fishes, reptiles and birds, and indicated that combined these animals are present in around 18.6% of homes and may equate to approximately 42 million animals. This includes 40 million indoor and outdoor fish. The PFMA survey data uses a representative sample of 4,000

people, suggesting an accuracy for pet ownership of exotic pets of around plus or minus half a percentage point. By comparison, dogs and cats are present in around 40% of homes and may equate to approximately 16 million animals. Some of these exotic animals (for example tortoises and many birds and fishes) present very low risk of injury to their keepers. However, other species (especially large, powerful predators and venomous and/or poisonous animals) are overtly dangerous and many are subject to specific licensing under the Dangerous Wild Animals Act (1976), and

some encounters, even for experienced specialist keepers, prove fatal. Other species (for example, toxic fishes and amphibians, as well as numerous invertebrates) present covert and subtle threats.

Although data are not available for all species, the trading and keeping of some exotic animals appears to be increasing dramatically. For instance, regarding reptiles, the PFMA^{2,3,4} data show that between 2009 and 2011 the number of homes with these animals rose by approximately 12.5%.

While zoonotic (animal-to-human) disease is also an important and emerging concern,^{5,6} and some injuries have pathogenic microbial sequelae⁷, here we focus on injuries, envenomations and stings from exotic pets and refer to recorded data from NHS Health Episode Statistics for England (not whole of UK) by including formal categories adopted under hospital admissions protocols. These data are based on full hospital consultation episodes only, and the data do not cover all possible relevant admissions, partly because some referencing categories are ambiguous. The information in Table 1 does not include GP consults or unreferred home incidents. The actual proportion of injuries from exotic pets is unknown and this survey should be considered a conservative account.

Table 1 lists NHS Health Episode Statistics categories of injuries, envenomations and stings incidents for 2004–2010 that probably derive from exotic pets, although some zoo-associated incidents conceivably may also be covertly included in these data.

Methods

We examined data compiled from National Health Service (NHS) Health Episode Statistics: 'Full Consultation Episodes' 2004–2010. This database is a free, publicly-accessible resource.

The following categories of injury, envenomation or sting were selected for inclusion: bitten or struck by crocodile or alligator; bitten or crushed by other reptiles; contact with venomous snakes and lizards; contact with scorpions.

Several other categories were selected for exclusion on the basis of low or unclear relevance, for example, 'contact with marine animal' could relate to a pet fish or an indigenous coastal jellyfish. The excluded categories were: bitten by rat; bitten or struck by dog; bitten or struck by other mammal; contact with marine animal; bitten/stung by nonvenomous insect and other nonvenomous arthropods; contact with centipedes and venomous millipedes (tropical); contact with venomous spiders, contact with other specified venomous arthropods; contact with venomous marine animals and plants; contact with other specified venomous animals; contact with unspecified venomous animal or plant.

Non-venomous injuries

Non-venomous injuries include a variety of traumas, for example, crushing and tearing or 'dry' bites (those not associated with primary toxin or pathogen introduction), claw lacerations, tail strikes, and constriction.

Table 1

Categories* of injuries, envenomations and stings probably attributable to exotic pets, number of incidents 2004–2010. Derived from NHS Health Episode Statistics.

<i>Injury, envenomation or sting</i>	<i>Episodes</i>	<i>Admissions</i>	<i>Hospitalization days</i>
Bitten or struck by crocodile or alligator	15	15	31
Bitten or crushed by other reptiles	398	376	1340
Contact with venomous snakes and lizards	307	287	463
Contact with scorpions	40	31	287
Total	760	709	2121

*Excluded categories of unclear relevance were: 'bitten by rat', 'bitten or struck by dog', 'bitten or struck by other mammal', 'contact with marine animal', 'bitten/stung by nonvenomous insect and other nonvenomous arthropods', 'contact with centipedes and venomous millipedes (tropical)', 'contact with venomous spiders', 'contact with other specified venomous arthropods', 'contact with venomous marine animals and plants', 'contact with other specified venomous animals', 'contact with unspecified venomous animal or plant'.

Our experience within the animal handling community suggests the following key exotic pet animal threat associations: crushing and tearing or 'dry' bites (large frogs, turtles, crocodiles, large lizards, large non-venomous snakes, especially pythons, boas, or anacondas, felines, large birds, primates); claw lacerations (large lizards, large birds, felines); tail strikes (crocodiles, large lizards); constriction (large snakes).

Further, a diverse array of pathogens is commonly associated with exotic pet bites and scratches, meaning that any injury potentially can become secondarily infected.⁸

Envenomations and stings

Envenomations from 'poisonous' snakes, fishes, cone marine snails, spiders and centipedes, as well as stings from scorpions, can cause toxic or allergic effects (or both), and may also result in infection. Studies in France and Germany of all admissions for bites and stings from exotic pets at four poisons centres found 404 mostly snake, fish and invertebrate envenomation cases between 1996 and 2006⁹, although none were fatal.

Briefly, there are very many different types of 'venom' or 'poison' and their mode of action as well as their effects are highly variable.

Depending on the species' poison, envenomations involve the introduction of potent proteins, enzymes and key compounds with evolved, largely systemically destructive effects on haematological or neurological tissue. Haematological consequences may be coagulative (resulting in blood clots, stroke, collapse and death) or anaemic (resulting in haemorrhages, hypoxia, neurological sequelae, collapse and death). Some direct neurological consequences may be neuro-paralytic, resulting in respiratory failure, cerebral hypoxia, and death.¹⁰

Most snake bites although often involving varying degrees of pain, local swelling, dizziness, malaise and nausea, are not fatal. Figures for England are sparse, but as a guide worldwide it is estimated that there are around five million snakebite envenomations compared with 125,000 deaths.¹¹ Of the fatal cases, many would likely have survived if appropriate medical help were available. Again, as a guide, around 25–50% of venomous snakebites are 'dry bites' involving no

actual envenomation, and the remaining portion involving some or no envenomation may or may not require medical treatment.

Fish stings involve varying degrees of pain, local swelling, dizziness, malaise and nausea, and are usually not fatal.¹² Spider bites may cause pain, local swelling, and lymphangitis.¹²

In addition to evolved systemically destructive effects of certain bites and stings most, if not all, such envenomations involve some degree of allergic reaction in the victim from mild irritation and swelling to the risk of severe and life-threatening anaphylaxis. Severe allergic reactions may take effect rapidly, within minutes, and manifest well in advance of any signs or symptoms of destructive toxicity.

Notably, the National Poisons Information Service offers an advice service on all aspects of acute and chronic poisoning (<http://www.npis.org/>).

Emergency medical management of exotic pet-related injuries

Regardless of species involved or the nature of the injury, referral for medical attention is essential for proper assessment and treatment. The general order for treatment is first aid, supportive care, antivenin (if required), and wound care. In cases of envenomations and exotic stings, not only may highly specific antivenin or other specific toxin modifiers be required, but also blood transfusion and cardio-respiratory, renal and other support may be necessary in severe or insidiously progressive situations.

Allergic reactions, other than mild and non-progressive forms, require urgent referral to hospital where immediate anti-allergic and supportive therapy is available. In addition, the potential for diverse bacterial septicaemias and other infections introduces an important consideration for antibiotic and other therapies.

Emergency treatment 'in the field' and without access to advanced drugs and procedures is limited to victim reassurance, bite or sting site topical cleansing, localized support (e.g. support dressing and/or sling). In the event of envenomation with no prospect of medical help for several hours or where any rapid onset and progressive allergic reaction occurs, consideration can be given to extending emergency treatment to include (if available) high

doses of over-the-counter oral antihistamines which may assist in addressing concomitant allergic reaction.

Conclusion

Injuries, envenomations and stings from exotic pets represent a small yet important component of an emerging medical problem. Although the related subject of exotic pet-linked zoonoses may be justifiably a greater concern, exotic pet-linked injuries involve mild, moderate and severe states with many minor incidents having the potential to progress to major medical episodes, and others warrant hospitalization from the outset.

Some exotic pet keepers perhaps occasionally lose sight of the fact that the species they prefer are essentially wild animals with intact defensive and aggressive behaviours, and robust physical attributes. The current rapid expansion of at least some sectors of wild animal keeping appears set to continue. Greater awareness of relevant injuries and medical sequelae from exotic pet keeping may help medics formulate their clinical assessment and advice to patients.

References

- 1 Warwick C, Lindley S, Steedman C. How to handle pets: a guide to the complexities of enforcing animal welfare and disease control part 1. *Env Health News* 2011;8: 18–19
- 2 Pet Food Manufacturer's Association; 2011 Pet Population Figures
- 3 Pet Food Manufacturer's Association; 2010 Pet Population Figures
- 4 Pet Food Manufacturer's Association; 2009 Pet Population Figures
- 5 Brown C. Emerging zoonoses and pathogens of public health significance-an overview. *Rev. Sci. Tech. Off. Int. Epiz* 2004;23:435–442
- 6 Karesh WB, Cook RA, Gilbert M, Newcomb J. Implications of wildlife trade on the movement of avian influenza and other infectious diseases. *J Wild Dis* 2007;43:55–59
- 7 Warwick C, Lambiris AJL, Westwood D, Steedman C. Reptile-related salmonellosis. *J.R. Soc. Med.* 2001;93:124–6
- 8 Goldstein EJ. Bite wounds and infection. *Clin Infect Dis* 1992;14:633–8
- 9 Schaper A, Desel H, Ebbecke M, *et al.* Bites and stings by exotic pets in Europe: an 11 year analysis of 404 cases from Northeastern Germany and Southeastern France. *Clin Toxicol* 2009;47:39–43
- 10 Bhattacharya P, Chakraborty A. Neurotoxic snake bit with respiratory failure. *Indian J of Critical Care Med* 2007;11:161–4
- 11 Aggarwal P, Jamshed N. What's new in emergencies, trauma, and shock? Snake envenomation and organophosphate poisoning in the emergency department. *J. Emerg. Shock* 2008;1:59–62
- 12 deHaro L, Pommier P. Envenomation: a real risk of keeping exotic house pets. *Vet. Hum. Toxicol.* 2003;45:214–6