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REVISTA INVESTIGAÇÃO

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Improving data collection at wildlife care facilities: development of a patient form based on the cases of wild animals admitted to the university of Franca veterinary teaching hospital between 2004 and 2014

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ABSTRACT

The objective of this study was to conduct a retrospective analysis on the cases of wildlife brought to the UNIFRAN-VTH in order to develop a patient form that could improve the efficiency of data collection. Medical records of all wildlife admitted to the VTH between 2004 and 2014 were analyzed, including: species; health condition upon arrival; cause of injuries (if known); date of admission; information on the person who brought the animal to the facility; and a description of the circumstances in which the animal was found (e.g. wounded on the side of a highway), if available. A total of 317 wild animals were admitted to the facility, including birds (68%, n=217), mammals (30%, n=96), and reptiles (1%, n=4). Among birds, the taxonomic Families most frequently brought to the VTH were Psittacidae (26%, n=57), Ramphastidae (14%, n=31), and Falconidae (13%, n=29). Regarding mammals, the majority of individuals belonged to the Families Canidae (25%, n=24) and Myrmecophagidae (21%, n=20). The four reptiles belonged to the Families Testudinidae (50%) and Boidae (50%).Anthropogenic factors were confirmed as cause of the injuries in approximately 19% (n = 61) of the cases; of these patients, 62% had been hit by a vehicle. The most frequent clinical findings or situations were orthopedic injuries (30%), orphaned animals (9%), and miscellaneous wounds (8%). The study detected a lack of relevant information in several records; thus, a form has been proposed herein to facilitate and improve data collection in wildlife treatment cases.

Keywords: anthropogenic factors; data collection; veterinary records; wildlife care; wildlife conservation.

INTRODUCTION

At the University of Franca Veterinary Teaching Hospital (UNIFRAN-VTH), domestic animals comprise the majority of cases admitted; nonetheless, this facility also receives animals of wild species for treatment. Due to a lack of a Wildlife Screening Center (CETAS) in the region of Franca (20º32'19"S 47º24'03"W) and surrounding areas, the VTH started offering veterinary services for wild species in 2003. Most cases of wildlife admitted for treatment were free-living individuals brought by the Environmental Police after having been injured by vehicles, domestic animals, weapons, or other harmful agents. Frequently, these patients arrived at the VTH without any accompanying information.

Since anthropogenic factors such as increased agricultural activity (Dobrovolski et al., 2011) and vehicle collisions (Souza et al., 2010; Costa, 2011; Hegel et al., 2012; Oliveira and Silva, 2012; Silva et al., 2013) have been linked to a higher risk of extinction for wild species, data collection upon admission of wildlife to veterinary facilities could contribute to a better understanding of the conservation challenges faced by the local native fauna.

The main objective of this study was to conduct a retrospective survey on the cases of wild animals admitted to the UNIFRAN-VTH in order to determine possible ways to improve efficiency of data collection. Based on the information obtained from the archived files, a new records form has been proposed that could be useful for different veterinary institutions in gathering relevant data while eliminating common issues in data collection. Specific objectives of this study were to identify the following factors: the taxonomic groups most frequently brought to the VTH; the reasons behind the admissions; the main medical findings; and the environmental and anthropogenic factors related to the cases.

METHODS

This study was approved and performed under the guidelines of the Animal Ethics Committee of the University of Franca (protocol #028/15).

Data collection and analysis

Data on the wild animals admitted to the UNIFRAN-VTH between 2004 and 2014 were obtained from the hospital's archives. Data collected included the patient's species and circumstances of capture (if available); its health condition upon arrival; date of admission; and identification of the person who brought the animal to the VTH.

Data are expressed as numeric values (n), percentage (%), mean plus standard deviation (SD), and confidence interval (CI). An analysis of the number of wildlife cases per month was conducted in order to detect any potential seasonal trend. In this analysis, only the period between 2010 and 2014 was considered because the number of wildlife cases before 2010 was considerably low.

RESULTS

Between 2004 and 2014, 317 wild animals were admitted to the UNIFRAN-VTH; of this total, approximately 68% (n = 217) consisted of birds, 30% (n = 96) of mammals, and 1% (n = 4) of reptiles.

Among birds, the most frequent taxonomic Families admitted to the VTH were Psittacidae (26%, n = 57), Ramphastidae (14%, n = 31), and Falconidae (13%, n = 29). Among mammals, the most frequent ones were the Families Canidae (25%, n = 24) and Myrmecophagidae (21%, n = 20), and a considerable number of them were primates of different Families (14%, n = 14). Only four reptiles, represented by the Families Testudinidae (50%, n = 2) and Boidae (50%, n = 2), were admitted to the VTH during this period.

Information regarding the person who brought the animal to the VTH revealed that 82% (n = 260) of them were members of the Environmental Police on duty. Animals were also brought to the institution by ordinary citizens (14%, n = 45), fire fighters on duty (1%, n = 3); or by their owners (2%, n = 8). This type of information was missing in one of the medical records (0.31%).

In the analysis of number of wildlife admissions per month, October had the highest number of cases (9.0 ± 1.8; CI: 7.42 to 10.58), followed by September (6.2 ± 4.1; CI: 2.61 to 9.79) (Table 1). The only two months whose CI overlapped with that of October were September and March (5.0 ± 3.0; CI: 2.37 to 7.63 (Table 1).

Table 1. Number of wild animals admitted per month to the University of Franca Veterinary Teaching Hospital from 2010 to 2014.

Month	Mean(±SD)	Confidence Interval
JAN	3.7(±2.9)	1.21 - 6.29
FEB	5.2(±1.5)	3.94 - 6.56
MAR	5.0(±3.0)	2.37 - 7.63
APR	4.8(±2.6)	2.52 - 7.08
MAY	4.4(±1.1)	3.44 - 5.36
JUN	4.0(±2.0)	2.25 - 5.75
JUL	2.4(±0.9)	1.61 - 3.19
AUG	2.6(±1.1)	1.64 - 3.56
SEP	6.2(±4.1)	2.61 - 9.79
OCT	9.0(±1.8)	7.42 - 10.58
NOV	3.4(±3.1)	0.68 - 6.12
DEC	2.5(±1.0)	1.63 - 3.38

In the analysis of the wildlife medical records between 2004 and 2014, the percentage of injuries known to be related to anthropogenic causes was approximately 19% (n = 61); of this total, 62% had been caused by vehicle collisions; 23% were victims of lines or wires constricting the limbs; 7% were hurt by people throwing stones at them or by bullets; 5% collided against walls; and 3% were victims of electrocution (Table 2).

Table 2. Anthropogenic factors known to be related to the injuries observed in the wild animals admitted to the University of Franca Veterinary Teaching Hospital from 2004 to 2014.

Type of event	Number of cases	(%)	Confidence Interval
Collision with car	38	62	50 - 74%
Leg entanglement/ constriction by string	14	23	12 - 33%
Attacked with rocks	4	7	1 - 13%
Collision against wall	3	5	0 - 10%
Electrocution	2	3	0 - 7%

In the analysis of health condition upon admission at the VTH between 2004 and 2014, approximately 30% (n = 96) of the animals had orthopedic injuries; 9% (n = 29) did not have any apparent reason for treatment other than orphanhood; and 8% (n = 27) of them had miscellaneous wounds (Table 3).

Table 3. Main clinical findings or conditions of wild animals (n = 317) recorded at the time of admission to the University of Franca Veterinary Teaching Hospital from 2004 to 2014.

Clinical finding/condition	Number of cases	(%)	Confidence Interval
Orthopedic injuries	96	30	25 - 35%
Anthropogenic-related injuries*	61	19	15 - 23%
Not described	45	14	10 - 18%
Orphanhood	29	9	6 - 12%
Miscellaneous injuries	27	8	5 - 11%
Dehydration	22	7	4 - 10%
Others**	141	43	-

*The cause of the injuries was recorded as related to anthropogenic factors.
**Individual clinical findings and/or conditions that had both a percentage and an upper limit of confidence interval lower than 10% were all combined into the "Others" category.

DISCUSSION

Veterinary hospitals located close to large extensions of natural environments are likely to receive wild animals for medical treatment, particularly if the area does not have a Wildlife Screening Center. This is the case of the UNIFRAN-VTH, whose number of wildlife cases has increased in recent years due to a strengthening of the partnership between the facility and the Environmental Police. Thus, it is essential that hospitals alike are prepared for such service, which involves medical knowledge on a wide range of animal species, proper personnel training, and availability of material for restraint and treatment of those animals as well as efficient, detailed data collection as part of good practices.

Until 2009, the number of non-domestic animals admitted to the UNIFRAN-VTH was considerably low. Beginning in 2010, there was an increase in the frequency of cases, and most of the patients were brought to the VTH by members of the Environmental Police on duty, indicating that these animals came from the wild. Among the species admitted to the VTH there were some of conservation concern such as the giant anteater (Myrmecophaga tridactyla), which is considered as vulnerable by the International Union for Conservation of Nature (IUCN, 2015). Thus, besides their essential function in animal wellbeing, veterinary hospitals that treat wild animals may play an important role in conserving biodiversity.

The highest number of cases in the months of September and October might possibly be related to environmental factors in the region, particularly pluviometric data. This time of the year typically comprises the last portion of the dry season. According to the Integrated Center for Agrometeorology Information (CIIAGRO, 2015), in the period between 2010 and 2014, the month of October recorded lower rainfall (105.46 ± 50.13 mm) compared to the same month (173.75 ± 96.19 mm) in previous years (2006-2009).

A possible explanation for the increase in the number of admissions during the dry season in the period studied could be the fact that droughts cause wildlife to migrate more in search for food resources, which would expose the animals to a higher risk of accidents as they crossed highways. A previous study on the incidence of road kills in the northeast region of São Paulo State revealed an increase in the number of birds killed by vehicle collision during the dry season compared to the rainy season (Prada, 2004). It would also be reasonable to speculate that escaped prescribed fires, which are more frequent during the dry season, would also contribute to a greater risk of accidents and injuries while forcing wildlife to migrate away from approaching fires.

In the present study, a relatively high incidence of anthropogenic factors leading to injuries in wild animals was observed. This incidence, however, might have been an underestimation of the actual number of cases given that most of the wild animals admitted to the UNIFRAN-VTH were free-living individuals, and many of the records did not have a description of the circumstances that led to the injury. The main confirmed anthropogenic cause of injuries to the local wildlife was collision with vehicles, followed by leg entanglement and constriction by strings, the latter occurring particularly in young birds of the Family Psittacidae that were frequently admitted together showing signs of necrosis in the entangled limb. Likewise, several patients of this taxonomic Family arrived at the VTH after amputation of a limb. Possibly, both the entangled and the amputated birds became entangled at young age in their nest due to their parents using lines or strings as nesting material.

The lack of important information in a considerable number of records was not unique to the archives used in this study; other retrospective studies based on medical records of wild animals also faced difficulties due to a lack of proper data collection (Wendell et al., 2002; Cardoso et al., 2010; Schenk and Souza, 2014). For this reason, this study proposes a form designed to facilitate data recording by veterinary personnel receiving wildlife for medical treatment that could be useful for different institutions, and could be adapted to a particular institution according to its specific needs (Figure 1). This form is also intended at collecting relevant data on the environmental challenges faced by local wild populations, including natural and anthropogenic factors. Collection of this type of data could be useful in identifying major issues in wildlife conservation in the region and could help implement strategies for protection of wild populations.

Veterinary Records - Nondomestic Species
Registration # : _____   Date of admission ___/___/____
Environment Police case # : _____   Veterinarian responsible_____

Species name: _____
Popular: _____
Scientific: _____   Photo
Name of the animal (if privately owned): _____
Estimated age: _____ Body weight: _____ ☐M ☐F

Name of Person and/or Organization responsible for the animal: _____
☐Environment Police on Duty; ☐Firefighter on duty; ☐Private owner; ☐Person who found the animal; ☐ Other: _____
ID #: _____ Phone #: _____
Address: _____
City: _____ State: _____ ZIP Code: _____

Anamnesis:
Cause of injuries/reason for admission

☐Collision with vehicle	☐Leg entanglement/ constriction by string or other material	☐Orphaned	☐Attacked by people	☐Attacked by dogs
☐Animal was found hurt	☐Other	If other please describe:		

Please specify the location where the animal was found: _____

GPS coordinates (if avaliable) : _____

Admission information

	Yes	No	Do not know	
Has it been drinking water?	☐	☐	☐	

				Diet:
Has it been eating?	☐	☐	☐	
Can it fly?	☐	☐	☐	
Can it walk?	☐	☐	☐	
What is the appearance of the excreta?				
Other important information				

Physical examination

Behavior:	☐ Normal	☐ Apathetic	☐ Aggressive	☐ Scared
Chemical restraint?	☐ Yes	☐ No	Protocol:	
Body temperature:		ºC.		

Respiratory frequency:		mpm
Resoiratory tract clinical findings:		
Heart rate:		bpm
Auscultatory findings:		

Dehydration level	☐ 0 – 3% None to minimal	☐ 4 – 5% Mild	☐ 6 – 8% Moderate	☐ 8 – 10% Severe

Capillary Refill Time:	Seconds			
Mucosa:	☐ Normal	☐ Cyanotic	☐ Jaundiced	☐ Hyperemic	☐ Pale

Cutaneous examination

Aspect of skin

Ectoparasites:	☐ Yes	☐ No	Type/Location:
Myiasis:	☐ Yes	☐ No	Location:
Injuries:	☐ Yes	☐ No	Location:
Describe Injuries:			

Orthopedic examination:

Palpable fractures:	☐ Yes	☐ No	Location:
Open fractures:	☐ Yes	☐ No	Location:
Luxation:	☐ Yes	☐ No	Location:
Amputation:	☐ Yes	☐ No	Location:
Atrophies:	☐ Yes	☐ No	Location:
Other:	☐ Yes	☐ No	Location:
Ophthalmic evaluation:			
Neurological evaluation:			
Genitourinary evaluation:			
Gastroenteric evaluation:			
Other information:			
Suspicion:			

Complementary tests: (please attach the result to this form)

Complete blood count	☐	
Chemistry panel	☐	
Urinalysis	☐	
Parasitological test	☐	
Arterial blood gas analyses	☐	
Electrocardiogram	☐	
Radiography - Specify area(s)	☐	Projections:
Radiography with contrast agent?	☐ Yes ☐ No	Results:
Ultrasonography - Specify area(s):	☐	Results:
Histopathology - Specify sample:	☐	Results:
Skin scraping: - Specify area:	☐	Results:
Serology - Test requested:	☐	Results:

PCR - Test requested:	☐	Results:
Other test(s) requested:	☐	Results:

Diagnosis

Diagnosis:				
Prognosis:	☐ Good	☐ Fair	☐ Poor	☐ Guarded

Treatment: (please attach documentation to this form)

Drugs prescribed				
Drug description	Generic drug	Dose	Route	Frequency

Diet: (please attach diet plan to this form)

Diet prescribed		Frequency	

Surgical procedure : (please attach documentation to this form)

Surgical procedure	☐ Yes	☐ No	Notes:

Discharge:

☐ Reintroduction into the wild	
☐ Life in captivity	☐ Facility Name:
	☐ Private Owner:
☐ Death during care	☐ Died in the hospital under care
	☐ Euthanasia

Date of discharge/euthanasia/death: ___/___/____

Signatureof the veterinarian: _____ Veterinarian ID: _____

Figure 1. Proposed medical records form designed for wildlife patients based on the data obtained from archived files of wild animals admitted to the Veterinary Teaching Hospital from 2004 to 2014 at the University of Franca (UNIFRAN).

One of the features of the proposed form is a space for a photograph of the animal, which can be helpful in cases where the correct identification of the species upon admission proves difficult; the photograph could later be viewed by a specialist to confirm the patient's species. This is particularly important if one intends to reduce the number of records that contain only information on the Genus of the animal instead of the complete species name, a situation that was observed in many records in the present study and was reported in other retrospective studies as well (Castro et al., 2013).

The proposed form also contains a field where the number attributed by the Environmental Police to a particular animal's capture should be entered so that this number and the entry number registered by the VTH have a link, which would enable easy matching of the records between the two institutions for documentation purposes in different situations, such as recommendation for reintroduction into the wild or life in captivity. Another feature of the form is a space to describe the location where the animal was found. As a suggestion, a field for global positioning system (GPS) coordinates was included. This information could be obtained in collaboration with the Environmental Police and/or staff from road maintenance companies and would be useful in detecting "hot spots" along highways where accidents involving car collisions with wildlife happen more frequently. Finally, this information could help implement conservation strategies as simple as better traffic signage or more sophisticated ones such as underpasses to provide a safe way for wildlife to migrate across highways.

In conclusion, this study identified the most frequent injuries and the main reasons for admission of wild animals to the UNIFRAN-VTH during the period from 2004 to 2014. The data revealed the impact of anthropogenic factors as causes of injuries to the local wildlife as the main type of clinical finding was orthopedic injuries and a considerable number of animals were confirmed to have been injured by vehicles on highways. Based on the information recorded in the institution's archives, this study proposes a form designed specifically for wild animals to facilitate data collection and to improve medical care while providing important information on the impact of environmental and anthropogenic factors on the local wildlife.

REFERENCES

1. Cardoso MD, Albuquerque MC, Camargo MB. et al. 2010. Estudo retrospectivo das afecções odontoestomatológicas em mamíferos selvagens e exóticos atendidos no Hospital Veterinário Firmino Mársico Filho, Universidade Federal Fluminense, RJ, Brasil. In: Anais do V Simpósio brasileiro sobre animais silvestres e selvagens - Universidade Federal de Viçosa (Viçosa, Brasil). 1 CD-ROM.

2. Castro PF, Fantoni DT, Matera JM. 2013. Estudo retrospectivo de afecções cirúrgicas em aves. Pesquisa Veterinária Brasileira. 33(5): 662-668.

3. CIIAGRO - Centro Integrado de Informações Agrometeorológicas. 2015. Monitoramento Climatológico dos Municípios do Estado de São Paulo. Available at <http://www.ciiagro.sp.gov.br> [Accessed in March 2015].

4. Costa LS. 2011. Levantamento de mamíferos silvestres de pequeno e médio porte atropelados na BR 101, entre os municípios de Joinville e Piçarras, Santa Catarina. Bioscience Journal. 27(3): 666-672.

5. Dobrovolski R, Diniz-Filho JAF, Loyola RD. et al. 2011. Agricultural expansion and the fate of global conservation priorities. Biodiversity and Conservation. 20(1): 2445-2459.

6. Hegel CGZ, Consalter GC, Zanella N. 2012. Mamíferos silvestres atropelados na rodovia RS-135, norte do Estado do Rio Grande do Sul. Biotemas. 25(2): 165-170.

7. IUCN - International Union for Conservation of Nature. 2015. The IUCN Red List of Threatened Species. Version 2015.2. Available at <http://www.iucnredlist.org> [Accessed in July 2015].

8. Oliveira DS, Silva VM. 2012. Vertebrados silvestres atropelados na BR 158, RS, Brasil. Biotemas. 25(4): 229-235.

9. Prada CS. 2004. Atropelamentos de vertebrados silvestres em uma região fragmentada do nordeste do Estado de São Paulo: Quantificação do impacto e análise de fatores envolvidos. 128f. São Carlos, SP. (Master's Thesis - Ecology and Natural Resources) – Universidade Federal de São Carlos, Brasil.

10. Schenk AN, Souza MJ. 2014. Major anthropogenic causes for and outcomes of wild animal presentation to a wildlife clinic in east Tennessee, USA, 2000–2011. Plos One. 9(3): 1-3.

11. Silva DE, Corrêa LLC, Oliveira SV. et al. 2013. Monitoramento de vertebrados atropelados em dois trechos de rodovias na região central do Rio Grande do Sul - Brasil. Revista de Ciências Ambientais. 7(1): 27-36.

12. Souza SA, De Lucca ALT, Dickfeldt EP. et al. 2010. Impactos de atropelamentos de animais silvestres no trecho da rodovia SP-215 confrontante ao Parque Estadual de Porto Ferreira - Porto Ferreira, SP (nota científica). Revista do Instituto Florestal. 22(2): 315-323.

13. Wendell MD, Sleeman JM, Kratz G. 2002. Retrospective study of morbidity and mortality of raptors admitted to Colorado State University Veterinary Teaching Hospital during 1995 to 1998. Journal of Wildlife Diseases. 38(1): 101-106.