










Original Articles

Epidemiological aspects of 306 emergency cases of small animals seen at a veterinary school hospital

Aspectos epidemiológicos de 306 casos emergenciais em pequenos animais atendidos em um Hospital Escola Veterinário

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ABSTRACT

The deficiencies in the screening protocols and the paucity of epidemiological studies aimed at emergency care contribute to a generalist emergency approach, without focusing on the most common causes and injuries of emergency admissions in veterinary practice. Thus, we aimed to retrospectively study the epidemiological aspects of emergency cases in dogs and cats under routine care at a veterinary school hospital at University X over 24 months (June 2012–June 2014). During this period, 328 cases were considered as emergencies, of which 306 were included in the study. The main causes of emergency admissions in both species were trauma, followed by hypovolemic shock. The third cause differed between species, the most common being neurological emergencies in dogs and urinary emergencies in cats. Knowledge of emergency epidemiological data in the pet clinic is essential for clinical surveillance, case screening, early diagnosis, rapid therapeutic intervention, and avoiding losses in the waiting rooms of veterinary emergency medicine.

RESUMO

A deficiência nos protocolos de triagem e o número reduzido de trabalhos epidemiológicos voltados para atendimentos de emergência contribuem para uma abordagem emergencial generalista, sem foco nas causas e lesões mais comuns de admissões de emergência na prática veterinária. Dessa forma, o presente trabalho teve como objetivo estudar retrospectivamente os aspectos epidemiológicos dos casos de emergência em cães e gatos no atendimento de rotina em um Hospital Escola Veterinário da Universidade X durante um período de vinte quatro meses (junho 2012 – junho de 2014). Nesse período, foram atendidos 328 casos considerados emergenciais, sendo 306 incluídos, por possuírem todos os dados clínicos e laboratoriais necessários ao estudo. As principais causas de admissões de emergência em ambas espécies foram o trauma, seguido por choque hipovolêmico. A terceira causa diferiu entre as espécies, sendo as emergências neurológicas mais comuns nos cães e as urinárias nos gatos. O conhecimento de dados epidemiológicos de emergência na clínica de animais de companhia é fundamental para vigilância clínica, triagem dos casos, diagnóstico precoce e intervenção terapêutica rápida, a fim de se evitar perdas nas salas de espera de pronto-atendimentos veterinários.

INTRODUCTION

In medicine, it has been shown that epidemiological studies investigating emergencies help to improve the

primary approach and diagnosis. In addition, they contribute to the improvement of facilities and the training of first responders (BINDMAN et al., 1995; CHAN, 2003; NEEDHAM et al., 2005). In veterinary

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medicine, there is a paucity of studies and publications that address the epidemiology of emergency care, thus leaving a gap in the preparation, surveillance, and recognition of critical cases that require rapid interventions. There are studies that have evaluated variations in emergency admissions with moon cycles or holidays (WELLS et al., 2007; MCALEES; ANDERON, 2007; DROBATZ et al., 2009), emergency oncology review in small animal clinics (TUMIELEWICZ et al., 2019), the epidemiological aspects and main pathologies of feline patients (SÃO GERMANO et al., 2011), epidemiology of trauma in small animals (ROHDE et al., 2014), and another study addressing emergencies in the general context (GUTERRES et al., 2013). In translational medicine, there is evidence of the benefits of emergency epidemiological studies at the interface and collaboration for all species (FÉLIX; GOMMEREN; BOYSEN, 2019). Thus, the present study aimed to assess the epidemiological aspects of emergency cases under routine care of a veterinary school hospital (VSH) over 24 months (2012 – 2014). The main causes of emergency admissions were recognized and discussed. In addition, the importance and contributions of the study of emergencies in medical care were discussed.

MATERIAL AND METHODS

We performed a retrospective survey of dogs and cats admitted to the Hospital Escola Veterinário (HOVET) at Universidade X. We surveyed and evaluated all medical records of patients admitted between July 1, 2012 and July 1, 2014. All medical records from the study period were consulted and evaluated. Review data including age, sex, race, species, weight, size, and the date of medical care, were obtained. In addition, data on medical history, physical examination, and complementary examinations were also obtained.

The characterization of emergency cases was completed according to previously established criteria (BARTON, 2009; HACKETT, 2009), taking into account the admission history, physiological parameters, primary and secondary physical examination findings, and results of complementary examinations. According to the underlying condition causing the emergency presentation, as well as the systems involved, the cases were classified into trauma, hypovolemic shock, cardiorespiratory arrest, intoxications, respiratory, gastrointestinal, urological, reproductive/obstetric, ophthalmic, infectious, dermatological, endocrine, neurological, and allergic/hypersensitivity reactions.

Respiratory cases were mainly cases of dyspnea. The cases of shock were characterized as previously described, taking into account the state of consciousness, heart rate, pulse, capillary filling time, and rectal temperature (BARTON, 2009). In this study, the authors considered hemorrhagic shock as belonging to the hypovolemic shock category, and distinct from dehydration and hemorrhage. Patients presenting with symptoms of vomiting and diarrhea who displayed

clinical parameters suggestive of grave/severe dehydration, such as tachycardia, hypotension, oliguria, and reduced cardiac output, were classified as having hypovolemic shock, even those with gastroenteric symptoms of infectious causes. The clinical characteristics of patients with hypovolemic shock were based on the methodology described by Ford and Mazzaferro (2007), by the association of physiological changes such as bradycardia or tachycardia, normotension or hypotension, normothermia or hypothermia, increased or decreased capillary filling time, skin turgor, presence of enophthalmos, and mucous staining.

Infectious emergencies referred to sepsis and were considered only after data evaluation according to the PIRO protocol (*Predisposition, Infection, Results, Organ dysfunction*), as described by Levy et al. (2003). These emergencies presented with imminent risk of life or severe organic damage, with hemodynamic changes, respiratory changes with dyspnea, changes in consciousness, convulsions, hyperalgesia, allodynia, acute paresis/plegia, states of hypersensitivity, and intoxication.

The occurrence of any data judged to be incomplete, whether from anamnesis or physical examination, which would hinder the correct interpretation of the case, was excluded from the research.

RESULTS

During the evaluation period, 328 cases were classified as “emergency”. However, 22 cases (20 dogs and 2 cats) were excluded, as they presented incomplete data in the medical records, 6 of them due to a lack of history, and 16 a lack of laboratory test results.

The main causes of emergency under the respective conditions are shown in Table 1.

Among the emergency cases, 251 were dogs (82%) and 55 were cats (18%). The prevalences of general cases in both species (canines and felines) are shown in Figures 1, 2 and 3.

Of the 306 animals recruited, 165 (54%) were males, and 141 (46%) were females. In the canine group, among the 251 animals, 138 (55%) were males and 113 (44.8%) females whereas in the feline group, among the 55 animals, 28 (51%) were males and 27 (49%) females.

Ages ranged from 2 days to 15 years, with a weighted average of 3 years. The most common breeds in the canine group were Pinscher (31% -13%), Pit bull (19% - 8%), Poodle (17% - 7%), Shihtzu (11% - 5%), and Dachshund (6% - 3%). In the feline group, the most common breeds included Siamese (10 - 18.18%) and Persian (5% - 9%). Mixed-breed animals (SRD) accounted for a large part of the population in both dogs (110% - 47%) and cats (40 - 72.72%).

Table 1. Classification of emergency cases of pets according to the main causes admitted at the VSH over two years (2012 – 2014).

Group	Cause of emergency
Trauma (n = 86 - 28,1%)	Running over (n = 52 - 16,9%), fight between animals (n = 24 - 7,8%), falls (n = 10 - 3,2%)
Hypovolemic shock (n = 56 - 18,3%)	Dehydration (n = 52 - 16,9%: 16 for diarrhea, 5,2%; 15 for vomit, 4,9%; e 21 for vomit and diarrhea, 6,8%), bleeding (n = 4 - 1,3%)
Neurologic (n = 46 - 15%)	TBI (n = 6 - 1,9%), convulsion (n = 17 - 5,5%), paresis/acute plegia (n = 13 - 4,2%), vertebral fracture (n = 10 - 3,2%)
Reproductive (n = 24 - 7,8%)	Postpartum tetania (n = 1 - 0,3%), dystocia (n = 17 - 5,5%), pyometra (n = 6 - 1,9%).
Ophthalmic (n = 17 - 5,5%)	Deep corneal ulcer (n = 4 - 1,3%), descemetocele (n = 2 - 0,6%), proptosis (n = 5 - 1,7%), glaucoma (n = 2 - 0,6%), laceration of the eyeball (n = 4 - 1,3%)
Urinary (n = 15 - 4,9%)	Acute renal failure (n = 9 - 2,9%), urethral obstruction (n = 6 - 1,9%)
Respiratory (n = 12 - 3,9%)	Pleural effusion (n = 2 - 0,6%), pneumothorax (n = 3 - 0,9%), pulmonary edema (n = 2 - 0,6%), diaphragmatic rupture (n = 3 - 0,9%), pulmonary contusion (n = 2 - 0,6%).
Intoxication (n = 11, 3,5%)	Tickworms (n = 5 - 1,6%), NSAIDs (n = 3 - 0,9%), dewormers (n = 3 - 0,9%)
Hematological (n = 10, 3,2%)	Autoimmune hemolytic anemia (n = 6 - 1,9%), anemia of unknown cause (n = 3 - 0,9%), bleeding thrombocytopenia (n = 1 - 0,3%)
Hypersensitivity reaction (n = 8, 2,6%)	Medicinal (n = 4 - 1,3%), insect bite (n = 2 - 0,6%), undefined (n = 2 - 0,6%)
Acute abdomen (n = 6, 1,9%)	Hemoabdomen (n = 2 - 0,6%), pancreatitis (n = 1 - 0,3%), peritonitis (n = 2 - 0,6%), uroabdomen (n = 1 - 0,3%)
Infectious (n = 5, 1,6%)	Sepsis (n = 5 - 1,6%)
Gastrointestinal tract (n = 4, 1,3%)	Strange body (n = 4 - 1,3%)
Cardiorespiratory arrest (n = 4, 1,3%)	Cardiorespiratory arrest (n = 4 - 1,3%)
Endocrine (n = 2, 0,6%)	Ketoacidotic diabetes (n = 2 - 0,6%)

*TBI: Traumatic brain injury; NSAIDs: non-steroidal anti-inflammatory drugs

Figure 1. Prevalence of emergency in dogs and cats over a period of two years (2012-2014) at a VSH.

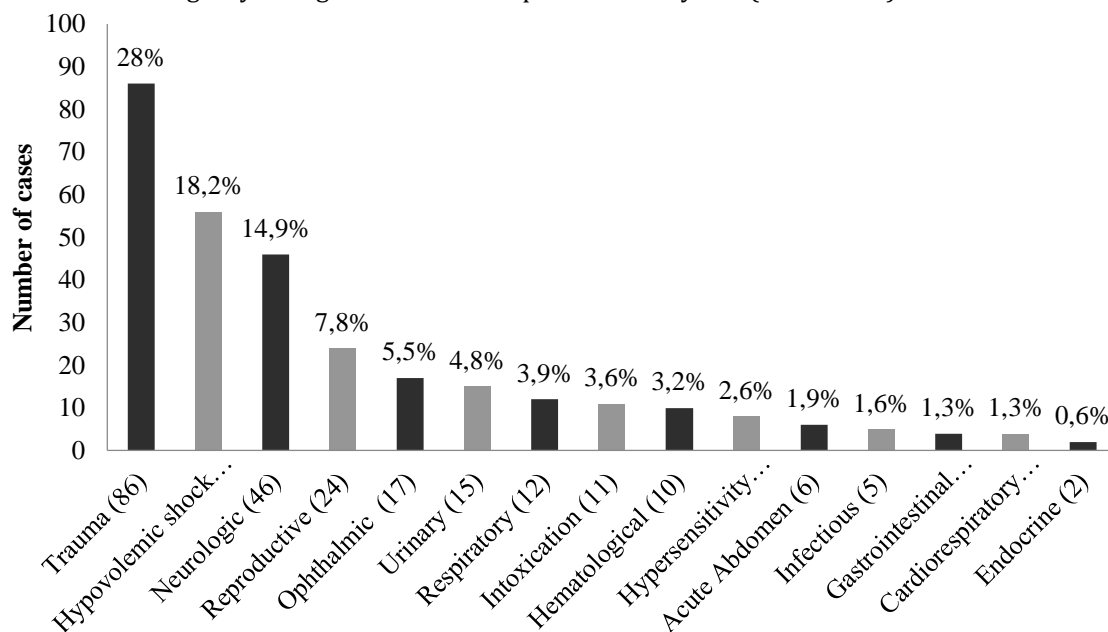


Figure 2. Prevalence of emergency cases in dogs, seen over a two-year period (2012-2014) at a VSH.

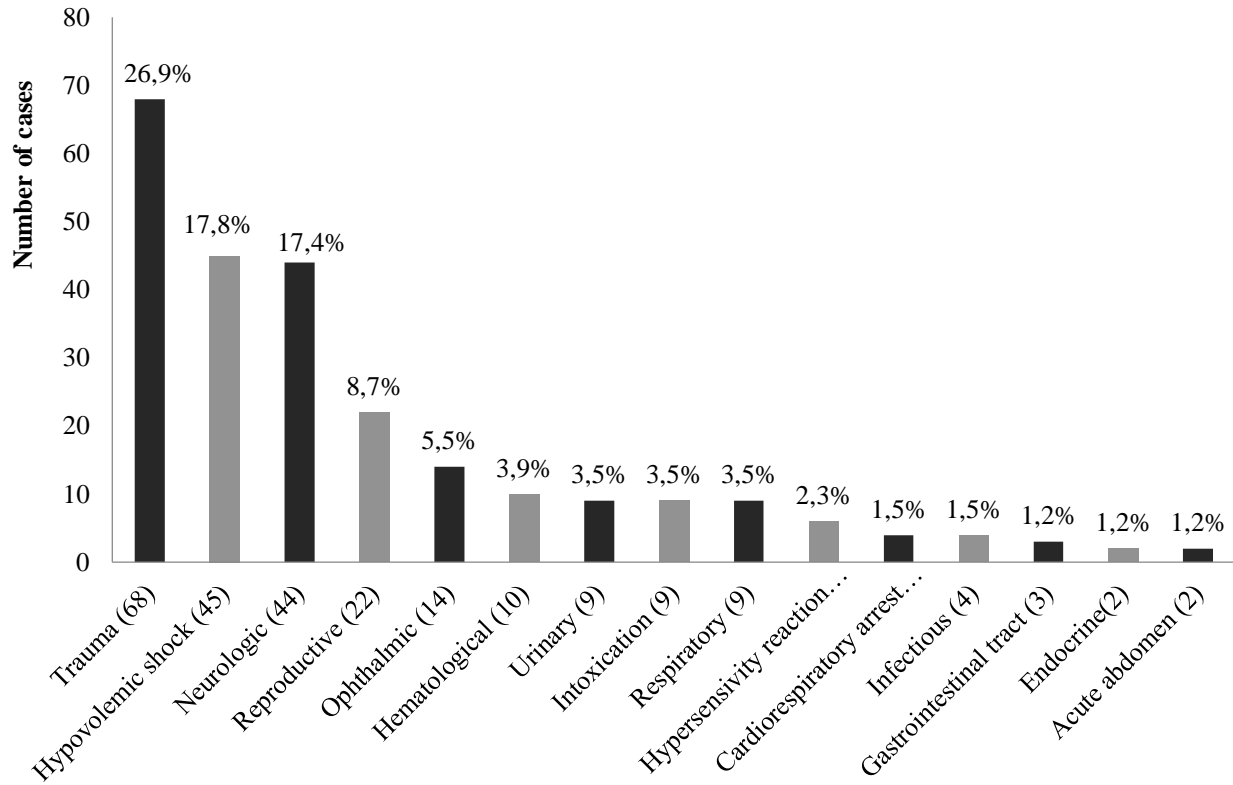
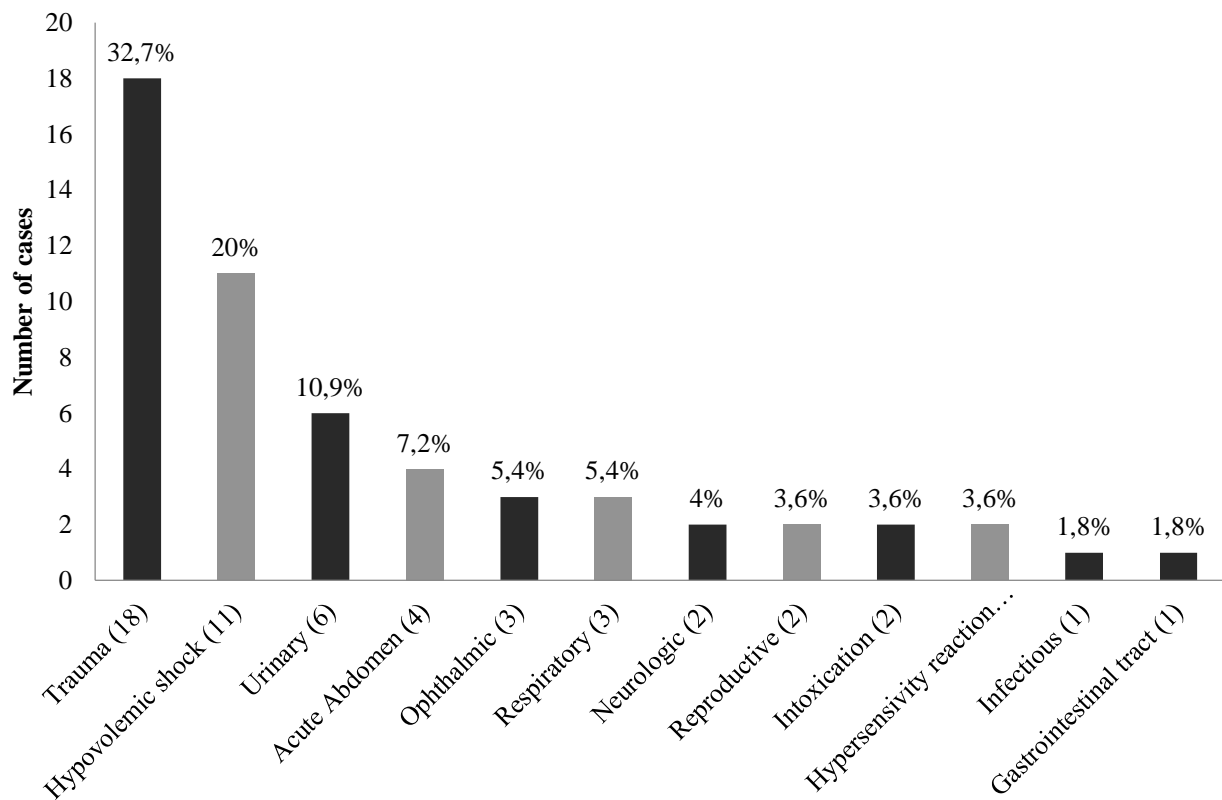


Figure 3. Prevalence of emergency cases in cats treated over a two-year period (2012-2014) at a VSH.



DISCUSSION

Epidemiological data of emergencies and the identification of the main and most common causes in

each hospital or clinic are essential for the adoption of care protocols aimed at these causes, thereby ensuring coordination in strengthening strategies at the time of admission including screening, diagnosis, and rapid

intervention of the most common emergencies, and avoiding deaths in the veterinary emergency waiting rooms (BINDMAN et al., 1995; CROWE, 2003; WELLS et al., 2007; RUYS et al., 2012).

At the national level, only three studies evaluating the epidemiology of emergencies have been conducted; one of them specifically evaluates only the epidemiology of trauma (ROHDE et al., 2014); another study addressing emergencies in a general context (GUTERRES et al., 2013), and the other presenting the epidemiological aspects and main pathologies of feline patients by São Germano et al. (2011). The work of Guterres et al. (2013) addressed 28 emergency cases, whereas here, we studied epidemiology in 306 cases of emergency care.

At the international level, there are only three studies that have evaluated the epidemiological aspects of emergencies (MCALEES; ANDERSON, 2007; WELLS et al., 2007; DROBATZ et al., 2009). In these studies, the focus of the authors was not to evaluate the cause of emergencies, nor the epidemiological data of the occurrences; only the period of admissions and/or the possibility of associations between certain types of emergencies and the cycles of the moon, holidays, or times of the year were studied. Thus, the present work stands out with regard to the study of the epidemiological aspects of different causes of emergencies in dogs and cats.

Trauma and hypovolemic shock were the most common causes of emergency in the hospital in this study. Other studies found a similar distribution (WELLS et al., 2007; DROBATZ et al., 2009).

Approximately 60.4% of trauma were caused by automobile accidents. This finding corroborates with the current literature (KOLATA, 1998; ROHDE et al., 2014). In humans, the contribution of automobile accidents to the series of trauma has been lowered, at around 28% (OGENDI E AYISI, 2011). This difference can probably be explained because this cause of trauma in humans is exceeded by other important causes that are rarely reported in veterinary medicine, such as assault injuries, which contribute to 41% of the reported trauma in humans (OGENDI E AYISI, 2011).

In the present study, trauma due to aggression/fights with other animals accounted for 27.9% (24/86) of the causes of traumatic emergencies and 7.82% (24/306) of all cases of emergencies. In medicine, studies related to animal traumas and injuries are common (STEFANOPOULOS et al., 2004; MASSARI; MASINI, 2006), and are important in public health because of the zoonotic character of some diseases (OSTANELLO et al., 2005). Rabies is the most commonly remembered disease in these situations (STEFANOPOULOS et al., 2004). However, in the veterinary context, babesiosis can also be transmitted by means of bites and fights between dogs, through blood or saliva, mainly *Babesia gibsoni* (AYOUB et al., 2010), a small babesia common in North America, but has been diagnosed in Brazil (TRAPP

et al., 2006). Recognition of trauma by bites has also been assuming increasing importance among emergencies in human and veterinary medicine units, as this type of injury stands out in the face of the risks of post-traumatic abscesses (STEFANOPOULOS et al., 2004). Past studies have shown a strong suspicion of the transmission of *B. gibsoni* by bites, occurring through blood or saliva. More than 60% of dogs infected with *B. gibsoni* are males with a history of bites or have been bitten by another dog positive for *B. gibsoni* (BIRKENHEUER et al., 1999; 2005; IRIZARRY-ROVRIA et al., 2001).

The third most common cause of emergency care in the canine species was neurological (15.4%). The recognition of these conditions is important since many of them pose a threat to patients' lives; others have high morbidity rates. For example, traumatic brain injury (TBI), which has a mortality rate of 18% - 24% (SHARMA; HOLOWAYCHUK, 2015). On the other hand, the urgency with which these emergencies are recognized, screened, admitted, and treated is fundamental to increasing the chances of survival and decreasing the degree of primary and secondary complications that can result in permanent sequelae or lead to negative prognostic factors (SANDE; WEST, 2010; PARK et al., 2012; SHARMA; HOLOWAYCHUK, 2015).

In a study conducted by Drobotz et al. (2009), neurological cases represented only 3.63% of emergencies. In the present study, neurological emergencies could be over-represented by the criteria adopted for the classification of emergencies. Spine fractures and TBI are conditions most frequently caused by traumatic events. Although in the present study, they were accounted for under neurological emergencies. In the study by Guterres et al. (2013), neurological causes represented 12.8%, which is similar to that found in this study (15.4%). However, only TBI was listed as a neurological cause in a study by Guterres et al., (2013), whereas in the present study, TBI alone had a prevalence of 1.9%.

Epileptic seizures are the most common neurological clinical signs in dogs and are usually presented to general practitioners for initial assessment (GESELL et al., 2015; FREDSSØ, et al., 2017). In the present study, this situation represented 5.5% (n = 17) of the cases, with the neurological disorder being the most frequent. Therefore, although the diagnosis and treatment are important for the patient, since the ineffective approach may result in death or sequelae to the animal, the education of the owner must be a priority for the general practitioner (MELAND; CARRERA-JUSTIZ, 2018).

In the feline species, the third most common cause of emergency care was related to the urinary system, a system that has specific and unique conditions related to the species in question. A retrospective study highlighted the increasing prevalence of cats treated for urinary emergencies, in which the main cause was urethral obstruction, with a prevalence of 35% (SEGEV et al.,

2013). In turn, São Germano et al. (2011) reported that the care of felines in the medical clinic, representing 43.96% of the cases, was related to urinary (26.37%), digestive (16.25%), infectious (11.87%), and cutaneous (11.25%) pathologies. In the surgical clinic, the total number of consultations was 56.04%, with reproductive (46.08%), musculoskeletal (30.39%), and oncological (7.84%) causes being the most common. In the present study, the main cause of urinary emergency care in cats was also urethral obstruction (66% of urinary emergencies).

The number of cesarean sections has increased, due to the popularity of this procedure in animals of specific breeds, in addition to cases of dystocia (CONZE et al., 2019). The 17 cases of dystocia in the present study had a surgical approach and accounted for 5.5% of all cases. Of these, 11 occurred in brachycephalic breeds [French Bulldog (n = 7) and Pug (n = 4)], three in miniature breeds (German Spitz), and three in mixed-breed animals. O'Neill et al. (2017) observed a high occurrence of dystocia in brachycephalic and miniature breeds, such as French bulldog, Boston terrier, and Chihuahua, demonstrating a high correlation (P <0.001). Further studies should be carried out to investigate the main causes of dystocia, as well as the best emergency approach (O'NEILL et al., 2017).

Hypovolemic shock is a common problem in emergency medicine for small animals and occurs when a decrease in the circulating blood volume reduces cardiac output and impairs the supply of oxygen to tissues (BOYD; SMART, 2019). Hypovolemic shock is commonly associated with several disease processes, such as hemorrhage, vomiting, and/or diarrhea (LLEWELLYN et al., 2020), as observed in this study. The clinician should quickly assess all emergency patients for the possibility of hypovolemic shock, using physical examination parameters (BOYD; SMART, 2019). In this study, 18.3% of the visits were associated with hypovolemic shock. No other studies on the frequency of hypovolemic shock were found in the clinical routine; therefore, further studies on this topic should be performed.

Epidemiological knowledge of emergencies is essential for future prevention campaigns against the main causes in the veterinary population, just as it already occurs in human medicine. Deficiencies in the screening protocols and the small number of epidemiological studies aimed at emergency care contribute to a generalist emergency approach, without focusing on the most common causes and injuries of emergency admissions in practice.

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