



## Causes of sudden and unexpected death in cats: A 10-year retrospective study

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The causes of sudden death in cats were reviewed by using postmortem records of the veterinary diagnostic laboratory at the Western College of Veterinary Medicine (WCVN). The veterinary diagnostic laboratory at the WCVN is the only laboratory serving Saskatoon, a city of 219 056 people (1), and the surrounding rural areas of central Saskatchewan.

All records involving cats over 6 wk of age presented to the WCVN for a postmortem examination during the 10-year period from July 1, 1989, to June 30, 1999, were reviewed. Cases selected for inclusion involved cats that were found dead but were considered healthy by their owners when last seen. The owners, therefore, did not observe clinical signs. Deaths that were iatrogenic, including those associated with anaphylaxis and general anesthesia, or induced as euthanasia, were not included.

The records were reviewed to determine the underlying cause, month, and year of the death, as well as the age, sex, breed, and type of housing. Regarding breed, cats were considered as either domestic shorthair and mixed or of any other breed. Housing was categorized as either entirely indoor, or outdoor. In all cases, the gross postmortem findings, the histologic findings, if any, and the results of any ancillary tests were reevaluated to determine if they supported the original pathologist's conclusion regarding the cause of death.

Nine hundred and ninety-four cats were examined during the 10-year study period. Of those, 79 (7.9%) died suddenly and unexpectedly; these are summarized by underlying cause of death in Table 1. The number of cases examined during each month and each year of the study was similar. The age of 13 cats was not recorded. The age of 66 cats ranged from 6 wk to 18 y, with a mean of about 3.5 y. All but 1 of the 66 cats was 10 y of age or less, with 34 (51.5%) of them 2 y or less, and 19 (28.7%) 1 y or less. Twenty-three (29.1%) cats were intact males, 16 (20.3%) were castrated males, 21 (26.6%) were intact females, and 9 (11.4%) were spayed females; the sex was not specified in 10 (12.7%) cats.

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**Table 1. Underlying causes of sudden and unexpected deaths in 79 cats**

General cause of death	Number of cases	% of total
Trauma	31	39.2
Heart Disease	16	20.3
Intestinal disease	6	7.6
Respiratory disease	5	6.3
Urinary tract disease	4	5.1
Feline leukemia virus related disease	3	3.8
Meningoencephalitis	1	1.3
Hepatic necrosis	1	1.3
Sepsis	1	1.3
Hemorrhage not associated with trauma	1	1.3
Undetermined	10	12.7
Total	79	100.2 <sup>a</sup>

<sup>a</sup>% total is greater than 100 due to rounding

The breed of cat was not recorded in 31 (39.2%) cases. Of the remaining 48 cases, 37 (77.1%) were domestic shorthair or mixed breed cats, and 11 were of another breed. Forty-nine of the 79 cats (62.0%) had some access to the outdoors, 11 (13.9%) never went outdoors, and for 19 (24.1%), it could not be determined if the cat had access to the outdoors or not. Without similar data on the population of cats present in the area served by the WCVN veterinary diagnostic laboratory, the implications of these findings are open to speculation.

Trauma was the most common cause of sudden and unexpected death: 27 of 31 (87.09%) of these cases were presumed to have been associated with a motor vehicle accident. This type of trauma was characterized by a combination of lesions, including displacement of an abdominal organ, ruptured diaphragm, ruptured spleen, ruptured liver, internal hemorrhage, fractured bones, and skin abrasions. Three of these occurrences were of cats being fatally wounded by the bites of another animal, likely a dog, and 1 was of a cat being killed by gunshot. Cats dying from trauma were similar in age, sex, and breed to other cats; all but 1 had access to the outdoors, and there was 1 cat for which the housing could not be determined. No indoor cats were found to have died of trauma.

Heart disease was the second most common underlying cause of sudden and unexpected death. The most common type of heart disease was hypertrophic cardiomyopathy (14 of 16 cases; 87.5%). This is consistent with reports that hypertrophic cardiomyopathy was the most common type of heart disease of cats during the 1990s (2-4). The other 2 cats were diagnosed with myocardial fibrosis and acute myocardial necrosis, respectively. The cause of those lesions was not determined.

Intestinal disease was the cause of death of 6 cats, 5 of which had enteritis due to feline panleukopenia virus. In all 5 cases, the diagnosis was established at the time of necropsy, based on the nature of the lesions and identification of the virus with either a fluorescent antibody test or by isolation. While it is possible that these cats may have shown clinical signs that went unobserved, it is also possible that feline panleukopenia virus can cause severe enough disease to cause death without premonitory signs. An important finding was that all cats with feline panleukopenia virus infection were 6 mo of age or less. It is also interesting that 3 of the affected cats were kept indoors and 2 were allowed outdoors. The 6th cat had an intestinal foreign body.

Respiratory disease led to the death of 5 cats. An acute bronchopneumonia was present in 3 cats. A mixed infection of *Pasteurella multocida* and *Pasteurella pneumotropica* caused death in 1 case, while the cause could not be determined in the other 2 cases because of postmortem overgrowth of contaminating bacteria. The cats dying of pneumonia were 2, 8, and 10 mo of age. Two of the cats with pneumonia were outdoor cats; the housing of the 3rd cat was not recorded. Two other cats died of asphyxiation associated with upper respiratory tract obstruction. One cat was a 5-month-old kitten with a foreign body present in the pharynx; the other was 2 y old with its trachea obstructed by material interpreted as regurgitated stomach contents.

Urinary tract disease was responsible for the death of 4 cats; 3 with renal disease and 1 with a urethral obstruction. The cats with renal disease were 8, 10, and 18 y of age. The 1 cat with urethral obstruction was a 6-year-old castrated male. This was an unexpected finding, since cats with these types of urinary tract disease would commonly display clinical signs.

Disease associated with feline leukemia virus (FeLV) infection was diagnosed in 3 cats: 1 had multicentric lymphoma; 1 had erythremic myelosis, based on the presence of neoplastic nucleated erythrocytes in the blood vessels and parenchyma of multiple soft tissues; and 1 had a fatal nonregenerative anemia, based on marked generalized pallor and an absence of accelerated erythropoiesis. Since each of these disease syndromes has been associated with FeLV infection (5), the presence of FeLV was confirmed by using an enzyme-based immunohistochemical staining technique on formalin-fixed, paraffin-embedded tissues (6) that had been stored since 1998, 1994, and 1991, respectively. Of the 3 cats dying with FeLV-associated disease, 1 was 2 y old and 1 was 4 y old; and the age of the third cat was not recorded. All 3 cats had access to the outdoors.

In 10 of the 79 cases (12.7%), the cause of death was not established. In some instances, lesions were identified but were not considered life-threatening, while in other instances no lesions were detected. These findings were not unexpected, as the cause of the sudden and unexpected death of horses was not determined in about 30% of horses examined in a study by Brown et al (7) and in about 13% in a study by Platt (8).

It is not known if the cats included in this study represent all cases of sudden and unexpected deaths in cats in the area served by the WCVM. Several factors may determine whether or not a cat that is found dead will have a postmortem examination. First, the cost of a postmortem examination may make it prohibitive or unwarranted to some owners. On the other hand, if

there are other animals at risk, an owner may be more willing to pursue an investigation. If trauma is obviously evident, a necropsy may not be performed. Trauma may well account for more deaths in cats, but if the incident had been observed or if the animal had been treated before going on to die, it would not have been included in this study. When owners are concerned about the possibility of poisoning, they may want confirmation of such; however it is interesting that none of the cats examined in this study were found to have been poisoned.

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