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A study of risk factors for cat mortality in adoption centres of a UK cat charity

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A case–control study was used to identify variables associated with the risk of mortality in cats housed at adoption centres. Multivariable logistic regression, based on retrospective data collected for 194 cases (cats that died or were euthanased) and 320 controls (cats that did not die) revealed an increased risk of mortality for cats admitted to adoption centres unneutered, in fair/poor health and cats born at adoption centres. Cats aged 7 weeks or less and cats aged over 7 years had an increased risk of mortality compared with cats of other ages. The risk of mortality decreased as the time in the adoption centre increased. Cats with disabilities (eg, blindness) had a higher mortality risk than cats without disabilities. Knowledge of these risk factors can inform intervention strategies aimed at reducing the risk of cat mortality at adoption centres.

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Within the UK, there are a large number of feline welfare charities that home unwanted cats and kittens in adoption centres whilst attempting to find new homes for them. Recent figures indicated that Cats Protection (CP), the largest UK feline-dedicated welfare charity, rehomed approximately 60,000 cats during 2005 (Cats Protection Annual Review 2005), which exceeded the total number of cats rehomed by the other main feline welfare charities (RSPCA Annual Review 2005, Blue Cross Annual Review 2005). Factors such as the large numbers of cats housed by the feline charities (many of which will be admitted in poor health, with an unknown vaccination history), the rapid turnover of cats and the potential for stress caused by a cattery environment may increase the risk of infectious disease and disease problems ultimately affecting the cats’ risk of mortality. Risk factors for mortality, resulting from natural death or euthanasia, among cats and kittens housed at UK adoption centres have not previously been investigated and may be different from risk factors for mortality of privately owned cats and kittens.

The lack of published data relating to the causes of feline mortality is surprising as this information is crucial to furthering our understanding of specific diseases, feline welfare and the variation that might exist in different populations of cats, particularly cats in adoption centres. Whilst studies have been conducted into the causes of mortality in populations of Swedish insured dogs (Bonnell et al 1997, 2005, Egevall et al 2005), Danish Kennel club registered dogs (Proschowsky et al 2003), US domestic cats (Hamilton et al 1969), Swedish insured horses (Egevall et al 2006) and a combined sample of dogs and cats (Lacheretz et al 2002, Moreau et al 2002), we are not aware of similar studies based solely on an adoption centre population of cats.

The majority of studies published on cat mortality have focused specifically on the prevalence and causes of kitten mortality (Scott and Peltz 1978, Lawler and Monti 1984, Cave et al 2002, Sparkes et al 2006), the causes of mortality in older cats (Landes et al 1984), or investigated risk factors for the stillbirth of kittens (Sparkes et al 2006).

Infectious disease was reported by Cave et al (2002) to be the most common cause (55%) of kitten mortality identified from the post-mortem...
findings of 274 kittens from private homes and rescue centres within the UK, with 25% of kitten mortality being attributed specifically to feline parvovirus (FPV). Idiopathic causes and congenital problems accounted for a further 33% and 5.1% of kitten deaths, respectively. The rescue shelter kittens were significantly younger and were more likely to have a viral infection, in particular FPV, than the kittens from private homes.

Stillborn kittens have been reported to account for approximately 7–10% of all cases of kitten mortality (Scott and Peltz 1978, Sparkes et al 2006), and 91% of the deaths of kittens dying within the first 3 days (Lawler and Monti 1984). Sparkes et al (2006) analysed data relating to 915 litters of pedigree cats and reported that an increased risk of having one or more stillborn kittens was associated with increasing litter size, the presence of congenital defects in the kittens and breed.

Landes et al (1984) analysed the post-mortem reports of 4561 cats submitted to the University of Munich, Pathology Department and concluded that the prevalence of specific causes of death appeared to be age-related. The majority of kittens died from viral diseases, supporting the findings of Cave et al (2002), whereas feline leukaemia virus (FeLV) and diseases of the urinary tract were reported as the main causes of death of middle aged cats and cats older than 8 years had a high incidence of tumours.

The aim of this study was to identify and quantify risk factors for mortality, resulting from natural death or euthanasia, among cats and kittens housed at UK feline charity adoption centres.

### Materials and methods

An unmatched case–control study design with a ratio of one control per case was used to test associations between potential risk factors for mortality (Table 1) and cat mortality (natural death or euthanasia of the cat).

| CP adoption centre | Number of cats admitted | Number (%) of cats admitted that died naturally | Number (%) of cats admitted that were euthanased | Total number (%) of cats admitted that died/were euthanased |
|--------------------|-------------------------|-----------------------------------------------|-----------------------------------------------|---------------------------------------------------------|
| 1                  | 661                     | 8 (1.2)                                       | 31 (4.7)                                      | 39 (5.9)                                                |
| 2                  | 403                     | 1 (0.2)                                       | 3 (0.7)                                       | 4 (1.0)                                                 |
| 3                  | 615                     | 1 (0.2)                                       | 42 (6.8)                                      | 43 (7.0)                                                |
| 4                  | 575                     | 12 (2.1)                                      | 24 (4.2)                                      | 36 (6.3)                                                |
| 5                  | 295                     | 7 (2.4)                                       | 24 (8.1)                                      | 31 (10.5)                                               |
| 6                  | 408                     | 10 (2.5)                                      | 37 (9.1)                                      | 47 (11.5)                                               |
| 7                  | 386                     | 2 (0.5)                                       | 5 (1.3)                                       | 7 (1.8)                                                 |
| 8                  | 335                     | 0 (0.0)                                       | 3 (0.9)                                       | 3 (0.9)                                                 |
| 9                  | 324                     | 1 (0.3)                                       | 25 (7.7)                                      | 26 (8.0)                                                |
| 10                 | 166                     | 0 (0.0)                                       | 5 (3.0)                                       | 5 (3.0)                                                 |
| 11                 | 417                     | 7 (1.7)                                       | 7 (1.7)                                       | 14 (3.4)                                                |
| 12                 | 847                     | 3 (0.4)                                       | 12 (1.4)                                      | 15 (1.8)                                                |
| 13                 | 436                     | 1 (0.2)                                       | 7 (1.6)                                       | 8 (1.8)                                                 |
| 14                 | 172                     | 7 (4.1)                                       | 9 (5.2)                                       | 16 (9.3)                                                |
| 15                 | 230                     | 3 (1.3)                                       | 11 (4.8)                                      | 14 (6.1)                                                |
| 16                 | 409                     | 0 (0.0)                                       | 8 (2.0)                                       | 8 (2.0)                                                 |
| 17*                | 108                     | 1 (0.9)                                       | 6 (5.6)                                       | 7 (6.5)                                                 |
| 18                 | 213                     | 5 (2.3)                                       | 8 (3.8)                                       | 13 (6.1)                                                |
| 19                 | 212                     | 0 (0.0)                                       | 8 (3.8)                                       | 8 (3.8)                                                 |
| 20*                | 174                     | 2 (1.1)                                       | 8 (4.6)                                       | 10 (5.7)                                                |
| 21                 | 191                     | 1 (0.5)                                       | 6 (3.1)                                       | 7 (3.7)                                                 |
| 22                 | 301                     | 3 (1.0)                                       | 9 (3.0)                                       | 12 (4.0)                                                |
| 23                 | 139                     | 2 (1.4)                                       | 4 (2.9)                                       | 6 (4.3)                                                 |
| Total              | 8017                    | 77 (1.0)                                      | 302 (3.8)                                     | 379 (4.7)                                                |

*Centres 17 and 20 were unable to provide data on control cats and were thus excluded from the case–control analysis.
Data relating to the number of cats that died naturally or were euthanased were collected from CP’s 23 largest adoption centres. CP adoption centres are run by managers employed by CP and have the capacity to accommodate an average of 120 cats at each centre. Approximately 30% of cats adopted each year from CP are housed at adoption centres, whereas the remaining 70% of cats are adopted from more than 250 CP branches which usually accommodate fewer cats than adoption centres and are run by volunteers. Data for this study related to all cats admitted during the first 6 months of 2005 to adoption centres, rather than branches as the management of the adoption centres is centrally controlled and data were more easily accessible. Two centres were unable to provide data on their control cats and were thus excluded from the case-control analysis. Data collected by 21 CP adoption centres were thus included in the case-control study. Data relating to the cause of mortality were supplied by staff at the adoption centres; however, not all causes were verified by post-mortem examination or by a veterinarian.

Cats that died naturally or were euthanased represented 4.7% (379/8017) of all cats that were admitted to 23 CP adoption centres between 1 January 2005 and 30 June 2005 (Table 1).

Case definition and selection
A case cat was defined as a cat that had died or been euthanased whilst housed at one of the study adoption centres between 1 January 2005 and 30 June 2005. Six case cats that had been housed by the adoption centre for 2 years (730 days) or more were likely to be ‘permanent’ residents at the centres. These cats were excluded from analysis as their inclusion may have biased the analysis, as it was unlikely that control cats would have been housed by CP for a comparable length of time.

Control definition and selection
In order that the variable of adoption centres could be examined as a potential risk factor for mortality, control cats were not matched to case cats by adoption centre. Therefore, in order to achieve a 1:1 unmatched case:control ratio, 4.7% of cats leaving each adoption centre between 1 January 2005 and 30 June 2005 for a reason other than death (ie, the cat was rehomed or transferred to another CP centre) were randomly selected as control cats. Similarly to case cats, the control cats were required to be housed by CP for 730 days or less prior to their selection. One randomly selected control cat was thus not eligible for inclusion in the study as a control cat.

Policy on euthanasia of cats
Currently, and at the time of data collection in 2005, CP has a policy not to euthanase cats, except on veterinary advice. Veterinary advice for euthanasia was recommended for all cats admitted to CP adoption centres that tested positive for FeLV. However, euthanasia was only recommended for cats testing positive for feline immunodeficiency virus (FIV) if they were also feral, in poor health or considered by CP staff to be unable to adapt to an indoor lifestyle. Decisions for treatment or euthanasia for other cats (eg, those with acute or chronic conditions that were not FIV- and/or FeLV-positive) were made by adoption centre managers on an individual basis with veterinary advice.

At the time of data collection (2005), CP did not have a well-defined policy for the selection of cats to test for FIV and FeLV. Three centres (Table 1, adoption centres 1, 3 and 8) tested all cats aged 6 months and older for FIV and FeLV, whereas the other centres tested only those cats that they believed to be at a ‘high risk’ of FIV and/or FeLV infection. ‘High risk’ cats included those that were feral, stray, in poor health, pregnant, lactating queens, unneutered males, those that had been in contact with FIV- or FeLV-positive cats and kittens of FIV- or FeLV-positive mothers. Cats were also tested for FIV and FeLV if they were to be housed with other cats at CP or if they were about to undergo extensive surgery or treatment. The selection of cats for FIV and FeLV testing thus varied between adoption centres.

Policy on admission of cats
Currently, and at the time of data collection, CP does not have an admissions policy. The majority of adoption centres are usually ‘full’ and keep a waiting list. Cats are admitted in order from the waiting list as vacancies arise. The only exception to this is that cats perceived to have a high need for accommodation may be given priority over cats higher up the waiting list if a vacancy arises (eg, heavily pregnant cats and cats from multi-cat households living in very poor conditions). Factors that may influence the ease of adoption of the cat (eg, age, health, temperament) are not considered when admitting cats to adoption centres.
Examination of the data revealed that, in line with CP’s policy to euthanase all cats testing positive for FeLV, 19 cats were euthanased following a positive FeLV test result and no control cats were thus known to have FeLV. Consequently, the FeLV test results were not considered as an explanatory variable, and these 19 cats were removed from the case–control dataset. In addition, due to the variation in selection of cats to be tested for FIV (and FeLV), and a policy to euthanise FIV-positive cats that were feral, in poor health or considered unable to adapt to an indoor lifestyle, all cats that tested positive for FIV (106 cases and three controls) were removed from the case–control dataset to avoid biasing the results.

Potential risk factors for cat mortality were tested for association with mortality using univariable logistic regression models. Potential risk factors included the subjective variable of the health of the cat at the time of admission to CP. Adoption centre managers were asked to rate the health of each cat as good, fair or poor based on records made at the time of admission. Although retrospective data collection for this variable might be subject to reporting bias as managers were aware of the outcome of each cat (ie, death or rehomed/transferred) when providing a subjective assessment of the cat’s health, the retrospective rating was based on prospective records, thus reducing the effect of bias and enabling the cats’ health at the time of admission to CP to be considered as a potential explanatory variable.

Following the removal of 126 case cats with FIV and/or FeLV (including three cats which had another recorded cause of mortality), six ‘permanent’ resident cats and 11 cats from adoption centres 17 and 20 which did not have FIV and/or FeLV, univariable analysis was based on data obtained for 236 cases and 357 controls; however, missing data existed for some cases and controls. Continuous variables were also categorised into quintiles in the univariable analysis. The fit of the categorical variables in the model was compared to the fit in the continuous variables by assessing the change in deviance. The statistical package Egret (Cytel Software Corporation, USA) was used for data analysis. Variables with a univariable P < 0.3 were considered for inclusion in a multivariable model.

The final multivariable model was based on data for 194 cases and 320 controls.

Results
A summary of the mortality statistics for cats that died or were euthanased at each of the 23 adoption centres included in the study is presented in Table 1. The percentage of cats that died or were euthanased at the adoption centres varied between 0.9% and 11.5% with a mean mortality rate of 4.7%. The percentage of cats being euthanased ranged from 0.7% to 9.1% and tended to be higher than the naturally occurring deaths which ranged from 0.0% to 4.1%.

Infectious causes were reported to be responsible for 148/379 (39.1%) of all deaths recorded at adoption centres during the 6-month study period (Table 2). The most common cause of mortality was attributed to FIV infection (27.7%), whereas FeLV infection accounted for only 4% of deaths recorded, with a further 1.1% of deaths being attributable to FIV and FeLV infection. Conditions affecting the gastrointestinal tract (9.8%) and urinary system (7.9%) were responsible for a high proportion of recorded deaths and 19.9% of all euthanasias. Kittens that were either stillborn or that died shortly after birth attributed to 7.1% of all recorded deaths and 29.9% of naturally occurring deaths.

Excluding kittens that were born at CP, 27% (20/74) of cats that died or were euthanased within the first 3 days of admission to the centre were relinquished by owners rather than admitted as stray or feral cats.

Following removal of the dataset of cats testing positive for FIV or FeLV, a multivariable logistic regression model was fitted to the data, and is summarised in Table 3.

Data relating to the length of stay at an adoption centre were not normally distributed. The median length of stay was 8 days for case cats and 30 days for control cats.

Discussion
The overall mortality rate of 4.7% was considered to be low for a population of cats entering adoption centres. As anticipated, the euthanasia rates tended to be higher than the naturally occurring deaths (Table 1). Excluding cats testing positive for FIV or FeLV, only 9.4% (24/255) of the case cats died as a result of infectious disease (Table 2). This figure suggests that effective disease control procedures were employed by the
adoption centres, as infectious disease (excluding those caused by retroviruses) was reported to be the cause of death of 6.2% (16/259) cats registered with 15 French veterinary practices (Lacheretz et al 2002). The figures are, therefore, encouraging as the potential for infectious disease spread will have been much greater for the adoption centre cats in our study than for the population of domestic cats in Lacheretz et al’s study. However, it is possible that a higher mortality rate might have been reported if the study had included a 12-month data collection period rather than a 6-month period (January–June), as more kittens with an associated increased risk of mortality, would have been likely to have been included in the dataset.

The age of the cat at the time of admission was significantly associated with the risk of mortality. Compared with the reference category of cats aged 0–7 weeks, cats aged over 7 years were nearly five times more likely to die whilst at the adoption centre. In contrast, cats between 8 weeks and 1 year of age were nearly seven times less likely to die and cats aged more than 1 year and less than or equal to 3 years old were nearly four times less likely to die than cats aged 0–7 weeks of age. These findings were as anticipated, as they reflect the increased risks associated with old age and previously identified risks associated with birth and the neonatal period (Scott and Peltz 1978, Lawler and Monti 1984, Sparkes et al 2006). Excluding kittens that died before reaching 6 weeks of age, the approximate median age of cats that died naturally was 3 years and 3 months compared with a median age of 8 years and 1 month.

Table 2. Causes of mortality reported by CP adoption centre/branch staff for 374 cats that died or were euthanased whilst in CP’s care between 1 January 2005 and 30 June 2005

| Cause of mortality          | Number (%) of cats that died naturally (n = 77) | Number (%) of cats that were euthanased (n = 302) | Number (%) of cats that died or were euthanased (n = 379) |
|----------------------------|-------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Infectious                 | 14 (18.2)                                       | 134 (44.4)                                       | 148 (39.1)                                       |
| FIV                        | 0 (0.0)                                         | 105 (34.8)                                       | 105 (27.7)                                       |
| Flu/FIE/parvo              | 9 (11.7)                                        | 10 (3.3)                                         | 19 (5.0)                                         |
| FeLV                       | 1 (1.3)                                         | 14 (4.6)                                         | 15 (4.0)                                         |
| FIV and FeLV               | 0 (0.0)                                         | 4 (1.3)                                          | 4 (1.1)                                          |
| Toxoplasmosis              | 3 (3.9)                                         | 0 (0.0)                                          | 3 (0.8)                                          |
| High FCoV titre            | 0 (0.0)                                         | 1 (0.3)                                          | 1 (0.3)                                          |
| Calicivirus                | 1 (1.3)                                         | 0 (0.0)                                          | 1 (0.3)                                          |
| Non-infectious             | 14 (18.2)                                       | 135 (44.7)                                       | 149 (39.3)                                       |
| Gastrointestinal           | 5 (6.5)                                         | 32 (10.6)                                        | 37 (9.8)                                         |
| Other (eg, multiple non-infectious causes, tumours of unknown location) | 0 (0.0)                                         | 31 (10.3)                                        | 31 (8.2)                                         |
| Urinary                    | 2 (2.6)                                         | 28 (9.3)                                         | 30 (7.9)                                         |
| Respiratory                | 2 (2.6)                                         | 11 (3.6)                                         | 13 (3.4)                                         |
| Cardiovascular             | 3 (3.9)                                         | 8 (2.6)                                          | 11 (2.9)                                         |
| Neurological               | 1 (1.3)                                         | 8 (2.6)                                          | 9 (2.4)                                          |
| Musculoskeletal            | 0 (0.0)                                         | 7 (2.3)                                          | 7 (1.8)                                          |
| Dermatological             | 0 (0.0)                                         | 6 (2.0)                                          | 6 (1.6)                                          |
| Endocrine                  | 1 (1.3)                                         | 2 (0.7)                                          | 3 (0.8)                                          |
| Behavioural                | 0 (0.0)                                         | 2 (0.7)                                          | 2 (0.5)                                          |
| Miscellaneous              | 49 (63.6)                                       | 33 (10.9)                                        | 82 (21.6)                                        |
| Unknown                    | 16 (20.8)                                       | 17 (5.6)                                         | 33 (8.7)                                         |
| Kitten died at or shortly after birth | 23 (29.9)                                       | 4 (1.3)                                          | 27 (7.1)                                         |
| Other (eg, died under anaesthesia) | 8 (10.4)                                       | 6 (2.0)                                          | 14 (3.7)                                         |
| Trauma injuries            | 2 (2.6)                                         | 6 (2.0)                                          | 8 (2.1)                                          |

FIE = Feline infectious enteritis, FCoV = Feline coronavirus.
for cats that had been euthanased. These figures are likely to reflect veterinarians being more likely to recommend euthanasia for older cats in poor health compared with younger cats in poor health. Indeed, further examination of the data revealed that the median age of cats that were euthanased following admission to the adoption centres in poor health was 8 years compared to a median of 1 year for cats that were not euthanased following their admission in poor health.

Cats admitted to the rescue centres unneutered were nearly three times more likely to die whilst in the care of the adoption centre (AC) than cats that were neutered at the time of admission. The multivariable model (Table 3) included the variable of age at admission; therefore, the risk associated with the neutered status of the cat is independent of the age of the cat. Although a link between neutered status and FIV is well recognised, cats that had tested positive for FIV had been removed from the dataset. Euthanasia of FIV-positive cats thus does not explain the association between neutered status and mortality observed in this dataset (based on cats that had either tested negative for FIV or had not been tested for FIV). The reason for the association between neutered status and the risk of mortality is thus unclear; however, a link between neutered status and other infectious diseases may exist. Further examination of the data provided some support for this hypothesis as the neutered status of the cat was significantly ($P < 0.001$) associated with the cause of death (infectious disease excluding FIV/non-infectious disease), with unneutered cats accounting for 86.1% (31/36) and 54.2% (110/203) of cats that had been reported to have died as a result of infectious diseases (other than FIV) and non-infectious diseases, respectively (data not shown). Unneutered cats

| Variable          | Cases (%) (n = 194) | Controls (%) (n = 320) | Adjusted* OR (95% CI) | $P$-value |
|-------------------|---------------------|------------------------|-----------------------|-----------|
| Age               |                     |                        |                       |           |
| 0–7 weeks†       | 71 (37.3)           | 37 (11.6)              | 1.00                  | <0.001    |
| 8 weeks–1 year    | 15 (6.9)            | 86 (26.3)              | 0.15 (0.06–0.39)      |           |
| >1–3 years        | 14 (7.4)            | 82 (26.3)              | 0.27 (0.09–0.78)      |           |
| >3–7 years        | 28 (13.7)           | 79 (24.7)              | 1.09 (0.36–3.36)      |           |
| >7–18 years       | 66 (34.8)           | 36 (11.3)              | 4.95 (1.50–16.35)     |           |
| Neutered status   |                     |                        |                       |           |
| Neutered†         | 84 (43.1)           | 182 (56.9)             | 1.00                  | 0.01      |
| Entire            | 110 (56.9)          | 138 (43.1)             | 2.88 (1.29–6.44)      |           |
| Background        |                     |                        |                       |           |
| Owned/stray/feral| 164 (85.3)          | 310 (96.9)             | 1.00                  | 0.03      |
| Born at CP        | 30 (14.7)           | 10 (3.1)               | 3.51 (1.13–10.94)     |           |
| Days at CP        |                     |                        |                       |           |
| 0–3 days†         | 73 (38.2)           | 12 (3.8)               | 1.00                  | <0.001    |
| 4–12 days         | 43 (23.0)           | 66 (20.6)              | 0.16 (0.06–0.43)      |           |
| 13–28 days        | 29 (14.2)           | 84 (26.3)              | 0.06 (0.02–0.18)      |           |
| 29–69 days        | 21 (10.8)           | 88 (27.5)              | 0.03 (0.01–0.08)      |           |
| 70–716 days       | 28 (13.7)           | 70 (21.9)              | 0.04 (0.02–0.13)      |           |
| Health            |                     |                        |                       |           |
| Good†             | 42 (21.6)           | 208 (65.0)             | 1.00                  | <0.001    |
| Fair              | 61 (29.9)           | 83 (25.9)              | 3.80 (2.08–6.95)      |           |
| Poor              | 91 (48.5)           | 29 (9.1)               | 11.88 (5.98–23.55)    |           |
| Disability        |                     |                        |                       |           |
| No†               | 180 (93.1)          | 307 (95.9)             | 1.00                  | 0.02      |
| Yes               | 14 (6.9)            | 13 (4.1)               | 3.05 (1.17–7.92)      |           |

*Adjustment is for all variables shown.
†Reference category.
may also be more likely than neutered cats to roam and thus be at an increased risk from poisoning or trauma-related injuries resulting from road traffic accidents; however, no cases of poisoning and few trauma-related \( (n = 8) \) deaths were recorded in this study. In contrast, road accidents and poisoning were reported by Moreau et al (2002) to be the most common causes of accidental deaths in cats, accounting for 41% and 40% of cases, respectively.

Cats that were born at an adoption centre were three-and-a-half times more likely to die whilst in the centre’s care than cats that were previously stray, feral or had been relinquished by an owner. This association emphasises the high risk associated with birth and the early neonatal period, particularly as the age of the cat at the time of admission to CP and the length of time that the cat spent in CP have already been adjusted for by the multivariable model, thus controlling for potential confounding by age.

The number of days that the cat had been housed at the adoption centre was significantly \( (P < 0.001) \) associated with the risk of mortality. The highest risk of mortality was associated with cats that had been housed by CP for 3 days or less. However, the association between time at the adoption centre and the risk of mortality was independent of variables included in the multivariable model, including the age of the cat, the birth location (at CP or elsewhere) and the health of the cat at the time of admission. In addition, FIV-positive and FeLV-positive cats that were euthanased during the first few days following admission to an adoption centre were removed from the dataset prior to multivariable analysis, thus not explaining the observed association between time spent at CP and the risk of mortality. Therefore, other factors not examined in this study may explain this association. It is possible that although the poor health of some cats might not have been apparent at the time of relinquishment, the initial veterinary examination would have revealed the need for euthanasia. However, it is also possible that some owners might take cats in need of euthanasia to CP rather than to their veterinary surgeon, in an attempt to reduce the cost and emotional distress associated with euthanasia. This hypothesis is supported by the finding that 27% of cats that died or were euthanased within the first 3 days of admission to the centre (excluding kittens that were born at CP), were relinquished by owners rather than admitted as stray or feral cats. It is also possible that some of the stray/feral cats were also ‘owned’ cats, but whose owners would not admit to ownership at the time of relinquishment, in an attempt to reduce any guilt associated with passing on the responsibility of euthanasia to an adoption centre. Further investigation of cats requiring euthanasia within the first few days since admission to an adoption centre might thus be warranted by rescue charities.

The health of the cat at admission was significantly associated with the risk of mortality. Cats that were in fair or poor health were 3.8 and 11.9 times more likely to die, respectively, than cats that were admitted in good health. Adoption centre managers based their assessment of the cat’s health at the time of admission on records that were made at the time of admission. However, there still remained the potential for this variable to be subject to reporting bias, as adoption centre staff may have been more likely to report the health of a cat retrospectively that had died as poor than the health of a cat that had subsequently been rehomed. Despite the possibility of reporting bias, this association was as expected due to poor health being a key indicator of mortality.

The risk of mortality was three times higher for cats that were reported to have a disability (eg, blindness, limb deformity) than cats that had no disability. Except for one cat that was blind and died of ‘old age’, the other case cats reported to have a disability were all euthanased on veterinary advice related to other health problems. Thus, it is anticipated that the association between the risk of mortality and the presence of disabilities was related to the presence or absence of a disability acting as an additional factor that contributed to the euthanasia decision.

In conclusion, six variables were significantly associated with the risk of mortality for cats housed at CP adoption centres. These variables were as follows: the age, neutered status, presence of disabilities and health of the cat at the time of admission to the centre, the location of the birth of the cat and the number of days that the cat was housed at the centre.

Whilst some associations between variables such as health at admission were predictable, others were less predictable and quantifying the increased risk associated with variables, such as the age of the cat at admission, has provided data that can be used to focus efforts on reducing the numbers of deaths. It is recommended that further research should be targeted towards
reducing the numbers of owners relinquishing cats in need of euthanasia to CP.

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