JOURNAL OF
SHELTER MEDICINE &
COMMUNITY ANIMAL HEALTH

ORIGINAL RESEARCH ARTICLE

A Retrospective, Descriptive Study Of Medical Conditions and Outcomes of Cats Relinquished to an Urban, Limited Admission Shelter from Hoarding Environments

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Abstract

***Introduction*:** Animal hoarding is a complex, often underrecognized public health problem affecting the health and welfare of humans and animals. Limited peer review literature exists on the conditions, outcomes, and resources needed to care for cats from hoarding environments in shelter settings. This study investigated intake medical conditions and outcomes of cats surrendered from hoarding environments to the New York City sheltering programs of the American Society for the Prevention of Cruelty to Animals (ASPCA). The objectives of this study were to (1) describe the prevalence of medical conditions at intake; (2) identify associations between medical conditions and outcomes; (3) summarize key interventions provided prior to outcome; and (4) compare outcomes of cats surrendered from hoarding environments to other owner/guardian surrendered (OGS) cats.

***Methods*:** This retrospective, descriptive study examined case records of cats voluntarily surrendered from hoarding cases to ASPCA sheltering programs between January 1, 2021, and July 31, 2023. Demographic, medical, and outcome data were collected on 613 cats relinquished in 34 case groups. Outcome data were compared to 775 non-hoarded OGS cats in-shelter during the same time period.

***Results*:** Only 27.4% of cats were already altered on intake. Dental disease was the most common medical condition (52.8%); 20.3% had moderate to severe disease requiring dentistry procedures. On intake, cats also had otitis externa (33.3%), Upper respiratory infection (URI) (23.8%), ocular disease (21.9%), dermatitis (19.9%), ectoparasites (17.6%), diarrhea (14.2%), dermatophytosis (10.1%), and matting/unkempt fur (4.1%). Once analyzed for interactions, body condition score (BCS) 1–2 (emaciation) at intake ($P < 0.001$), moderate to severe dental disease ($P = 0.007$), and increased number of medical conditions per cat ($P < 0.001$) were associated with non-live outcomes. Over half of cats (57.8%) went to foster homes. Most (63.1%) required antibiotics, and a third (36.4%) received psychopharmaceuticals. Difference in median length of stay (LOS) between hoarded and non-hoarded OGS cats was significant (52 days vs. 28 days; $P < 0.001$). Proportions of live outcomes for hoarded (89.2%) and non-hoarded cats (88.3%) did not significantly differ ($P = 0.6$). When euthanasia was the outcome, OGS cats were more often euthanized for medical conditions (64.8%) compared to hoarded cats (45.9%). Behavioral euthanasia rates were significantly higher for hoarded than OGS cats (47.5% vs. 25%; $P = 0.017$).

***Conclusion*:** The significant need in hoarded cat populations for dentistry and spay/neuter procedures and the significantly longer LOS of hoarded cats suggests organizations working with these populations need to proactively strategize to optimize care delivery without negatively impacting shelter capacity for care. Harm reduction approaches to hoarding employ a collaborative, staged means to reduce populations in the home, including offering surrender of some animals and the provision of spay/neuter and/or other services for remaining animals. This approach, in addition to improving animal welfare, enables the shelter to better manage capacity and resources.

Keywords: *animal hoarding*; *shelter medicine*; *dental disease*; *harm reduction*

Received: 12 June 2025
Revised: 14 August 2025
Accepted: 14 August 2025
Published: 27 October 2025

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Citation: Journal of Shelter Medicine and Community Animal Health 2025, **4**: 148 - http://dx.doi.org/10.56771/jsmcah.v4.148

Animal hoarding is a complex, often underrecognized public health problem impacting the health and welfare of people and animals. The Hoarding of Animal Research Consortium (HARC) defines animal hoarding by four characteristics: failure to provide minimum standards of care, inability to recognize effects of this failure on animal and human welfare, obsessive attempts to accumulate animals in the face of deteriorating conditions, and denial of developing problems.[1] Animal hoarding cases occur along a spectrum of severity and size. It is estimated up to 250,000 animals are victims of hoarding each year,[2] and thousands of cases are reported annually.[1,3] Compared to dogs, cats may suffer significantly higher mortality in hoarding cases; a review of 412 media reports of animal hoarding found the mean number of cats and dogs involved was comparable (59 dogs, 61 cats), but the mean number of cats that reportedly died (34, 55.7%) was significantly higher than dogs (19, 32.2%).[4]

People who hoard animals have been classified into three types: the overwhelmed caregiver, the rescue hoarder, and the exploiter hoarder. Distinctions include their method of acquiring animals and responses to intervention: overwhelmed caregivers tend to passively acquire populations through uncontrolled breeding, while rescue and exploiter hoarders are more likely to actively acquire animals.[1] Overwhelmed caregivers may be more likely to voluntarily accept assistance and even relinquish animals; rescue hoarders and exploiter hoarders are more resistant to interventions.[1] Much of the published literature focuses on describing the consequences of larger scale, more severe cases[5–8] rather than smaller-scale cases of overwhelmed caregivers that organizations may see on a more routine basis.[9–11] Smaller, less severe cases are likely unrecognized, underreported, or understudied.[8]

The spectrum of interventions in animal hoarding cases spans from collaborative to punitive based on willingness of the caretaker to engage and the severity of the situation. Harm reduction approaches prioritize timely reduction of the animal population through collaboration with the owner and various social and animal services.[2,9,12] A systematic review of animal hoarding reported recidivism rates of 13 to 41%[8] after interventions.

Hoarding cases place a significant demand on resources, especially if involving lengthy criminal proceedings.[13] Many animal shelters provide care and housing for animals from hoarding situations. These animals are generally presumed to have more complex medical and behavioral conditions due to crowding, poor sanitation, and chronic neglect. However, there is limited peer-reviewed literature on the medical and behavioral conditions and outcomes of hoarded animals cared for by shelters.[10,14] More data on populations entering shelters from hoarding environments would inform planning and response efforts, including expectations for animal outcomes.

This study investigated medical conditions and outcomes of cats surrendered from hoarding environments to the New York City sheltering programs of the American Society for the Prevention of Cruelty to Animals (ASPCA) between January 1, 2021, and July 31, 2023. Study objectives were to (1) describe the prevalence of medical conditions at intake; (2) identify associations between medical conditions and outcomes; (3) summarize the key medical interventions provided prior to outcome; and (4) compare the outcomes of cats surrendered from hoarding environments to other owner/guardian surrendered (OGS) cats.

Methods

This project received ethical review and approval from the ASPCA's internal Committee on Animals as Research Participants and Ethics (CARPE 2024-74).

Study site and population

This retrospective, descriptive study examined case records of cats voluntarily surrendered from hoarding cases to ASPCA sheltering programs between January 1, 2021, and July 31, 2023. The ASPCA programs in New York City include urban, privately funded, limited admission shelters, including the Animal Recovery Center (ARC), the Adoption Center (AC), and the Kitten Nursery (KN). These programs primarily accept and rehabilitate animals from cruelty cases, neonates and kittens transferred from local shelters and partners, and owner/guardian surrenders facilitated by Community Engagement (CE). A smaller proportion of stray animals and others with extensive medical needs also enter this organization, usually through shelter partners or members of the public. The CE team is dedicated to assisting community members with at-risk companion animals through facilitation of veterinary care and resources. The CE program provides a voluntary, non-punitive, managed pathway for animal relinquishment using a harm reduction approach when conditions in the home are consistent with animal hoarding and caretakers are willing to engage, preventing the need for criminal prosecution.

The surrender of hoarded cats is facilitated by the CE program, which does not operate a sheltering facility. Instead, cats are triaged and individually directed to the ARC, AC, or KN depending on age, program capacity, and perceived severity of condition. Cats entering any of the ASPCA programs receive an intake examination by a veterinarian, vaccines (modified live FVRCP vaccine and killed Rabies vaccine), broad spectrum dewormer (e.g. pyrantel pamoate, fenbendazole, ponazuril, and topical emodepside/praziquantel), and flea preventative. Wood's lamp and retroviral screening (Idexx SNAP FIV/FeLV Combo for adults and Idexx SNAP FeLV for cats

Citation: Journal of Shelter Medicine and Community Animal Health 2025, **4**: 148 - http://dx.doi.org/10.56771/jsmcah.v4.148

<6 months) are performed. Additional diagnostics and treatments are performed as needed. The ASPCA also employs a behavior team in the assessment and treatment of behavioral conditions in a process that begins at intake and parallels medical evaluation and treatment. Behavioral pharmaceuticals such as gabapentin are commonly prescribed by veterinarians in collaboration with the behavior team to mitigate fear, anxiety, and stress (FAS) in cats and aid in behavioral modification sessions.[15,16] Euthanasia decisions are generally based on collected data from medical, behavioral, and sheltering teams and consider quality of life, response to treatment, and placement options.

Cats were included in this study if coded by CE as cats from a hoarding environment using an internal assessment tool based on the Five Freedoms[17] that takes into account environmental conditions, number of cats, and ability to provide care. Case groups were defined as cats owned by the same person and surrendered on the same date or within 6 months to accommodate for phased removals. Additional cats were included if noted to be from the same case group and surrendered on the same date even if incorrectly coded, or if born in care and associated with a case group. Cats were excluded if an intake examination was not found or if case group size was <2. This minimum group size represented the number of cats willingly surrendered at the time, but not necessarily the number of cats in the home; therefore, all case groups coded 'hoarding' based on the overall assessment were included.

For the same time period, a dataset of all cat intakes not associated with hoarding was obtained from software (PetPoint 6 Animal: Intake Extended Reports), excluding return and service-ins, and duplicates utilizing the 'V Lookup' Microsoft® Excel® (Microsoft 365 MSO Version 2504 Build 16.0.18730.20122) function. Because the ASPCA provides sheltering for animals from criminal cases and other populations not readily available for adoption, only OGS cats were included in the comparison group.

Data on intake, outcomes (date, type, and subtype), euthanasia reason (medical, behavioral, and both), and foster care were retrieved from electronic medical records (PetPoint 6 Data Management System and Impromed, version 23.12.0). Individual records were reviewed for age group at intake (classified as kittens A (0 to <1.5 months), kittens B (1.5 to <5 months), juvenile (5 to <12 months), adult (12 to <96 months), senior (96 to <180 months), and geriatric (180 + months)), sex (male/female), alter status (yes/no), Purina body condition score (BCS, 1 to 9),[18] and medical conditions: feline immunodeficiency virus (FIV) and feline leukemia virus (FeLV) test results (positive/negative), dental disease stage (1–4), ectoparasites (fleas, ear mites, and lice), otitis externa (yes/no), dermatitis (yes/no), matted or severely unkempt fur (yes/no), and ocular disease (i.e. conjunctivitis, scarring, and ulceration). Dental disease was assessed at intake in non-anesthetized cats, and dental disease stage was estimated using the AAHA Dental Care Guidelines periodontal disease staging,[19] with a visual aid to clinically classify disease severity. At the ASPCA, generally only animals classified stage 3–4 are scheduled for dentistry. Additional medical conditions included upper respiratory infection (URI) at or within 4 days or intake, diarrhea within 3 days of intake, and dermatophytosis within 2 weeks of intake. If a cat was noted to have URI at intake and clinical signs remained 3 weeks later, the cat was considered to have chronic URI.

Records were reviewed for use of antibiotics, psychopharmaceuticals, and procedures performed while in care: spay/neuter, dentistry, and other procedures were quantified. Examination of behavioral conditions and interventions was beyond the scope of this study other than capturing behavior as a factor in a euthanasia decision.

Statistical analysis

For categorical variables, counts and percentages were calculated in Microsoft® Excel® (Microsoft 365 MSO Version 2504 Build 16.0.18730.20122) or Stata (version 17, StataCorp, 4905 Lakeway Drive, College Station, Texas 77845, USA).

For hoarded cats, cat demographics, all health conditions (yes/no), and outcomes were compared using the Fisher's exact test. Using expected cell values versus observed values, cells that were influential were identified for the significant exact tests and bolded in the table. For the number of medical conditions, the total number of medical conditions were added for each cat and analyzed as continuous data. Dental disease was categorized for analysis as none/stage 1/stage 2 versus stage 3/stage 4, where the latter was counted as yes for number of medical conditions.

For hoarded cats, medical conditions and demographic variables with univariable $P < 0.2$ were included in an exploratory multilevel logistic regression model with non-live versus live outcomes using case group as the random effect to represent a sample of cat hoarding cases. Of the 12 medical conditions, seven had $P < 0.2$ and were entered into the logistic regression model. Age and BCS groups were also included in the model. Covariance was set as clustered for the random effect of case group to account for similarities within case groups. Odds ratios and 95% confidence intervals and the intraclass correlation coefficient for the random effect were calculated. For the age group, kitten B and juvenile were combined, and for BCS, BCS 6 and 7, and BCS 8 and 9 were combined due to sparse data. $P < 0.05$ was considered to be significantly associated with outcome.

For hoarded versus non-hoarded cats, live versus non-live outcomes were compared using chi-square and the interpretation of influential cells as above. Similarly, all subtypes of outcomes (adopted, returned to owner [RTO], transfer, died, and euthanized) were compared. Median length of stay (from intake to outcome, including time in foster) by hoarded and non-hoarded groups and the number of medical conditions compared to outcome were analyzed using the Wilcoxon Rank Sum test.

Results

Demographic data

Between January 1st 2021 and July 31st 2023, 613 cats from 34 case groups were relinquished from 32 different hoarding environments. Case group sizes ranged from 2 to 76 cats with a median of 13 cats per case group (Fig. 1). Two caretakers who had relinquished cats more than 6 months previously once again needed support within the study period. Demographic data are summarized for individual cats, including estimated age, sex, alter status, and BCS, and associations to outcome type (live/non-live) are shown in Tables 1a and 1b.

The majority (439/613; 71.6%) of hoarded cats were > 5 months old. Of the 613 cats, 168 (27.4%) were already altered on intake. Intake body condition scores were available for 584 hoarded cats, with the largest proportion (282/584; 48.0%) classified as thin (BCS 3–4).

Table 1a. Demographic characteristics of 613 cats surrendered from 32 hoarding cases

Cat demographics	Subtype	Total
		n (%)
Age at intake	Kitten A (< 1.5 months)	94 (15.3)
	Kitten B (1.5 to < 5 months)	82 (13.4)
	Juvenile (5 to < 12 months)	59 (9.6)
	Adult (12 to < 96 months)	367 (59.9)
	Senior (96 to < 180 months)	11 (1.8)
	Geriatric (180+ months)	0
	Total	613 (100)
Sex	Male	309 (50.4)
	Female	304 (49.6)
	Total	613 (100)
Altered on Intake	No	445 (72.6)
	Yes	168 (27.4)
	Total	613 (100)
BCS	1–2 (Emaciated)	40 (6.9)
	3–4 (Thin)	280 (48.0)
	5 (Ideal)	228 (39.0)
	6–7 (Overweight)	34 (5.8)
	8–9 (Obese)	2 (0.3)
	Total	584*(100)

**n* = 584 due to missing data for 29 cats (6 non-live and 23 live outcomes).

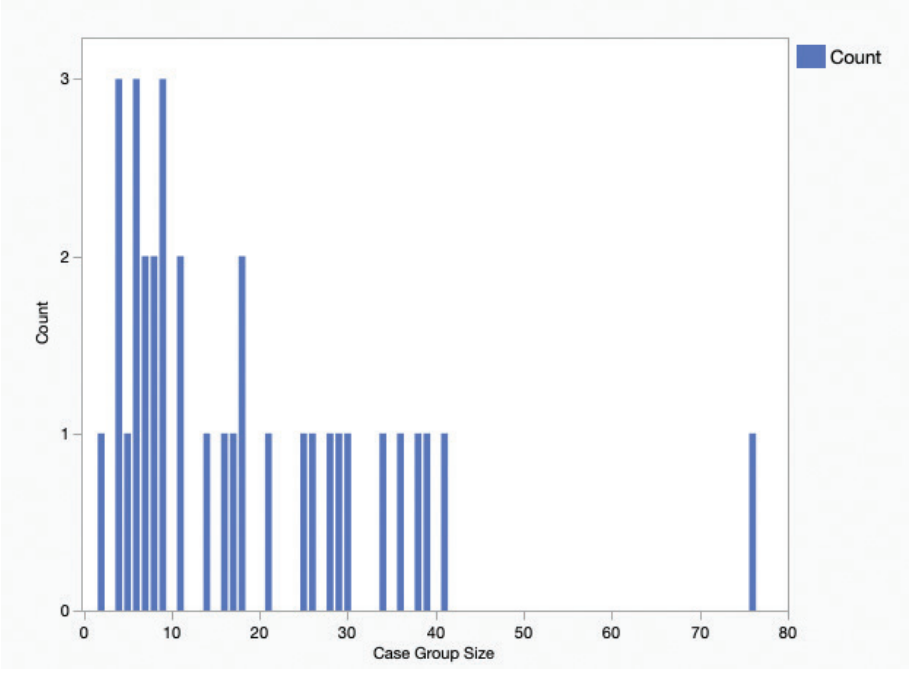


Fig. 1. Frequency distribution of case group size (cats per case) representing a total of 613 hoarded cats surrendered to an animal shelter in 34 case groups.

Citation: Journal of Shelter Medicine and Community Animal Health 2025, **4**: 148 - http://dx.doi.org/10.56771/jsmcah.v4.148

Table 1b. Associations between demographic characteristics and outcomes of 613 cats surrendered from 32 hoarding environments

	Subtype	Outcomes		*P*
		Live *n* (%)	Non-live *n* (%)	
Age at Intake	Kitten A (< 1.5 months)	85 (15.5)	9 (13.6)	
	Kitten B (1.5 to < 5 months)	75 (13.7)	7 (10.6)	
	Juvenile (5 to < 12 months)	**59 (10.8)**	**0**	**0.001**
	Adult (12 to < 96 months)	321 (58.7)	46 (69.7)	
	Senior (96 to < 180 months)	**7 (1.0)**	**4 (6.1)**	
	Geriatric (180+ months)	0	0	
	Total	547 (89.2)	66 (10.8)	
Sex	Male	273 (49.9)	31 (47.0)	0.70
	Female	274 (50.1)	35 (53.0)	
	Total	547 (89.2)	66 (10.8)	
Altered on Intake	No	400 (73.1)	45 (68.2)	0.39
	Yes	147 (26.9)	21 (31.8)	
	Total	547 (89.2)	66 (10.8)	
BCS	1–2 (Emaciated)	**25 (4.8)**	**15 (25)**	
	3–4 (Thin)	256 (48.9)	24 (40.0)	
	5 (Ideal)	210 (40.1)	18 (30.0)	**< 0.001**
	6–7 (Overweight)	31(5.9)	3 (5.0)	
	8–9 (Obese)	2 (0.4)	0	
	Total	524 (89.7)	60 (10.3)	

Influential rows for overall associations with a $p < 0.05$ are bolded.

BCS at intake was significantly associated with decreased live outcomes compared to other BCS measures, with BCS 1–2 (emaciation) being most influential ($P < 0.001$). Juveniles experienced increased survival, and seniors decreased survival ($P = 0.001$). No other characteristics were significantly associated with live outcomes.

Medical conditions

Associations between medical conditions at intake and outcomes are shown in Table 2.

Feline immunodeficiency virus (FIV) status was obtained for 563 cats with 51 (9.1%) testing positive. All positive cases were clustered in four case groups. FeLV status was obtained for 600 cats with 2 (0.3%) testing positive, both in the same case group. Retroviruses were not significantly associated with outcome. The majority (43; 84.3%) of FIV positive cats had live outcomes; one FeLV+ cat was transferred out, while the other was euthanized.

Dental disease was the most common medical condition found on intake, with 52.8% (323/612) reported to have dental disease; 20.3% (124/612) had moderate to severe dental disease (stages 3–4). Having moderate to severe dental disease was significantly associated with non-live outcomes ($P < 0.001$). Five other conditions (otitis externa, dermatitis, ectoparasites, dermatophytosis, and matting) were associated with a non-live outcome ($P < 0.05$). Because any one of these conditions in isolation is unlikely to result in euthanasia in this organization, a multivariable analysis was performed.

Number of medical conditions and outcome subtype

The number of medical conditions per cat was counted, and associations to outcome type (live/non-live) are shown in Fig. 2.

Overall, increased number of medical conditions per cat was significantly associated with increased risk of non-live outcome ($P < 0.001$). However, six cats with seven conditions and two cats with eight conditions had live outcomes. The number of medical conditions was not included in the logistic model due to collinearity concerns.

Multilevel logistic regression

Results of an exploratory logistic regression are in Table 3.

Severe dental diseases (compared to no dental disease) had an odds ratio of 0.21 for live outcomes ($P = 0.007$). Relative to cats who were emaciated (BCS 1–2), cats with a BCS score of 3–4 had an odds ratio of 6.2 ($P < 0.001$), and those with a BCS score of 5 of 4.2 ($P = 0.031$) for live outcomes. The case group variable had an intraclass coefficient (ICC) of 0.19, indicating that 19% of the variability in the data was due to variance among cats within

Table 2. Medical conditions and associations with outcome for 613 cats surrendered from 32 hoarding environments

Medical conditions	No/Yes	Total	Live outcomes	Non-live outcomes	*P*
			Total	Total	
		n (%)	*n* (%)	*n* (%)	
FIV*	No	512 (91.0)	463 (90.4)	49 (9.6)	**0.24**
	Yes	51 (9.1)	43 (84.3)	8 (15.7)	
FeLV**	No	598 (99.7)	538 (90.0)	60 (10.0)	0.20
	Yes	2 (0.3)	1 (50)	1 (50)	
Dental Disease ***	No	289 (47.2)	269 (93.1)	20 (6.9)	**< 0.001**
Mild (Stage 1–2)		199 (32.5)	183 (92.0)	16 (8.0)	
Moderate to Severe (Stage 3–4)		124 (20.3)	**94 (75.8)**	**30 (24.2)**	
Otitis externa	No	409 (66.7)	375 (91.7)	34 (8.3)	**0.008**
	Yes	204 (33.3)	**172 (84.3)**	**32 (15.7)**	
Dermatitis	No	491 (80.1)	445 (90.6)	46 (9.4)	**0.033**
	Yes	122 (19.9)	**102 (83.6)**	**20 (16.4)**	
Ectoparasites	No	505 (82.4)	457 (90.5)	48 (9.5)	**0.039**
	Yes	108 (17.6)	**90 (83.3)**	**18 (16.7)**	
Dermatophytosis	No	551 (89.9)	501 (90.9)	50 (9.1)	**< 0.001**
	Yes	62 (10.1)	**46 (74.2)**	**16 (25.8)**	
Matting, unkept fur	No	588 (95.9)	529 (90.0)	59 (10.0)	**0.012**
	Yes	25 (4.1)	**18 (72.0)**	**7 (28.0)**	
Diarrhea	No	526 (85.8)	471 (89.5)	55 (10.5)	0.58
	Yes	87 (14.2)	76 (87.4)	11 (12.6)	
Ocular disease	No	479 (78.1)	430 (89.8)	49 (10.2)	0.43
	Yes	134 (21.9)	117 (87.3)	17 (12.7)	
URI	No	467 (76.1)	420 (89.9)	47 (10.1)	0.36
	Yes	146 (23.8)	127 (87.0)	19 (13.0)	
Chronic URI****	No	80 (65.6)	76 (95.0)	4 (5.0)	0.058
	Yes	42 (34.4)	36 (85.7)	6 (14.3)	

*n = 563, **n = 600, ***n = 612, ****n = 122 due to 24 cats with URI lost to follow-up before 3 week mark.

each hoarding case group and the remaining variance due to individual cats across case groups.

Medical resources

Cats required many services while in care (Table 4).

Of the 613 hoarded cats, 119 (19.4%) underwent dentistry procedures. Of the 445 intact cats, 420 (94.4%) were spayed/neutered before their outcome. Antibiotic administration was also common, with 387 (63.1%) of cats receiving at least one course of antibiotics. 223 (36.4%) cats received repeated dosing of psychopharmaceuticals, usually gabapentin, for behavioral support.

One hundred two cats (16.6%) received at least one additional procedure (123 total procedures), including diagnostic imaging (e.g. ultrasound or radiographs), additional surgeries (e.g. enucleation, cystotomy, gastrotomy, and mass removal), or advanced diagnostic procedures (e.g. tracheal wash and anesthetized polyp checks). Of these, diagnostic imaging was the most common, with 83 cats requiring at least one radiograph, ultrasound, or echocardiogram.

Foster care was utilized for 354 (57.8%) of cats for various reasons, including medical or behavioral support, being underage for adoption, or to support shelter capacity.

Comparison between hoarded and non-hoarded cats

Data were available for 2,945 non-hoarded cats admitted during the study period; of these, 1,378 (46.8%) cats were transferred in from other organizations, 775 (26.3%) were OGS, 629 (21.4%) were stray, and 163 (5.5%) were seized. Age ranges, alter status at intake, length of stay, and outcomes by subtype of cats surrendered by owners are reported and compared to characteristics of the 613 hoarded cats in Table 5.

The median age of hoarded cats was 18 months (range 0–131 months), while the median age of OGS cats was 36.5 months (0–232 months), which was a statistically significant difference skewed by senior and geriatric cats in the non-hoarded group ($P < 0.001$).

Citation: Journal of Shelter Medicine and Community Animal Health 2025, **4**: 148 - http://dx.doi.org/10.56771/jsmcah.v4.148

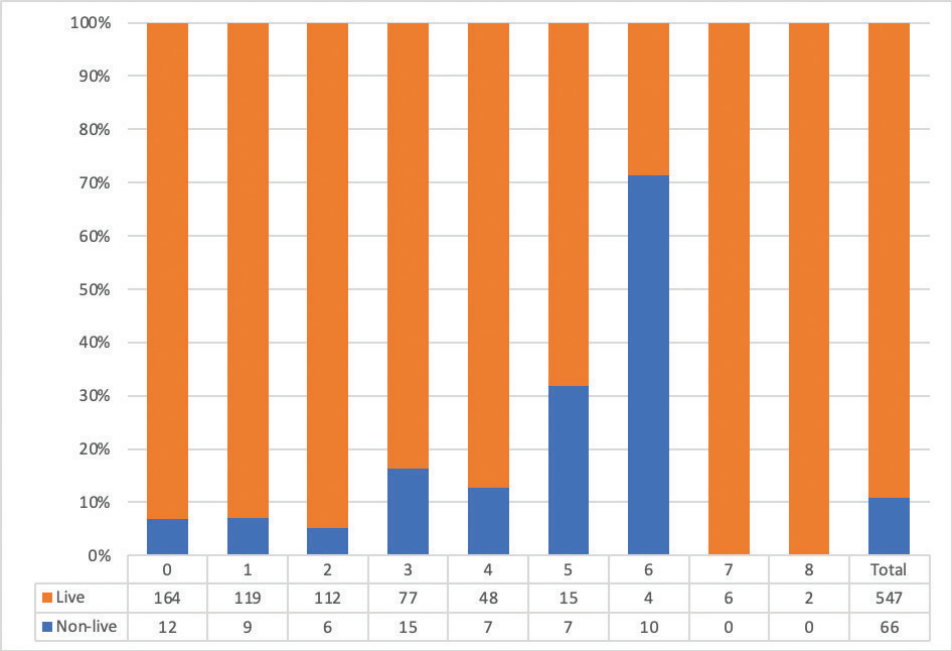


Fig. 2. Association between the total number of medical conditions (0–8) per cat and live vs non-live outcomes in 613 hoarded cats.

Table 3. Multilevel, logistic regression analysis of characteristics and conditions associated with live outcomes in 613 cats surrendered from 32 hoarding environments

Condition	Subtype	*P*	Odds ratio	95% CI
Age	Kitten A (< 1.5 months)		Reference group	
	Kitten B (1.5 to < 5 months) /Juvenile (5 to < 12 months)	0.13	3.9	[0.66, 22]
	Adult	0.92	1.1	[0.21, 5.8]
	Senior	0.99	1.0	[0.13, 8.2]
BCS	1–2 (Emaciated)		Reference group	
	3–4 (Thin)	**<0.001**	**6.2**	**[2.4, 16]**
	5 (Ideal)	**0.03**	**4.2**	**[1.1, 15]**
	6–9 (Overweight to Obese)	0.07	6.2	[0.841, 145]
Dental disease	None		Reference group	
	Mild (stages 1 and 2)	0.28	0.55	[0.19, 1.6
	Mod/Severe (stages 3 and 4)	**0.007**	**0.21**	**[0.07, 0.66]**
Otitis externa	No		Reference group	
	Yes	0.91	0.98	[0.45, 2.0]
Dermatitis	No		Reference group	
	Yes	0.72	0.89	[0.40, 1.9]
Ectoparasites	No		Reference group	
	Yes	0.16	1.8	[0.80, 4.0]
Dermatophytosis	No		Reference group	
	Yes	0.41	0.59	[0.16, 2.1]
Matting/severely unkempt fur	No		Reference group	
	Yes	0.38	0.48	[0.08, 2.5]
Chronic URI	No		Reference group	
	Yes	0.58	0.68	[0.19, 2.6]
Intercept		0.003	4.89	[1.7, 14]

Influential rows for overall associations with a $p < 0.05$ are bolded.

Differences in alter status between hoarded and OGS cats were significant, with 58.6% (454/775) of OGS cats noted to be altered at intake, compared to 27.4% (168/613) of hoarded cats ($P < 0.001$).

Proportions of live outcomes for hoarded and OGS cats were not significantly different (89.2% vs. 88.3%; $P = 0.61$). Adoption rates were also similar between the groups, with 84.3% (517/613) of hoarded cats and 86.3% (669/775) of OGS cats adopted. A slightly larger proportion of hoarded cats transferred to partner organizations (4.6%) than OGS cats (1.3%) ($P < 0.001$).

Euthanasia rates were similar, accounting for 10% of total outcomes for hoarded cats and 11.4% for OGS cats. However, reasons for euthanasia significantly differed between the groups: non-hoarded cats were primarily euthanized due to medical reasons (64.8%); hoarded cats had a larger proportion of behavioral euthanasia (47.5%) than OGS cats (25%) ($P = 0.017$).

Median length of stay differed significantly ($P < 0.001$) between hoarded and OGS cats (52 days, range 0–618 days; 28 days, range 0–459).

Table 4. Summary of resources and procedures for 613 cats surrendered from 32 hoarding environments

Resource/Procedure	*n* cats receiving item (%)
Foster home care	354 (57.8)
Medical care requiring antibiotic administration	387 (63.1)
Behavioral care requiring psychopharmaceutical administration	223 (36.4)
Spay/Neuter Surgery	420 (68.5)
Dentistry	119 (19.4)
Other procedure/diagnostic	102 *(16.6)

*Some cats required more than one procedure.
Influential rows for overall associations with a $p < 0.05$ are bolded.

Discussion

ASPCA direct care programs in New York City mostly recover cats from small homes or apartments. In this study, all hoarded cats were voluntarily surrendered, with relinquishment often in staged removals; therefore, interventions represented smaller-sized hoarding intakes, with a median size of 13 cats per case group. In some cases, a subset of cats remained in the home after spay/neuter as part of a harm reduction approach to encourage ongoing collaboration and attempt to reduce owner acquisition of

Table 5. Comparison between 613 hoarded and 775 non-hoarded owner/guardian surrendered (OGS) cats for selected variables

	Hoarded	Non-hoarded	*P*
	n (%)	*n* (%)	
Age distribution (months)			
Kitten A (< 1.5)	94 (15.3)	105 (13.5)	
Kitten B (1.5 to < 5)	82 (13.4)	87 (11.2)	
Juvenile (5 to < 12)	59 (9.6)	63 (8.1)	
Adult (12 to < 96)	**367 (59.9)**	**366 (47.2)**	**< 0.001**
Senior (96 to < 180)	**11 (1.8)**	**139 (17.9)**	
Geriatric (180+)	**0 (0)**	**16 (2.1)**	
Altered on intake	**168 (27.4)**	**454 (58.6)**	**< 0.001**
Total live outcomes	547 (89.2)	684 (88.3)	
Adopted	517 (84.3)	669 (86.3)	
RTO	2 (0.3)	5 (0.7)	
Transfer	**28 (4.6)**	**10 (1.3)**	**< 0.002**
Total non-live outcomes	66 (10.8)	91 (11.7)	
Died	5 (0.8)	3 (0.4)	
Euthanized Total	61 (10)	88 (11.4)	
Medical Euthanasia	28 (45.9)	57 (64.8)	
Behavioral Euthanasia	**29 (47.5)**	**22 (25.0)**	**0.017**
Medical and Behavioral	4 (6.6)	9 (10.2)	
Total cats	613 (100)	775 (100)	
Length of stay (LOS) in days			
Median LOS	**52**	**28**	**< 0.001**
LOS range	0–618	0–459	

Influential values for overall associations with a $p < 0.05$ are bolded.

Citation: Journal of Shelter Medicine and Community Animal Health 2025, **4**: 148 - http://dx.doi.org/10.56771/jsmcah.v4.148

more cats. This phased, harm reduction approach supports the community member and helps the shelter to work within their capacity, plan for large intakes, and not acutely overwhelm their resources.

Hoarded cats required numerous interventions after intake. Less than a third of hoarded cats (27.4%) were already spayed/neutered, much lower than the spay/neuter status at intake of the cats in the OGS comparison group (58.6%) and the reported prevalence of altered status in owned pets.[20] The provision of spay/neuter, while commonly practiced in shelters, can still be a bottleneck to placement when resources are overwhelmed by large intakes.

Twelve medical conditions were studied, representing common medical conditions in cat populations. Once variables were entered into a regression to account for interactions, being emaciated at intake and having moderate to severe dental disease were the only medical variables significantly associated with increased risk of non-live outcome.

Aside from spay and neuter, the most common procedure performed for hoarded cats was dentistry. Animal shelters frequently report dentistry concerns in new arrivals.[21] Severe dental disease and gingivostomatitis have been theorized to have varied possible etiologies, including viral causes, although a definite association has not been established.[22] Risk of chronic gingivostomatitis has also been associated with increasing numbers of cats in multi-cat households.[23] High-density housing, high pathogen load, chronic exposure to squalid environments, physiological stress, shared genetics, and medical neglect may also contribute to dental disease. In this study, approximately half of hoarded cats were reported to have dental disease, and cats with moderate to severe dental disease (stages 3–4) were almost five times more likely to have a non-live outcome. This study organization prioritizes more severe dental disease for procedures to prevent bottlenecks in pathways and optimize resources while still addressing significant welfare concerns. Less severe cases are provided disclosures at the time of placement and encouraged to seek care in the community. Need for dentistry services in isolation would not routinely prompt a euthanasia decision in this organization unless quality of life was markedly challenged by other concerns, including behavioral health. Because the scope of this study did not include behavioral conditions, behavioral comorbidities associated with chronic periodontal pain could have contributed to non-live outcomes.

Cats also required evaluation and treatment for infectious diseases. Contagious diseases have been noted to be more common in hoarding cases with >30 animals.[8] The prevalence of infectious diseases other than retroviruses was similar to published literature.[5,10] FIV prevalence was higher (9.1%) than in a similar shelter-based study,[10] and higher than estimates of prevalence in the United States (2.5%),[24] but similar to reported rates in large-scale cases (8%).[5] FeLV prevalence (0.3%) was lower than estimates of FeLV in the US (2.3%)[24]; an estimate previously reported in a similar shelter study[10]; and reported in cats retrieved from large, failed sanctuaries (8%).[5]

Many cats received antibiotics for infections, including otitis externa, dermatitis, and URI. Many cats also received ongoing gabapentin, used in shelters for stress reduction for cats demonstrating fear, anxiety, and stress (FAS), and to facilitate behavioral modification.[16,25] Treatments for these cats were extensive, and although URI at intake, chronic URI, and diarrhea were not found to be significantly associated with outcome, these conditions required time and resources, and extended LOS.

Hoarded cats had a significantly longer median LOS than OGS cats, reflecting the more extensive care required to get these cats to adoption eligibility. One should note the reported LOS for both hoarded and OGS cats in this study would be considered long term according to shelter medicine experts,[25] although the average LOS of OGS cats was less than the 34.3 days reported nationally in 2024.[26] Given their focus on the city's most vulnerable animals, this organization's LOS is likely skewed for all animals beyond what would be expected for shelters receiving a higher proportion of healthy, more readily adoptable cats. Extended LOS in shelters challenges both individual and population well-being as organizations struggle to stay within their capacity for care and provide for animals' physical, social, and mental needs.[25]

The vast majority of cats in both groups were adopted. However, hoarded cats may present to the shelter on the under-socialized end of the spectrum,[14] with many already past the sensitive period of socialization (2–7 weeks of age for cats).[27] Placement of under-socialized cats in adoptive homes is complex and may result in questionable welfare for both cats and owners,[28] and extended LOS.[14,29] Many shelters must make the difficult decision to euthanize animals due to poor quality of life in the shelter and potentially in adoptive homes.[28] These decisions are in keeping with best practice guidelines for ensuring humane outcomes.[25,30]

As number of medical conditions per cat increased, hoarded cats were less likely to experience a live outcome. Humane euthanasia is an appropriate outcome for untreatable disease or unmitigable suffering.[25,31] Many of these cats would have needed extensive resources and treatment times. Euthanasia rate was low in both hoarded and non-hoarded OGS cats, but non-hoarded OGS cats were primarily euthanized for medical causes, while euthanasia of hoarded cats was divided between medical and behavioral causes. Given hoarded cats were more likely to be euthanized for behavioral conditions, it is likely that these cats would have experienced even greater compromise

to welfare under extended treatment plans. The significant median age difference of 18.5 months between the groups was unlikely to be clinically significant; however, the decreased number of senior and geriatric cats in the hoarded group could represent rapid reproduction of cats in the home prior to the intervention. It is also possible that fewer cats in hoarding situations were surviving to advanced age due to the physiological stresses in the environment, or that older cats were the sub-group that remained in the home after the intervention.

Long-term follow-up of caretaker management was outside the scope of this study. Voluntary engagement in population reduction by caretakers and a positive association with responding agencies – including a willingness to once again request assistance – are critical to reducing recidivism and support positive animal welfare. Therefore, the two households who needed second interventions were not perceived as failures of the program but a mutually beneficial opportunity to continue to support the caretaker and ensure the welfare of the cats.

This study had several limitations. First, the case group size was skewed toward smaller numbers of cats – more likely to be found in an urban environment, consistent with overwhelmed caregiver classification, and not easily generalizable to other shelters that may routinely get larger groups of cats. Second, hoarder classification and the severity of the environment from which these cats were recovered were not available but could be important to consider as risk factors for non-live outcomes. Third, the ASPCA is a highly resourced, limited admission shelter with a focused mission and specialized programs for rehabilitating animals from cruelty investigations, neonatal kittens, and other vulnerable populations. Metrics may be difficult to generalize to other settings. Fourth, retrospective data are prone to biases, including medical record entries from many veterinarians and staff members and the use of different medical and shelter software across programs in this study. Despite the use of published measures and scales (dental eruption charts, Purina BCS, AAHA Guidelines dental stages), inconsistency in implementation, thus assessment of cats is likely. Additionally, dental disease stages reported in this paper were estimated at intake in non-anesthetized patients, leading to potential underestimation of the severity of dental disease. Finally, additional conditions (medical and behavioral) not included in our study could have factored into euthanasia decisions and were not reported here. Future research exploring interactions between medical and behavioral conditions could illuminate reasons for non-live outcomes in hoarded cats.

Conclusion

Although cats surrendered from hoarded environments had live outcomes similar to cats from non-hoarded environments, they experienced a significantly longer LOS. The significant need in hoarded cat populations for spay/neuter and dentistry procedures as well as a variety of diagnostic procedures and treatments suggests organizations that intake case groups of hoarded populations should proactively plan for medical services or devise pathway plans that minimize delays. For example, organizations may wish to prioritize moderate to severe dental disease for procedures, consider whether to provide in-shelter dentistry services or outsource to community veterinarians, provide vouchers for dental procedures to be pursued after adoption, or adopt out animals with appropriate disclosures. A staged, harm reduction approach to relinquishment with willing caretakers may provide a means to both intervene and reduce populations in the home, increase spay/neuter service delivery to stabilize the population, enable the shelter to plan intake to match capacity, and ensure resource optimization. Decreasing LOS of these and other shelter animals continues to be critical to maintain optimal capacity for care.

Authors' contributions

Daniela Lopez Goicochea – conceptualization, methodology, data curation, investigation, writing – original draft, writing – review and final; Margaret Slater – methodology, data analysis, writing – original draft, writing – review and final, supervision; Elizabeth A. Berliner – methodology, investigation, writing – original draft, writing – review and final, supervision.

Acknowledgments

The authors wish to thank the staff of the ASPCA Community Engagement, Adoption Center, Kitten Nursery, and Animal Recovery Center teams for their relentless work on behalf of animals and communities. We are particularly grateful to Rachel Maso for her insight on the behavior information in this work, and Stephanie Janeczko and Randy Lockwood for review and feedback on this manuscript.

Conflict of interest and funding

The authors declare no potential conflicts of interest. The authors have not received any funding or benefits from industry or elsewhere to conduct this study.

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