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Training Veterinary Students in Shelter-Medicine: A Service-Learning Community Classroom Based Technique

Brenda J. Stevens, D.V.M. [Clinical Assistant Professor] and

Department of Clinical Sciences., North Carolina State University College of Veterinary Medicine.
1060 William Moore Drive, Raleigh, NC 27607

Margaret E. Gruen, D.V.M., M.V.P.H, D.A.C.V.B., PhD

Candidate in Comparative Biomedical Sciences at North Carolina State University. 1060 William Moore Drive, Raleigh, NC, 27607

Brenda J. Stevens: Brenda_Stevens@ncsu.edu

Abstract

Shelter medicine is a rapidly developing field of great importance, and shelters themselves provide abundant training opportunities for veterinary medical students. Students trained in shelter medicine have opportunities to practice zoonotic and species-specific infectious disease control, behavioral evaluation and management, primary care, as well as animal welfare, ethics, and public policy issues.

Ranges of sheltering systems now exist, from brick-and-mortar facilities to networks of foster homes with no centralized facility. Exposure to a single shelter setting may not allow students to understand the full range of sheltering systems that exist; a community classroom approach balances the opportunity to introduce students to a diverse array of sheltering systems, while gaining practical experience. This article presents the details and results of a series of two-week, elective clinical rotations with a focus on field and service-learning in animal shelters. The overall aim was to provide opportunities that familiarized students with sheltering systems and provided primary care training. Other priorities included increasing awareness of public health concerns, and equipping students to evaluate shelters on design, operating protocols, infectious disease control, enrichment and community outreach. Students were required to participate in rounds, and complete a project that addressed a need recognized by them during the rotation. This article includes costs associated with the rotation, a blueprint for how the rotation was carried out at our institution, and details of shelters visited and animals treated, including a breakdown of treatments provided. Also discussed are the student projects and student feedback on this valuable clinical experience.

Keywords

Shelter; primary care; medicine; training

Introduction

Shelter medicine, as a specialty, is a rapidly emerging field and is currently being evaluated for specialty status within the American Board of Veterinary Practitioners. This field requires knowledge of medicine, surgery, emergency care, behavioral health, epidemiology, and infectious disease.^{1,2} Fourteen veterinary schools offer a shelter experience including didactic lectures and clinical rotations.¹ Some veterinary schools now offer residencies in shelter medicine with a focus in infectious disease and/or animal behavior. Combining a shelter medicine teaching program with one that hones primary care skills, including physical examination, basic diagnostic testing and treatment planning, is an appealing amalgamation of two disciplines that work synergistically to produce a well trained entry level veterinarian with greater appreciation and awareness of community based sheltering issues and public health. However, shelter medicine programs in veterinary schools are often based on a relationship with only one or two shelters. While this allows for good cooperation and consistency of care, it may not allow students to fully understand the diversity of sheltering systems that exist.

The objectives of this report are to detail an innovative method for teaching shelter medicine to students that highlights the diversity of sheltering systems and the myriad opportunities for engagement. This method allows students to be engaged in the community, and challenges them to critically evaluate a variety of animal shelters, including factors that contribute to successful management. We discuss the student learning outcomes as well as the teaching opportunities that this method provides. Our hope is that this will serve as a blueprint for other veterinary colleges interested in field-service learning in the area of shelter medicine.

Materials and Methods

Educational Setting

North Carolina State University's College of Veterinary Medicine (NCSU-CVM) is a four year professional program. The first three years are spent in didactic and laboratory settings and the final year is spent rotating through clinical services or externships in two week blocks. The majority of rotations are onsite through the specialty services (cardiology, neurology, etc.) with one Small Animal General Practice rotation available. In the past, a Community Practice rotation, based at a county animal shelter, was an integral part of the Small Animal curriculum. While this rotation gave students some experience in managing patient health in a shelter setting, the main focus of the block was on surgical techniques, particularly spay/neuter and tissue handling. No opportunities existed for students to gain exposure to the diverse array of sheltering systems, including open admission, limited admission, and rescue groups, while evaluating the advantages and restrictions inherent in each. As part of a goal to provide service-learning opportunities that benefit both the students and the shelters, a two-week elective rotation for fourth year students was designed to provide students with hands-on experience with as many sheltering systems as possible, while providing veterinary care for the shelter population.

Aims and Objectives of the Course

The overall aims and objectives were multifaceted but encompassed a few basic goals:

- To give the students ample opportunity to hone primary care skills in a real-world setting
- To familiarize students with shelter medicine through exposure to a diverse array of animal shelters, highlighting the serious issue of pet overpopulation
- To support the animal shelters in a sustainable fashion that would benefit the animals, shelter staff, and the community
- To provide students with exposure to community extension and engagement that could continue following graduation

Design of the Program

A two-week field service-learning rotation was designed to maximize the ability to expose students to a diverse group of sheltering systems. One goal was to balance travel times with opportunities, so shelters and rescues selected were restricted to those within a 1½ hour drive from the CVM (unless special circumstances arose). Travel time was used for topic rounds in the morning and for debriefing and discussion in the afternoon. The NCSU-CVM is in Raleigh, NC, a centrally located city with several shelters within a 1–1½ hour drive. A university vehicle (Chevrolet Suburban) equipped with a veterinary box insert in the back was utilized. A maximum of six students were enrolled in each two week rotation and it was offered 4 times per academic year. Each rotation met five days/week from approximately 07:30–17:30, with time given for lunch.

Shelter Selection

Representatives from twelve local shelters and rescue organizations within a 10–60 mile radius were initially contacted to determine interest and feasibility of a Shelter Medicine rotation visit. The discussion included the teaching needs and hands-on nature of the rotation, and the needs of the shelter staff including their interest in assessments of the facility, infectious disease protocols, behavioral management, handling of specific species and animal preventive health care. All except one shelter representative expressed interest in having the veterinary students and clinicians visit their facility. A variety of high/low intake, public/private, open or limited admission shelters as well as shelters with low and high euthanasia rates were included to give the students the widest breadth of exposure.

Expectations for students

Students were expected to attend each day of the rotation (unless specifically excused) and to participate fully in rounds and discussion. Topic rounds, conducted during the morning drive, included sessions on infectious diseases, disinfection, vaccination, animal abuse, behavior and temperament testing, environmental enrichment, public health concerns, pet overpopulation, euthanasia and shelter/compassion fatigue. Each shelter experience was designed to be unique, but at each, students were expected to assess the following items:

- Overall shelter assessment for facility/structural features, infectious disease protocols, individual animal care and behavioral management
- Where appropriate, individual animal assessment including physical examination, simple diagnostic testing, minor surgical procedures and minor/manageable disease treatment
- Preventative health measures including vaccination and deworming
- Discussion with shelter workers on their needs and concerns
- Behavioral assessments as indicated

By the end of the rotation the students were expected to complete a project which could either be individually or group prepared. The project was to evaluate one shelter or a specific issue identified at a shelter and to develop a concrete workable plan to address the concern.

Students were expected to dress professionally and appropriately for the shelters being visited. They were asked to wear scrubs on field service days (also called Hands on Learning Days (HOLD)), and were able to wear clinically appropriate attire on non-field service days as described in the veterinary teaching hospital standard protocols. Students were assessed using the CVM rotation grading system (Honors, Pass, Marginal, or Fail) and were evaluated on knowledge base, physical examination skills, completion of medical records, motivation and initiative, participation and problem solving.

Faculty Commitments and Budgetary/Equipment Concerns

The rotation was held 12 times over four years. The first year and last year the rotation was taught by one faculty member, while the second and third years, rotations were team taught with faculty splitting the two weeks. Both faculty members had shelter experience and interest, one primarily focused on primary care and surgery and one on veterinary behavior.

An initial budget of \$5,100.00 for startup costs was allotted. Startup supplies included items needed for a mobile veterinary practice and are listed in Table 1. Subsequent annual budgetary allowances were approximately \$2,100.00.

Fortunately many commercial companies were supportive of the rotation and donated items or provided them at a very low cost. Instrumentation, parasiticides, vaccines as well as other medications were among the items donated.

We estimated approximately 500 to 750 miles of travel for the two-week rotation. Fuel costs were estimated on the average of the past 6 months per gallon charge.

Rotation Schedule

On the first day of the rotation the students were oriented to the schedule and expectations of the block, including details of the final project, prior to visiting the first shelter. On subsequent days, students met at the CVM and would board the vehicle for transport to the scheduled shelter. (Figure 1.)

Upon arrival at the shelter, students first met with the shelter director or veterinarian and had a brief (20 minute) discussion on the specifics of the shelter, including concerns and questions from the shelter staff. Budget, intake numbers, euthanasia rate and relationships with rescue organizations were frequent topics discussed. They then toured the facility with a shelter staff member. Depending on the shelter's needs, the students were then provided with an area and allowed to set up a mobile veterinary facility. Though this varied by shelter, typically tables or work benches were provided by the shelter, and students would designate an area for examinations, a microscope station, and a small laboratory area for in-house testing (FeLV, FIV, Heartworm, fecal analysis, urinalysis, cytology). The students were then divided into teams and rotated roles as primary veterinarian, assistant and recorder/laboratory technician. Clinicians were available at all times to provide oversight and as a resource for student questions, and often provided technical/laboratory assistance.

Shelter staff identified animals or animal areas of primary need, and students conducted both healthy and sick animal evaluations. For infectious disease prevention, animals deemed generally healthy were examined first. A typical healthy evaluation included a physical exam, appropriate vaccination and testing for FeLV/FIV or Heartworm infection. Depending on age and shelter policy, animals were either dewormed with pyrantel pamoate or a fecal analysis performed and animals with positive results were appropriately treated with pyrantel or fenbendazole. Topical parasiticides were applied as needed.

Following completion of examinations of healthy animals, animals with medical concerns were addressed. Most commonly, these were animals with upper respiratory infections, pyoderma, otitis, wounds or cutaneous parasitic diseases. If an animal had a manageable condition, and the shelter staff felt comfortable continuing treatment if necessary, students designed and implemented a treatment plan in conjunction with the faculty members. If an animal could not be maintained by shelter staff, and was deemed extremely ill or inhumane to be housed without care, the animal was euthanized by injection with pentobarbital sodium/phenytoin sodium (Euthasol solution, Virbac AH, Fort Worth, TX). Student participation in euthanasia was voluntary. Depending on the needs of the shelter, time was spent discussing behavioral needs and conducting assessments of individual animals.

Some shelters did not require or request veterinary services, but welcomed the rotation for a tour and discussion of their facility and operations. Topics generally included animal intake and outcome information, shelter funding, infectious disease protocols and concerns, management of animal behavioral health, staffing and shelter philosophy. As the focus of the rotation was to provide service-learning experiences while providing exposure to as many sheltering systems as possible, these non-field service days included at least two shelters or rescue operations.

In order to allow students an opportunity to see the law enforcement side of animal sheltering, students spent one half day with county animal control officers. Students traveled either solo or in pairs with county officers and observed their community interactions. Two of these experiences resulted in animal hoarding exposures and large animal seizures that the students participated in handling.

The last day of the rotation was used to cover any additional shelter topics and to review the student projects. The students were expected to present their projects to the group as well as have a detailed written project that could be presented to the shelter. A typical rotation schedule is outlined in Figure 1.

Results

Shelters and animals

Over the course of 4 years, 12 different shelters were visited, with many being visited each time a rotation was held, and some on only one or two rotations. Student feedback helped to shape the shelters included on subsequent rotations. The shelters visited represented a range of sheltering systems and resource availabilities. The details of budget, intake and euthanasia rates for 7 of the shelters were available, and are listed in Table 2. Four of the 12 shelters visited had part or full-time veterinarians on staff, nine of the shelters offered hands-on learning opportunities. On average, students examined 118 animals per two-week rotation. Of these, 60% were canines and 40% were felines. Additional animals examined were goats, pigs, ferrets and a snake. On average, vaccinations were administered to 80% of the animals examined. Fecal analysis was performed in 50% of the animals, heartworm testing in 50% of the dogs and FeLV/FIV testing in 30% of the cats. Over the course of the two-week rotation the students averaged 78 canine physical examinations, 40 feline physical examinations, vaccinated 78 canines and 29 felines, conducted 62 heartworm tests, 15 FeLV/FIV tests and 70 fecal analyses. Healthy animal physical examinations were limited due to time constraints, animals most likely to be adopted were prioritized for examinations.

Students were able to diagnose and treat animals with a variety of primary medical concerns frequently seen in animal shelter populations, detailed in Table 3. For diagnostic purposes, students had access to a mini-laboratory with the capability to perform cytology, urinalyses, fecal analyses, skin scraping, Woods light examination, dermatophyte culture, Shirmer tear and fluorescein testing. Students also had equipment for otoscopic and ophthalmic exams. SNAP tests for Heartworm 3DX, FeLV/FIV, Parvovirus, and Giardia were available. Treatment plans were designed and implemented by the students, and subsequent treatments were performed by shelter staff or veterinarians. Medication was reviewed and prescribed by faculty members. Treatments included pain management, antibiotic therapy (oral and topical), cutaneous or intestinal parasite treatment, immiticide treatment, wound treatment/management, and oral foreign body removal. Over the four year span of the rotation 32 humane euthanasias were performed.

Student Projects

Students developed a diverse array of presentation topics, and group formation varied by rotation. The projects were generally high quality and represented significant student investment of time and interest. On one rotation, the group of students worked together to design a comprehensive proposal for a shelter interested in hiring a kennel attendant, while on other rotations, students worked individually or in groups of two. The students were encouraged to discuss their projects during the afternoon debriefing sessions to gather input from the faculty and their colleagues. The students presented on the following topics:

- Designing a whelping box for shelter use
- Development of a marketing plan for a particular shelter
- Justification of fees to hire a kennel attendant
- Vaccination protocols for a distemper outbreak
- Cost analysis of performing fecal examinations versus routine deworming
- A public awareness protocol on recognizing illness in pets
- A computer algorithm for treating upper respiratory disease in cats
- Behavioral enrichment techniques for dogs and cats in a shelter setting
- Educational materials on the proper ways to disinfect surfaces
- Grant proposal for portable air conditioners for a shelter without temperature regulation

Discussion

Utilizing animal shelters for field service based student learning has many benefits including care for unowned animals, hands-on learning in primary care for students, important extension opportunities for shelters to enhance their practices, and a cross sectional opportunity to teach epidemiology, infectious diseases and behavior in an applied setting.^{1,3}

We believe this program to be unique in the field of shelter medicine clinical rotations. To our knowledge, it is the only program that treats shelter medicine as a true field service rotation traveling to multiple different shelters during the clinical rotation with a focus on primary care skills, including behavioral evaluation. Mississippi State University and Purdue University have developed shelter programs that include travel to multiple shelters in a mobile surgical unit and favor a strong surgical (spay/neuter) component. Several veterinary colleges visit one specific shelter or have student's complete externships at specific shelters¹. Some colleges have set up veterinary facilities at animal shelters or offer externship programs for their students. We hope to highlight the advantage of the field service-learning technique and the benefits we believe it provides to student learning.

The community based field service-learning allows students to be exposed to a diverse group of shelters and sheltering systems. This has many benefits, both in engaging students in the community effort that animal sheltering must be, but also encouraging them to appreciate the challenges faced by many shelters. It exposes them to the unique struggles shelters face due to facility, staffing, animal volume and budgetary restraints. We were able to see shelters with numerous resources as well as those working hard with very limited resources. Some shelters with significant financial restraints still prioritized their animals' physical and behavioral health. This forced the students to be flexible in their treatment plans, while still demanding the highest level of care possible.

Visiting multiple shelters allowed our students to use their knowledge base to evaluate each shelter on its own merit in regards to infectious disease control, behavioral management, and

animal care from basic husbandry to disease recognition, prevention and handling. It forced the students to contemplate real world situations when formulating plans for individual animals or for the shelter as a whole. They quickly realized the huge differences in animal shelters and that there was not a cookie cutter plan to animal care that would fit each shelter.

While the students primarily cared for dogs and cats, the diversity of animals presented at the shelters also gave the students ample opportunity to perform physical examinations and other basic diagnostic testing. The low faculty-student ratio (1:3–1:6) provided a chance for individual instruction and technique mastery. The rotation allowed the students to develop simple cost effective treatments that could be managed at the shelter. It also allowed them to hone their primary care skill set starting with repeated physical examinations on animals with minimal to no presenting history. We feel this primary care training is invaluable in light that much of their current training resides in a tertiary care facility. While this tertiary care training allows the student to manage complex medical and surgical cases, shelters are a wonderful training ground for primary care.^{4,5} The shelter rotation also allowed students to focus on other important aspects of primary care, including decision making under pressure without extensive back up from ancillary staff or equipment. Students also had to consider important aspects such as how veterinary ethics and public policy impacted their treatment plans, especially in terms of follow up care.

At shelters with a staff veterinarian, students were able to benefit from their knowledge as each shelter veterinarian contributed their own perspective. This often included an engaging discussion of the causes and solutions for the friction that sometimes exists between shelter shareholders, including budgetary constraints and behavioral vs. infectious disease management.

There are drawbacks to this type of a program. Not having a dedicated work space in which to perform physical examinations or animal evaluations at times proved difficult as conditions could be hot, cramped, or inconvenient. The lack of follow-up on patients is a concern for many of the students. We frequently included a second visit to one high-needs shelter on the second week of the rotation, which allowed for some limited follow-up. Repeated visits to a single shelter had to be balanced with the goal of visiting as many shelter types as possible. Also, traveling certainly added to the length of the day and limited the supplies we could bring to the shelters. Daily restocking of the veterinary supply box was mandatory. However, this is similar to many ambulatory practices at veterinary schools.

Feedback from the students was overwhelmingly supportive of the rotation, despite these drawbacks. Students consistently commented that they felt traveling and personally seeing different shelters was an eye opening experience. They felt that the hands-on experience enhanced their physical examination skill set and enjoyed ‘getting down to the basics’ of veterinary care, something difficult to find at tertiary care facilities present in many veterinary teaching hospitals.

While travel could take up to 3 hours in a day, conducting rounds in the truck seemed to be an effective way to utilize the time and student participation was generally good. On the trip back to the veterinary school conversation was usually directed at the uniqueness of the

shelter and the positive things they were doing as well as areas that could be improved. It was a good time as well to decompress and discuss some of the frustrations faced or cases that were upsetting. On several visits students participated in the euthanasia process and this was a perfect opportunity for them to discuss their experiences.

The impact of this program for community outreach was tremendous. The shelters staff involved were excited to have students visit and to have the opportunity contribute to their education. They were grateful for the care that the students were able to provide and welcomed the suggestions that the students made. Staff at one shelter consistently employed suggestions the students had made for improved animal care, and were proud to show off what they had accomplished when we returned.

The student's projects demonstrated a sincere and serious evaluation of a shelter and a realistic way to make improvements. For example, one project involved developing a whelping area for dogs as the shelter frequently had pregnant animals yet no designated area for whelping away from the general population. At our next visit, the shelter staff had already taken the student's suggestions, purchased a small child pool and had a reasonable whelping area set up in a quiet space. As the CVM is a small, tightly-knit community, we were able to let past students know of their impact, especially for the high-needs shelters visited.

Teaching shelter medicine in a clinical setting can be valuable for student learning as well as an excellent form of community outreach. Sheltering of animals is a community commitment, and this program allowed for extension and engagement of the veterinary school with area shelters and provided a service for many of the shelters involved. The rotation requires planning, initial start-up, and faculty time, but the benefits to students in terms of exposure and hands-on learning makes this a rewarding process well worth the effort.

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Week 1

Monday	Tuesday	Wednesday	Thursday	Friday
<ul style="list-style-type: none"> • Orientation • Shelter 1 visit <ul style="list-style-type: none"> • Tour • HOLD 	<ul style="list-style-type: none"> • Shelter 2 visit <ul style="list-style-type: none"> • Tour • HOLD 	<ul style="list-style-type: none"> • Shelter 3 visit <ul style="list-style-type: none"> • Tour and discussion • Shelter 4 visit <ul style="list-style-type: none"> • Tour and discussion 	<ul style="list-style-type: none"> • Shelter 5 visit <ul style="list-style-type: none"> • Behavioral evaluations (1/2 day) • Ride with ACO (1/2 day) 	<ul style="list-style-type: none"> • Shelter 6 visit <ul style="list-style-type: none"> • Tour • HOLD

Week 2

Monday	Tuesday	Wednesday	Thursday	Friday
<ul style="list-style-type: none"> • Shelter 7 visit • Tour and discussion • Early day to allow for project development 	<ul style="list-style-type: none"> • Return to Shelter 2 • Follow-up discussion • HOLD 	<ul style="list-style-type: none"> • Shelter 8 visit • Tour and discussion • Shelter 9 visit • Tour and discussion 	<ul style="list-style-type: none"> • Shelter 10 visit • Behavioral evaluations (1/2 day) • Ride with ACO (1/2 day) 	<ul style="list-style-type: none"> • Rotation wrap-up • Student presentations • Opportunity for feedback

Shelter: may refer to a physical shelter or rescue group facility

HOLD: Hands on Learning Day

Figure 1.

A sample rotation schedule for a typical 2-week rotation.

Table 1

Initial startup purchases for the shelter rotation.

One time purchases	
Microscope	
Otoscope/ophthalmoscope	
Woods lamp	
Camera	
Cooler	
Muzzles	
Leashes	
Clippers	
Surgical instruments	
Carrying case for instruments/supplies	

Recurrent (revolving) Purchases	
Sedatives	Syringes
Antibiotics	Scalpel Blades
Otic/ophthalmic medications	Stain (diff quick)
Euthanasia solution	Bandage material
Parasiticides (oral/topical)	Diagnostic tests (FeLv/FIV, HW, Parvo)
Vaccines	Fungal cultures
Topical medications	Alcohol
Medication bottles	Disinfectants
Labels	Gowns
Suture	Gloves
NSAIDs	Tear strips, fluorescein stain
Nail trimmers/brush/comb	Microscope slides
Cotton swabs	Fuel
Fecal float solution	

Table 2

Type of facility	Annual budget	Annual intake	# euthanized	Cost/animal
Public	2.3 million	12,500	8,500	187
	835,000	6,000	4,000	129
	386,000	3400	2300	106
	295,000	2800	2200	99
	456,000	6400	4700	69
	1.6 million	15500	7700	103
Private	895,000	400	1	*

* Number unable to be calculated as a portion of the budget is dedicated to low cost/free spay/neuter operations.

Table 3

Diagnoses and treatments made by students on the Shelter Medicine rotation

	Cats	Dogs
Diagnoses made		
Viral and infectious diseases	<ul style="list-style-type: none"> • Panleukopenia • URI complex • FIV/FelV 	<ul style="list-style-type: none"> • Parvovirus • Heartworm infection • URI complex • Erlichia
Dermatologic conditions	<ul style="list-style-type: none"> • Dermatophytosis 	<ul style="list-style-type: none"> • Dermatophytosis • Demodectic and sarcoptic mange • Pyoderma • Otitis • Fleas and flea allergy dermatitis • Wounds • Embedded collar
Orthopedic diseases		<ul style="list-style-type: none"> • Fractures (new and old) • Dislocated coxofemoral joints
Oral cavity disorders	<ul style="list-style-type: none"> • Dental disease 	<ul style="list-style-type: none"> • Dental disease and grading • Oral foreign body • Pulpal hemorrhage • Dislocated mandible
Gastrointestinal disease	<ul style="list-style-type: none"> • Intestinal parasitism 	<ul style="list-style-type: none"> • Intestinal parasitism
Reproductive system	<ul style="list-style-type: none"> • Pregnancy 	<ul style="list-style-type: none"> • Cryptorchidism • Pregnancy • Open pyometra • Mastitis
Ocular disease	<ul style="list-style-type: none"> • Corneal ulceration • Eyelid agenesis 	<ul style="list-style-type: none"> • Corneal ulceration • Entropion • Cherry eye • KCS
Behavioral concerns	<ul style="list-style-type: none"> • Aggression • Anxiety • Barbering/psychogenic alopecia 	<ul style="list-style-type: none"> • Aggression • Stereotypic and self-mutilatory behavior • Anxiety