High quality, high volume sterilization programs
Brenda Griffin
Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, Gainesville, FL

Abstract
High quality, high volume spay neuter (HQHVSN) programs are efficient surgical initiatives designed to provide services to cats and dogs that would otherwise be unlikely to be neutered. Services typically target the pets of low-income owners and community cats with the goal of decreasing shelter impoundment and euthanasia. In the context of HQHVSN programs, the recommended timing for neutering dogs and cats is before adoption and before puberty. By concentrating on a single practice area, HQHVSN programs strive to improve surgical outcomes and reduce complications, while simultaneously reducing costs. Published veterinary medical guidelines for HQHVSN programs include recommendations for preoperative care, anesthetic management, surgery and post-operative care. These guidelines apply to a variety of program types including stationary and mobile services. Various program models facilitate the provision of services depending on the geographic needs and population. Formal mentorship programs and veterinary support facilitate program development. Programs should include an evaluation component so that the impact on cat and dog populations can be better assessed.

Keywords: Spay, neuter, castration, animal shelter, overpopulation, shelter medicine

Neutering is widely accepted as an essential component of preventive healthcare for cats and dogs in the United States and represents the best method of birth control for these species. High volume, high quality spay-neuter programs are “efficient surgical initiatives that meet or exceed veterinary medical standards of care in providing accessible, targeted sterilization of large numbers of cats and dogs in order to reduce their overpopulation and subsequent euthanasia”. The purpose of this review is to describe the need for HQHVSN programs and to review the recommended veterinary medical guidelines and various models of these programs.

The need for high quality, high volume spay-neuter programs

Population estimates

According to the 2011-2012 American Pet Products Association National Pet Owners Survey, US households own approximately 86 million cats and 78 million dogs. Current estimates indicate that between five and seven million cats and dogs enter US animal shelters each year, and approximately three to four million of them are euthanized. Notably, cat impoundments and euthanasias significantly outnumber those of dogs in many animal shelters. In addition to the large numbers of cats that enter shelters, millions of others live in communities as unowned free-roaming strays with their reproduction frequently resulting in un-socialized feral cats. In fact, these “community cats” may produce up to 80% of the kittens born annually in the United States. Thus, community cats represent both an effect of feline overpopulation as well as a significant source of it.

The population of unowned community cats present in a given locale is calculated by estimating one cat per six residents. This formula is based on composites from multiple surveys. A spreadsheet for calculating both the owned and unowned, outdoor cat population in a given community and its relationship to shelter impoundment is available at: http://www.sheltermedicine.com/documents/shelter-and-outdoor-cat-population-calculator.

Targeting

In order to maximize their impact, HQHVSN programs should target recognized sources of surplus cats and dogs. These include those cats and dogs that would otherwise be unlikely to be neutered, including both owned pet cats and dogs from low-income households and unowned community cats.
Cats and dogs in animal shelters frequently originate from low-income households,\(^6,7\) thus HQHVSN programs strive to provide opportunities for affordable surgery for this population.

The traditional approach to controlling free-roaming, unowned community cats has been trapping and euthanasia by animal control agencies. However, large scale trap and kill programs, which would be necessary for even temporary population control, have not been widely implemented and even small scale attempts at trapping and euthanizing cats frequently result in public outcry. In contrast, the provision of affordable services to neuter free-roaming community cats raises awareness that cats require care and enables people to “do the right thing” when cats take up residence on their property or in their neighborhood.\(^8\) These cats develop higher body condition scores following neutering,\(^9\) and urine marking, fighting, breeding and roaming are dramatically reduced, making them less likely to be targeted as public nuisances.

**Timing**

**Neuter before adoption**

Surgical sterilization prior to release to adopters, including kittens and puppies as young as six weeks old, remains the most reliable and effective means of preventing unwanted reproduction of cats and dogs.\(^2,10\) Approximately 20% of owned cats and dogs originate from animal shelters,\(^7\) and many of these are adopted as young kittens and puppies. Animal shelters generally require that adopted animals be neutered, yet compliance rates for neutering following adoption average only 50-60%.\(^11\) Neutering all cats and dogs prior to adoption ensures control of reproduction and sets an example of responsible ownership for the community. Neutering also improves the odds that pets will be retained in their homes because being sexually intact has been identified as the leading risk factor for owner relinquishment of cats and dogs.\(^12-14\)

**Neutering prior to puberty**

To prevent pregnancy and avoid contributing to overpopulation, neutering should be performed before puberty. Given that queens may experience estrus as early as four to five months of age,\(^15\) delaying spaying of juvenile cats is especially likely to result in a significant number of unintentional litters. Pet owner surveys reveal that many owned pets have one or more unintentional litters prior to being spayed.\(^16-18\)

Currently, most private veterinary practices recommend six to nine months of age as the appropriate timing for neutering.\(^19\) In contrast, professional guidelines for spay-neuter programs recommend that owned animals be scheduled for surgery at four months of age or older to allow time for the development of immunity through vaccination.\(^2\) In the context of spay-neuter programs, the surgeon must always weigh the benefits of neutering when the opportunity arises against the risks posed by proceeding with surgery at the time of presentation. Often times, the presentation of a patient for surgery represents a one-time opportunity for that animal to be neutered, resulting in a risk:benefit ratio that generally favors surgery. This is true even for animals that are not yet vaccinated, have minor medical conditions, or that are pregnant or in heat.\(^2\)

**Recommendations for patients in private practice**

It is important to recognize that the current standard age of six to nine months is not based on a scientifically defined optimal age for neutering. This age was originally chosen because anesthetic and surgical techniques were less advanced at the time and surgical success was more likely in a larger patient. Despite considerable advances in anesthetic and surgical techniques and published data that illustrate shorter surgical times and lower complications rates for younger patients,\(^20\) these recommendations have persisted.

Veterinarians routinely see kittens and puppies for a series of wellness exams and vaccinations between approximately six and 16 weeks of age. At the conclusion of the series, they typically advise owners to schedule an appointment in a few months for neutering. This gap in care likely contributes to
many pets being neutered following puberty and the births of many unintentional litters. In the author’s opinion, most owned pets with private veterinarians are best served by neutering at five months of age following standard vaccinations. This allows time for development of immunity through vaccination while ensuring they are neutered prior to sexual maturity. Because there is no gap in veterinary care between the vaccine series and the surgical appointment, owner compliance may be improved since the owner establishes a routine of veterinary appointments for their cat during kitten- or puppy-hood visits.21

**Health risks and benefits**

There are risks and benefits to all medical and surgical procedures and it is the veterinary clinicians’ responsibility to always weigh these in context. Detailed reviews of the risks and benefits of elective gonadectomy have been published.19,22 The value of neutering as a preventive health care measure deserves emphasis. Most notably, when complete ovariohysterectomy or orchietomy is performed, diseases of the uterus, ovaries, and testes, including cystic endometrial hyperplasia, pyometra, prostatitis and various cancers of the gonads themselves, are eliminated. Additionally, there are reports of significant reduction in the risk of mammary carcinoma in spayed versus intact females. Sexually dimorphic behaviors are also influenced by sterilization. Most notably, spraying in tomcats is generally eliminated and intramale aggression is frequently reduced in both cats and dogs.

**Veterinary medical guidelines for spay-neuter programs**

It is a common misperception that veterinarians performing a high volume of surgical sterilizations per day or those performing surgical procedures at a reduced cost are not providing quality care for their patients.23-25 While exceptions may certainly exist, this is not typically the case. To the contrary, increased volume and reduced costs are not obtained by reducing quality. Concentrating on a single practice area has been used successfully in human surgery to significantly improve outcomes and reduce complications while simultaneously reducing costs. In HQHVSN programs, support teams, equipment, and protocols are geared towards safety, efficiency and humane quality care of large numbers of companion and feral cats and dogs. In pursuit of this effort, surgeons become extremely proficient at performing sterilization procedures and develop techniques unique to the field or utilize existing less well-known techniques that lead to increased efficiency.21 Reported mortality rates in HQHVSN programs are very low. For example, the Humane Alliance Spay-Neuter Clinic in Asheville, NC reports a mortality rate of 0.03% (23,531 surgeries, 9 deaths) for 2012. This is lower than published mortality rates in small animal private practice and teaching hospitals.26-28 An example of postoperative complication rates is found in the table.

**Professional guidelines for spay-neuter programs**

State practice acts and professional organizations provide recommended guidelines for the practice of veterinary medicine, including spay-neuter surgery. Guidelines that specifically address spay-neuter practice have also been published and serve as valuable adjuncts to state and local practice acts.2,29 Although specific protocols and procedures will necessarily differ among programs, certain aspects should remain consistent. A veterinarian should examine every patient and medical records should be prepared in compliance with state practice acts.7 Systems for infectious disease control should be in place to prevent or minimize transmission among patients. Balanced anesthetic protocols are required, including the provision of adequate analgesia for all patients. Patients should be continuously monitored by trained hands-on observers, and emergency readiness plans should be in place.2

Regarding surgery, aseptic technique must never be compromised and separate sterile instruments should be used for all patients. Veterinarians (or veterinary students under their direct supervision) must perform all surgical procedures. For female patients, ventral midline, flank, and laparoscopic approaches are acceptable for ovariohysterectomy or ovarioectomy. For males, a prescrotal or scrotal approach may be used for castration. Hemostasis must be ensured and verified prior to completion of any procedure. Either an interrupted or continuous suture pattern is acceptable for abdominal closure. The use of a permanent tattoo is recommended to mark cats and dogs at the time of spaying or neutering surgery.
Removal of the tip of one of the ears (or pinna) is the accepted global standard for marking or identifying a neutered free-roaming or feral cat (figure 2). In the postoperative period, care should be taken to provide patients with a smooth recovery. Pet owners, caregivers or their agents should be provided with clear instructions for postoperative care. Finally, regular policies for managing complications and emergencies that occur within the 48-hour period after surgery must be in place.

**Model spay-neuter programs**

A variety of programs have been designed and implemented to serve as efficient surgical initiatives providing accessible, targeted sterilization to large numbers of cats and dogs. These programs include stationary and mobile spay-neuter clinics, mobile army surgical hospital (MASH)-style operations, shelter services, feral cat programs and services provided through private practitioners.

In order for a community to support a stationary clinic, the National Spay Neuter Response Team of Humane Alliance (http://www.humanealliance.org) recommends a minimum human population of 250,000 within a 90-mile radius of a proposed clinic site. In order to be self-sufficient, these clinics typically must be capable of performing a minimum of 25 surgeries per day, five days per week, 48 weeks per year. Transport systems can be used to bring in patients from surrounding areas for surgery.

Stationary clinics offer many advantages over mobile clinics, including greater daily surgical capacity compared to most mobile clinics, the ability to establish relationships with local veterinary practices and community members, and the possibility to hospitalize animals if necessary. Disadvantages include time and costs associated with establishing and maintaining a commercial facility and the potential for geographic limitation of the population in need of services. An alternative model of a stationary clinic that may counteract some of these disadvantages is the use of an existing veterinary hospital for regularly scheduled spay-neuter clinics. These “in clinic clinics” are especially valuable for serving the needs of targeted populations in rural communities.

Mobile spay-neuter clinics often take one of two forms: MASH-style clinics and vehicles outfitted with surgical facilities. These models have the advantages of being able to target any geographic area in which services are needed and lower overhead costs. Disadvantages include limited animal housing and time constraints on spay-neuter efforts at a given location. Client communication and emergency care protocols must be especially well-planned as mobile clinics often leave an area after completing surgeries for the day, potentially leaving animals without the benefit of veterinary care shortly after recovery and release to their owners. In some states, practice acts prohibit or limit mobile neutering services.

**Optimizing success of HQHVSN programs**

In order to optimize the impact of spay-neuter programs, the individual needs of a specific community must be identified. Factors to consider include both geographic and regional needs as well as socioeconomic and cultural barriers. A sterilization program should target the subpopulations of cats and dogs most responsible for influencing the population dynamics at a given locality. In other words, efforts should be focused on those cats and dogs that contribute the most to shelter impoundment and euthanasia and those that would not otherwise receive veterinary care.

Networking with other organizations and formal mentorship programs are useful for jumpstarting HQHVSN programs. The National Spay Neuter Response Team of Humane Alliance established a formal mentorship program in 2005. The program encompasses all aspects of clinic management and operations, from setting up a facility to training veterinary and support staff. Since its inception, the program has overseen the establishment of 118 clinics, which are collectively responsible for neutering more than 2.9 million cats and dogs since 2005.

Support from the local veterinary community also helps to ensure the success of spay-neuter programs. Historically, many veterinarians have opposed low cost spay-neuter services believing that they represent unfair competition for business. For this reason, individuals involved in spay-neuter
programs should communicate with local veterinarians about their goals in order to prevent or relieve misconceptions and facilitate collaboration and patient referral.21

Funding represents another key consideration for HQHVSN programs. As the single largest private funding agency for HQHVSN programs, Petsmart Charities has facilitated the development of many programs in the US. Developing a sound business plan is essential to ensure long-term sustainability. In some communities, public animal control funds are directed towards neutering pets. Both private humane organizations and private veterinarians have developed business models to serve targeted populations in need of low cost or subsidized spay-neuter services. Recruitment and training of veterinarians to staff HQHVSN clinics is another crucial consideration. The Association of Shelter Veterinarian’s Veterinary Task Force to Advance Spay-Neuter was established in 2006 in order to improve the availability of resources and support for veterinarians in this practice area. Finally, collecting data to track the impact of spay-neuter programs on community cat population dynamics represents another important goal. The ability to demonstrate a measurable effect of spay-neuter efforts on shelter statistics serves to further legitimize programs and could be used to justify additional funding for them.21

Shelter euthanasia estimates have declined substantially over the past several decades, from an estimated 13.5 million cats and dogs in 1973 to current estimates of three to four million.30 Some studies of community spay-neuter programs have demonstrated encouraging effects on shelter intake and euthanasia,31 but more studies are needed to provide more detailed evidence on the effects of HQHVSN programs on animal populations. In conclusion, ensuring the availability of accessible, affordable HQHVSN programs provides opportunities to care for more cats and dogs, while helping people, promoting veterinary medicine, and providing humane alternatives to sheltering and euthanasia.

Acknowledgements

The author thanks Quita Mazzina and Karla Brestle of Humane Alliance.

References

Figure 1: A linear tattoo along the ventral midline serves as an identifying mark to indicate this cat is neutered.
Figure 2: Cropping of the left ear tip serves as the standard method for identifying neutered community cats.

Table: Humane Alliance Spay Neuter Clinic 2012 post-operative complications

<table>
<thead>
<tr>
<th>2012</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coughing, vomiting, diarrhea, lethargic, or other</td>
<td>114</td>
<td>0.48%</td>
</tr>
<tr>
<td>Incision (noncompliant client)</td>
<td>8</td>
<td>0.03%</td>
</tr>
<tr>
<td>Incision problem</td>
<td>176</td>
<td>0.75%</td>
</tr>
<tr>
<td><strong>Total rechecks</strong></td>
<td><strong>298</strong></td>
<td><strong>1.27%</strong></td>
</tr>
<tr>
<td>Normal</td>
<td>23,233</td>
<td>98.73%</td>
</tr>
<tr>
<td>Total all</td>
<td>23,531</td>
<td></td>
</tr>
</tbody>
</table>