Key points:

- Focus limited resources on small, isolated communities
- Avoid cross contamination of unvaccinated animals
- Avoid hot summer clinics
- Provide adequate pain control post-operatively
- Take care of volunteers and paid staff
- Ask for donations on site
- Have a designated contact person(s) available after field clinics
- Ensure vaccines are stored and administered correctly
- Do not hesitate to use expired medications if no other option is available
- Avoid establishing feeding stations or colonies
- Heartworm prevention can be safely done without testing

Focus limited resources on small, isolated communities:

Given that 70%+ of intact females need to be spayed in order to reduce population in a free-roaming populations or those in which

unwanted household litters ultimately end up as part of feral populations, the best use of limited human and financial resources towards spaying is to focus as much effort in the smallest, most isolated communities first. Similar to the house fire analogy, spaying a small percentage of the total dogs or cats then moving on to another area ultimately has no effect at the population level. By coordinating efforts with other animal welfare groups if need be, if a geographically isolated small community can be covered in less than a year's time, then efforts repeated on s smaller scale each passing year, it is possible to actually put the proverbial fire out and then require minimal long term preventative efforts thereafter. And as previously discussed, outside of closed households, neutering of males has no effect on the population and should not be a priority.

Focusing on one initial area for clinics also is the best approach for contagious disease. In order to effectively eliminate contagious infectious disease, high percentages of the population must also be vaccinated on a regular basis in order to actually reduce the level in populations. Thus, focusing clinic efforts on small communities is more effective than providing low levels of vaccination in random sites throughout larger communities. This is especially important for viral diseases such as distemper that require direct transmission from animal to animal, but is less effective with parvoviruses that can survive months to years in the environment and remain infective.

It may seem inequitable to focus all of one's efforts on the smallest, most isolated communities first, and may be met with resistance from local governments and other animal welfare groups, but this is the only way to achieve long term success.

Avoid cross contamination of unvaccinated animals:

Mobile field spay / neuter operations frequently involve large numbers of animals brought to a clinic and placed in cages while awaiting surgery or recovering in the post-operative period. Many of these animals will have had no previous vaccine history, and being grouped in large numbers in the same room will inevitably result in parvo or

distemper transmission for dogs, and panleukopenia for cats. As seen with disease outbreaks following similar cage set ups during natural disasters, in any group of 50 or more animals, there is frequently one or more individuals shedding but not yet clinically sick with one of these viral diseases. If spay / neuter does not reduce total population numbers, then our goal of improving health and quality of life has to be weighed against the inevitable disease transmission that we will cause.

The risk of exposure should be minimized by separating cages as best possible, changing gloves and gowns between patients, and cleaning any previously used cage with appropriate antiviral agents such as bleach and direct UV sunlight. Further, it is common for nonmedical volunteers to cross contaminate cages as they move puppies with diarrhea for cleaning purposes, with the mistaken thought that a vaccine afterwards will prevent parvo transmission. It should be explained that post exposure vaccination and/or a vaccine given at the time of surgery will not prevent disease if exposure has already occurred, and that vaccines take weeks to be effective.

Finally, many animals are often surrendered at field clinics, and ultimately moved to Foster homes, rescues, shelters, etc . Transporting animals that have unknown disease status can have very large consequences that can compromise much larger populations. It is very common for rez dogs and cats to be placed in carriers in the same vehicle, be moved to a new location, then have parvo break out amongst the animals because one nonclinical dog shedding the virus exposed everybody. In the case of parvo, the vehicle is also now contaminated, and should not then be used for future transport unless completely cleaned from top to bottom, and even then should ideally not be used.

Avoid hot summer clinics:

Considering that having clinics monthly is beyond what most places can realistically expect from a financial perspective, focusing

resources to clinics outside the summer months is reasonable, safer for animals, and better ensures live vaccines remain effective.

Many of the largest Native American reservations are in the southwest United States, where summers are extremely hot. Combine this with dogs most commonly transported in the beds of pickup trucks in the hot sun, and sometimes long wait times for vaccines, and heat stroke becomes a real possibility. Heat stroke carries a 50% mortality even in an ER setting with plasma transfusions, and in a field setting is a dire situation. Even without going into true heat stroke, many of these animals at outdoor summer clinics are heat stressed to the point of compromising any immune response to vaccines. Further, during a hectic vaccine clinic with hundreds of patients, it is common for nonmedical volunteers to reconstitute vaccines by the box, which are then left in direct sunlight while going from vehicle to vehicle. Any modified live vaccine that warms up to room temperature and beyond is now an inactivated vaccine. The end result is an animal that is heat stressed and received a now useless vaccine, further compounded by the fact that the unvaccinated dog is one whose owners mistakenly is now vaccinated and protected.

As such, outdoor summer clinics should be avoided unless they can be done safely in shade or indoors, and have animals dropped off early in the morning and picked up later in the day (assuming they can be housed separately and without cross contamination and potential infectious disease exposure). Even if assigned slots are provided with specific times for each owner, these areas can be very rural, and a one hour drive in 90+ degree heat with no shade in the back of a pickup truck can be fatal. Further, avoiding outdoor field clinics in hot weather is overall a more comfortable experience for volunteers in order to keep them returning.

Finally, consider purchasing small plastic “kiddie” pools for distribution to owners at clinics. Available en bulk for <$1 US each, this simple addition to the home area (ideally in a fenced, shaded spot) will not reduce the risk of heatstroke in the clinic setting, but can reduce the risk in the home environment for outdoor dogs in the summer. If nothing else, having a place to wet down and cool off can vastly

improve the quality of life for dogs living in hot climates. The small pools are too shallow to drown in, but should be secured with a rock or similar item to allow small dogs (and wildlife) the ability to climb out as needed.

Provide adequate pain control post-operatively:

At the population level, everything is a statistical odds game, and every medical treatment can be viewed as a risk vs benefit analysis. What is the statistical likelihood of something occurring? Take a non-steroidal anti-inflammatory as an example. What is the risk in using an NSAID such as carprofen post-operatively in a mass surgery or wellness setting on the rez, with no pre-surgical labwork? Many vets private practice will refuse to prescribe an NSAID without a chemistry panel to confirm no elevations in kidney or liver values, especially in older animals. Yet, the statistical likelihood of problems is low. In humans, approximately 3 in 100,000 people taking NSAIDs will have liver issues. Considering that NSAIDs are taken more frequently and in larger amounts by arthritic, geriatric human patients, this a wide margin of safety, and thus NSAIDs are available over-the-counter everywhere. And what about our veterinary patients? It is dogma that NSAIDs in cats cause kidney issues, and yet meloxicam has been shown in multiple studies to cause no reduction in lifespan for older cats and to actually slow the progression of kidney disease in cats (99, 100, 101). In the end, the risk benefit analysis would suggest that for most patients, NSAIDS are safe, especially for short courses post-operatively, keeping animals comfortable. If we are going to do elective surgeries, then adequate pain control is a must, and NSAIDs are useful in most cases.

In addition to NSAIDs, other modalities for pain control include the use of opioids during the pre-operative and postoperative period, and if financially feasible one can consider the use of delayed release buprenorphine. Ancillary analgesics such as tramadol and gabapentin can be considered, but clinic personnel should be aware that studies have failed to demonstrate consistent pain control using either of

these (in fact, the original pharmaceutical company that marketed gabapentin was hit with a half billion dollar judgment for fraudulent marketing as to the actual pain relieving properties of gabapentin outside of neuropathies). Entire textbooks are dedicated to analgesia and the details are beyond the scope of this document, but for our purposes, NSAIDs are the safest, most consistently effective, non-abusable, and easiest medication to transport legally across state and international lines.

Take care of volunteers:

Volunteers are the lifeblood of any field clinic. Feed and house volunteers if you want them to return. Food should be good, and housing should have showers and be better than a sleeping bag in a local basketball gym. It may seem counterintuitive to provide decent sleeping arrangements in often poor and underserved areas, and may lack the novelty and "volunteer" factor that brings in veterinary students and eager, younger people, but providing good sleeping arrangements will ensure that experienced volunteers keep returning. After a long day of hard work, having a shower, a bed, and a good meal can make all the difference and will leave people ready for days 2, 3, and and beyond.

Keep hours reasonable if you want volunteers to return. Experienced staff and volunteers at low cost field clinics know that days will be long and that emergencies will arrive late in the day as word gets out about the clinic, but there should be some time limit at which point clinics stop seeing all but severe emergencies. Nobody will turn away a truly sick animal, but if no limit is placed, people will continue to show up at all hours. Staff and volunteers that end up continuing to work late into the night will end up operating on 4 hours of sleep, and by day 3 will be not only enjoying the experience but also potentially making poor medical decisions. Having enough time after hours to return to a hotel, shower, exercise, eat, etc. is important. If a clinic insists on housing its staff in a gym or similar facility, ask to ensure that no community activities are taking place in the building late in the day. Explain to local contacts / coordinators that staff has to wake up early

in the morning and that if the community is using a building late, other sleeping arrangements need to be made.

Take care of paid staff:

Pay trained staff a reasonable rate if you want them to return regularly. Groups that put on field clinics and depend solely on volunteers tend to also not be able to put on frequent clinics. Groups that employ staff and pay a reasonable rate not only put on more clinics, but returning staff already knows the routine and can accomplish significantly more in any given day. Finding the funds to pay is, of course, the crux of the problem, but asking for $5 or $10 per pet from a client can help offset the cost and ensure future clinics. Additionally, as word spreads about a group's efforts, it may be possible to find individual donors willing to pay a few thousand dollars to sponsor a clinic in its entirety. These donors will frequently volunteer at the clinic, and will quickly learn that a few thousand dollars spent on the ground will treat a hundred times more than any large, branded, logo driven mega "nonprofit" humane organization.

Ask for donations on site:

If possible, as previously mentioned, try and ask for at least a nominal fee for services for owned animals. Most people will value your time and effort if they pay in even a little, and client compliance is always better if they have an investment in the outcome. On Native American reservations, clinics seem to run better and have repeat clients and volunteers in areas where $5 or $10 is asked for as a donation. People understand that they cannot get a dog examined, vaccinated, treated for parasites, and treated for fleas and ticks for $10 at any vet, and they are usually very receptive to donating if it is explained that donations pay for vaccines and meds for future clinics. Clinics that are entirely free counter-intuitively tend to be met with less enthusiasm, and clients are frequently irritated at having to wait at times for free services. These areas tend to discourage volunteerism,

and the end result of well intended "free" services becomes "no" services until some large multi-million dollar humane organization puts on a clinic or two for publicity, spaying a handful of animals at n charge and then using the footage in order to generate more income for the parent organization with the lion's share of the income going to "administrative" fees. In the end, however, few numbers of animals are ever treated in comparison with heavily subsidized grassroots clinics which may treat thousands of animals a month, in part due to clients paying a small fee in order to help offset medical care for feral animals. In these clinics, owners who truly cannot afford even $5 or $10 are treated nevertheless, but that small nominal fee funds the next animal, or the next clinic.

Ensure a vaccine protocol:

Nonmedical volunteers should fully understand how to draw up, reconstitute, and label vaccines, since it is easy to mix up different vaccines on a chaotic day when several hundred total vaccines might be given. Despite the fact that it might make the day run smoother, avoid drawing vaccines up more than 30 minutes before administration. Doing so compromises the efficacy of the vaccines and defeats the purpose. Since heat and even being allowed to hit room temperature will render vaccines useless, vaccines and coolers should not be left in direct sunlight, and clinics during hot weather should be avoided in order to guarantee vaccines are kept cold at all times.

Have a designated contact person:

Have a designated person for owners to contact after clinics. When providing medical care for hundreds of animals on any given weekend, problems are bound to occur, and it will avoid negative perception in the community if someone can at least call a clinic representative for help afterwards.

This is especially important with elective surgery clinics in areas in which rickettsial (tick borne) diseases are endemic, in which animals with subclinical (not obvious) illness are presented for surgery then develop postoperative bleeding complications. Performing several hundred, high speed spays or neuters in a weekend will inevitably result in a few complications here and there, so clinic staff should be prepared to address community concerns.

If possible, pre-arrange with other groups, shelters, etc. to take in owner relinquishments and / or sick and injured strays. Having arrangements in advance is hugely beneficial, but is of course an extremely difficult task in a world of overpopulation, insufficient numbers of homes available, and already overcrowded shelters.

The use of expired medications:

Although within the United States it is technically not legal to use expired medications, many field veterinarians and vets outside of the US use expired medications routinely. Given that private practice clinics cannot sell or use expired medications, properly stored expired meds are frequently the most cost feasible option for mobile clinics treating hundreds of dogs or cats at a time. In fact, the expiration date of any given medication simply indicates the longest date at which the drug manufacturer can guarantee safety and potency, but does not indicate that either of these decline after this date (102).

Expired medications work very well in most cases (102, 103, 104), as proven by a large study funded by the US military. Sitting on billions of dollars of expired meds that would have otherwise been thrown away, the military found that 90% of over 100 medications were safe and effective even 15 years past their expiration date. Tablets and pills were especially resistant to decay, with liquids and injectables less so.

So, clinical judgment should be used when deciding whether to use an expired medication or not. It may be a matter of how important it is clinically, versus comparison with non expired alternate drug options.

Many times, use of an expired medication may be the only option available at any given clinic because of financial constraints and/or owner inability to pursue non expired medications.

Feeding stations (colonies):

It is a given assumption that anybody working in field veterinary settings in Third World settings does not want to see animals starving, and the emotional toll is why people are out there trying to provide a better life for animals. In order to improve the quality of life for feral animals, rescue groups and Community Cat Programs (CCPs) in particular recommend feeding community cats both individually and in colonies. In the same manner, stray dogs in various communities worldwide are fed from feeding stations or directly by well-intended good Samaritans. But, food is the single largest limiting factor with feral animals, and providing food to stray animals essentially allows them to reproduce in higher numbers (increased fecundity, i.e. coming into heat more frequently, with larger litters, etc.), thereby creating even more starving animals in the long run. From the University of Edinburgh's International Center for Animal Welfare Education, "resource restriction is a necessary element of population control" (26). Further, stray animals that increase in numbers in response to feeding stations will also become dependent on these food sources, and if the human food provider ever moves away or ceases to provide food for any reason, the increased animal population will experience even sudden further starvation (105).

Additionally, establishing feeding stations or "colonies" creates an environment ripe for animal fights and disease transmission. Dog fights over a food source can leave animals severely injured, frequently dying from wounds and infection after days of suffering. Cat fights and concentration around a regular food source directly leads to FIV and feline leukemia transmission, and thus ultimate slow death.

As concluded by Australian researchers seeking to find a solution to feral cat overpopulation and the difficult life that feral cats endure,

"cessation of provisioning unowned cats with food is the most effective approach to achieve the objective" of reducing the number of unhomed cats. (57).

Heartworm prevention:

In an ideal world, all patients would be tested for heartworm disease, then if negative started on preventatives, and if positive treated using the several month protocol published by the American Heartworm Society (AHS) (95). However, testing, treating, and even prevention in feral animals is not practical nor financially feasible. More realistically, clinics may wish to test owned animals that have clinical signs of possible heartworm disease, or may wish to start preventatives in owned animals without testing. Starting preventatives without testing is counter to conventional private practice, since some preventatives will not address adult heartworms. Further, some preventatives given to dogs carrying adult heartworms can cause catastrophic die-offs of immature heartworms (microfilariae) that can lead to severe shock and death of dogs. However, as previously discussed, some preventatives can and do effectively eliminate adult heartworms if given over extended periods, especially when combined with doxycycline. As such, heartworm prevention without prior testing can be done but should be ideally limited to the use of products containing only ivermectin or moxidectin since these are effective long term medications against adult heartworms, given enough time. Selamectin can safely be used without heartworm testing, but has no efficacy against adult heartworms. Milbemycin should not be used without prior heartworm testing.