1. Introduction
The sport of endurance has grown substantially in the past 20 yrs, with enthusiastic participation occurring worldwide. The standards of care have been elevated to meet expectations and requirements of both the American Endurance Ride Conference (AERC) and the Federation Equestrian International (FEI), with the horse’s welfare foremost in importance.

This discussion is directed toward veterinarians who assume the responsibility of treating medical problems in endurance horses at competitive events. With trial and error, each practitioner devises a treatment protocol that gives the best and most efficient results. Each horse presents a unique story in its plight and therefore must be managed for its specific problems. There are as many ways to “stir the pot” as there are “cooks,” with no single way to manage a metabolic collapse. Over the years, we have developed more tools, and more knowledge has become available to bring endurance horse problems to a successful conclusion. However, to be able to manage the care of even a single horse, there must be some strategies put into place to facilitate emergency treatment. My intention is to share with you practical logistics that I have learned and experienced over 20 yrs while treating endurance horses around the world, at World Championship races and high caliber national or local backyard endurance rides.

2. Collaborative Efforts
Many of the strategies discussed in this paper are based on common sense similar to how you would practice in a private clinic setting, but until one encounters the interesting adventures of practicing medicine along the trail, in the wilderness, and without many regular amenities, you will not believe the breadth of convoluted possibilities that might occur. In addition to considering the horse and owner during a treatment situation, you also have to take into account a hierarchy of other responsible parties, including Ride Management or the Organizing Committee, the President of the Veterinary Commission (at non-FEI rides, this person is often referred to as the Head Veterinarian), the Foreign Veterinary Delegate (at FEI events), and the oversight committee that regulates the rules of the sport, whether it be FEI or AERC. At high profile events, there will likely be a team of veterinarians and/or a team of treatment vets, all of whom have assigned responsibilities regarding horse welfare. Because you may be used to working by yourself or alongside a few others in daily practice, you will find that, at an endurance event, there are teams of people needing to be kept apprised of every detail concerning the horses. Good and ample communi-
cations will help avoid a slew of problems. No matter how busy you are during the course of the event, it is important to maintain active communications and/or to delegate this task to a reliable assistant who is working close to you.

3. Legal Stipulations
In addition to being held responsible to other officials and oversight organizations, there are state legal statutes that dictate that a vet licensed to that state (or country) must be in attendance at the event. Any further care offered by other veterinarians not licensed in that state usually falls under the auspices of the person actively licensed in that state (or country). It may be necessary to discuss in advance with the state veterinary board about logistics of medical care being offered by vets unlicensed in that state. This protects the veterinarians on the treatment team from future litigious difficulties and also protects those vets against license infractions.

As an example of how states may view this dilemma, Dane Frazier, DVM (past U.S. representative to the FEI Endurance Committee and past president of AERC), queried the State of Missouri and summarizes the response: “The State of Missouri does not care who ‘vets’ rides for AERC in Missouri as the enforcement of ‘club rules’ is not the practice of veterinary medicine. However, to treat horses at a ride requires diagnosis as well as therapy, both of which are inclusive in the practice of veterinary medicine. Therefore, a veterinarian unlicensed in that state can provide treatment only if they are under the ‘direct supervision’ of a veterinarian licensed in that state. Direct supervision is defined as the licensed veterinarian being present at the exact location of the treatment.” It is particularly noteworthy that an out-of-state veterinarian, not licensed in the state in which the ride is held, may not be able to provide treatment anywhere in the course of the event unless a licensed veterinarian is present at the same spot as the treating veterinarian, not just present somewhere in the vicinity of the ride. This has relevance when horses may be treated in multiple areas or at vet checks scattered throughout the course of the trail and not just at a single, central facility. In such cases, a statute conflict may arise when veterinarians are split up to provide sufficient coverage at various stations.

Furthermore, many states do have “Good Samaritan” laws that cover treatment under emergency circumstances. However, some states do not view the voluntary officiating at a ride (where treatment is commonly required) as an emergency circumstance of which an unlicensed veterinarian is unaware.

There are recent individual state rulings that consider state licensing as a requirement in the state where the event is to be held even for performing duties as a veterinary judge without any intent to treat. It is important for anyone involving themselves at an endurance event, especially in a treatment capacity, to check with the relevant State Board of Veterinary Medicine as to their exact requirements. This same detail should be addressed when working an endurance event in overseas countries, where treatment may only be permitted under the direct auspices of a person licensed to practice veterinary medicine in that country. Although you may not plan to treat horses at a ride, situations do arise where this could become necessary to save a life; it is critical that you protect your license and ability to practice medicine into the future while also protecting yourself against any malpractice litigation.

4. Considerations in Setting up Emergency Care
It may seem obvious, but one of the most critical steps in offering emergency care to an endurance horse is to have at least one practitioner on hand who is well versed in the peculiar metabolic features that develop with endurance sport exercise. Different climates, terrain, and racing conditions will elicit a variety of metabolic mishaps. Experience is invaluable in the assessment and treatment of such situations. Therefore, the number one issue is for the potential endurance veterinarian to develop skills based on experience in the sport. The President of the Veterinary Commission plays an essential role in outlining the details of judging criteria, as well as facilitating the working conditions for the treatment vet or vet team. In addition, the President of the Veterinary Commission is instrumental in selecting the treatment personnel, and this should be done with consideration of the experience level of the primary treatment vet. If there is to be a team of treatment veterinarians, at least one qualified practitioner should be present to oversee and mentor those with less experience.

There must be excellent communication and agreement with Ride Management in advance about the details of the treatment arrangements. A short seminar and/or meeting in advance of race day can help get all veterinarians on the same page as to treatment technicalities and philosophies and to answer pertinent questions. A detailed list of cell phone numbers and contact information for all officials and ride managers should be provided to every veterinarian on the treatment and officiating teams. (In overseas venues, the Organizing Committee may be requested to provide “local” cell phone equipment to foreign veterinarians to keep phone expenses to a minimum and to encourage communications.) Maps should be made available to expedite travel between veterinary check points, and every veterinarian should be assigned a driver or navigator who is familiar with the local area.

Also, it is important to recognize that at multinational events, people come from all walks of life, and it is not just language barriers that pose a challenge; there are often cultural differences that are enriching but may create misunderstandings. This may occur not just between veterinarians and riders and/or event officials but also among members of the Veterinary Commission. If you find
yourself in such a confusing situation, just remember to be sensitive to others’ cultural differences and to keep a sense of humor.

During the course of an endurance ride, horse owners often canvas multiple veterinarians in search of multiple professional opinions about their horse’s injury or illness. It is helpful to remind everyone that caution should be taken for each veterinarian not to offer too many opinions based on a cursory exam or scant information about a horse. Some comments may contradict veterinarians’ comments, causing unnecessary confusion and controversy. Assistants should also be cautioned against making any medical statements or judgments, and they should be advised about medical confidentiality regarding the horses they are helping to treat.

5. Common Horse Emergency Conditions at Endurance Events

Although musculoskeletal injuries may occur at any point along an endurance ride event, the most pressing emergency situations generally involve metabolic problems. Endurance rides combine a lengthy duration, as much as 12–24 h, of continuous exercise with resultant loss of body fluids and electrolytes. Coupling this with additional demands placed on these horses from speed, challenging terrain, and possible adverse weather conditions, the most prevalent metabolic concerns fall under the umbrella of a complex known as exhausted horse syndrome, which develops because of dehydration, electrolyte imbalances, and glycogen depletion. There are all degrees of metabolic compromise, ranging from very mild and barely detectable to extremely serious and life threatening. A sick horse may be affected with myositis, synchronous diaphragmatic flutter (thumps), colic secondary to intestinal atony, and heat stress or prostration, and also has the potential to develop laminitis.

An affected horse will show at least one or more of the following clinical signs as a result of fluid, electrolyte, and energy losses: poor heart rate recovery, elevated cardiac recovery index, decreased borborygmi or total ileus, disinterest in surrounding stimuli or depression, reduced or absent appetite, lack of thirst, delayed capillary refill time and/or pale or marginated mucous membrane color, delayed skin tenting, elevated rectal temperature, flaccid anal sphincter tone, thumps, muscle twitching, muscle cramps with or without associated lameness, myoglobinuria, increased digital pulses, recumbency, or colic.

The cardiac recovery index (CRI) has become an important criterion for evaluation of distance horses—taken at intervals along the course, it is a measure of a horse’s fitness and how well the horse is responding to the exercise demand. The CRI may be evaluated at each vet check and at the finish as a helpful parameter to assess a horse’s metabolic condition. Once a horse’s heart rate has reached the veterinary criteria of 64 beats/min (bpm) (or 60 bpm), the horse is presented to the veterinarian, and the horse’s resting heart rate is again taken. Then the horse is asked to trot away for 125 ft and back 125 ft. Exactly 1 min after the horse initiated the measured trot of 250 ft, the heart rate is again counted, and this value is compared with the pre-trot value. (In most cases, the trot out takes <0.5 min, and the horse is allowed to stand quietly for the remainder of the minute.) The heart rate should return to the same number beats or 4 bpm less than the initial rate. As an example, if a horse has a resting heart rate of 64 bpm, at the minute count after the trot out, his rate should return to 60 or 64 bpm or less. If the CRI is elevated >4 bpm (68 or 72 bpm or greater), this may be an indication of some impending metabolic problem that should be corroborated by other physical findings. It is important to recognize that not all metabolic crises are accompanied by an elevated CRI, whereas the presence of an elevated cardiac index tends to be associated with fatigue, dehydration, and other indications of exhausted horse syndrome.  

An experienced practitioner is often able to recognize the more subtle signs of equine discomfort or distress before a horse becomes overtly ill, based on a horse’s despondent neck and/or body posture and anxious facial expressions, such as puckering of the lips and a glazed look to the eyes. Because horses are herd animals, a horse may tend to move along at the pace of another horse or group of horses based on the emotional tie to its “herd,” regardless of fatigue or pain or capability. This herd phenomenon and the power of adrenalin often mask clinical signs of impending metabolic collapse until a horse has had a chance to stop exercise activity at the required rest periods provided at intervals along the course. Continuous monitoring of every horse during an event and in the hours afterward is necessary to identify problems as early as possible.

Regardless of the specific metabolic crisis a horse may experience, it is necessary to replenish large volumes of isotonic fluids and to restore electrolyte balance and energy. This is accomplished with ample intravenous fluid therapy, requiring at least 20–30 l in most cases, initially administered rapidly through large-bore (12-gauge) IV catheters. For a sick horse with audible intestinal activity, electrolyte and energy-laced fluids can also be administered by nasogastric tube to bolster quick restoration of deficits.

Additional medical measures should also be taken to promote intestinal motility, renal function, and neuromuscular equilibrium, to manage pain, to limit endotoxin, and to minimize the risk of laminitis. These life-saving therapies rely primarily on volume replacement, along with energy (dextrose) supplementation in the IV fluids. Calcium, potassium, and magnesium IV supplementation also may improve intestinal activity and lessen muscle cramping from myositis. Dimethyl sulfoxide given IV or by nasogastric tube is helpful for its anti-inflammatory,
anti-oxidant, renal dilatory, and diuretic properties. A horse may also need analgesic medication (non-steroidal anti-inflammatory drugs [NSAIDs] or sedatives such as xylazine or dormosedan) and acepromazine for its vasodilatory and muscle relaxation effects for myositis and to thwart development of laminitis. Anti-endotoxin medication (flunixin meglumine and/or polymyxin B) is beneficial to lessen metabolic complications. Dantrolene may be helpful to manage myositis, and dopamine may maintain renal perfusion. Icing of the distal limbs and frog support can be instrumental in minimizing the risk of laminitis provided the primary metabolic crisis is averted. Often, timely restoration of fluid, electrolytes, and energy improves a horse’s overall condition such that he will begin to take care of himself by eating and drinking to further restore his losses.3

6. Triage

Much of the treatment care of an endurance horse occurs in the “field” with limited facilities or supplies, even at world-class events. Great medical care can be performed out of a well-stocked veterinary truck, but in some cases, a horse must be shipped to a referral hospital for intensive and/or follow-up care or surgery. Arrangements should be made in advance with the nearest referral hospital and surgical center to ensure that qualified veterinarians will be available for the duration of the endurance event and also to give the referral hospital staff the courtesy of advance notice of potential cases that could arise. Depending on the caliber and nature of the endurance ride, horses are on site at least from Friday through Sunday (or any designated 3 days) of an event, and in many cases, for days before and after the long weekend. There may be an event requirement that at least one qualified veterinarian remains on site for the entire period that horses are stabled on site. Arrangements may be necessary to provide meals and lodging for a veterinarian so that the event site is not left without veterinary supervision at any time.

The details of the treatment/triage area(s) should be arranged in advance. Practical considerations to address include the following:

- Set up triage areas that are protected from inclement weather and the elements
- Have sufficient and adequate lighting, electrical outlets, and extension cords to facilitate treatment at night, using generators if necessary
- Design traffic flow such that a sick or injured horse can move directly from each vet check to a designated treatment area that is devoted solely to treatment
- The treatment area should be located out of the way of normal foot traffic—consider liabilities of a casual passerby getting involved with or interfering with care of a sick horse or of a passerby being at risk of injury by a fractious horse
- Have consent forms available for an owner to sign to authorize treatment and also a form to authorize euthanasia should that become necessary
- Have medical record sheets available to track treatment specifics, monitoring of condition, and a horse’s response to treatment
- Arrange for sufficient numbers of personnel to enable a veterinarian to continue to treat and monitor a horse at an out vet check—a horse may require ongoing intensive care before it can be moved to the main treatment area, and it should not be abandoned in its medical care while awaiting transport nor should treatment be delayed
- Ensure availability of adequate numbers of transport trailers and phone contact numbers with trailer drivers and consider also that arrangements for a special trailer may be necessary for a down horse that is unable to rise
- The treatment team should collaborate about drugs and supplies one anticipates needing, especially at high profile events where large numbers of horses might require treatment
- Assure in advance that these medications and supplies will be present—there is nothing more frustrating than to have had someone else arrange for medical supplies to be available, especially in an overseas venue or on a weekend when many pharmacies are closed, only to find that specialized drugs or important supplies were not included in the preparation order
- Set up blood chemistry machines when possible and have qualified personnel available to run them and to communicate results to the treating veterinarians
- Ensure availability of ample clean water for horses to drink, for cooling an overheated horse, and for necessary veterinary procedures
- Ensure availability of ice to manage appropriate musculoskeletal problems and arrange to have cooling fans when practical and possible
- Ensure availability of ample IV fluids and appropriately sized, large-bore IV catheters and IV lines
- Prepare for the need to hang large volumes of fluids in the triage areas and in the field—IV poles can be constructed from electrical conduit or tree branches, 2 × 4’s, etc. may be substituted
- Provide capable assistants to help veterinarians in their tasks, and if in foreign countries, there is a need to consider qualified translators to facilitate communication between a veterinarian and a horse owner/rider or Team Veterinarian
- Consider the number of stallions that will likely be on site (particularly in countries outside the United States where stallions are commonly ridden), and set up treatment areas that
segregate stallions away from the proximity of mares and geldings
● Arrange for qualified personnel to stay with a sick or convalescing horse at all times, even if the owner is present—there have been situations where an owner is unaware of the power of analgesics and drugs that make a horse seem better than it is and the owner offers the horse grain with subsequent stomach rupture
● Arrange for a quiet and private location for practitioners to collaborate on difficult cases—brainstorming and consensus of opinion may be important in some cases for the benefit of the horse or because of liability issues

Additionally, the protocol followed in most competitions encourages veterinary evaluation of every horse that is disqualified from continuing in competition, regardless of whether the horse has been eliminated because of a known metabolic or suspect lameness problem or even an issue with the rider. This ensures that a horse with an impending myositis, for example, is not overlooked by an assumption that there is only a musculoskeletal issue that caused the horse to be eliminated because of “lame ness.” There should be provisions in place to accommodate for enough manpower that allows time to examine all horses that are pulled from competition and to monitor those in question at regular intervals. All horses that have received veterinary care or are in suspect medical condition should also be re-evaluated the next day and before release from the event or transport off the grounds.

7. Need for Treatment May Be Anywhere
Horses do not always get sick or injured in convenient places or at Base Camp. An endurance course of 50 or 100 miles lends many opportunities for a horse to suffer a metabolic collapse or injury in an area far from a vet check and easily accessed roads. It is important to coordinate in advance with Ride Management as to how a sick or injured horse will be transported off trail and back to Base Camp. If the ride is conducted along trails through deep wilderness, prior arrangements should be considered for a Treatment Veterinarian to have horsepower access with an ATV (all terrain vehicle), four wheel drive vehicle, or mounted on horseback. In advance, additional arrangements should be prepared:

● Have safe trailer transport and capable drivers available at all times to ferry a sick or injured horse to a designated treatment area
● Have communications operable to coordinate rescue and transport of a horse from the trail to the treatment area—many ham radio operators view this as an exciting weekend adventure and are often available to man communications; this becomes essential where cell phone coverage is spotty or absent
● Discuss options and make provisions of how to rescue and recover a horse that cannot or will not be moved—in some cases, a horse may take a fall off trail into a position that does not allow the horse to extricate itself without assistance
● Have an assistant available to support a Treatment Veterinarian called out to treat in the field—this person serves as communications conduit, can obtain additional supplies and equipment when necessary, and is present to assist the veterinarian in providing treatment

In addition, it is important that adequate communications (ham radio, cell phone, pager) are set up to alert and inform the Head Treatment Vet about all cases as they occur and as treatment progresses and that there is a backup plan for communications should transmission towers go down or equipment becomes inoperable. This may be in the form of a designated person who drives between vet checks and base camp to relay information.

8. Refusal of Treatment
Sadly, there are times when a horse is in need of treatment yet an owner refuses veterinary care. In such cases, if you are unable to convince an owner of the necessity of treating the horse, it would be wise to have the owner/rider sign a statement that they have refused medical care despite your recommendations. It is heart wrenching not to be able to offer treatment to a horse in need, but not all owners will cooperate because of financial concerns, a perceived stigma to having a horse treated at a ride, or because of denial by the owner that the horse has a problem. A signed document, particularly one that is also signed by a witness, is one measure you can take to cover yourself legally should something go terribly wrong and the owner/rider later wishes to assign blame for failure to treat.

In addition, if an owner/rider refuses treatment for their horse, it is necessary to immediately involve an official person of the event who is a representative of Ride Management—at an FEI event, this would be a Steward and/or member of the Ground Jury.

9. Rider Education
At the pre-competition day ride meeting, it is important that Ride Management and/or the President of the Veterinary Commission advise riders in advance as to what will be expected of them should veterinary treatment be rendered to their horse. Details of fees and expectations of reimbursement for drugs and supplies should be spelled out in advance to avoid unnecessary misunderstandings later. At local and national rides, prepare a protocol for this contingency and be sure to inform the owner/rider of each treated horse of their financial obligation, just as you would in a private practice setting. At FEI events, often a horse’s national United States Equestrian Federation (USEF) or FEI international
passport will be retained until the owner settles any outstanding bills related to emergency veterinary care or makes payment arrangements before the horse can be discharged from the ride site.

After the competition and before release of the horse, the treating veterinarian can provide significant value to the horse’s welfare by explaining to the owner/rider about their horse’s metabolic illness incurred during the competition, how this might affect immediate travel plans to return home, and future training and competition schedules. A written and signed medical report (preferably on letterhead stationary) should be provided to the horse owner to facilitate follow-up evaluation and care by their local veterinarian once the horse returns home. This document should include the presumptive diagnosis, all medications and amounts given, laboratory results, detailed information that tracked the horse’s response to treatment, and recommendations for follow-up care. Phone contact information should also accompany this report so first-hand information can be shared between veterinarians.

10. Care and Feeding of Ride Veterinarians

To provide the best care for the horses, it is important that veterinarians at a ride also be cared for. The care and feeding of all working veterinarians is important to ensure hydration and energy needed to work non-stop for a 24-h span or more. Arrange with Ride Management for regular delivery of drinks, snacks, and meals and also for chairs and areas out of the weather where one can sit for a short rest when possible. Bathroom facilities should be within a short reach of the areas where one is stationed to work, along with ample water for use in equine medical care, cleanup of supplies, and to refresh one’s self. These creature comforts facilitate doing one’s job and keep one’s mind as sharp as possible.

11. Resources for Specifics on Treatment of the Endurance Horse

Guidelines and detailed treatment principles and recommendations for managing metabolic problems in endurance horses were prepared by this author for the AERC veterinary handbook, Veterinary Guidelines for Judging AERC Endurance Competitions (pp. 28–41). These can be accessed at http://www.aerc.org/upload/VetHandbook0606.pdf. This same website also provides appropriate forms for reporting treatment and results of necropsy findings should it be necessary to euthanize a horse that is non-responsive to therapy.

For FEI events, guidelines for the use and authorization of veterinary treatment can be found at http://www.fei.org/Athletes AND Horses/Documents/GuidetotheuseofMedicationForms.pdf. Specific medication forms must be filled out and filed with appropriate officials at an FEI event. The report form for any horse receiving treatment at an FEI endurance event is found at http://www.fei.org/Rules/Veterinary/Documents/Medication%20Form%201.pdf. General rules for a veterinary code of conduct at FEI events can be accessed in the Endurance Rulebook at http://www.fei.org/Disciplines/Endurance/Rules/Pages/Regulations.aspx.

References