Fluid Therapy: When and Where?

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It was February in central Georgia. I was an intern at the University of Georgia Veterinary School responding to an ambulatory emergency on a cloudy, 31°F day. My patient was a mature thoroughbred gelding with severe colitis. The owners would not consider referral. Physical examination revealed the following: HR = 80; RR = 24; T = 103; MM = dark red, toxic; CRT = 4 seconds; watery, high volume diarrhea, with hypermotile gut sounds; clinical dehydration assessed at 8%.

I didn’t need a packed cell volume and total protein to tell me that this horse was suffering from significant depletion of circulating fluid volume. In addition, one look around the horse’s pen confirmed severe ongoing loss in the form of liquid feces. Without access to any laboratory data, I decided to start the horse on Lactated Ringer’s solution. We carried 10-L carboys of LRS in our ambulatory vans, as well as 14-gauge angiocaths and a simple coil fluid delivery system. To make a long story short, I spent the next 45 minutes throwing ropes over the owner’s free-standing driveway basketball hoop, lifting the carboy as high as I could to provide excellent gravity flow, carefully placing a 14-G catheter aseptically in the horse’s jugular vein, and rigging a safe method to tie the now colicky horse to the basketball gizmo so that he could receive his fluids. All these preparations completed, I hooked up the fluids and opened the line with pride, sure that I would be instrumental in saving the life of this horse. I reached the soon to be euthanized horse. Moral of the story: consider the practicality of fluid administration, as well as the clinical indication for it before you embark on a frustrating endeavor such as mine.

This walk down memory lane provides a useful framework for a discussion of fluid therapy in a field setting. There are two questions that we should ask ourselves every time we consider delivering IV fluids on the farm: (1) Is it a practical undertaking? and (2) Is it going to significantly improve the well-being of the patient? The answers to the two questions are related. Consider the horse discussed above with a heart rate of 80, toxic mucous membranes, severe clinical dehydration, and profuse watery diarrhea. Even if it had been a warm spring day and the owner had a barn with a simple way to hang fluids, how much good could I have done for this horse in a farm setting, and was I doing the client and the horse a service or disservice by attempting fluid therapy on site?

To answer this question, we must know how to estimate dehydration and calculate fluid replacement needs. Assessment of dehydration in a field setting is based primarily on skin turgor, heart rate, and capillary refill time. It is essential to consider volumes of intake and loss when evaluating your ability to correct fluid deficits. Clinical signs including tacky mucous membranes, heart rate of 50 to 60 bpm, and capillary refill time (CRT) of 2–3 seconds indicates 5–7% dehydration. Heart rate over 60 bpm, weak pulses, poor jugular distension, and CRT >3 seconds signifies 8–10% (severe) dehydration.
Before shipping a horse, it should be placed aseptically and given sufficient fluid therapy. The exception to this rule would be in cases where an unavoidable delay (waiting for a trailer, contacting an owner, etc.) is incurred before shipping. In the case where an unavoidable delay is expected, the attempt to win the race with progressive dehydration and clinical deterioration was unlikely to succeed.

Under what circumstances, then, is fluid therapy in a field setting practical and likely to help the patient?

1. Impaction Colic

Impaction colic is a clinical condition in the adult horse very likely to benefit from fluid administration on the farm. A horse with a clearly palpable large colon impaction that does not respond within 12 hours to initial shotgun treatment with water and laxative administered by nasogastric intubation is a very good candidate for fluid therapy in the field. The horse should have no signs of systemic toxemia, a mildly elevated heart rate, mild to moderate signs of abdominal pain, and imperceptible to very mild clinical dehydration. Fluids can be administered orally via an indwelling nasogastric tube, as well as intravenously. Daily maintenance fluid requirement for a 1000 lb horse is 24 L. By giving 20 L of fluid intravenously by rapid infusion through a 14-G catheter and 8 L of water orally every 2 hours via nasogastric tube, it is possible to make a significant impact on this horse’s hydration status within a few hours. If the client and the physical environment are suitable, then fluid therapy can be continued on the farm both intravenously and by indwelling nasogastric tube.

2. Colic Referral

In general, fluid therapy on the farm is contraindicated prior to referral of a surgical or severe medical colic. The reason is simple: it is impossible to deliver large fluid volumes rapidly in a field setting. You are likely to do more harm than good by delaying referral long enough to establish an IV line and start fluid therapy. The exception to this rule would be in the case where an unavoidable delay (waiting for a trailer, contacting an owner, etc.) is incurred before the horse can be transported. If a catheter is placed before shipping a horse, it should be placed aseptically, be 14-gauge size, be secured carefully with superglue or suture material, and be capped with an injection port. If the horse becomes violent during transport, the catheter must remain in position and sealed. If the horse will reach a referral center within 2 hours, consider administration of hypertonic saline. Given as a rapid IV bolus (7% solution at 4 ml/kg or 2 L per 500-kg horse) hypertonic saline produces a temporary improvement in the cardiovascular status of patient’s in shock. Isotonic fluids should be administered within 2 hours.

3. Exhausted Horse/Hyperthermia

Dehydration associated with exhausted horse syndrome or hyperthermia in endurance or 3-day event horses is a field situation in which IV fluid therapy can be of great clinical utility. Without access to laboratory data, a horse with markedly elevated pulse, respiration, and body temperature immediately following strenuous exercise should be treated with rapid infusion of 10–20 L isotonic sodium chloride. Sodium chloride is the fluid of choice for such patients because acid base status is variable and metabolic alkalosis occurs commonly. If Lactated Ringer’s solution is the only fluid available, don’t hesitate to use it, as the need for rapid volume expansion and cooling outweighs the risk of exacerbating a metabolic disturbance.

4. Foals

The smaller body size makes volume delivery a more realistic goal in foals. Again, a 14-gauge jugular catheter should be utilized for IV administration whenever possible. Careful attention to asepsis is important in catheter placement, and fluid administration rate and volume must be calculated carefully to avoid overhydration. Maintenance fluid rate for a neonate is 4–5 ml/kg/hr. During rapid fluid bolus administration, do not administer a volume greater than 8% of kilogram body weight (e.g., 0.08 × 45 kg = 3.6 L to a 100 lb foal). In general, Lactated Ringer’s solution is a safe choice for therapy without benefit of laboratory data.

Ambulatory Fluid Therapy Equipment List

Essential

- Nasogastric tube and pump or funnel
- 14 G 5¼” Angiocath
- Injection port
- Super Glue or 2-0 prolene suture
- Surgical prep
- Clippers
- 1 and 5 L bags of lactated Ringer’s solution
- Coil delivery system
- Heparinized saline for flush

Optional

- Hypertonic saline
- 1- and 5-L 0.9% sodium chloride bags
- 50% dextrose