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The PROMISE of SGLT-2s

SGLT-2s look promising for hyperinsulinemia and insulin dysregulation

By Marie Rosenthal MS

Sodium-glucose cotransporter-2 (SGLT-2) inhibitors may be an effective way to control hyperinsulinemia and insulin dysregulation in horses, according to a recent study.

SGLT-2s are a class of medication used to lower high-blood glucose levels in humans and felines (Bexacat, Increvet), and is being researched for use in equids and canines. However, SGLT-2 inhibitors have not been approved for use in animals outside of cats, explained **Nicholas Frank,** DVM, PhD, DACVIM, who recently was appointed dean of the College of Veterinary Medicine at Mississippi State University. He is an expert in equine endocrinology.

"These drugs work by inhibiting the re-uptake of glucose from the proximal tubule of the kidney, and by inhibiting the re-uptake of glucose, the animal wastes glucose in the urine," Dr. Frank explained, when he discussed a recent study he and his colleagues did on the SGLT-2 inhibitor, velagliflozin, being studied in horses.

Persistent Insulin Dysregulation

"In contrast to dogs, cats and people, horses remain in this persistent state of hyperinsulinemia and insulin dysregulation," he explained at the recent ACVIM Forum, held in Philadelphia.

Although a few horses might go on to develop diabetes, most horses "remain in this state of hyperinsulinemia where they're secreting large amounts of insulin and quite successfully keeping glucose concentrations at least somewhat in normal range or in a high-normal range. But the only way they're able to do that is to secrete large amounts of insulin."

Wasting glucose in the urine provides a way to lower the need for secreting more insulin. They hoped that insulin concentrations decrease when the blood glucose concentrations are lowered because the animal is wasting glucose in the urine. This is what they found with velagliflozin, which is being developed by Boehringer Ingelheim Animal Health.

Velagliflozin was tested successfully in ponies, where the SGLT-2 inhibitor decreased insulin concentrations in the ponies. This drug has been developed specifically for horses, but it is only available for research at this time.

In the randomized, double-blind, placebo-controlled study, Dr. Frank and his colleague from Tufts University, **Kristen Thane,** DVM, strove to look for horses with moderate to severe hyperinsulinemia, because they tend to be animals that are more difficult to manage, he explained.

"So, the aim of this study was to investigate the efficacy of velagliflozin, a novel SGLT 2 inhibitor designed for use in horses, to see if it would decrease insulin concentrations in horses with moderate-to-severe hyperinsulinemia," which was defined as ≥75 µIU/mL of insulin during an oral sugar test where blood was sampled at 60 and 90 minutes. Basal hyperinsulinemia was also measured.

Thirty-seven client-owned horses, with moderate-to-severe hyperinsulinemia, were enrolled and randomly chosen for the 0.3 mg/kg of velagliflozin or placebo groups (given as an oral suspension). Most had a history of clinical laminitis, and because of the degree of hyperinsulinemia allowed for entry, some horses had concurrent pituitary pars intermedia dysfunction (PPID).

"The physical characteristics of equine metabolic syndrome, including the cresty neck and other forms

Courtesy of Dr. Frank

The cresty neck of a horse with metabolic syndrome.

of regional adiposity were present in these horses," Dr. Frank said.

There were 2 treatment periods, which both lasted 20 weeks, he explained. "In the first period, we had horses randomly assigned to the velagliflozin or placebo groups, and they received 0.3 mg/kg of velagliflozin or placebo. After 20 weeks, they switched the placebo group to the velagliflozin. So, both groups received velagliflozin."

They monitored the animals at study entry and then again at 2, 4, 8, 12 and 20 weeks, with chemistries, physical examinations, lameness scores, body weight and condition, and cresty neck scores. The main variables of interest were plasma insulin and serum glucose, but they also looked at liver and kidney function, complete blood counts and adrenocorticotropic hormone (ACTH) testing results.

"We did ask the clients and the primary care veterinarians to hold the horses on the same dose of per-

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EQUID CHARACTERISTICS ON DAY 0		
Demographic characteristics	Placebo	Velagliflozin
Age (years)	20 (15–24)	21 (18–23)
Mares	10	11
Prior laminitis	17	16
Concurrent PPID	11	11
Body Condition Score	6 (5–6)	6 (5–7)
Cresty Neck Score	3 (2–3)	3 (2–3)
Horse	8	10
Pony or Miniature Horse	11	8

PPID, pituitary pars intermedia; Data are median (interquartile range)

DAY 0 LABORATORY RESULTS		
Laboratory Results (US)	Placebo Group (n=19)	Velagliflozin Group (n=18)
Basal Insulin (µIU/mL)	193 (82–345)	188 (127–464)
Glucose (mg/dL)	108 (90–116)	106.5 (90–129)
Triglycerides (mg/dL)	81 (57–107)	74 (55–90)

Data are median (interquartile range)

golide if they were on pergoglide—and not to vary treatment unless they talked with us," Dr. Frank explained. They did not make any changes during the study period.

There were 18 horses, 10 ponies and 9 miniature horses with a median age of 21, a median body condition score of 6 and a median cresty neck score of 3. Thirty-three (89%) had a history of laminitis, and 22 (61%) had concurrent PPID.

After random selection, 19 equids (11 horses, 8 ponies/miniature horses) were in the velagliflozin group and 18 equids (8 horses, 8 ponies/miniature horses) were in the placebo group, and they had similar characteristics.

"So as always happens in a clinical trial, we had some attrition from the study," he said. "I'm going to go through some of the reasons for this because it's important. The first part of this that I will discuss in more detail is horses receiving velagliflozin developed a degree of hypertriglyceridemia when treatment was initiated, and there was a lot of individual horse variability in the amount of hypertriglyceridemia."

This was anticipated, so if they developed a triglyceride concentration of 1,000 mg/dL during the first period, they would be given a period without velagliflozin to allow the triglyceride concentration to lower and then be restarted at a lower dose. This occurred in 6 horses in the velagliflozin group. However, all these horses remained clinically normal, and they did not develop clinical signs of equine hyperlipemia such as inappetence.

Treatment Effect

Two other horses left the placebo group because of medical problems (laminitis in 1 horse and suspensory ligament disease in another), and some horses were withdrawn due to scheduling conflicts, so they evaluated 17 horses in the placebo group and 12 in the velagliflozin group. Data collected from these horses were included up until the time of their withdrawal from the study.

They saw a significant decrease in serum glucose and plasma insulin in the velagliflozin patients, and they remained at that lower concentration for the duration of the first 20 weeks versus placebo, according to Dr. Frank. However, if approved, horses will need to be monitored for hypertriglyceridemia when treatment is started, he added.

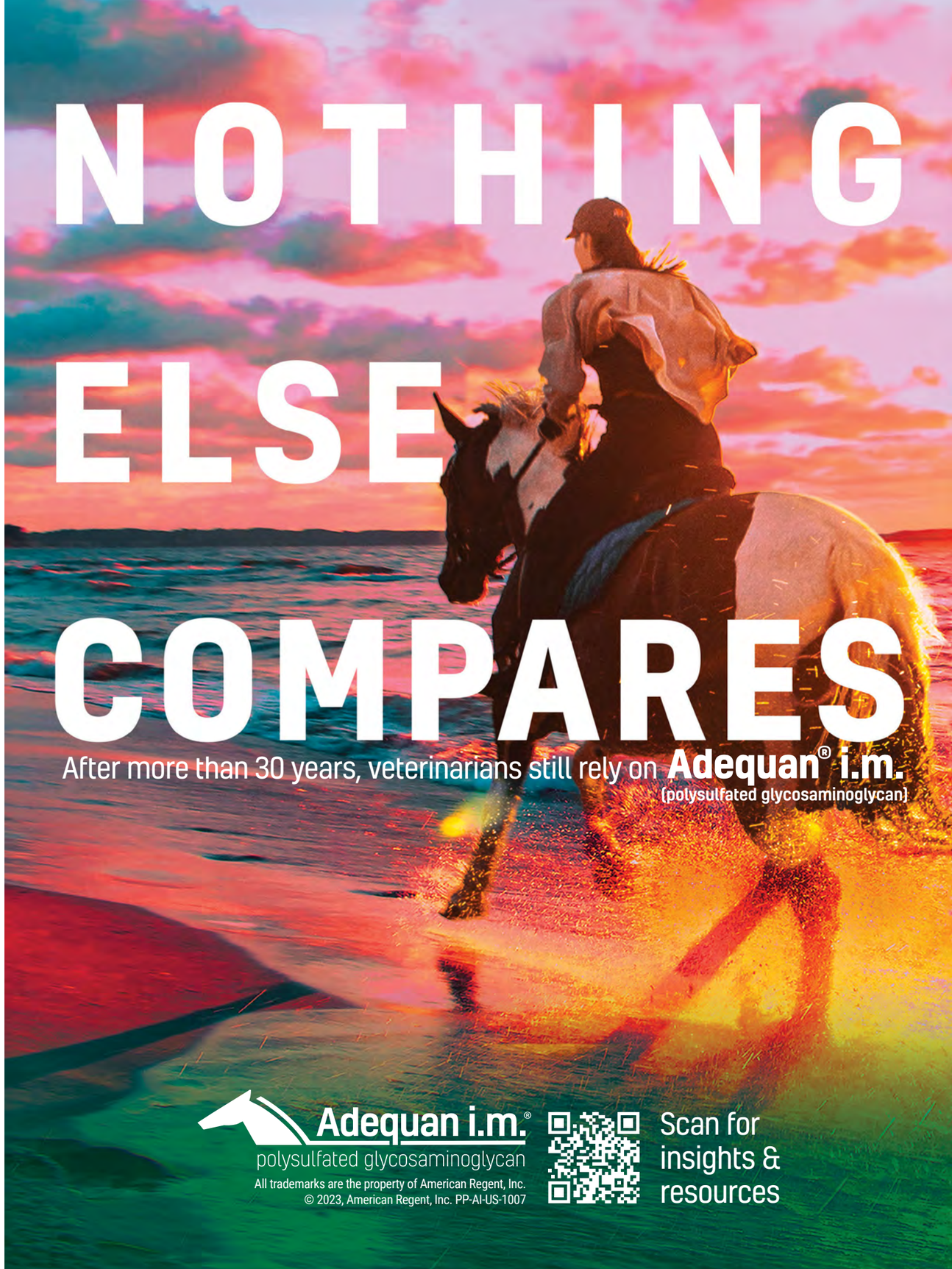
"There was a clear treatment effect that we were hoping to see," he said.

They looked separately at the placebo group that switched to velagliflozin and saw the same positive effects, although they were not statistically significant because of the lower number of horses remaining in the study at this point, he explained.

"We can conclude that the velagliflozin was effective in this study at reducing plasma insulin concentration and, therefore, is a potential treatment for moderate to severe hyperinsulinemia in horses," Dr. Frank said. **MeV**

SGLT-2s work by inhibiting the re-uptake of glucose from the proximal tubule of the kidney.

The study was performed while Dr. Frank was at Tufts Cummings School of Veterinary Medicine. Kristen Thane, DVM, DACVIM, of Tufts was the investigator responsible for running the project. This study was funded by Boehringer Ingelheim Animal Health.



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Ask the Financial Expert

This column is brought to you by AAEP Educational Partner CareCredit, a Synchrony solution.

How do I decrease accounts receivable in my ambulatory practice?

BY LINDA HAGERMAN, DVM

Equine practice is a highly rewarding career, but it's not an easy one, especially for ambulatory practitioners. Balancing the demands of daily practice with the needs of the business while on the road is challenging, to say the least. But to provide prosperous careers for ourselves and our employees, and to keep our practices viable, we must make our financial health a priority. Collecting payment at the time of service and maintaining low accounts receivable (A/R) is a key way to ensure a thriving practice. Here are some strategies to help you do this.

DEVELOP A CULTURE OF COLLECTION

Collecting payment at the time of service is a whole-team effort. The practice owner and/or manager leads the effort by creating a financial policy that states payment is required when services are provided. They then share the policy with associates, staff and clients and create a system of regular follow-up to ensure it's being upheld.

If your clients are used to receiving a bill, manage their expectations through proactive communication. Discuss payment options when appointments are scheduled and again when you present your treatment plan and associated costs. This can help head off uncomfortable financial conversations when it's time to pay. With time and consistency, you'll see your practice culture change.

BE SELECTIVE

If a new client calls with an emergency, take time to talk to them on the phone to assess their situation. Find out who their regular veterinarian is, give them a cost estimate and establish the method of payment before heading out to help. Be especially careful if there are other veterinarians closer to them—the client may be in arrears with surrounding practices.

MONITOR YOUR METRICS

To meet your financial goals, be mindful of key performance metrics. Keep your A/R total under 9% of revenue and your days-to-collection number as low as possible—here's the formula:

- A/R beginning of period + A/R end of period ÷ 2 = Average A/R
- Total sales ÷ Average A/R = % of A/R to sales
- % of A/R to sales × 365 = Days to collection

MY TIPS FOR MANAGING ACCOUNTS RECEIVABLE

- **Make sure payment is worked out** before providing services. Establish the payment method when the appointment is booked.
- **Make your billing period** from the previous 16th to the current 15th of the month. This aligns with client end-of-month bill payment habits.
- **Offer flexible financing with the CareCredit** health, wellness and animal care credit card, which provides a mobile-friendly experience accessible anywhere.
- **Take card readers in the field** to collect credit and debit payments, and accept online options such as PayPal, Venmo and CareCredit.
- **Do not accept checks** from first-time clients.
- **Be prepared with a collections strategy** if clients don't pay.

TAKE-HOME MESSAGE

The success of a veterinary practice is determined by a mix of business and veterinary skills, yet few of us get the business education we need during veterinary school. We can start by collecting payment at time of service and decreasing A/R to create more profitable practices that let us continue providing care to the horses and clients that need it.

To discover more about how veterinary financing can help you, your patients, your clients and your practice, visit CareCredit's Equine Insights page. Learn how you can provide the contactless digital financing clients want at carecredit.com/mycustomlink.

Dr. Linda Hagerman has owned Tacoma Equine Hospital in Tacoma, Washington, since 2000. She and her five associates focus on providing outstanding preventive care along with advanced specialty services for those who need it. She was a speaker at the 2022 AAEP Convention.

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Providing a Clear Win Against Infection

By Burgetta Eplin Wheeler

The radiograph of Vinny the chestnut horse's head was shadowy, and therefore, inconclusive about whether an infected tooth might be causing his chronic sinus drainage from 1 nostril.

Antibiotics had stopped the drainage for a while, but it returned in the same nostril, indicating Vinny probably had a bacterial infection, explained **Cathy Lombardi**, DVM, Vinny's local veterinarian who serves at The Oaks Equine & Farm Services in Smithfield, Va.

Until NC State College of Veterinary Medicine installed a standing equine computed tomography scanner, the protocol would have been to keep trying antibiotics and hope the problem became clearer or even to remove the suspicious tooth without being confident it was the cause.

"With the CT, it was instantly obvious what tooth it was," Dr. Lombardi said. "You could clearly see that the area between the sinus and oral cavity had been completely taken over by infection. It's so obvious on the CT, and it's just not obvious on the X-ray."

With the help of generous donors, NC State installed the standing CT scanner in its large animal veterinary center last year.

The standing CT allows horses to walk into stocks on a platform that then lowers the animal below the floor until its head is level with the scanner. The CT machine then moves back and forth over the horse's head and neck. Though the horses are sedated, they don't have to be put under general anesthesia, which is a huge benefit for animals their size.

"With the standing CT, we do not have to anesthetize a horse and put them on their side or back to get these images," said **Callie Fogle**, DVM, a professor of equine surgery who performed Vinny's surgery. "Especially with older horses like Vinny, sometimes it can be more difficult for them to stand up from general anesthesia."

The CT scan allows for a confident diagnosis that then can be treated surgically, whether it's a tooth abstraction or sinus mass removal. The ability to diagnose and treat disease of the horse's head while the horse is standing has also made it safer and less expensive.

"Having access to these very detailed 3-dimensional images from the CT scan as a part of the work-up in

Images courtesy of NC State

Before the standing CT imaging begins, Vinny is sedated, and his eyes are covered.

The cross-sectional view shown on a CT scan can help veterinarians better pinpoint what is causing a problem and where precisely it is located. In Vinny's CT, above, the black arrow marks a defect in the bone surrounding a specific tooth. The infected tooth caused inflammation in his right sinus, which filled with fluid as shown by the orange arrow. The radiograph at the bottom right shows the same inflammation, but the image's angle makes the cause of the irritation unclear.

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most of our head surgeries allows us to perform better presurgical planning and a more thorough and focused surgery, which means a better chance of resolving the disease," Dr. Fogle said.

In its continuous quest to offer the best of veterinary care, the NC State Veterinary Hospital has installed standing CT equipment that allows our equine experts to scan the head and throat latch of horses without having to put the animals under general anesthesia.

Dr. Callie Fogle, a professor of equine surgery at NC State College of Veterinary Medicine.

Lisa Bambury, of Chesapeake, Va., has had Vinny for 11 years, and Dr. Lombardi has been his veterinarian the whole time. Ms. Bambury describes Vinny, her first horse, as the class clown.

"All he wants to do is run around and play," said Ms. Bambury, who rode horses in her teens but returned to horse-riding seriously in her 40s. "Either you're born adoring horses or you're not. My husband has learned to love Vinny. He's never been around them and didn't realize they have personalities and attach to their person. Vinny is very playful. And curious."

After she began treating Vinny's nasal discharge in November, Dr. Lombardi suggested they send the inconclusive radiographs to NC State equine experts, who recommended that Vinny have the CT scan.

The veterinarians had the results within the hour after the scan and scheduled surgery to remove the tooth and clean out the infection contained within his sinus the next day.

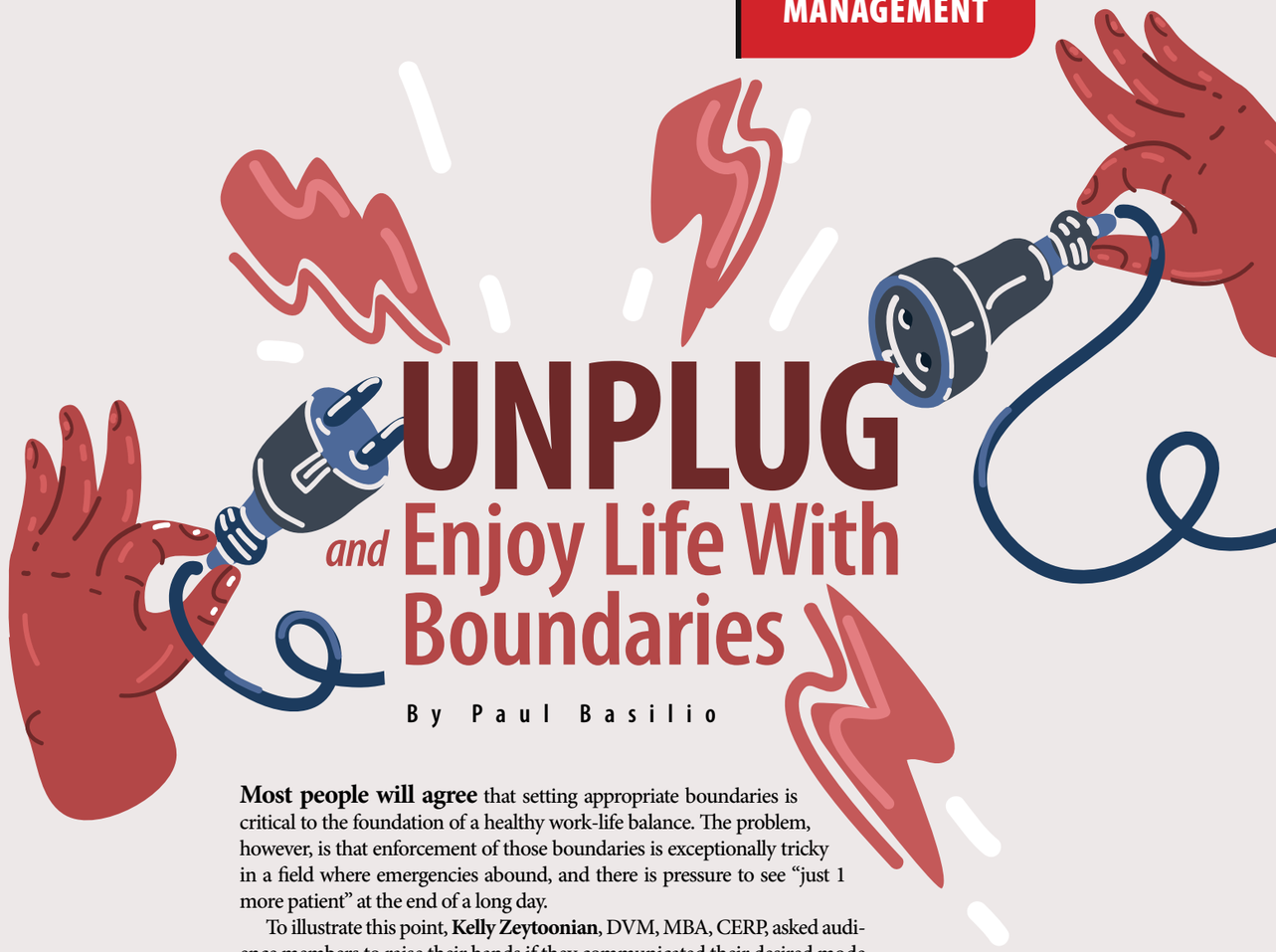
Vinny went home with a catheter in his nose so that Ms. Bambury could flush his sinuses for several more days.

"That CT scan is 100% appreciated," Ms. Bambury said. "Without it, you're lacking pieces of the puzzle going in to do surgery. Something's wrong, you know it's wrong, but you don't know exactly where to go without that tool."

"The nice thing about the college is you've got a whole lot of experts under one roof and the latest and greatest in diagnostic equipment, and that's really a huge asset for our clients to have access to," Dr. Lombardi said. "This is one of these good cases where we were able to get a clear definitive answer quickly and resolution very quickly, too. Everyone was very happy, including the horse." **MeV**

This story was originally posted on the NC State University website. It was edited for length and style.
https://news.cvm.ncsu.edu/for-vinny-nc-states-standing-equine-ct-provides-a-clear-win-against-infection/

Vinny, shown during his CT appointment, is happier after NC State vets helped clear his persistent sinus infection, his regular veterinarian says.



UNPLUG *and* Enjoy Life With Boundaries

By Paul Basilio

Most people will agree that setting appropriate boundaries is critical to the foundation of a healthy work-life balance. The problem, however, is that enforcement of those boundaries is exceptionally tricky in a field where emergencies abound, and there is pressure to see "just 1 more patient" at the end of a long day.

To illustrate this point, **Kelly Zeytoonian**, DVM, MBA, CERP, asked audience members to raise their hands if they communicated their desired mode of communication to clients before attending the 68th Annual AAEP Convention in San Antonio. Only a few hands went up.

She then asked the group of assembled veterinarians whether they were feeling resentment toward clients who were texting or calling them relentlessly during the conference. Many, many more hands went up.

"If you're feeling guilty or resentful toward your clients, team, or even family, it could very well be that you have not clearly communicated the boundaries that you wanted to set," said Dr. Zeytoonian, owner of Starwood Equine Veterinary Services and Starwood Veterinary Consulting in Woodside, Calif.

Identify the pain points

Setting boundaries can seem like an abstract, unattainable ideal for veterinarians who are doing everything they can for their patients and their clients alike. However, a quick evaluation of common pain points can identify concrete solutions.

"I look at [the origins of boundary violations] by breaking them down into resource-based boundary crossings or values-based boundary crossings," she explained.

By asking yourself simple questions, such as what part of the day causes you to feel the most drained or what brings you the most stress during a typical workday, you can begin to identify some of your boundaries.

"It's a great way to start to identify them," Dr. Zeytoonian said. "Many of us

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BOUNDARY-CROSSING PAIN POINTS	
Resources	Values
Patient emergencies	Client Access
Appropriate pay	Patient-care disconnect
"Just one more appointment"	"Just one more appointment" The ability to fully unplug

LEARNING TO BE STRATEGICALLY UNNECESSARY

In addition to managing communications from clients, Dr. Zeytoonian's practice also uses Slack to manage intraoffice communications, specifically because staff members can mute notifications while they are on vacation or when they take personal time.

"If a veterinarian goes on vacation, they are required to turn over all of their cases, complete all of the medical records, and share with another doctor any outstanding laboratory tests or questions or concerns that may come up while they are out," she said. "When [a doctor] is gone, they can be gone. It's their responsibility to make sure all of the information is there for us, but as long as they do we have a hard protocol of not bugging people when they're out."

Dr. Zeytoonian recently put these strategies into practice after welcoming her daughter and taking temporary leave from the practice.

"It's been important for me to really be able to focus my time and attention on the new human being, and enjoy that downtime," she said. "I feel like I've been able to do that, while also making sure that my first baby—the practice, and the team and clients associated with it—is still well taken care of."

She added: "I have found that with all of these protocols in place, the team doesn't need me. And that's a little bit scary, but it's also great."

don't even know what those boundaries are. We feel resentful, but we're not sure why. It's important to ask your employees the same questions, because it's a great starting point for working through the differences among team members."

Get the right tools

To establish boundaries, it's necessary to establish expectations.

"Expectations are the bottom line," she explained. "Share those expectations so people know which lane to stay in."

As an example, Dr. Zeytoonian stated that her practice notifies clients that they must adhere to certain standard of care treatments regularly, such as scheduling the horse for regular evaluations, fecal egg counts, dentistry and vaccines, to guarantee emergency coverage by the practice's veterinarians.

Simply put: If the clients do not use the practice for all those services, then the practice cannot guarantee coverage in an emergency. Clients can certainly call in an emergency, but they will not be a priority.

"Some people may think that there is no way they are going to be able to tell clients to do all of those things to guarantee emergency service, but the fact is that 26% of clients use a non-veterinarian for dental care, and 50% administer at least 1 vaccine on their own," Dr. Zeytoonian said. "This is an opportunity for us to drive business back to our practice while establishing boundaries. It improves revenue, and it keeps our associate veterinarians happy because there is already an established relationship when they go to see an emergency case."

Strategic automated responses

Another tool to help veterinarians establish boundaries is to fully embrace the usefulness of automated text, email and voicemail responses.

"I have a response [on my phone] that pops up on a daily basis," she explained. "It says, 'Thank you for contacting me. If you need something that's veterinary related, call the office. Here's the number, here's the email.'"

She added, "We don't text at our practice."

Dr. Zeytoonian explained that all of the associate veterinarians at her practice have a similar voicemail template, since it's inevitable that a client will find their number somewhere and try to call them individually.

"The standard [outgoing] voicemail message says, 'If this is veterinary related, call the office,'" she explained. "Full stop. The veterinarians either don't have to respond to the voicemail, or they can forward it to the office, and the office will take over the callback. There's no exchange [with clients] through our cell phones." **MeV**

Moving the Needle on Horse Rescue

By Landon Gray

When rescuing equids from mud, use a Nicopolous needle instead of jumping into the hole yourself, suggested **Rebecca Husted**, PhD, the primary instructor and president of Technical Large Animal Emergency Rescue, in Macon, Ga.

This simple idea—hatched from **Dino Nicopolous**, DVM, of Shelby, N.C.—calls for a large suture needle attached to a pilot line, passed underneath the stuck animal, to guide webbing beneath the sternal area to precipitate a safe and effective rescue.

"And the best thing is you can make it out of something simple," Dr. Husted, PhD, said

Mud rescues can be extremely dangerous situations, not just for the animal, but for veterinarians and assisting crew. Dr. Husted advised veterinarians to bring a helmet.

"Part of it comes down to those crazy horse owners that are going to be putting you in this position, they think nothing of it, sending you down into a muddy hole that's technically a confined space," she said. "And if you're a firefighter, they will tell you that this is a really dangerous place to be, and they don't want you to be there, so don't go in those kinds of places."

Mud rescue is essentially a surface area problem, she explained. Due to the weight of the horse and the small size of their hooves, the weight is disproportionately spread and the horse sinks right into the mud.

"I'm more than 200 lbs, but I'm standing on 2 shoes that have more surface area on the bottom of my feet than the 1,000-pound horse," Dr. Husted explained. Even if the horse has a slightly wider foot, "it still does not compensate for providing that amount of surface

Images courtesy of Dr. Rebecca (Gimenez) Husted

Webbing is safer than rope for pulling a horse out of the mud.

Getting the webbing around the horse.

area. So, it's basically a big 55-gallon drum on toothpicks, and it goes right into the mud."

Digging should be avoided during mud rescues, because it will only exacerbate the problem, according to Dr. Husted. During a mud rescue, digging essentially buries the animal because with most types of muds, digging only refills the hole.

"You're the veterinarian on scene or the vet tech that's there, say, 'Hey, guys, let's stop doing this. Let's come up with a better plan.' And in the end, what we're going to do is we're going to use a huge suture needle called a Nicopolis needle."

After formalizing the rescue plan around the Nicopolis needle, Dr. Husted instructed veterinarians to connect with the animal handler to gain head control. The next piece of advice is to not remove the saddle, as it can be helpful in guiding the webbing underneath the horse to the correct spot around the sternum. Webbing, not rope, around the sternal area prepares the animal for the 'sideways drag' out of the hole.

"These are the things I really want you to do: stay away from the fancy stuff, use something simple, get a helmet on, call the fire department and use some of your simple manipulations," Dr. Husted concluded at the 69th annual convention of the American Association of Equine Practitioners, held in San Antonio, Texas. **MeV**

16 BEST PRACTICES FOR HORSE RESCUE

1. Assess the situation, call for resources, make a good plan, bring needed resources and personnel to the scene, and prepare for the extrication.
2. Develop a coordinated effort that is safe for horse and human. Communication is key.
3. Get scene lighting by fire/rescue early; they can provide medical rehabilitation, first aid, and heating and cooling resources for both people and animals.
4. Helmets should be worn when working with recumbent animals, especially by the animal handler. Have a lead rope and halter available
5. Control the head so the extricated animal does not get loose after extrication.
6. Stay out of the mud!
7. Allow the animal to self-rescue where possible; first, remove obstacles such as trees or debris, but leave the legs, head and neck free to move so that the animal can balance itself and make active efforts to extricate itself.
8. Plywood or other slick substrates are not recommended to be placed in front of the horse
9. Do not attach slings or webbing to the head, neck, tail, or legs to pull. The abdomen and chest are better anchor points for webbing or slings.
10. Do not use the tail as an attachment point for any mechanical manipulations and do not tie it to anything
11. Use blindfolds while horses are recumbent to protect the downside eye and relax the animal.
12. Sedation and/or anesthesia should be carefully evaluated by the practitioner.
13. Use wide, flat webbing with looped ends or continuous loops (instead of ropes) for any type of manipulation.
14. Animals can be rolled laterally onto the ground pads, rescue glide sled, or a tarp for sliding to solid ground.
15. Assists and drags/slides employed by the responder are most effective.
16. Always treat dead and live animals respectfully.

Medical Grade Honey Does Not Affect Tensile Strength of Sutures

Medical-grade honey appears to protect against surgical site infections, but does it affect the strength of the sutures used to close the wound?

Researchers from Belgium and Italy decided to find out. They conducted an in vitro study to evaluate the tensile properties of 3 synthetic absorbable suture materials that had been exposed to medical grade honey.

Ten strands of polydioxanone USP 2 (PD2), polyglactin 910 USP 2 (PG2) and poliglecaprone USP 2-0 (PC2-0) were incubated for 1, 7, 14, 21 and 28 days in several substances, including medical-grade honey, phosphate-buffered saline, equine plasma and medical-grade honey mixed with equine plasma.

All the materials that were incubated in the honey had higher tensile strength compared with those incubated in equine plasma and buffered saline:

- Polydioxanone compared with plasma ($P<0.05$, mean difference (md) = 16.95 N, CI 95% (9.19–24.70 N)) and phosphate-buffered saline ($P<0.05$, md = 14.48 N CI 95% (6.73–22.23 N)) on day 7 and the remaining times.
- Polyglactin compared with equine plasma ($P<0.05$, md = 69.28 N CI 95% [64.16–74.40 N]) and phosphate-buffered saline ($P<0.05$, md = 56.90 N CI 95% [51.78–62.02 N]) until day 28.
- Poliglecaprone compared with plasma ($P<0.05$ md = 12.40 N CI 95% [4.59 N–20.20 N]) and phosphate-buffered saline ($P<0.05$ md = 11.23 CI 95% [3.42–19.03 N]) on day 7 and the remaining times.

A limitation of the study was that the sutures were unloaded during incubation, and only a single cycle-to-failure test was performed.

The researchers said a limitation of the study was that the "sutures were unloaded during incubation and a single cycle-to-failure test was only performed," which may not reflect the shear forces from an animal recovering from surgery.

However, they found that medical-grade honey "did not negatively affect the tensile strength of the suture material and can safely be applied in contact with suture materials commonly used in equine surgery," the researchers wrote. **MeV**

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For more information:

Madsen K, Martens A, Haspeslagh M, et al. The effect of medical-grade honey on tensile strength, strain, and Young's modulus of synthetic absorbable suture material used in equine surgery. *Equine Vet J.* 2023 June 16.

https://beva.onlinelibrary.wiley.com/doi/10.1111/evj.13966

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