

# Hydration is in, but heat still stalks athletes

By Dave Lawrence  
Sports Editor

**MECHANICSVILLE** – Former football players of a certain age can remember the “good” old days when water was the enemy, and when asking to drink water during the broiling August two-a-days was a sign of weakness.

Back then, however, athletes died as dehydration compromised the body’s natural cooling system: sweating. It is just like a car with a radiator leak that overheats. No coolant, no cooling. The difference was that, while the car just stopped working – preferably without permanent damage to the engine – an overheated human can literally cook from inside. Cells die, tissues die, and, in too many cases, the affected person dies.

Fortunately, most coaches and trainers learned that proper hydration was a necessary component to keeping the athletes alive, and it boosts performance as well. Far fewer athletes die as a result of dehydration in the new century.

But athletes are still dying, despite recognition of the importance of hydration, despite improvements in the recognition and treatment of heat stroke, despite a better understanding of weather conditions that aggravate heat-related illnesses, despite more stringent professional standards



**DEADLY PRACTICE**  
First in a series

for trainers and coaches alike.

According to a 2017 study in the *Journal of Athletic Training* by Scott Anderson of the University of Oklahoma, there have been 27 non-traumatic deaths among NCAA athletes since 2000, an average of about two deaths per year.

While some deaths are complications of sickle cell disease, heart disease and asthma, the primary unchecked – yet preventable – killer is exertional

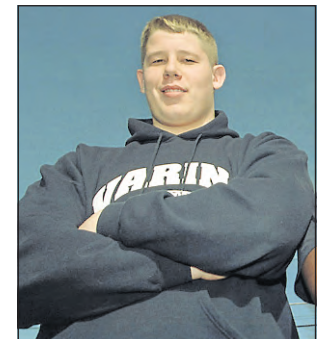
heat stroke, according to Mike Craven, owner of True Fitness Solutions in Mechanicsville.

During any intense activity, the body generates heat. The bigger a person is, the more the heat builds up inside the body. The cardiovascular system faces two competing tasks: supplying blood to the muscles that are working and transferring the heat generated from the interior to the skin where the evaporation of sweat from the skin should cool the body – at least when weather conditions allow evaporation.

In exertional heat stroke, the cardiovascular system is not up to handling both tasks simultaneously. The muscles that are working win the competition for the blood supply, and heat builds up inside the body. If not recognized and treated in time, the athlete dies.

The last Richmond-area high school athlete to die from exertional heat stroke was Craig

Lobrano in 2000, but several players have been severely injured as a result – including a pair of athletes from Highland Springs’ recent state championships teams. College athletes, such as Maryland’s Jordan McNair, professionals like the Minnesota Vikings’ Corey Stringer, and former professionals like the New York Giants’ Mitch Petrus, are among those



Times-Dispatch file photos

**Left, while an improved understanding of the importance of hydration has reduced the number of heat-related deaths among athletes nationwide, one-sized-fits-all training methods like suicide sprints or gassers, while intended to improve conditioning, may be doing more harm than good by triggering exertional heat illnesses and deaths. Above, Varina’s Craig Lobrano is the last Richmond-area athlete to die of exertional heat stroke, but others continue to be injured – sometimes severely – and die each year nationwide at all levels of competition.**

who have made national headlines as a result of their deaths from exertional heat stroke in recent years.

So what continues to go wrong? And what can be done about it?

Stay tuned.

## CHAMPS

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tively. Old Church was 17th, Ashcreek 20th and Milestone 21st. Rockville-Dolphin Club was 23rd. Pebble Creek finished 26th, followed by Bell Creek and Battlefield Green.

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Team scores: 1. Burkwood 988; 2. Canterbury 860.5; 3. Church Run 693; 4. Atlee Recreation Association 518.5; 5. Wyndham 516.5; 6. Wellesley 448.5; 7. Hungary Creek 444; 8. Fox Hall 426; 9. Twin Hickory 385; 10. Goochland 346; 11. Colonies 321; 12. The Federal Club

313; 13. Mechanicsville Recreation Association 302; 14. Ashland 275.5; 15. Hanover Country Club 270; 16. Chestnut Oaks 259.5; 17. Old Church 234.5; 18. The Dominion Club 233.5; 19. Kings Charter 194; 20. Ashcreek 190; 21. Milestone 186; 22. Raintree 178; 23. Rockville-Dolphin Club 151; 24. Wembly 137; 25. Tuckahoe Village West; 26. Pebble Creek 100.5; 27. Bell Creek 73.5; 28. Battlefield Green 32.

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the game.

Blake Doggett went 3-for-4 with a double, a run scored and an RBI against Lakeside. Hunter Beck went 3-for-5, likewise with double, a run scored and an RBI; and Carter Trice went 2-for-3 with two runs scored. Joey Turner finished with a double, a run scored and two RBI, and Ryan Mabry had a

hit, a run and two RBI.

Mabry started on the mound against Colonial Heights, but three Mechanicsville errors helped put him on the defensive early on. He gave up 10 hits and all seven runs – five earned – but he was going up against a Post 284 team with solid hitting. Brandon Pond led Colonial Heights, going 2-for-3 with a double, a run and two RBI.

But Mechanicsville had some solid hitting of its own.

Leadoff batter Noah Smith connected on a two-run home run to left field in the fourth inning. He also knocked in a run on a fielder’s choice in the second.

But Carter Trice had the bomb of the day, connecting on a towering shot in the seventh inning that not only cleared the left field wall, it cleared the three-story tall netting along the left field fence.

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# Hydration not enough to prevent heat illness

By Dave Lawrence  
Sports Editor

## MECHANICSVILLE

Have changes in training regimens reduced the risk of athlete deaths from heat-related illnesses?

Maybe yes, maybe no. The data needed to clearly back either argument remain elusive.

A 2018 article in Environmental Research Letters by researchers Scott C. Sheridan and Michael J. Allen reviewed more than 70 studies conducted over the previous 15 years of heat-related death and illness and found that collectively they suffer from one major flaw: lack of a standard definition of what constitutes a heat-related event.

The review found that populations overall are less vulnerable to heat-related illnesses – likely because of improved adaptations to heat, such as in increase in the use of air conditioning. But it noted that adequate information on the impacts to specific groups such as outdoor workers or athletes is lacking.

Still, the data that exists are worrying. A 2010 analysis by a research team led by Andrew J. Grundstein of the University of Georgia that was published in the International Journal of Biometeorology found that the number of heat-related illnesses among football players increased from 1980 to 2010. This increase occurred despite improved understanding of heat illness in the athletic training community.

There are a number of reasons why athletes (and others) continue to die, no matter how much they hydrate. For one, The Grundstein study of football players found that more heat-related deaths occurred in the Southeast where the climate tends to be warmer and more humid than the rest of the



Dave Lawrence/The Local

Left, Lee-Davis athletic trainer Sara Salvato measures the temperature and relative humidity during an afternoon practice at Lee-Davis Friday. The two numbers can be used to calculate the apparent temperature – or heat index – that can be used to fine tune practices to the outside conditions so as to minimize the risk of heat-related injury to players. Above, Lee-Davis linemen prepare for football season with drills.

## Guidelines in place to reduce risk

By Rob Witham  
For the Mechanicsville Local

Area high schools came alive this week as fall sports tryouts attract thousands of student-athletes. Faced with the dog days of summer, what guidelines are provided to trainers and coaches to assist

in the safety in the heat of all involved?

The National Federation of High Schools' latest statement on minimizing risk for exertional heat illness, released last year, focuses on several areas, including continually monitoring one's weight and subsequent weight loss, to deter-

mine risk.

"A loss of three percent of body weight during vigorous exercise can also significantly increase the risk for exertional heat-related illness," the NFHS statement says.

Those in charge of practic-

see **GUIDELINES**, pg. 29 ▶

**DEADLY PRACTICE**  
Second installment in a series

United States.

When the weather is hot and humid, there is only so much that our built-in cooling system can accomplish. Sweating cools the body not by the movement of water from the inside of the body to the surface of the skin, but by the evaporation of the sweat from the skin.

For anyone who vaguely remembers hearing the term "latent heat of vaporization" in a school science class, this is where the scientific gobbledygook gets very relevant to one's life. It takes a lot of energy to

convert water from the liquid state to the vapor state: When you sweat and it evaporates, a lot of that energy comes out of you, and that loss of energy in turn reduces your body's temperature.

But there has to be room in the surrounding air for that water in your sweat to go. When the relative humidity is high, there is little evaporation and all that happens is water moves from inside the body to outside. You get dehydrated, but not any cooler.

This is one reason why weather forecasters report the sensible temperature – a measure of how hot it feels to the

body. In the warm part of the year, the number reported is the heat index, which can be higher than the outside temperature.

For example, as of the time this article is being written, the outside temperature is 87 degrees. But, because of the 56 percent relative humidity, it feels like 91 degrees. According to a National Weather Service heat index chart, if the relative humidity was more than 85 percent, the temperature would feel like more than 110 degrees.

Jeff Orrock, meteorologist-in-charge at the NWS office in Wakefield, the heat index is easy to understand, but it is not perfect. For example, the

temperature is measured in the shade and in a way that the temperature sensor is shielded from the wind. Wind would increase evaporation and reduce the heat index, while being in direct sunlight would raise the actual temperature and, in turn, the heat index. He said the Occupational Safety and Health Administration recommends using a measure called the global wet-bulb temperature, which takes into account air temperature, relative humidity, wind and direct sunlight (or shade).

Virginia High School League guidelines recommend use of the heat index. When the heat index is 105 degrees or greater, no outside activity is permitted. From 95 to 104 degrees, no equipment (like helmets or pads) should be worn. From 90 to 94 degrees, equipment should be removed as often as possible, such as during rest breaks. Below 89 degrees, unrestricted access to water should be provided along with frequent rest breaks.

Neither measure, however, takes into account an athlete's ability to move heat from the muscles, where it is being generated, to the skin, where it can be released. When that ability is

diminished, the heat builds up internally and, in severe cases, the athlete essentially cooks from inside as organs fail from the built-up heat. A vigorous circulatory system is required to transport that heat and improve the ability to cool. This is especially important in sports like football, where players – particularly linemen – are much bigger now than they used to be, say, in the 1970s.

But this is where the system, despite all the progress and continued good intentions, breaks down, says Mike Craven of Mike's Olympic Gym in Mechanicsville. Development of the circulatory system is most effective when an athlete's capacity for intensive effort is individually assessed. In far too many cases, such assessment is not taking place. Part of the problem is that death is relatively uncommon – though Craven said that three high school athletes have died since June 11 during conditioning.

"Because it's rare, we keep making the same mistake," Craven said. "Some kids can't keep up with what the coach is asking of them."

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## ATLEE

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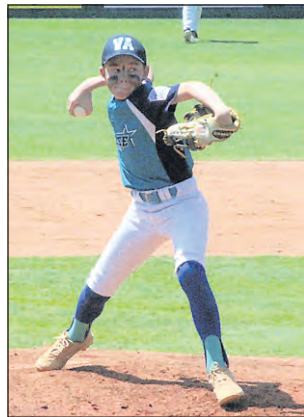
to face Vienna American, taking the title game by another 4-2 count to clinch their trip to North Carolina.

But nine South Carolina runs over the fourth and fifth innings were too much for Atlee to overcome in the season's final game.

"We only had a goal of winning Game One," Layne noted, asked to recall the beginning of his team's journey during practice before District V Tournament play began in late June. "One of us has got to win, that was always our motto."

And with both Atlee and South Carolina finishing with 4-1 records, each giving the other their only defeat at the TOSC, Layne waxed poetic about the budding rivalry.

"I bet you if we play them 10 times, they win five and we win five, but they got the one that mattered most this year," he said.



Courtesy of Rachel Witham

**William Haynie works in relief for the Atlee All-Stars in the fourth inning of their 11-3 loss to South Carolina in the Tournament of State Champions final Wednesday in Greenville, North Carolina.**

Other Atlee team members include Cooper Molloy, Owen Goble, Chase Blumberg, William Haynie, Thomas Layne and Max Baedke. With the bulk of this roster at the age 11 level, Atlee fans begin to wonder what might be come 2020.

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## GUIDELINES

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es are requested to follow a heat index chart from the National Weather Service to make practice modifications, such as time changes or duration change, or cancellation. Many school divisions make this practice mandatory.

The NFHS offers hydration guidelines, saying a person should drink 16 ounces of fluid two hours before, and eight to 16 additional ounces 15 minutes before activity. Four to eight ounces should be consumed three to four times hourly, with 16 to 20 ounces suggested "for every pound lost during physical activity" once activity ceases.

Every public school student-athlete must have a current Virginia High School League (VHSL) physical examination form completed and on file at the school prior to being allowed to try out for any sport. On the form, one question



Dave Lawrence/  
The Local

**Lee-Davis obtained a grant from the Jordan McNair Foundation to purchase this recovery tub to provide rapid cooling of an athlete who is struck by heat illness.**

specifically asks if a student, "when exercising in heat, do you have severe muscle cramps or become ill?"

The goal of the guidelines is to help ensure coaches, trainers and other adults in charge of high school athletic programs learn and follow them in order to keep players safe. An Albemarle County parent believes her son almost died two years ago after an off-season soccer conditioning practice due to a case of exertional heat illness that she believes was totally preventable.

According to the Charlottesville Daily Progress, Patrick Clancy sued the student

activities director and the head boys soccer coach of Monticello High School, claiming his heat stroke occurred in part from a failure to follow heat index guidelines. The team, on a synthetic turf field, worked out in heat index values ranging from 107 to as much as 139 degrees over two hours.

There was no trainer present, no water provided – students were told to bring two liters of water themselves – and no place to store said water other than in the hot sun. Litigation is pending.

The case of Clancy, who quit perspiring and had to be rushed to a hospital to save his life, is

a stark reminder of what can happen to any student-athlete. One nearby district has added a new system to its high schools should an emergency occur.

One "Polar Life Pod" was purchased for each Spotsylvania County high school, according to NBC4 in Washington. Its maker, Polar Products, describes it as a "portable, collapsible immersion system to facilitate" cooling when someone shows exertional heat illness symptoms. Several high schools in the Richmond metropolitan area have similar systems for rapid cooling.

The pod holds a body, which can be immersed in ice and or cold water at the field while trainers check vital signs and await emergency assistance.

In the battle to keep student-athletes safe on the field this time of year, the most important weapons for all are knowledge and understanding – and a willingness to follow the advice of experts.

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Prep golf:  
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## Life-saving test is not new, but is little used

By Rob Witham  
and Dave Lawrence  
*Mechanicsville Local*

ASHLAND – While athletic programs closely monitor players during the dog days of summer, looking to prevent an exertional heat health emergency, is it possible that a test whose roots date back almost a century could be key to discovering which players most susceptible to such an event, and, more important, give coaches a system to not only test student-athletes, but then improve their ability to perform?

What is known as “VO2max testing” – a test of the maximum amount of oxygen a person can use during intense exercise – would not be possible without the work of Archibald Vivian Hill and Otto Fritz Meyerhof, who shared the Nobel Prize for Physiology or Medicine in 1922. Hill was honored “for his discovery relating to the production of heat in the muscle,” while Meyerhof shared the prize “for his discovery of the fixed relationship between the consumption of oxygen and the metabolism of lactic acid in the muscle,” according to the Nobel Foundation.

Their work laid the groundwork for our current understanding of how muscles do work: Energy for the work is generated by a chemical process that requires oxygen; as the



Rob Witham for The Local

Patrick Henry's new head football coach Ken Wakefield knew of the benefits of VO2max testing and wasted no time implementing it in the Patriots' program when he took over last spring. Wakefield said the use of the test helps players in practice and in games.

### DEADLY PRACTICE Third installment in a series

muscles use that energy, they generate heat.

As one may remember from high school or college biology, when the oxygen supply is exhausted, muscles switch to lactic acid metabolism, which is not as efficient in producing energy, helping lead to fatigue

and creating the sensation of soreness in the muscles. Oxygen is also needed to clear the lactic acid buildup from muscles.

The more fit a person is, the more efficient his or her cardiovascular system is in delivering oxygen to the muscles and the more efficient muscles are in using oxygen. It takes longer for the oxygen to be depleted, thus reducing lactic acid build-

up, and any buildup of lactic acid that occurs is cleared more quickly.

Thus, the notion that VO2max testing can reveal an athlete's ability to cope with and maintain performance in hot weather is not new: Hill and Hartley Lupton first published on it in 1923 and studies for several decades now have been showing VO2max testing to be

one of the more important (and easily obtained) indicators of cardiovascular capacity and, in turn, heat tolerance.

More recently, a 2014 study by Peter Lisman and others in the journal *Military Medicine* found that the higher one's VO2max, the lower one's maximum core body temperature

see **LITTLE USED**, pg. 24 ▶

## Taking the test

By Dave Lawrence  
*Sports Editor*

MECHANICSVILLE – What is a maximum oxygen consumption (VO2max) test like?

I decided to find out with the help of Mike Craven, owner of Mike's Olympic Gym.

A number of ways to test VO2max have been developed over many years, but all follow a basic plan: to force the person being tested to exert maximum physical effort while monitoring oxygen uptake and carbon dioxide output, and both at aspects of how well the body responds to the test.

I arranged to meet Mike one day along with Rob Witham – who was assigned to document my physical insufficiencies with photos and video.

To get an idea of what Mike had to work with,

see **THE TEST**, pg. 24 ▶



## LITTLE USED

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and the lower one's maximum heart rate, and vice versa. In other words, a person with a high VO2max is at lower risk of exertional heat illness.

To understand why this is so, think of the similarities in the cooling system in humans and in the liquid-based cooling system in most automobiles. Our blood is the coolant: It picks up heat from our muscles (engine) and transports it to the skin (radiator), where the excess heat can be dissipated into the environment.

If anything impedes the flow of the blood (coolant) to the skin (radiator) – such as a weak heart (water pump) – heat builds up in the muscles (engine) until a breakdown occurs.

While VO2max testing may not be the only way to get at a measure of heat tolerance, the simplicity of the test and the statistics it generates makes it a handy tool for devising individualized conditioning programs that yield maximum benefit for both athletes and their coaches.

When Ken Wakefield was hired to become the new head football coach at Patrick Henry High School this spring, he brought his experience with VO2max testing with him to Ashland, implementing a testing program in May with his players, and discussing its benefits and the reasoning behind its usage to their parents.

"We test all the kids initially, just to give us a base line of where are they right now," Wakefield said, explaining how he began the program in May. "From that, that gives us a red flag of, are they prone to a heat condition right now given what their score is?"

During summer conditioning, Wakefield and his staff use heart monitors on players, taking away he says, any guesswork on the actual ability of any of his student-athletes.



A number of factors contribute to a person's risk of heat-related illness. Many sports sanctioning bodies like the Virginia High School League have policies that address those factors relevant to an athlete's risk, such as weather, direct sun exposure, limited air movement, hydration, personal protective equipment (PPE) and clothing, and physical exertion. Some health problems, such as sickle-cell trait, are likewise addressed in a number of policies. But few mandate tests of the physical condition of athletes – such as VO2 max tests – to determine the athlete's fitness prior to the start of a conditioning program.

"There's no guess on my part on 'Can Johnny run so hard?' Wakefield explained. "I already know how hard, we've tested that theory, so we understand how to push each kid. We can't push certain guys as hard because they're physically not ready yet."

Some Patriot linemen have been able to improve their VO2max scores from readings in the twenties, which signifies a high risk for heat issues,

into the forties, both signifying progress in conditioning overall, but, more importantly, the lowering of their risk factor for exertional heat emergencies.

Besides the most important benefit of working to prevent a medical emergency, Wakefield appreciates other advantages that he believes come with using VO2max testing.

"Some of our linemen have been running in the summer for thirty minutes on a consecu-

tive basis within their zones," Wakefield said. "On Friday night, when we step on the field, that kid is going to play faster than what he could prior to [testing]."

The biggest sell for Wakefield, already dealing with being the new guy in Ashland, was convincing his players that implementing this program was important, both for their health, and for the growth of the team. As it turned out, asking them to

buy in wasn't difficult.

"The kids really took to it. Some of these guys are two-way kids and I look out and see some of them have to be out of the second series [of the game] because they don't have the wind to do it," Wakefield explained. "If I know that, part of my job is to get them in shape to get to that point. The big picture is, we're looking out for that kid's best interest, their safety, and that's really, really

important."

Varina High School also utilizes VO2max testing, but it is not mandated by the Virginia High School League, and most schools do not utilize it. The question now may be, if the long-term results of VO2max testing are student-athletes playing under safer conditions, with both them and their coaches understanding their true physical capacities while working safely to improve them, why hasn't it become the norm?

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Dave Lawrence – a former college biology professor who remembers what he taught (even if some of his students couldn't) – can be reached at [dllawrence@mechlocal.com](mailto:dllawrence@mechlocal.com).

## THE TEST

Continued from pg. 22 ▼

here is a brief resume of my condition: I am in the back half of my sixth decade on this planet. I have both asthma and diabetes, and (according to my body mass index) am slightly overweight. I get miserable quickly with an inadequate daily dose of coffee, and I've been driving a desk for a long time – so I am usually lacking in the recommended exercise department.

I think that just about covers it.

I was mentally prepared to be embarrassed the day I met Rob and Mike at Mike's gym. I arrived looking as shabby as usual, and Mike briefed me for what to expect. Then we began setting up for the test.

First, I had to attach a heart monitor – not one of those fitness watches, but an actual monitor that I had to strap across my chest. First, I splashed some water across my midriff to improve the monitor's connection with my skin, then attached the strap and

see THE TEST, pg. 25 ▼



# Rockville makes 2nd run at Cal Ripkin World Series

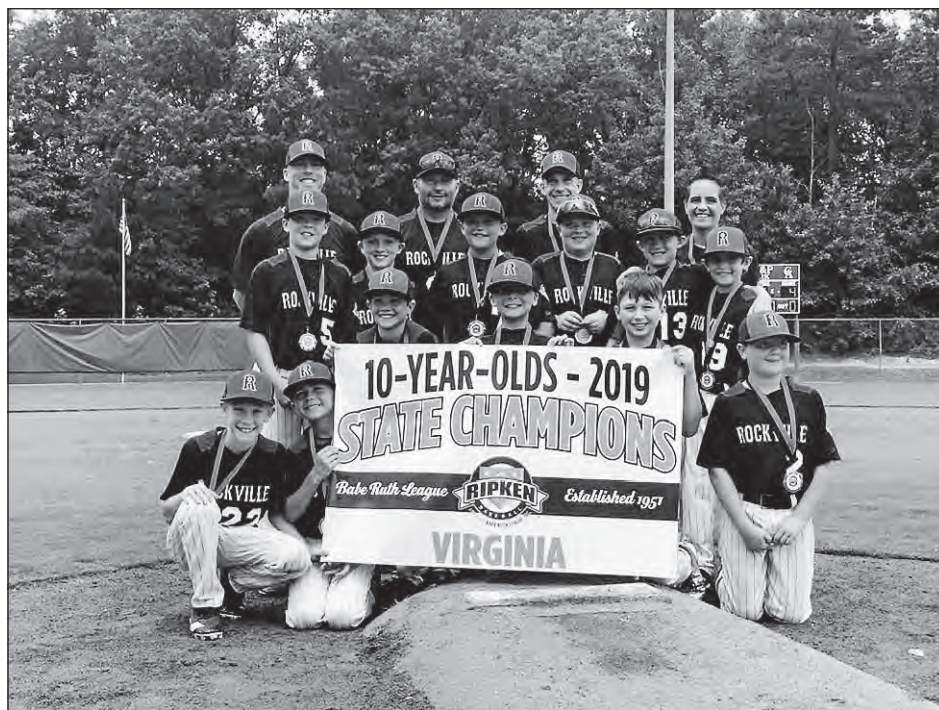
By Rob Witham

For the Mechanicsville Local

It's tough enough when you're facing the best competition the nation has to offer. Then, throw in a persnickety Mother Nature in Phenix City, Alabama, last week, and it made for a stormy ride for the Rockville 10U All-Stars, who were playing in their second consecutive Cal Ripken World Series.

It also didn't help when the brackets placed Rockville against the Alabama state champions, Mobile, in the first game of pool play. That loss, played over two days – Aug. 1-2 – due to rain delays, placed Rockville in an early hole. (Mobile would go on to an unbeaten record in both pool and elimination play, losing in the championship game to Raleigh, North Carolina.)

In their second game on Aug. 2, Rockville faced Idaho, which came out with bats swinging and defeated Rockville 15-5. The team, however, recovered well, scoring all seven of its runs in the first two innings of a



Contributed by Melissa Johnson

Rockville's 10-under baseball team reached the Cal Ripken World Series for the second year in a row. The team's run ended at the hands of the Idaho state champions on Aug. 6.

7-5 triumph over New England to pick up Rockville's first pool play victory on Aug. 3.

The key to that victory may have been in how the team shook off another rain delay, deciding to use their dance

skills to good use while waiting for more weather to clear the area. When the game finally began, their bats were red hot. Three Rockville pitchers hurled two innings each and quelled a late New England comeback.

On Sunday, Aug. 4, the opponents were the California champions, and again, Rockville started strong on offense with three runs in the second inning. But California answered with five of their own in the bottom

of the frame, then added four in the third and three in the fourth inning for a 12-5 win. The defeat placed Rockville into the "Iron Man Bracket" for their final two games.

The first game in that bracket was against a familiar foe: the host team from Phenix City on Aug. 5. The previous year, Phenix City ended the Rockville run in the World Series. After the hosts took a 1-0 lead in the first, Rockville's bats came alive in the third inning, scoring five runs. Two Rockville pitchers scattered just five hits and earned four strikeouts as they pulled away for an 8-2 victory, earning them a date with the Idaho state champions the next day for what would be their World Series finale.

What a finale it was, a testimony to a never say die attitude which led Rockville head coach Dave Frei to coin the phrase, "Cardiac Kids," to describe his team.

Idaho took an early 2-0 lead, erased when Rockville plated a pair in the top of the second inning. Idaho responded with four runs in the third, three

more in the fourth. Going into the sixth and final inning, things seemed bleak for the Virginia and Southeast Region champions, down 9-2.

But in the sixth, Rockville rallied for seven runs to tie the game at nine apiece. A squeeze bunt attempting to take the lead fell short, and Idaho was able to push across the winning run to survive 10-9.

While the 2-4 record was not what the team had envisioned en route to Alabama, as Frei noted, to be among the final 12 teams playing in the 10U division of Cal Ripken Baseball, a division that hosts some 200,000 players on teams across the nation annually, is a feat for which the Rockville players can be very proud.

What's even more impressive is the success of Rockville baseball, now sending teams to World Series play in two consecutive seasons. There's no doubt that the expectations have been raised on Pouncey Tract Road to make a trip to a World Series an annual event, and, one day, bringing a championship home.



Rob Witham for The Local  
**Mike Craven** (left), of Mike's Olympic Gym in Mechanicsville, talks The Local sports editor **Dave Lawrence** through a VO2max test in July.

## THE TEST

Continued from pg. 24 ▼

Mike adjusted it all to get the monitor just below my sternum. The monitor does come with a watch that serves as a receiver, and we made sure the wireless connection between the two worked.

Next, Mike fitted me with a mask that had two ports – an intake, for the oxygen, and an outflow, for the carbon dioxide. We tested the seal (not always easy to get with the fur on my face), and then Mike hooked up the respective hoses.

This is where the hard part began. Mike introduced me

to a climber, a machine that seems to me like it would have worked well as a medieval torture device. It has two steps and two handles. The goal is to keep moving as if I am doing a handhold scramble up a cliff.

While the machine required no special coordination, it did require my thighs to do a lot more work than they were used to. That fact I noticed quickly as Mike got me slowly moving into the peak part of the test. While I moved, Mike had me pay attention to my heart rate on the monitor.

I was too busy paying attention to the pain in my thighs, especially where the quads attach to my knees. They started

burning quickly. After a minute of warmup, Mike had me pick up the pace.

The burning increased.

After another minute, Mike had me increase the pace again.

The burning was getting serious.

After the second minute, Mike had me increase the pace yet again.

My assessment of the burning is unprintable. My heart rate was hitting something in the neighborhood of 160.

Finally, Mike asked me to go all out, as fast as I could manage.

I could not manage much. It was all over – start to finish – in about 3½ minutes. My

breathing and heart rate recovered reasonably quickly, but my legs felt like warmed rubber for hours.

Mike calculated my VO2max to be 27.6 (milligrams per kilogram body weight per minute, if you must know the units). My number was slightly below average for a male in my age group (56-65), which should range between 30 and 31.

I shouldn't be too disappointed. There are plenty of teenage males scoring below me, but that's not much consolation. I asked Mike how to improve my fitness level.

I'll reveal that answer next week.



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22  
2019

Prep golf:  
Lee-Davis, P. Henry  
at Glenwood G.C.  
10 a.m.

08  
27  
2019

Prep golf:  
Atlee, Hanover  
at Belmont G.C.  
2:00 p.m.

For more information go to [www.mechlocal.com](http://www.mechlocal.com)

# Heat illnesses: A failure to communicate?

By Rob Witham  
and Dave Lawrence  
*Mechanicsville Local*

ASHLAND – An individual's fitness level has long been recognized as one of the key factors predisposing one to exertional heat illness and heat stroke, and maximum oxygen consumption, or VO<sub>2</sub>max, has likewise been long recognized as one of the best measures of fitness.

"Since exercise and heat stress can stress the cardiovascular system to the limits of its regulatory ability, the first major problem is what constitutes a 'maximal' cardiovascular adjustment," wrote Loring B. Rowell in an article in *Physiological Reviews* in 1973. "The solution depends on our ability to establish some objectively measured, reproducible, and specifically defined index of maximal cardiovascular function. Maximal O<sub>2</sub> consumption (VO<sub>2</sub>max) appears to be such an index."

VO<sub>2</sub>max testing has a long pedigree, dating back to the first decades of the twentieth century in the Nobel prize-worthy work of Archibald Vivian Hill and Otto Fritz Meyerhof. While it's not the only way to measure heat tolerance in athletes, the test is not difficult to do – all you need is a machine like a climber or an inclined treadmill to put the athlete through



Atlee linebackers run through a drill during practice in this photo from 2014. The lack of pads helps them acclimate to the heat.

Nick Liberante/File photo

**DEADLY PRACTICE**  
Fourth installment in a series

his or her paces and a way to measure gas (oxygen and carbon dioxide) exchange. While

research continues into how to improve the test – particularly for specific age groups and for people with specific medical conditions – there is little to no question as to its utility as a

measure of fitness.

Locally, the idea of using VO<sub>2</sub>max testing as an overall, individualized assessment of a student-athlete's fitness seems to be most accepted and under-

stood in the world of running.

In the Winter 2010 edition of "Sports Backers Quarterly" from Richmond Sports Backers,

see **HEAT**, pg. 25 ▶

## Getting in better condition

By Dave Lawrence  
*Sports Editor*

MECHANICSVILLE – When I took the VO<sub>2</sub>max test with Mike Craven at Mike's Olympic Gym, the goal was very short-term. Mike had described the test in some detail, but I could not visualize it from the description. I needed to take the test in order to understand it enough to write about it.

But after taking the test – and finding out I scored a bit below average for my age group – I had another question: How does one improve his or her VO<sub>2</sub>max scores?

Mike had a simple answer. It involved work.

Ugh.

Getting into shape is not that complicated. Push your body to work harder than it is used to. This week, push a little harder

see **CONDITION**, pg. 25 ▶



## CONDITION

Continued from pg. 24 ▼

than last week. Next week, push a little harder than the week before, and on and on.

What work one does depends on what one's goals are, and since mine was to get into better condition, Mike designed a workout designed to build my endurance from week to week without over-training (and wrecking what I was trying to build).

Mike's workout consisted of three intensity levels: high, medium and low. The difference was in the exercise and the target heart rate I would try to maintain for each intensity level. The target heart rate was derived from that obtained in my VO2max test: 161 beats per minute.

On high-intensity days, I would return to the infernal medieval torture device – i.e., the Versa climber. The heart rate I was to shoot for was 145 to 160 beats per minute.

On medium-intensity days, I would tackle one of the greatest challenges of my limited coordination skills – the elliptical. My target heart rate for that was 130 to 145 beats per minute.

Finally, on low-intensity days, I would just walk, wherever I wanted, with a target heart rate of 115 to 130 beats per minute.



Joel Klein for The Local

**Mechanicsville Local sports editor Dave Lawrence keeps his eye on the heartbeat monitor while hitting the elliptical.**

The initial hitch was my own idiocy. The day I was to learn the plan, Mike planned on me to start working. I found out I was to start on my favorite torture device – the climber – shooting for 30 total minutes of exercise at 5-minute intervals separated by a minute of rest. But idiot me, the former biol-

ogy professor with Type II diabetes who should know better, I didn't eat before showing up at Mike's. I lasted 5 minutes, was woozy after I stepped off for the first rest break, and Mike wisely suggested we stop.

I did better the second say of the program: 30 minutes on the elliptical in 15-minute inter-

vals with a minute of rest in between.

The third of the program was a walk – in the neighborhood. Thirty minutes, with no rest breaks. As that is my favorite exercise, and one I do fairly often anyway, I had no problem other than keeping my earbuds in my ears as I bounced down

the streets of Highpoint Farms.

The second week, I got through the full 30 minutes I should have completed on the climber the previous week. Mike tacked on extra time for the elliptical and the walk – 45 minutes in three 15-minute intervals for the elliptical and 40 for the walk. Each day, I strug-

gled at first, but as I got deeper in each session, any discomfort I felt faded away.

The third week, I had a mission: to get back on the original track with the program. I did 40 minutes on the climber, 60 on the elliptical, and 50 on the walk.

Mike designed the program to work in a stair-step fashion. Rather than increasing week to week, after the third week in each cycle, the total times decrease a bit from the week before – although the intervals on the climber, in particular, increase in length. So last week, the fourth week, I did 30 minutes on the climber with 10-minute intervals, 30 minutes on the elliptical (all in one swoop), and 40 minutes on the walk.

This week, I'll do it all a little longer, and next week, even longer – then I'll drop down again in terms of total times for each exercise. My targets for the 12th and final week of this plan are 60 minutes on both the climber and elliptical – each with no intervals, just one long slog – and 70 minutes on the walk.

After that, I'll take the VO2max test again. And I promise to follow up in these pages, no matter how embarrassing the result may prove to be.

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## HEAT

Continued from pg. 24 ▼

a column featuring questions from readers asked if “working out in hot weather ... make me have thin blood?” The response cautioned readers to use gradual acclimation to heated conditions – with an eventual result being a higher VO2max. Another publication, by the Tidewater Striders running club in 2016, featured an ad from a

regional medical firm offering reduced-price VO2max testing.

If VO2max knowledge has been around for decades, why hasn't there been widespread acceptance and usage of it or similar testing in order to accurately gauge athletes' exercise as well as heat tolerance?

One reason may be a failure in risk communication. Currently, the Virginia High School League offers a special page on its website dedicated to education surrounding exer-

tional heat illness. The VHSL Heat Guidelines, last updated in 2017, breaks down into areas of prevention, types of illness, the signs and symptoms for each, fluid replacement recommendations, and the use of the wet bulb globe temperature to best determine current conditions.

The VHSL recommends gradual acclimatization to heat, hydration, monitoring of environmental conditions, among other things. But the need for student-athletes to be

pre-tested, using a method such as VO2max, for their baseline tolerance of heat and exercise is not addressed, even though individual fitness is explicitly acknowledged in the guidelines as a risk factor for heat illnesses.

For example, in the document's section on “Heat Exhaustion,” it says, “Heat exhaustion is the inability to effectively exercise in the heat, secondary to a combination of factors, including cardiovascular insufficiency, low blood

pressure, energy depletion and central fatigue.”

Guidelines on preventing sudden death in athletes (published in the Journal of Athletic Training in 2013) and position statements on preventing exertional heat illnesses (published by the American College of Sports Medicine in 2007 as well as by the National Athletic Trainers' Association in 2015) all acknowledge that poor physical fitness predisposes an athlete to exertional heat illness

and heat stroke.

For example, in the latter position stand, which was published in the Journal of Athletic Training, the authors wrote that, “Untrained individuals are more susceptible to [exertional heat illness] than trained individuals because, as aerobic power (VO2max) improves, the ability to withstand heat stress generally also improves.”

Despite the best practice

see **HEAT**, pg. 26 ▶



# King William holds off Raiders in season opener

By Dave Lawrence  
Sports Editor

MANQUIN – Weather and depleted rosters marred some planned head-to-head matchups last week, area golf teams hit the links just the same.

Patrick Henry squared off against a Hanover team missing its top two golfers along with Henrico and Varina at Hanover Country Club on Aug. 13, while

Lee-Davis hosted a depleted Henrico lineup at Queenfield Thursday and King William – with its planned season opener postponed by storms on Aug. 13 – got in a storm-shortened match in at Queenfield Thursday.

The Cavaliers planned to play 18 holes against visiting Rappahannock Thursday, but severe weather forced the teams off the course while the last

group was on the ninth hole. The golfers in the final four-some – two from King William and two from Rappahannock – were awarded par on Queenfield's No. 9 as they were unable to finish the hole.

King William's golfers had a touch of the first-match jitters, but they didn't last. Even the top two Cavaliers, No. 1 Taylor Hubbard and No. 2 Arria Gross, had their share of difficulties.

"I'd say they came around a little bit," said King William head golf coach Jay Blanton. "It wasn't pretty by any means, but it got better."

The Cavaliers were led by Hubbard, a senior, with a 37 and Gross, a junior, with a 41. The other two scorers were freshman Owen Burrow (46) and sophomore William Knoeller (48).

Senior Sydney DeShazo led Rappahannock with a 39.

Jessica Rathbone and Dan Ailor led Patrick Henry with a 35 and 37, respectively, in their quad against Hanover, Henrico and Varina. The Patriots (158) finished well ahead of Hanover (182) and Henrico (219). Highland Springs had only three golfers and did not record

a score.

Thursday's match between Lee-Davis and Henrico – which was missing its No. 1, Mitchell Marcus – was a laid-back affair that allowed the mostly green golfers from both teams a chance to get more experience.

"It's a young bunch. Even experience-wise, it's a young bunch. But they're coming around," Lee-Davis head coach Tyler Johnson said. "Playing golf four days a week kind of helps out."

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Dave Lawrence/The Local

**King William No. 1 Taylor Hubbard just misses a putt in a match against Rappahannock at Queenfield Golf Club Thursday.**

## Invite champions



Contributed by Travis Holt

**Mechanicsville Little League's 9-year-old All-Stars swept the competition in the 31st annual Atlee Invitational, capping the tournament with a 15-9 win over Tuckahoe American in the tournament championship on Aug. 3.**

## HEAT

Continued from pg. 25 ▼

statements and position stands, few organizations – including sports-sanctioning bodies such as the VHSL – recommend methods to assess an athlete's physical fitness beyond obtaining a medical history during a routine physical exam.

This reticence stands in start contrast with militaries from around the world, many of which have recognized the importance of fitness testing for recruits as well as for volunteers for specific types of missions such as special forces. The U.S. Army, in its Physical Fitness Training field manual, recognized that "VO2 max, also, called aerobic capacity, is the most widely accepted single indicator of one's [cardiorespiratory] fitness level."

Other branches of the U.S. military, other military forces, such as the British Army, Royal Navy, Israel Defense Force and others likewise recognize that VO2max is an essential measure of fitness and has set minimum standards derived from the test. The test is also used by police, fire, and emergency

medical service departments in the U.S. and elsewhere.

For now, the word about the importance of some form of individualized fitness testing and conditioning programs is driven locally by individual coaches at individual schools.

While the Patrick Henry and Varina High School football teams are currently using VO2max testing for their players, other institutions are aware of the usefulness of the test, and one now-famous program has used it in the past.

"We were one of Mike's first schools six years ago," Highland Springs head coach Loren Johnson said of Mike Craven, owner of Mike's Olympic Gym in Mechanicsville. "We did it with him twice."

Johnson noted that while recent teams have not had the baseline testing, his coaching staff utilizes the theories behind VO2max in their conditioning programs, and not just during summer. Johnson said that cost was the reason why he did not get his players tested every year, though he noted that – with most kids who had the latest round of tests having graduated – a new round of testing was likely needed.

"We watch what kids are doing, and aren't asking them necessarily to push themselves to the max, but just give us effort," Johnson explained. "When you see a guy giving effort, and he may not be as fast as he should be, we ask him how he's feeling. We've learned from Mike how to get a better feel on that individual."

Johnson learned firsthand the dangers of exertional heat illness when, in June 2014, Springer Brandon Lambert collapsed during the first day of offseason workouts, the victim of heat stroke. Lambert battled for over a month in the hospital, but recovered, famously taking the final snap in Highland Springs' 2015 Class 5 State Championship win over Stone Bridge at the University of Virginia.

Can there be a consensus regarding the use of VO2max or some other form of cardiovascular or heat tolerance test across either the Richmond region or the Commonwealth before someone else experiences a life or death emergency?

Recent visits to practices and scrimmages revealed the presence of athletic trainers and an ample supply of fluids.

Some schools have cooling tubs for emergency ice baths readily available.

Are all schools immediately ready and capable of handling an exertional heat stroke emergency? That should be a major concern for all high school sport programs that play or practice in hot, humid conditions, no matter the time of year.

Watching the weather, modifying practices accordingly, and having the capability to respond with rapid hydration or emergency cooling when a player falls ill from the heat is important, and the progress made by the VHSL and other sanctioning bodies as well as local schools made toward that regard is laudable.

But it would be even better if there was a system-wide policy in place for the testing of student-athletes to identify those at risk of exertional heat illness and to fine-tune their training to best prevent such an event?

The data have been out there, but, it seems, the message has not.

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# How does VHSL rank on exertional heat safety?

By Rob Witham  
and Dave Lawrence  
*Mechanicsville Local*

MECHANICSVILLE – As Richmond-area football teams begin 2019 regular-season play with high temperatures near 90 degrees, how well have Virginia's schools prepared their student-athletes in conditioning, and, specifically, in handling any heat related issues?

The Korey Stringer Institute at the University of Connecticut, named for the former Minnesota Vikings lineman who died of exertional heat stroke in 2001 during training camp, conducts annual surveys of state policies regarding several physical safety issues, including prevention of exertional heat illness, judged against the Institute's preferred standards.

In 2019, New Jersey topped the survey, with a score of 83.4 percent out of a possible 100. Virginia, at 53.4 percent, ranked 21st overall, but is tied with Texas at 38th with respect to total compliance with the Stringer Institute's recommendations on exertional heat illness.

However, a closer look at grading shows that Virginia High School League guidance may need simple tweaks and not an overhaul.

For example, Stringer Institute grades Virginia down for not "requiring" a Wet Bulb Globe Temperature (WBGT) to be standard procedure for all outdoor activities. However, the 2017 VHSL Heat Policy states "the WBGT is the recommended method for assessing environmental conditions and should be used to determine the nature of any modifications."

While the VHSL does leave final policy to local school officials, they "strongly encourage schools to utilize WBGT",



Nick Vandeloecht/Powhatan Today

Some teams are still scrimmaging this week, as was Collegiate and Powhatan Friday. Others are beginning their regular season campaigns. The question is whether everything possible has been done to prevent exertional heat illnesses among athletes.

## DEADLY PRACTICE Fifth installment in a series

as stated in its 2017 Heat Guidelines statement. Cost should not be an issue, as a cursory look online shows WBGT gauges for as little as \$33.

The Stringer Institute also states that "cold water immersion tubs for onsite cooling for

all warm weather practices" be mandatory. While the VHSL lists "cold water immersion until core body temperature reaches 102 degrees or athlete begins to shiver" under treatment plans for any exertional heat stroke symptoms, details are not provided on how to implement such an emergency plan.

To the defense of schools, they face multiple obstacles in creating optimum circumstances to quickly answer any exertional heat symptoms. In the spring, when baseball, softball, soccer, lacrosse and track are all holding practices, or some games, and there is one athletic trainer present, even with a cooling system available, where

should it be placed on a physically expansive campus?

This is where understanding all symptoms of heat illnesses are critical for all coaches, that they be able to constantly monitor student-athletes for any warning signs of heat illness before it proceeds to heat

see HEAT, pg. 22 ▶

Rank	State	Score
1	New Jersey	20.000
2	North Carolina	18.750
3	Hawaii	17.125
4	Utah	15.000
5	Georgia	14.375
6	Kentucky	14.125
7	Mississippi	13.250
8	Oregon	13.125
9	D.C.	12.750
10	South Dakota	12.375
11	Nebraska	11.750
12	Arkansas	11.625
13	Kansas	10.750
14	Massachusetts	10.625
15	Vermont	10.375
16	Florida	10.250
T17	Rhode Island	10.125
	Wisconsin	10.125
19	Tennessee	9.125
T20	Arizona	9.000
	Iowa	9.000
22	New York	8.750
T23	Illinois	8.375
	South Carolina	8.375
25	Idaho	8.000
T26	Connecticut	7.000
	Missouri	7.000
	Delaware	6.750
	Minnesota	6.750
30	Alabama	6.500
T31	Michigan	6.125
	West Virginia	6.125
T33	Indiana	6.000
	Nevada	6.000
	New Hampshire	6.000
36	Ohio	5.125
37	Oklahoma	4.500
T38	Texas	4.000
	<b>Virginia</b>	<b>4.000</b>
40	Montana	3.250
41	Wyoming	3.000
42	Maryland	2.625
43	Maine	2.500
T44	Alaska	2.000
	Louisiana	2.000
	North Dakota	2.000
	Pennsylvania	2.000
	Washington	2.000
49	New Mexico	1.875
T50	California	0.000
	Colorado	0.000

Ranking of states in their compliance with the Korey Stringer Institute's exertional heat stroke safety recommendations. Complete compliance would result in a score of 20. While Virginia is tied with Texas in 38th place, a review of the Virginia High School League's 2017 Heat Guidelines suggests that tweaks rather than an overhaul of those guidelines would significantly improve Virginia's score. Data are from the Stringer Institute's High School sports safety rankings: <https://ksi.uconn.edu/high-school-state-policies-2/>





Joel Klein for The Local

**Lee-Davis senior Mason Burrows creates quite a stir as he hits and approach shot from the dry ground along Queenfield Golf Club's treeline during the Hanover County quad on Aug. 20.**

## QUAD

Continued from pg. 20 ▼

Mason Burrows with a 43.

Hein said the Hawks are in the middle of an intense stretch – with four matches this week alone – but that once school starts, they will have plenty of time to prepare for the post-season.

“Now I can start to focus on what we need to work on to be where we need to be at the end of the year,” Hein said. “To play the sub-regional well and hopefully earn that spot and get into the regional and hopefully qualify for states.”

### King William tops rival

The Cavaliers faced a big region rival – Randolph-Henry



Joel Klein for The Local

**Smiles are evident all around as Patrick Henry's Jessica Rathbone, Hanover's Andrew Wilkinson, Lee-Davis' Mason Burrows and Atlee's Jack Miller enjoy a laugh on the final green of the Hanover County quad at Queenfield Golf Club on Aug. 20.**

– Wednesday on Randolph-Henry's home course and came out on top 159-164 at Briery Country Club in Keysville.

The Cavaliers were led by senior Taylor Hubbard with 3-under 33 and junior Arria Gross, when an even-par 36.

“It was an old-style course – one we hadn't played before – called Briery Country Club,” said King William head golf coach Jay Blanton. “It was a little shorter, it was probably the shortest course we'll play during the year. ... It had some character to it, I mean, and our kids seemed to like it and played well.”

Aside from Hubbard and Gross, the Cavaliers were led by sophomore William Knoeller with a 44 and freshman Kyla Blanton with a 46.

Blanton said the Cavaliers had a long day before at Piankatank, but were in a more relaxed mood against Randolph Henry.

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## HEAT

Continued from pg. 21 ▼

stroke.

Neither the Stringer Institute and the VHSL agree on this: There are no calls for mandatory fitness or heat tolerance testing (such as VO2max testing) of student-athletes, to initially gauge their fitness level and better design a conditioning program that will improve both the athlete's health and performance. If a student presents a current physical examination form signed by a physician, they are initially cleared for activity.

Part of the problem may be that the scientific community has yet to agree on what constitutes an ideal test. Rebecca Stearns, chief operating officer of the Korey Stringer Institute, said that the VO2max test is the “gold standard” for cardiovascular fitness testing, but when it comes to heat tolerance testing, other factors must be considered.

“If looking for a test to determine something that could be termed ‘heat fitness’ or ‘heat readiness’, there is not currently

Right, the Korey Stringer Institute's 2019 scoring of the VHSL's exertional heat stroke policies. Complete results can be seen at the Stringer Institute's 2019 High School Sports Safety Policy Rankings: <https://ksi.uconn.edu/high-school-state-policies-2-2-2/virginia-2/>

a sport-based model,” Stearns wrote in an e-mail response edited for punctuation. “Truly the best indicator for heat tolerance is simply body temperature rise at a given workload or exercise prescription. Because heat tolerance is dynamic (it changes due to many factors throughout the year – including but not limited to fitness, hydration status, heat acclimatization status, environmental conditions, etc.) even if a good test existed it would only be good for that singular moment in time.”

VHSL policy addresses hydration, acclimatization, and environmental conditions. The one element mentioned by Stearns that has yet to be addressed by policy remains fitness. The scientific reservations mentioned by Stearns could be a problem of letting “the perfect be the enemy of the good.”

### Topic Areas

#### Exertional Heat Stroke

##### Heat Acclimatization

- 1H. Days 1–5 are the first formal practices. No more than 1 practice occurs per day
- 2H. In days 1–5, total practice time should not exceed 3 hours in any 1 day
- 3H. On days 1–5, 1-hour maximum walk-through is permitted, however there must be a 3 hour minimum between practice and walk-through (or vice versa)
- 4H. During days 1–2 of first formal practices, a helmet should be the only protective equipment permitted (if applicable). During days 3–5, only helmets and shoulder pads should be worn. Beginning on day 6, all protective equipment may be worn and full contact may begin. Football only: on days 3–5, contact with blocking sleds and tackling dummies may be initiated
- Full-contact sports: 100% life contact drills should begin no earlier than day 6
- 5H. Day 6–14, double-practice days must be followed by a single-practice day. On single-practice days, 1 walk-through is permitted, separated from the practice by at least 3 hours of continuous rest. When a double-practice day is followed by a rest day, another double practice day is permitted after the rest day.
- 6H. On a double-practice day, neither practice day should exceed 3 hours in duration, and no more than 5 total hours of practice in the day. Warm-up, stretching, cool-down, walk-through, conditioning and weight-room activities are included as part of the practice time.
- 7H. On a double-practice day, the 2 practices should be separated by at least 3 continuous hours in a cool environment.

##### WBGT Modifications (device/regional modifications)

- 1W. State requires all schools to have a heat modification policy
- 2W. The heat policy is based off of WBGT (optimal measurement)
- 3W. The recommended heat policy is based off of Heat Index (adequate alternative if WBGT is unavailable)
- 4W. The environmental conditions guidelines are based off of epidemiological data specific to that state/region (for bigger states a more comprehensive analysis may be needed)
- 5W. The heat policy has at minimum 4 levels of modification, including the modification of practice time
- 6W. Policy includes modification of equipment (if applicable to the sport)
- 7W. Policy includes modification of work:rest ratios, including unrestricted access to fluids
- 8W. Policy mentions the use of a shaded area for rest breaks

##### Cold water immersion tubs for onsite cooling for all warm weather practices (3 Points)

##### If exertional heat stroke is suspected, onsite cooling using cold water immersion before transport to the hospital (3 Points)

##### Screening questions on PPE (i.e., previous history, other predisposing factors)

- Require 4th Edition PPE forms from American Academy of Pediatrics or equivalent

Yes/No Weighting (%)

20

7

N 0

N 0

N 0

N 0

N 0

N 0

N 0

N 0

N 0

N 0

N 0

N 0

N 0

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Section Total 4



# Lawyers help drive effort for better heat safety

By Dave Lawrence  
Sports Editor

**MECHANICSVILLE** – Sometimes it takes outside pressure to force change. The sports world – especially in tradition-bound sports like football – is not immune from the human tendency to keep doing things the way they've always been done, and in some areas, the resistance to change is not a problem.

But, when the resistance to change leads to preventable deaths and injuries – as it has over the decades with respect to heat stroke and heat illness – someone has to step in and get everyone's attention.

Mike Craven of True Fitness Solutions in Mechanicsville said that is where lawyers often have to step in.

"Lawyers play a big role," said Craven, who has worked with a number of law firms over the years on exertional heat safety cases. "Lawyers ... are probably the ones that make the biggest change."

One of those helping drive improvements in athlete safety is David Dickey of the Yerrid Law Firm in Tampa, Florida. He's no stranger to the sports world, having grown up immersed in the football life – his father, Doug Dickey, was head football coach at the University of Tennessee from 1964-1969 and at the University of Florida from 1970 to 1978; his brother, Daryl Dickey, was a quarterback at the University of Tennessee who led the Vols to a 35-7 victory over Miami in the Sugar Bowl in 1986.

David Dickey, who took up law after serving in the U.S. Navy, and his firm have represented and are representing athletes injured by failure to adhere to safety standards on the practice and playing fields. He said the role of attorneys is



Joel Klein for The Local

Patrick Henry "H2O On The Go" girls deliver water during a timeout Thursday night.

## DEADLY PRACTICE Sixth installment in a series

to nudge those responsible for the health and safety of athletes closer to compliance with the recommendations of experts. He is currently representing the family of Hezekiah Walters, a 14-year-old incoming freshman at Middleton High School in Tampa who died during conditioning drills in June. He said lawyers are part of a team.

"We in the legal profession ... we're the conductors," Dickey said. "The actual people playing the instruments are in that particular field or specialty. We wouldn't be anywhere near where we are without people like Doug Casa at the Corey Stringer Institute and the University of Connecticut. They're the ones that really are setting and saying, 'Hey, this is the standard and this is why.' We know better. And once we know better, the coaches should know better."

"We in the legal community are just taking up these

cases and then working with the appropriate professionals to really set the standard of care. Sometimes ... a jury may not agree. And they may say, 'No, that's not quite the standard of care. We'll give them a pass on that.' But we would never get in the courtroom and get past the judge on a summary judgment standard if we did not have the appropriate professionals available to comment."

The team, so to speak, extends beyond the legal, health and scientific experts. Craven credits the marketing and public relations work of the makers of Gatorade in improving understanding of the importance of hydration.

Lloyd Snook, of the Snook & Haughey law firm in Charlottesville, said that family's can play a big role, too.

Snook is representing the family of Patrick Clancy, a soccer player at Monticello High School in Albemarle County in 2017. Clancy was participating in an off-season conditioning session when he collapsed from

exertional heat stroke. No trainer was available, an adequate supply of water was not available, they were on the second day of a heat advisory – and they were conducting the session on an artificial turf surface in which the surface temperature can be dozens of degrees higher than a similar surface covered by grass.

Clancy's family retained Snook's firm, and Albemarle County school officials have

been making changes to reduce the risk of other students from suffering a similar fate.

But Snook said the lawsuit – which is ongoing – may not be the main driver of the current reforms.

"My understanding is that, by virtue of Emily Clancy (Patrick's mother) getting up and fussing at school board meetings, the school board has on its own decided to start requiring trainers at all pre-season, even pre-preseason, practices," Snook said. "Now you have to have a trainer there for everything."

"There was a story just in the last couple of days about how the trainers are all being trained in how to use the wet-bulb thermometers, how to assess the physical circumstances, and how to make sure that they're continuing to stay on top of how the kids are doing and things like that."

While it is unclear whether the VHSL's 2017 heat guidelines were in effect at the time that Patrick Clancy was injured, the VHSL did have a standard – dating back to 2007 – in place.

"They (Monticello High School) violated those, too," Snook said.

While Snook is not sure whether the Clancy legal case

is making much of a difference in Albemarle County yet, he is certain of one thing: Whatever steps one takes to get the public's attention can help get the authorities to take action.

"There are some good things happening," Snook said. "I can't say that in Albemarle's case it is specifically the result of our lawsuit. It is certainly specifically the result of the Clancy's fussing, because it appears that – if it had been up to the main school administration – it would have just been sort of covered over and nobody would have paid any real attention."

Still, history has shown that institutions can disregard the wishes of constituents and the advice of experts. When that happens, the lawyers step up.

"We may take the blinders off," Dickey said. "Certain people, they have the blinders on because it's cheaper, let's say, or doesn't cost as much money, but the appropriate professionals are saying, 'No, we need to do it a different way. We can do this better.' And so [we lawyers] are helping to sharpen that focus of people who are the trendsetters."

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## STOP

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new and creative ways to extend plays and find receivers. His final touchdown pass, from 30 yards out as a play broke down, tied the game at 34 with 6:22 left. But, for the second time in the game, the Patriots blocked the extra-point attempt.

Osborn never took a lead, despite tying the game three separate times.

The winning score, a 7-yard

Newell run, capped a drive which chewed nearly five minutes off the clock. Sikkar ran up the middle for a 2-point conversion, and the 42-34 lead. One final Osborn drive, with only one timeout, reaching the Patrick Henry 9, setting up the moment of truth, and the game-clinching sack from Epps.

"The biggest thing I'm so proud of with our kids is responding through adversity," Wakefield explained. "There were so many times we shot ourselves in the foot, or they

tied the score. What did our kids do? They responded."

Wakefield, his staff, and the players, will find much to work on reviewing the video of this game. But watching Sikkar total 335 yards of offense on his own, Cedric Carter and the defensive line work relentlessly to capture Hollingsworth, on a night filled with tremendous plays, one thing Patrick Henry doesn't need to worry about in 2019 is effort.

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# Improving athlete heat safety: the summing up

By Dave Lawrence  
Sports Editor

MECHANICSVILLE – Great strides have been achieved over the years in improving heat safety among athletes, but, as we have reported in the “Deadly Practice” series over the past few weeks, more progress remains to be made.

As our reporting has found, most of the reforms since the 1970s have addressed three main contributing factors to exertional heat illness: hydration, heat acclimatization, and limiting outdoor practices when weather conditions make it all but impossible for athletes to properly cool themselves on the field.

For example, heat acclimatization programs – where implemented – have led to a 55 percent reduction in heat illnesses, according to Rebecca Stearns of the Korey Stringer Institute. But athletes continue to get sick in the heat, and some are still dying. It would be nice to make a dent in what’s remaining.

That begs the question: What should be done?

“One of the big contributing factors that has yet to be systematically addressed is fitness. Cardiovascular fitness is certainly helpful for managing heat stress; however, due to the many other factors related to exertional heat stroke, we find that on its own it is not necessarily the predictor of who will have an exertional heat stroke,” Stearns wrote. “We find many times that many of the [exertional heat stroke] runners we see at road races are some of the most elite. In football we find it is typically the linemen (and those that would typically have lower VO2max values) that often succumb to EHS.”

While it is true that elite athletes, especially those in



Patrick Henry's Ryan Matosky (11) stays hydrated on the sidelines of the Patriots' 21-6 win over visiting Glen Allen Friday.

Dave Lawrence/The Local

**DEADLY PRACTICE**  
Editor's note: This is the last installment (sort of, anyway) in the series. It definitely wraps up the discussion on heat safety.

But there is one story left: on the results of my attempt to improve my own cardiovascular fitness. Sometime in October, after I complete a 12-week conditioning program, I will get my VO2max tested again. The results – good or bad – will be faithfully reported in these pages.

endurance sports like marathon running, can be fit and yet push their bodies to such an extreme that they suffer heat injuries.

But the biggest threat – especially at the youth level – are to those athletes whose cardiovascular capacities aren't as well developed (such as football linemen), yet who are expect-

## VHSL responds to Stringer rankings

By Dave Lawrence  
Sports Editor

MECHANICSVILLE – In the fifth installment of the Deadly Practice series, “How does VHSL rank on exertional heat safety?” The Local reported that the Virginia High School League scored low on the Korey Stringer Institute's high school safety rankings with respect to heat safety.

The Local also reported

that tweaks rather than an overhaul would be needed to greatly improve the VHSL's scores.

The problem comes down to two words. In its 2017 heat guidelines, the VHSL recommends pretty much every heat safety guideline – either explicitly or by reference to published standards – the Stringer Institute proposes with respect to heat acclimatization, wet-bulb global temperature monitor-

ing, availability of cold-water immersion tubs and use of cold-water immersion to cool athletes down before transport to a medical facility.

The problem, according to the VHSL's Mike McCall, is that the Stringer Institute wants to see the word “recommendation” changed to “requirement” – and that is something the VHSL's by-laws in most instances prevent it

see VHSL, pg. 26 ▶

ed to participate in the same conditioning regimens as those whose cardiovascular systems are better equipped to handle (such as defensive backs and wide receivers in football).

This is why Mike Craven of Mike's Olympic Gym in Mechanicsville has been

preaching the gospel of VO2max testing. It establishes the upper limit of what an athlete can physically achieve. Yet the key is what coaches and trainers do with those limits for individual athletes.

While Stearns was not sure VO2max is in and of itself the best proxy measurement for heat illness risk, she does find a role in using it to guide the design of training programs. Once an athlete's VO2max is identified, one can set exercise targets based on a percentage of the measurement that will have maximum cardiovascular benefit and pose minimum health risk.

In other words, rather than having everyone run the same number of suicide sprints all out, have everyone work at the percent VO2max that is best – and, ultimately, most productive – for them.

“We find that a high relative intensity of exercise is much more predictive of heat illness versus absolute intensity. Meaning, the relative challenge of an exercise program needs to be accounted for based on the individual's fitness ... adjusting the workout load, the workout can be made equally challenging for all the players,” Stearns wrote in an email slightly edited for clarity. “When an absolute intensity workout is applied, and applied to a workout intended to be tough or in conditions that lend themselves to heat illness, then we see the less fit individuals struggle, which would put them at higher risk for heat illness. ...

“I think that if you spoke with any exercise scientist or educated coach they would agree that individualized intensity-based (or at least a grouping-based) exercise prescription is best for the development,

see SUMMING UP, pg. 26 ▶



# Yellow Jackets come back in big way at Averett

By Rob Witham  
For the Mechanicsville Local

DANVILLE – From the opening kickoff Saturday evening at Campbell Stadium, the Averett Cougars were determined to make history and defeat the Randolph-Macon Yellow Jackets for the first time.

Tre Frederick, and an offensive line missing two starters, had other ideas and, in the end, the Yellow Jackets made history of their own.

Randolph-Macon scored the final 21 points, all in a wild fourth quarter, to complete the largest comeback in head coach Pedro Arruza's 16 seasons at the helm, turning a 27-9 deficit into an improbable 30-27 victory to even their record at 1-1.

"We really struggled at times, we got some bad breaks, and blew some really big opportunities," Arruza said outside a relieved locker room. "I tell

you, hats off to these boys for the way they fought, the way they battled."

The battle, and the struggle, began on the opening kick when Joshua Tapscott, who scored in the Cougars' opening win last week over Hampden-Sydney on a 99-yard kickoff return, used a gaping hole up the middle to race 85 yards to give Averett a 6-0 lead just 14 seconds into the contest. The Yellow Jackets' first drive, consisting of 12 plays, ended when Colin Brooker missed a 28-yard field goal.

Brooker would make a 31-yarder on their next drive to put Randolph-Macon on the board with 3:11 left in the first period. Averett answered with their best offensive drive of the night, using 12 plays of their own to travel 84 yards, scoring on a 5-yard pass from Jacob Wright to D'Lante Lambright for a 13-3 lead.

Later in the quarter, the Yellow Jackets' third of four first-half trips into the red zone would end in disaster as a Burke Estes pass to the end zone intended for Joey Hunt was picked off by Terrell England, who took off down the right side for a 99-yard interception return to extend the Cougar lead to 20-3.

But the Yellow Jackets showed a glimpse of the resiliency that would dominate the final quarter, Estes finding Trey Owens for a 15-yard touchdown near the end of the first half. Brooker's point after attempt failed, making the score 20-9.

Randolph-Macon saw its first possession of the second half fail thanks to a bad snap on a field goal attempt resulting in a turnover on downs. The Cougars scored on a 6-yard run from Wright to extend the lead to its largest at 18 points.

Then, on the first play of the fourth period, Estes found Jordan Foster, who broke a tackle to reach the end zone from 10 yards out. It was 27-16 after a Gavin Stone extra point. Later, with under eight minutes left, Estes threw a quick out to Foster, who broke another tackle and raced 75 yards to the end zone, quieting the Cougar faithful. A 2-point conversion try failed, but it was 27-22. The stage was set for the historic finish.

Getting the football back at the Yellow Jackets' own 35 with 4:34 left, Arruza stuck to his gut, and his team's bread and butter. The Cougars expected pass, but Tre Frederick, who became the school's and the Old Dominion Athletic Conference's all-time leading rusher on this night, ran the football, right up the middle, on 7-of-9 plays in the drive. After calling a timeout at 1:23 left at the Averett 33,



W. David Conner II/Averett University

**Randolph-Macon wide receiver Joey Hunt (13) hauls in a pass despite the efforts of an Averett defender in the visiting Yellow Jackets' 30-27 win over the Cougars Saturday.**

it was back to Frederick who planted his foot, turned left, and won the race to the pylon for a 33-yard touchdown run. With 1:14 left, Randolph-Macon led for the first time. An Estes 2-point conversion run made it 30-27.

"I think we wore [the Averett defense] down a little bit," Arruza said. "We talked about it and, with four minutes and change left, we've got plenty of

time. Let's just run our offense and do the things we know are working. I tell you, during these two, three minutes situations, you always have more time than you think you have."

Averett, looking for a field goal and overtime, threw quickly downfield on their final drive. Isaiah Grice, however, fumbled the football on a hit from Bryan Sullivan at midfield, and Randolph-Macon's Anthony Williams recovered.

There are a myriad of issues for Randolph-Macon when it comes to execution, especially on special teams. Arruza called the field goal team "abysmal". But the Yellow Jackets could have won their opener, and stole a victory in Danville.

Saturday, they welcome Emory and Henry to Day Field as the ODAC season begins and wins and losses count more than ever.

Yellow Jacket fans hope that, soon, the level of execution will meet the level of effort and heart that the win in Danville has already shown.

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## SUMMING UP

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health and safety of athletes."

Still, Stearns is worried about the cost (in terms of both time and money) of a mandatory VO2max testing or heat tolerance testing program for

athletes. It is true that some labs charge a lot, but others don't. Many school systems could have their own staff trained in conducting such tests. Furthermore, once an athlete's baseline is determined when he or she begins to compete at an institution, there may be no need to test again as long as the

athlete does the requisite work throughout the year – especially in the off-season – to stay in, if not improve, their shape.

Should that take resources away from the advances that have been made with respect to hydration, weather awareness

and heat emergency response? No. But some kind of appropriately designed and scaled fitness testing program should result in less need for heat emergency response – and better athletes overall.

## LEE-DAVIS

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on fourth down pass that came up short of the first down marker, ending the game and the Confederates' hopes of earning their first win of the season.

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D. Freeman 0 7 7 0 – 14  
Lee-Davis 0 0 0 6 – 6

DF – Bland 6 run (Laughlin kick)

DF – Fellows 2 run (Laughlin kick)  
LD – Moody 16 pass from Joyce (kick failed)

### RUSHING

DF: Martin 10 carries 43 yards, Bland 17-39, Fellows 8-69; LD: Williams 15-109, Joyce 5-40, Hatcher 11-33.

### PASSING

DF: Bland 9 completions 17 attempts 78 yards 2 interceptions; LD: 20-32-191-1.

### RECEIVING

DF: Laughlin 3 receptions 7 yards, Shourds 1-13, Horne 1-11, Jennette 3-38, Moore 1-9; LD: Hairfield 6-49, Grubbs 1-18, Payne 2-34, Williams 10-74, Moody 1-16.

## ATLEE

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came out, everybody had energy, and we got better each day."

Raider fans can also get excited about another Warren, sophomore Caleb, who rushed for 52 yards and showed lots of promise.

"You can never have too many Warrens," quipped Atlee head coach Matt Gray.

Atlee now prepares for its first road trip this Friday to Region 5B rival Douglas

Freeman, which – with its 14-6 win at Lee-Davis – improved to 2-1.

In the rugged 17-team region where only eight teams make the playoffs, there are already nine teams with better records than Atlee, including two defending state champions in Highland Springs and Manchester. The chemistry and friendship between Warren and Oliver will certainly help the Raiders in their quest to return to the postseason.

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## VHSL

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from doing.

"Flip those two words, and suddenly we've got a really high scorecard," McCall said. "Everything we're doing is great, but they want to see that word 'requirement' and that's something our by-laws don't allow us to require. We can make recommendations, present information to all the schools."

Even though the VHSL's heat guidelines are "merely" recommendations, the VHSL issues that guidance from a bully pulpit.

"We are run by the schools.

The principals are our bosses," McCall said. "When we make a recommendation, they know it's coming from the executive committee and then all the school principals and athletic directors [know] this is their policy. This is what they want. ... Many schools will add their own stringent requirements above and beyond what our recommendations are."

For more information on the VHSL's heat and hydration policies, go to: <https://www.vhsl.org/sports-medicine/heat-hydration/>

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# Deadly Practice: Climate change raises risk

By Dave Lawrence  
Sports Editor

**Editor's Note:** When I more or less wrapped up the series in October, I was not sure I wanted to raise the issue of climate change and heat injury risk. But I was persuaded to reconsider. — DML

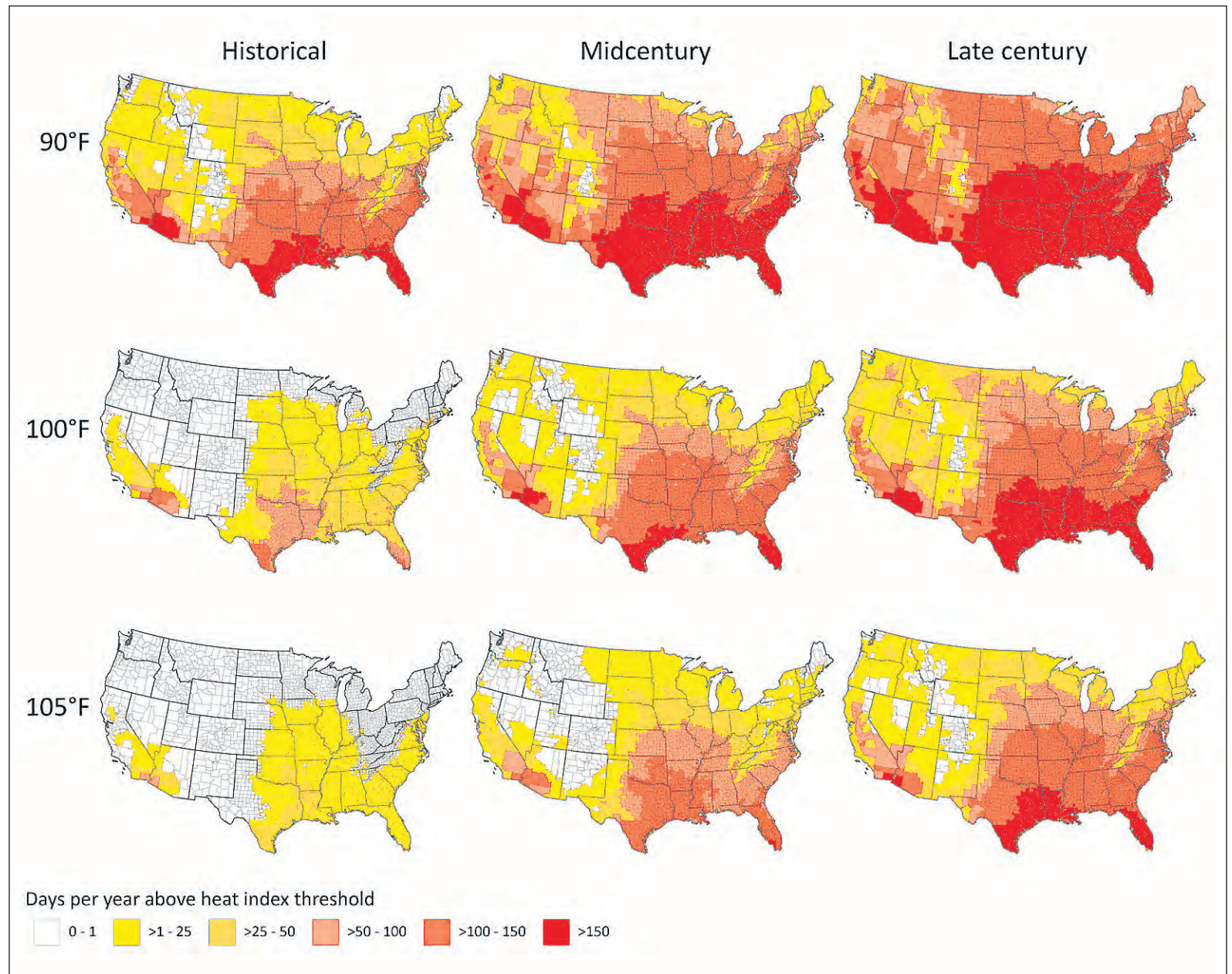
MECHANICSVILLE – The Richmond metropolitan area is all too familiar with stories of athletes felled by heat injuries during practices or competition. Despite great strides in understanding many of the risk factors and how to manage them, athletes continue to sicken, even die, from overdoing it in the heat.

Most of the Deadly Practice series so far has focused on conditioning and fitness screening to identify athletes at risk of heat injuries. But so far, the nation has done little to grapple with what may be the single biggest threat to outdoor athletes in the coming decades: climate change.

While the topic may be off-putting to some, the science is clear: the planet is warming and we are the main cause of that warming because of our fossil fuel emissions, destruction of natural ecosystems and other activities.

Climate change will affect many aspects of our lives in the future, but it may have one of its biggest impacts on when and how we choose to enjoy ourselves outdoors. Those who enjoy outdoor sports may have to make significant adjustments to adapt to the hotter temperatures to come.

This past summer, the Union of Concerned Scientists published a report – both as a peer-reviewed study in a research journal as well as an expanded version on its web-



The Union of Concerned Scientists published a study last summer looking at how climate change will affect the timing and distribution of extreme heat waves in the continental United States. The left column shows the historical average number of days with a heat index above 90 degrees (top row), 100 degrees (middle row) and 105 degrees (bottom row). The middle column shows the same for mid-century if nothing is done to reduce carbon emissions, and right column shows the same by the end of the century if nothing is done. Note that Virginia High School League guidelines recommend restricted outdoor activity above 90 and none above 105.

Courtesy of Kristina Dahl/Union of Concerned Scientists

**DEADLY PRACTICE**  
Last installment in a series

site – on how extreme heat will affect the United States in the coming century. The research team, led by Kristina Dahl and Rachel Licker, looked particularly at the heat index.

What they found, is that extreme heat will affect more and more of the country more frequently than it has in the past.

“We found that if we fail to reduce our carbon emissions, that there will be expansion of dangerous heat across the

country,” Dahl said. “Athletes are particularly at risk.” The trend has already begun.

“The hottest day of the year is typically sometime near the third or the fourth week of July,” said Jeremy Hoffman, climate science specialist at the Science

Museum of Virginia. “The days that are very hot have kind of fattened out into earlier and earlier parts of the spring and even into the fall.

“Even though the warmest day might be going on, traditionally, sometime in late July, the likelihood of seeing a very

hot day outside of that time has gotten higher.”

John Boyer, meteorologist at the Richmond Times-Dispatch, had another way of looking at how the climate will change.

“Another way of thinking

see **RISK**, pg. 24 ▶



# I survived the exercising — and even got better!

By Dave Lawrence  
Sports Editor

## MECHANICSVILLE

When I began work on the Deadly Practice series, Mike Craven of Mike's Olympic Gym had been preaching the gospel of fitness testing as a way to: a) identify athletes at risk of heat injury; and b) to help design conditioning programs to lessen the risk of heat injury.

And Craven was — is — a fervent disciple of the usefulness of VO2max testing for that purpose. But at the time, I did not understand what the test was, so I did what any respectable journalist would do: I had myself tested to get a feel for it.

As followers of the series already know, I was not terribly fond of the test. I was less fond of the result. My VO2 max was 27.6, which, while not surprising, was still below average for men in my ever-advanced age group.

So I asked Mike how I would improve it, and he put me on a 12-week conditioning program. If you have followed the series, you already know how much I didn't enjoy that.

The 12 weeks wrapped up after the initial run of the series came to an end, and I promised a follow-up. And, I can attest that, if one embraces a properly designed conditioning program, he or she will get fitter.



Joel Klein for The Local

**Right, Mike Craven (left) of Mike's Olympic Gym in Mechanicsville fits a mask on Local sports editor Dave Lawrence in preparation for Lawrence's follow-up VO2max test. Above, a computer monitors how much oxygen Lawrence breathes in and now much carbon dioxide he breathes out while exercising.**

In my case, the regimen of VersaClimber, elliptical and walking resulted in a new VO2max of 33.8, which is above average for men in my age group. For me, that was an impressive improvement.

But there was a more pleasant surprise to come. In November, shortly after wrapping up the conditioning program, I got my annual physical (a year late, as usual).

At the beginning of 2015, I was diagnosed with Type II



diabetes. Since then, my A1C — a long-term measure of my blood sugar level — ran above 6. While the numbers I was getting were in the high but acceptable range, I thought I had been doing good.

The exercise program had me doing much better than I

could have imagined. My A1C in November was 5.7 — near the top of, but still in, the normal range.

That's a number I can most definitely live with.

I began another 12-week program with Craven, but to be honest, I got off track recently

because of an illness (with complications) that has been wreaking havoc among a lot of folks I know.

But I like my more fit body, and I love that lower A1C, so I get back on the medieval torture device otherwise known as a VersaClimber, and pace

the roads, and keep an eye on my heartbeat to make sure I'm working hard enough.

The long-term benefits most certainly outweigh the short-term pain.

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## RISK

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about it is Richmond potentially having a summer climate more like eastern Texas," he said.

What the Union of Concerned Scientists found, is that — assuming nothing is done to reduce carbon emissions — that the number of days in Hanover County with a heat

index above 90 degrees will likely increase threefold, from 45 days per year historically to 119 days per year by the end of the century. The number of days with a heat index above 105 degrees will likely increase more than twenty-fold, from two days per year historically to 55 days per year by the end of the century.

By mid-century — just a generation of grandkids away — we

will be seeing more than 76 days per year with a heat index above 90 degrees, nearly ten times the historical average of nine days per year above 90.

For those wondering whether that will affect our daily lives, consider the current Virginia High School League heat safety guidelines. They recommend restricting outdoor activities when the heat index reaches 90 degrees. They recommend

prohibiting all outdoor activities when the heat index reaches 105.

By the end of the century, that could pretty much prohibit any outdoor practice — or play — for much of the month of August when most fall sports begin practice. It could wreak havoc on the traditional summer season for sports like Little League baseball and softball.

Dahl notes that athletes and

the military are particularly at risk of heat injury.

"I think that in athletic cultures, or in a culture like the military, there is a tendency to push ourselves, to push ourselves physically," she said. "There is a temptation when it is hot to just try to push through it. I think that is hard for teams and for individuals to get over."

Climate changes are already wreaking havoc with athletics.

A heat wave in Europe affected the Women's World Cup soccer tournament. In the World Athletic Championships in Doha, Qatar, in September, organizers schedule the marathon at night; Still, quite a few got seriously ill because of the heat even during what was supposed to be the "cool" part of the day. The headlines from this past year are a worrisome hint of things to come.