

Researchers work to stop sudden cardiac death among young athletes

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As March Madness captures the imagination of sports fans across the country, it also serves as a stark reminder of a frightening trend. On average, every three days a competitive athlete in the U.S. succumbs to from sudden cardiac death. Gianmichael Corrado, head team physician at Northeastern, is on a mission to change that. Credit: Adam Glanzman/Northeastern University

March Madness: It's a time of buzzer-beaters and bracket-busters, seed debates and the Sweet 16, as the 68-team NCAA men's basketball tournament hijacks our lives over a three-week stretch known as the Big Dance.

But it's also a stark reminder of a frightening trend: the prevalence of sudden cardiac death, or SCD, among young competitive athletes. It was 26 years ago this month that Loyola Marymount star Hank Gathers, just 23, collapsed on the court at the university's Gersten Pavilion and died shortly thereafter. Diagnosis: SCD.

He's not the only one. On average, every three days a competitive athlete in the U.S. dies from SCD, according to an article in the journal *Circulation*, often due to an undetected congenital heart condition called hypertrophic cardiomyopathy—an abnormal thickening of muscles in the heart's left lower chamber.

Gianmichael Corrado, head team physician at Northeastern, is on a mission to change that.

Corrado leads a research team that is developing a new pre-participation screening practice to identify athletes at risk for SCD: Echocardiography performed by frontline physicians using portable ultrasound machines to detect heart abnormalities. Early results with Northeastern athletes show the protocol to be significantly faster, less costly, and more accurate than current screening methods, reducing the rate athletes are referred to cardiologists for false-positive heart abnormalities by 33 percent.

A review of the research appears in an article in the March issue of *Advanced Sports Medicine Concepts and Controversies*.

"Echo, done regularly, shows how much a heart can change structurally over time," says Corrado, who practices sports medicine at Boston

Children's Hospital. It uses high-frequency sound waves to produce moving images of the heart, including the chambers and valves. "So if someone has an underlying pathological condition, you can track any abnormal thickening and misalignment of the muscle fibers and provide treatment before it's too late."

Current methods insufficient

Corrado knows whereof he speaks: He witnessed SCD firsthand as a 22-year-old premed student playing pickup basketball in Raleigh, North Carolina. "A young African American man just died," he recalls. "I sat there and watched the resuscitation, another kid screaming at him to breathe and live."

Two screening methods are used today: the American Heart Association's 14-element history and physical exam, which is "very vague," says Corrado, and electrocardiograms, or EKGs, which measure the heart's electrical activity. EKGs, which are generally not part of U.S. screenings, have been roundly criticized for their high rate of false positives. Indeed, last March, when the NCAA's chief medical officer recommended that all male college basketball players have the test, some 100 university team physicians fired off a petition in protest. EKGs also miss important clues: According to the American Heart Association, at least one in 10 people with hypertrophic cardiomyopathy have a normal EKG.

An echocardiogram, on the other hand, has "an incredibly high ceiling" when it comes to possible applications, says Corrado. They range from catching abnormalities before a condition goes over the edge to understanding how nonpathological changes in the heart from intensive exercise relate to performance.

"The screening proposed by Dr. Corrado is quick and has the potential to

prevent an athlete with a heart abnormality from dying while exercising," says Jonathan Finnoff, medical director of the Mayo Clinic Sports Medicine Center, in Minneapolis, Minnesota, and a team physician for the Minnesota Timberwolves and Lynx. "Although further research is required, performing it during the pre-participation physical exam may enable physicians to correctly identify structural abnormalities of the heart, helping to lower the risk of SCD and the need for unnecessary tests."

Meticulous research

Corrado and his colleagues began their research cautiously. After writing several papers on the feasibility of the practice, they learned how to best use portable ultrasound machines at the knee of Frederick C. Basilico, physician-in-chief for medicine at Boston's New England Baptist Hospital and cardiologist to the Boston Celtics. They then conducted two clinical studies to ensure that their echo measurements were as accurate as those of Basilico and a registered cardiac sonographer at the hospital. They were.

In a follow-up clinical study, published in 2014, they put the new protocol into practice at Northeastern. They screened 65 male student-athletes, ages 18 to 25, three ways: with the standard history and physical exam, with an EKG, and with an echocardiogram performed by Corrado.

Corrado's protocol cut the referral rate to cardiologists resulting from false positives by one-third. "That showed the world: Look how effective this can be on a college campus," he says.

"By relying on just the history and [physical exam](#), there is an underlying risk that we're clearing athletes who potentially have underlying disease that could put them at risk for SCD," says Basilico, a co-author on

several of the studies. "Medicine is moving toward using bedside ultrasound as a help in evaluating patients in general in settings such as emergency rooms. It's low-cost, there's no radiation, and it takes just one to five minutes. Gian Corrado asked, 'Why can't we train the [sports medicine](#) physicians to do a brief ultrasound during screening to help determine if an athlete is eligible to participate in sports?' I think the idea is very good; it gives us additional information."

Corrado's commitment to the practice extends beyond its diagnostic value to its social relevance: Only certain segments of society, he says, have access to screening by a cardiologist. Pre-participation echocardiography by a frontline physician brings us one step closer to leveling that playing field.

Sports medicine physicians at several other universities in the NCAA have expressed interest in the echo protocol, says Corrado, who has another clinical study ready for publication that includes both a cost and an efficiency analysis of the three [screening methods](#). "Our hope now is to get the funds to send 10 portable ultrasounds to 10 NCAA institutions and to train the team physicians," he says. "Northeastern could be the headquarters of a multicenter trial that helps end these tragedies."

More information: M. S. Link et al. Sudden Cardiac Death in the Athlete: Bridging the Gaps Between Evidence, Policy, and Practice, *Circulation* (2012). [DOI: 10.1161/CIRCULATIONAHA.111.023861](https://doi.org/10.1161/CIRCULATIONAHA.111.023861)

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