

FEATURE

Keeping Pain Out of the Red Zone

The mechanisms of pain are both physical and psychological. Here's what PTs and PTAs need to know in order to gauge treatment strategies.

By Michele Wojciechowski | July 2017

NCAA fans won't soon forget March 31, 2013, when the University of Louisville played Duke University in basketball. Not because of the game itself, but because of what happened to then-sophomore Kevin Ware.

During a play, Louisville's Ware came down on his right leg and broke his tibia in a way the media would describe as a "gruesome leg injury." Six inches of bone protruded from his leg. A video on YouTube shows the injury occurring and Ware falling to the ground. All around him, people look horrified. Teammates are crying, fans are shocked. Ware later said that when Coach Rick Pitino came over, "He looked like he saw a ghost."

Ware, though, told ABC news, "I honestly didn't feel the pain." Before leaving the court, he told his teammates to win. In the ambulance, Ware was most concerned about keeping track of the score. He called his mom as he went into surgery and told her not to worry, because he was okay.



How could someone who'd experienced such a serious injury *not* feel pain?

"Pain is a physiological process, not an anatomical one," explains Joe Brence, PT, DPT, director of staff development and education for Celtic Healthcare and Allegheny Healthcare@Home. An expert in pain neuroscience, Brence is the national spokesperson for APTA's #ChoosePT campaign and wrote APTA's "9 Things You Should Know About Pain." The first 2 points are: (1) pain is output from the brain, and (2) the degree of injury does not always equal the degree of pain.

Addressing the first point, Brence wrote, "While we used to believe that pain originated within the tissues of the body, we now understand that pain does not exist until the brain determines it does. The brain uses a 'virtual roadmap' to direct an output of pain to tissues that it suspects may be in danger. This process acts as a means of communication between the brain and the tissues of the body, to serve as a defense against possible injury or disease."

So, pain is complex. That noted, what other conventional thinking about how pain is perceived and treated might bear revisiting?

Pulling a False Alarm?

The International Association for the Study of Pain defines it as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage." But Steven Z. George, PT, PhD, said during his 2016 John H.P. Maley Lecture that pain often is misunderstood by physical therapists (PTs) and other health care professionals as "a sensory experience associated with actual tissue damage." Rather, he noted, pain starts only when the brain says it does tissue damage needn't have occurred. (Conversely, there can be tissue damage without pain, per the experience of Duke's Kevin Ware.) George is a professor and vice chair of clinical research in the Orthopedic Surgery Department at the Duke University School of Medicine and the director of musculoskeletal research for the school's Duke Clinical Research Institute.

Pain often is characterized as acute or chronic. "Acute pain usually has lasted for less than 3 months, and it's usually associated with actual tissue damage," says Meredith Schumacher, PT, DPT. "Chronic pain is pain that has persisted beyond 3

months or the time needed for tissue repair. It's your brain's perception of a perceived threat meaning, usually, potential for tissue damage, or tissue damage that is not actually present. After 3 months, the tissues in your body already have healed as well as they're going to, so any residual pain is no longer associated with actual tissue damage, but with the anticipation of a pain sensation based on a learned memory of prior tissue-damaging experience."

Schumacher is a diplomate of the American Association of Integrative Pain Management and is the lead PT for the functional restoration pain program at the Naval Medical Center San Diego.

"Your brain is what determines whether you feel pain 100% of the time, whether it's a true positive tissue-damaging experience or a false alarm to protect the body from harm," she says.

Acute pain is your brain's attempt to protect the body from an actual threat, much like an accurate alarm system. Chronic pain, though, is a false alarm system. It may occur because tissue damage healed but the nerves healed in a hypersensitive state so that the nerves are sending extra danger signals to the brain. The brain, then, interprets these signals along with all other emotional, cognitive, environmental, and physical stressors at the same time, and the output is pain. Acute pain is a symptom. Chronic pain is a condition.

Not All Pain Is Bad

"Pain is necessary for our survival," Brence says. "It's a protective mechanism. It's an output from the nervous systems to tell us there's a potential danger to our tissues, and we need to alter our behavior. PTs don't simply recommend a pill to turn off that signal. Instead, we use movement and other strategies to see how the nervous system reacts when we do something differently."

George recalls hearing a student say he wanted to use biomechanics to cure all pain. George responded, "Why would you want to do that? Pain is also protective. What if your cure eliminates the protective message?" He explains, "When we study disease, we don't think of it as also having an 'up' side. We know pain has a protective function, and then it doesn't. It's the 'when it doesn't' part that causes society all kinds of problems."

Biopsychosocial Involvement

While anatomy often plays a role in pain, it sometimes may be a minor one. Pain has many psychological components. One misconception about it, George says, is that if you just deal with the physical part of pain, the patient will be okay. In fact, fear, anxiety, and depression all can contribute to a patient's pain.

"PT's must become more psychologically informed," says George. "Fear of pain, pain catastrophizing, and even anger can have a role in pain."

Jeremy Fletcher, PT, DPT, an assistant professor in the department of physical therapy at Pat Capps Covey College of Allied Health at the University of South Alabama, conducted a study with Joseph Day, PT, MSPT, PhD, also an assistant professor at the school. They chose the patient because she had many risk factors for chronic pain upon presentation. She had been involved in a car accident and previously experienced anxiety and depression. While she had received cognitive behavioral therapy for it, she had not had medical management. Her grandfather had recently passed away, as well. She had neck pain, but it wasn't typical.

"The patient presented with risk factors for chronicity and with a pain picture that indicated she didn't have purely nociceptive pain or purely central sensitization pain, but a mix of both," Fletcher says. "I chose to change both my evaluation and my treatment approach to adjust for those risk factors and intervene accordingly."

His first step was to build a therapeutic alliance. He was careful not to use language that might scare the patient when they discussed her physical condition. Because she was beginning to avoid movement, Fletcher minimized the use of manual therapy techniques and instead empowered her through movement exercises.

The patient also had post-trauma experiences. When she revisited the scene of the accident, she felt an increase in pain. "She had a thematic response to the psychological stressor," Fletcher says. He spent time supporting and encouraging her. "This method incorporated the biopsychosocial model into treatment."

In the course of 5 visits with the patient, Fletcher and Day reported seeing a significant improvement in her neck disability index. Her pain response at the

accident scene improved. During her first visit, the patient reported her pain as 7 out of 10. By the third visit, her self-reported pain was zero. "Acute symptoms may go away pretty quickly, so that wasn't too surprising. But what we did *not* do was as important as what we did do. We did not show her pictures of where she was hurt and say that those were things she needed to avoid. Instead, we told her that her body was resilient and could overcome the pain," Fletcher says.

Neil Pearson, PT, MSC, BA-BPHE, made a similar point during his presentation "Enhance Clinical Outcomes By Providing Inconsistent Pain Experiences" at APTA's Combined Sections Meeting in 2015. "Educating people about the extent of tissue damage from their injury or disease is consistent with their brain's interpretation of danger," he cautioned. "This includes posters and models of ridiculous bulging discs you have up in your clinic!" Instead, Pearson said, "We need to provide people with experiences that are *inconsistent* with their beliefs about pain and their brain's automatic conclusions about the danger involved in movement."

A Fear of Movement

"Kinesiophobia the fear of moving is a huge problem," Jan Dommerholt, PT, DPT, MPS, says. He gives this example: "A patient came into our clinic 6 or 7 weeks after surgery. Her ankle was fused. She had enjoyed traveling but now was afraid she'd break something in her ankle. I knew she loved to dance. So I suggested we dance 10 feet one way, then 10 feet the other. We did that for a while. Then she sat down to rest and have a cup of water. That was our session. I knew she had functional strength. But she needed something to convince her that 'Yes, I can.' We did that without any equipment. We used an external focus, concentrating on dancing." Dommerholt is chief executive officer of Maryland-based PhysioFitness.

A variety of other self-management strategies also can be effective, Fletcher says. These include deep breathing and relaxation techniques. Patients also need to experience restorative sleep. "PTs need to be aware of these strategies so that even if they aren't trained in them, they can refer those patients to trained health care providers," he says.

Even culture and beliefs can influence pain, says Brence. That's why point 2 in "9 Things You Should Know About Pain" states, "Research has demonstrated that we all experience pain in individual ways. While some of us experience major

injuries with little pain, others experience minor injuries with a lot of pain (think of a paper cut)."

Relieving Pain to Return to Duty

Through the functional restoration pain program at the Naval Medical Center San Diego, Schumacher treats service members from the Navy or Marines who are dealing with chronic pain. The 8-week program uses an interdisciplinary approach that includes a PT, a health psychologist, a clinical nurse educator, and a pain management physician. It's tailored for service members who want to return to active duty. Service members on opioids must transition off them before starting the program.

"We track the patients on weeks 1, 4, and 8, and we're able to make treatment adjustments based on what their data show," says Schumacher. Because the program accepts only 8 patients at a time, she can spend an hour on all her evaluations and treatments. After 8 weeks, patients who remain on active duty are assessed posttreatment at months 3, 6, and 12 to determine whether treatment gains have been maintained.

As the PT on the team, Schumacher educates the patients about pain science, neuroplasticity, pacing, and goal setting. She looks at any biomechanical deficits they may have developed due to deconditioning because of their pain or that were present prior to the pain that contributed to it becoming chronic. She also assesses patients' gait and looks for muscle or balance issues.

The patients may participate in yoga, Pilates, aquatic therapy, hiking, swimming, and circuit training as part of their recovery. "A lot of the activity is neuromuscular reeducation in different forms," Schumacher says. "We try to make it pleasurable, because the pleasure centers in the brain combat the pain.

"From a military perspective, the program works because the patients are able to find their identities again. When someone experiences chronic pain, pain becomes their identity. We encourage them to get their lives back," says Schumacher. For example, she describes working with a 20-year rescue swimmer who cannot return to that function. The team worked with him to help him discover what his "new normal" would be. "He's going to be an instructor and teach the upcoming generation. [On the other hand] we have had rescue swimmers go back

to their regular duties; we helped them regain their confidence so that they could return."

"Pain is multifaceted. It is a physical, emotional, sensory, and cognitive experience. Environmental factors such as a stressful work environment, marriage problems, death in the family, or trauma all contribute to the patient's pain experience," says Schumacher.

For example, a patient in Schumacher's program injured his shoulder by reaching out to catch his child, who was jumping toward him. In other settings, the patient recreated the motion and the same kind of pain shot back. "He said that if he wasn't in the program, he would have thought that he injured the shoulder all over again," Schumacher says. Instead, he realized that he created the same motion that triggered a pain memory, even though there was no actual risk of tissue damage.

Interventions are individualized. In the case of this patient, part of his homework was to toss a balloon back and forth with his child to recreate the motion and undo the belief that the particular motion was dangerous.

LTC Robyn Bolgla, PT, DPT, MSPT, a lieutenant colonel in the US Army Reserve's Specialist Corps and the polytrauma program coordinator at the Department of Veteran Affairs in Sunrise, Florida, also works with a team providing cognitive behavioral therapy for chronic pain (CBT-CP). Knowing how to work with a team of other health care professionals, and to help patients learn to relax, can help make a crucial difference in the pain they experience. "We incorporate not only exercise but also neuromuscular reeducation. That's how CBT ties in," says Bolgla.

It Is All in Your Head And That's Okay

In the past, health care workers may have told chronic pain patients that the pain was "all in your head." Schumacher assures patients they haven't "made up" the pain that "it is in your head, and it's supposed to be there. It's a subconscious experience in which your brain is overprotecting you."

She cites the example of a mom who makes her child don too much padding before riding a bike. "We have to learn to take off the excess protective padding

and instead wear an appropriate amount for a protective response," Schumacher says. "That way, when you have a pain flare up, you can trust that you have injured something or were close to injuring it. Maybe you only lifted a bit too much weight. But you can trust this input. It's difficult not being able to trust your body."

"We also can offer people better pain relief than we have in the past by asking patients what their expectations are," says George. "When we know what people desire and tell them what we can offer them, it can result in help for their pain. We have to get people involved in their own care with self-management techniques. Physical therapists need to recognize that each person is different, so they need to broaden their assessments. There is no single magic cure for pain that works for everyone."

The Opioid Epidemic

APTA has developed the #ChoosePT campaign to educate and provide resources for patients and clients. The fact sheet "The Opioid Epidemic: What PTs and PTAs Need to Know" states that APTA is following Centers for Disease Control and Prevention (CDC) guidelines in its recommendation for nonopioid approaches to chronic pain. "Physical therapy is a safe and effective alternative to opioids for long-term pain management and prevention." (The CDC does state that opioids can be appropriately dosed and used for cancer treatment, palliative care, end-of-life care, and certain acute situations.)

Bolgia says that efforts to get people to try motion and physical therapy first may be facilitated by educating them about endogenous opiates—the natural painkillers people produce through movement. And, she adds, you don't need to be a high-performance athlete to feel them.

"At low levels of exercise about 30 minutes we produce endocannabinoids, which produce a feeling of well-being," says Bolgia. "Many of my patients want immediate pain relief. If I can guide them to accepting the chemical changes that occur with movement, it may keep them from taking opioids."

If a chronic pain patient says that more than 5 minutes of movement is impossible, Bolgia will start that individual at 5 minutes but she'll try to have the patient perform that movement or exercise 6 times a day to total 30 minutes.

Doug Slick, PTA, a physical therapist assistant at Lankenau Medical Center in Wynnewood, Pennsylvania, agrees with the incremental approach. "It's necessary to get the patients to start moving, if only a small bit at a time. Sometimes you have to 'spoon-feed' them. But as they move, they will realize they are feeling better. Then they will do more and more," he says. Like so many people health care providers included Slick had a personal connection with someone who had died from opioid abuse, and when APTA introduced #ChoosePT he investigated the research behind the campaign to learn for himself how and why physical therapy can replace opioid use for pain relief. He was convinced: in an article he contributed to the Pennsylvania Physical Therapy Association's Winter 2017 Quarterly Newsletter, he shared his confidence in the evidence that supports nonopioid treatment for chronic pain, noting the CDC guidelines that state, "Physical therapy, and other non-narcotic interventions, are cheaper and offer a more desirable risk/benefit analysis" for chronic pain.³

Another advantage that PTs have over some other health care providers is the ability to touch patients while working with them. "We get a release of oxytocin through touch, and that's another natural component to give that feeling of well-being," Bolgla says.

At times, she'll work with preoperative patients to have them try physical therapy first. Sometimes, she says, patients are able to avoid surgery because of her interventions. Even if they do require surgery, she knows that because they had physical therapy first, they will go into it as strong as possible, which will result in better outcomes.

The Big Picture

As part of #ChoosePT, APTA has proposed 6 longstanding APTA positions on reducing reliance on opioids as a "quick fix" for pain:

- Repeal the Medicare therapy cap
- Remove federal and state restrictions that impede access to a physical therapist
- Ensure comprehensive insurance coverage for physical therapist services
- Provide for fair physical therapy copays under insurance
- Allow physical therapists to perform to the full extent of their education and training

- Protect patient choice of their physical therapist

Empowering patients with self-management skills also will save money, Fletcher adds.

PTs must see the big picture and be open to changes, Bolgla says. "We need to continue learning, because when you think you understand everything, you don't. There are many new techniques being used today. For some techniques that I would have sworn 10, 20, or 30 years ago were effective, the science has now changed," she notes. "We need to be open-minded, especially with regard to chronic pain."

Michele Wojciechowski is a freelance writer.

References

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2. Wojciechowski M. Mindfulness: How It Can Help Patients, PTs, and Students. *PT in Motion*. 2017;9(1):24-32.
3. Slick D. #ChoosePT. PPTA Winter 2017 Quarterly Newsletter. Winter 2017:10. <http://www.ppta.org/docs/default-source/default-document-library/2017-ppta-winter-newsletter9e12b26fa59d68b7bd11ff000070546a.pdf?sfvrsn=0>. Accessed May 26, 2017.

Other Possible Nonpharmacological Pain Treatment Strategies

Research funded by the National Institutes of Health (NIH) is exploring a number of nonpharmacological strategies for treatment of pain. In testimony before the Senate Judiciary Committee in January 2016, Nora Volkow, MD, described some of the NIH-funded research efforts.¹

These include neural stimulation therapies such as transcranial magnetic stimulation, transcranial direct current stimulation, electrical deep brain stimulation, and peripheral nerve stimulation.

Additional research is exploring stem cell transplants to generate new pain-signaling neurons to reduce inflammation and inhibit chronic pain. Other

studies are exploring complementary, integrative health approaches that consider the biopsychosocial nature of pain. These include clinical studies on cognitive behavioral therapy, exercise, complementary therapies, mindfulness practices, and team-based multidisciplinary care.

Many of these already have been shown to work well with physical therapy to reduce pain. For example, Matthew J. Taylor, PT, PhD, director of the Matthew J. Taylor Institute which takes a biopsychosocial approach to pain and illness stated in a recent issue of *PT in Motion*, "We're beginning to see mindfulness being used for chronic pain management."²

In the same article, David Morrisette, PT, PhD, said, "Physical therapists should use tools relevant to psychology and the thought processes of the patient. When I was in PT school, we learned CBT. Physical therapists need to understand that while patients with pain may be working with psychologists, this may not be enough. These techniques may need to be integrated with patients' physical therapy as well."² Morrisette is director of the Division of Physical Therapy in the College of Health Professions at the Medical University of South Carolina.

1. Volkow ND. What science tells us about opioid abuse and addiction. Testimony before the Senate Judiciary Committee. January 27, 2016. <https://www.hhs.gov/about/agencies/asl/testimony/2016-02/what-science-tells-us-about-opioid-abuse-and-addiction/index.html>. Accessed April 20, 2017.

2. Wojciechowski M. Mindfulness: how it can help patients, PTs, and students. *PT in Motion*. 2017;9(1):26.

APTA Pain Resources

APTA offers many resources for PTs and PTAs on the subject of pain. Among them are the following:

APTA LEARNING CENTER COURSES

The Puzzle of Pain: Empowering Your Patients to Put the Pieces Together

- <http://www.apta.org/NEXT/Virtual/Programming/PuzzleofPain/>

Pain Care Innovation in Rehabilitation

- <http://learningcenter.apta.org/Student/MyCourse.aspx?id=cb7fb1e3-f32f-4e2e-8303-6f0d851a6f77&ProgramID=dcca7f06-4cd9-4530-b9d3-4ef7d2717b5d>

Musculoskeletal Pain Management Principles

- <http://learningcenter.apta.org/student/MyCourse.aspx?id=584ced2d-7164-46f2-8e67-281c287904f4&programid=dcca7f06-4cd9-4530-b9d3-4ef7d2717b5d>

MOVE FORWARD PT

Avoid Addictive Opioids. Choose Physical Therapy for Safe Pain Management. #ChoosePT

- <http://www.moveforwardpt.com/choosept/>

Physical Therapist's Guide to Pain

- http://www.moveforwardpt.com/symptomsconditions_detail.aspx?cid=e6dabed7-c6d5-4362-8260-9ce807427619

RECORDED LECTURE

21st John H. P. Maley Lecture: "Pain Management: Roadmap to Revolution" by Steven Z. George, PT, PhD

- <http://www.apta.org/NEXT/2016/MaleyLecture/>

PT IN MOTION MAGAZINE

- Wojciechowski M. Mindfulness: How It Can Help Patients, PTs, and Students. *PT in Motion*. 2017;9(1):24-32.
- Ries E. Treating Pain Head-On. *PT in Motion*. 2014;6(8):16-23.

- Ries E. Dry Needling: Getting to the Point. *PT in Motion*. 2015;7(4):12-22.
- Ries E. Putting the "PT" in Pain Management. *PT in Motion*. 2010;2(3):16-21.

PT in Motion, APTA's official member magazine, is the successor to *PT—Magazine of Physical Therapy*, which published 1993-2009. All links within articles reflect the URLs at the time of publication and may have expired.

Comments

Recently my husband and I were having this very discussion....How could we determine if the pain (Chronic) a family member was reporting as "so bad, it's never been this bad" was true pain or not. This article could not have come at a better time. We will definitely read it with great interest and in great detail

Posted by Celeste Dunlap -> AIQJB on 7/2/2017 1:29:59 PM

How would you relate this research to situations where there actually is ongoing tissue damage, such as OA and stenosis?

Posted by Elizabeth Neilson -> CFU`>K on 7/3/2017 12:58:19 PM

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