

Diagnostic Testing is Transforming Physical Therapy

By Dimitrios Kostopoulos

Physical therapists have long worked with the best tools available to diagnose patients' health problems, but for most of the medical field's history, technology didn't play a significant role.

Physical therapy has been around in some form for centuries. Hydrotherapy (water therapy) and therapeutic exercises were used around 3000 BC by the Chinese and 400 BC by the Greeks and Romans. In modern times, Marguerite Sanderson and Mary McMillan are often credited with creating the physical therapy profession. Their titles were "reconstruction aides," and they ended up training the first physical therapists, whose services would be especially in demand from soldiers in the aftermath of World War I and World War II. In fact, in 1921, McMillan wrote *Massage and Therapeutic Exercise*, the first physical therapy textbook.

Ever since then, physical therapists have generally learned to diagnose patients by observing them standing and walking and performing various activities and tasks, and performing simple tests. They've also learned much by talking to patients and looking for patterns and clues as to why people were feeling pain and how to treat it.

That will never go out of style.

Even without technology, physical therapists have become extremely proficient at

diagnosing problems. While that will always continue, non-invasive medical diagnostic testing is complementing conventional physical therapy methods and transforming modern medicine.

Recent developments in diagnostic testing technologies available to physical therapists have been creating even more accurate results for patients. And also, greater insurance reimbursements and a more diversified clientele for physical therapy practices.

If you're not intrigued, you should be, and if you're intrigued, you may well wonder — what types of diagnostic testing are physical therapy practices utilizing?

THE TYPES OF DIAGNOSTIC TESTING PT PRACTICES ARE USING

There are well over 100 diagnostic tests that physical therapists can use in their constant quest to determine why somebody's body is in pain, but in recent years, there have been about half a dozen that have been changing and improving patients' lives.

In general, diagnostic tests can be invasive — or not. Invasive doesn't always mean, say, surgery. If you're a patient giving a blood sample, for instance, that's invasive. It isn't pleasant, but it isn't going to ruin anybody's day. If you're getting a colonoscopy, well, that's really invasive.

Obviously, patients always like it when they can be tested for a problem that doesn't involve invasive methods or guesswork. ("Take two aspirin and call me in the morning.") Insurers like that as well. Even though it's extremely unlikely that somebody will breathe their last when being given a colonoscopy, it is possible that there could be complications and that a patient could die. Meanwhile, when a patient is sent home with medication and instructions to check back with a general practitioner or physical therapist in a week or two if things don't clear up, a lot of time can be wasted.

So, non-invasive is welcomed by both patients and the insurer, but for most of the time between the moment Sanderson and McMillan arrived on the scene until now, high-tech, non-invasive equipment simply hadn't existed. And what did exist was sometimes problematic. William Roentgen did the world a huge favor when he invented the X-ray machine, but the radiation emitted from it could be deadly. Clarence Dally, an X-ray technician in Thomas Edison's lab, soon discovered that. Due to experimenting with X-rays and being exposed to a lot of radiation, he ended up having both of his

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arms amputated. Several years later, he died of skin cancer at age 39.

So, when you come across diagnostic tests that are non-invasive and safe, that's cause to celebrate. And in recent years, the healthcare industry has been on the receiving end of some very beneficial gifts to modern physical therapy. Highly advanced diagnostic equipment, most of it small and easily storable, can be used by physical therapists for just about any part of the body.

It used to be that ultrasound equipment was primarily only used to determine the health of a fetus. Now, with the aid of ultrasound devices, a physical therapist can generate images of joints, soft tissues, and even of the bones inside the body — and often come up with a diagnosis for a patient before they even leave their practice. Treating a condition can begin immediately. It has not always been this way.

So, what types of safe and non-invasive diagnostic testing are being done today? Some of the more popular and effective tests include the following:

Musculoskeletal Ultrasound. This employs sound wave technology to generate images of a patient's muscles, tendons, joints, nerves, and ligaments. FDA-approved, musculoskeletal ultrasounds help physical therapists examine and diagnose sprains, strains, tears, nerve injuries, and other soft tissue conditions.

If you have a patient who has a difficult-to-diagnose joint disorder, the musculoskeletal ultrasound will aid the physical therapist in its discovery. It's also safe and non-invasive, and it doesn't use ionizing radiation.

Electromyography (EMG) and Nerve Conduction (NCS) Testing. For the nerve conduction study part patients are hooked up with electrodes on their skin similar to what is done during an EKG. Then a gentle electrical impulse is generated to measure the nerve activity. For the electromyography part, a small needle electrode is inserted in select muscles of the patient to evaluate

the neuromuscular integrity. It is a low-risk procedure — and one that yields a lot of high-level information about the body.

That is, physical therapists use electromyography and nerve conduction studies to determine the health of a patient's muscles and the nerve cells that control them, also known as motor neurons.

When a patient receives EMG/NCS testing, the physical therapist is looking for potential nerve problems of the peripheral nervous system, such as muscle dysfunction or something amiss with the nerve-to-muscle signal transmission. If a patient is suffering from simple conditions such as carpal tunnel syndrome or radiculopathy or polyneuropathy or things such as muscular dystrophy, polymyositis, or perhaps a disease like myasthenia gravis, electromyography, and nerve conduction testing should uncover that.

There are other disorders that EMG testing can find as well. Physical therapists can diagnose disorders that affect the motor neurons in the brain or spinal cord, such as amyotrophic lateral sclerosis, also known as ALS or Lou Gehrig's disease.

If nothing turns up, physical therapists and their patients can breathe a sigh of relief.

Videonystagmography (VNG) Testing. VNG tests assist in diagnosing whether a vestibular (inner ear) disease may be the reason for a balance or dizziness problem. It's also one of the only tests available that can tell the difference between unilateral (one ear) and bilateral (both ears) vestibular loss.

VNG testing is conducted not by examining the ears but by recording eye movements. The patient tracks objects with their eyes, and testing monitors examine how well the eyes respond to information from the vestibular system.

Patients are always happy to learn that VNG testing is non-invasive. Insurers like that as well.

Somatosensory Evoked Potential (SSEP) Tests. These tests analyze the nerve pathway from the peripheral nerve through the spine

to the somatosensory region of the brain.

(*Somato* is a word with Greek origins, meaning "body.")

SSEP tests can help unearth whether a patient has a spinal cord injury or disease or even a neuromuscular disease or demyelinating diseases such as multiple sclerosis and others. It, too, is a simple and non-invasive test, one that uses a series of minor stimuli in the median and/or tibial nerves and a recording of the response as it reaches the brain.

Visual evoked potential tests examine nerves that travel from the eye to the visual cortex.

VEP Testing. Visual evoked potentials (VEP) tests examine nerves that travel from the eye to the visual cortex. Physical therapists opt for VEP testing when they want to identify impaired transmission along the optic nerve pathways.

There are many reasons a patient might require VEP testing, which can take up to an hour to do. A patient might have:

- Loss of vision
- Double vision
- Blurred vision
- They may see colors differently than they did.
- They may see flashing lights.
- Their eyes may simply feel weak — and sometimes, when arms or legs feel weak, a perceptive physical therapist who suspects multiple sclerosis will recommend a VEP test.

Although it takes about 45 to 60 minutes, it's a simple test. Similar to an SSEP test, VEP testing offers a series of visual stimuli over

a television monitor, and then it records the brain's response as the stimuli reach the brain. Electrodes are attached to the top of the patient's head, and each eye is tested one at a time, which is why VEP testing can take a little while.

BAER Testing. BAER is an acronym for "brainstem auditory evoked potentials." These four words describe a test that examines the ear and the brain for auditory and brainstem disorders. It's non-invasive and is conducted with a series of sounds that are heard via a set of headphones. When the brain reacts, its response is recorded.

BAER testing is often used in newborns and young children — or anyone who can't readily participate in a conventional hearing test. In fact, BAER tests are even common in veterinary offices. Dogs are given BAER tests. It's the only accurate method of testing a dog's ability to hear. That should make it clear how effective BAER testing is.

WHY IS DIAGNOSTIC TESTING SO EFFECTIVE?

If it isn't already clear, when a patient comes into a physical therapist's office, they often know that they have pain in a certain area — or they recognize that their joints, muscles, or nerves aren't working the way they should. But why things are out of sorts is the question.

Using the traditional model of physical therapy, the physical therapist performs an initial evaluation, creates a treatment plan, applies the treatment, re-evaluates the patient, and adjusts the treatment and at the end of care, the patient is released from the care of the physical therapist with a follow-up program. Using the new diagnostics model, the physical therapist determines if the patient is a candidate to receive any of the various diagnostic tests available to the physical therapist. If the therapist or the patients' physician determines that the patient could benefit from an MSK Ultrasound or EMG or other testing, then the physical therapist performs these tests and forms a comprehensive physical therapy

treatment plan based on the PT evaluation as well as the data obtained by the diagnostic tests performed.

A recent multi-center study that included 462 patients evaluated the Impact of electrodiagnostic (EMG/NCS) tests on clinical decision-making and patient-perceived benefit in the outpatient physical therapy practice. The study found that patient management was changed in 60.61% of patients post EMG/NCS testing ($p < 0.0001$). Also, 92% of patients reported very high, or high, value perceived from the EMG/NCS test administered.¹

Physical therapists have in their hands diagnostic testing solutions with high degrees of sensitivity and specificity for the most frequently seen musculoskeletal problems. The newest generation of diagnostic testing is safe to use — which, as noted, can't always be said of an X-ray machine and its radiation. It's also non-invasive. Nobody's going under the knife to learn why their joints aren't working properly — and risk making their problems worse. There's also far less speculation and conjecture involved when you have diagnostic testing as part of your physical therapy solution.

For instance, inside the physical therapist's office, with electromyography (EMG) and nerve conduction (NCS) testing, the physical therapist, using EMG/NCS technology, identifies the precise level of nerve root impingement that a patient with radiculopathy has, evaluates the function and degree of the pathology of the nerve and makes a prognosis about the patient's condition. The therapist will now create a more accurate treatment plan, using precise and useful data from the EMG/NCS testing, in addition to using the physical examination results.

Another example would be a patient with shoulder pain sent to a physical therapist for evaluation and treatment. The astute physical therapist performs a shoulder MSK Ultrasound and finds for instance a partial rotator cuff tear or tendinosis. The therapist can see the torn tendon retracting

during dynamic MSK Ultrasound imaging or the degree of inflammation in the tendon. Treatment is specific to the patient's problem and several weeks later the therapist can repeat the MSK Ultrasound testing and view any positive changes because of the physical therapy treatment.

For most of the 20th century and into the 21st century, if patients complained of dizziness, vertigo, or any sort of balance issue, they might be prescribed an antihistamine, and everybody would hope for the best.

With videonystagmography (VNG) testing, the physical therapist can identify signs of a condition like a cholesteatoma, which is a condition in which you have aberrant skin cells deep in the ear, acting in a way that they shouldn't. For instance, the ear might develop a skin cyst trapped behind the eardrum or the bone behind the ear. A cholesteatoma, left untreated, can damage the ear — and even if it didn't, it can also result in ear infections. In other words, it's something you want to treat — and not waste any time guessing at what the problem might be. The physical therapist can then send the patient to the appropriate specialist to treat the condition.

Or consider a high schooler who comes into an office with what's believed is a concussion. That may be easy enough for a physical therapist to diagnose — the kid was playing football, fell, and hit his head. Still, believing something and knowing something are two entirely different things, and that's why physical therapists can bill insurers far more for diagnostic testing over conventional tests.

Insurers love it when physical therapists are positive in their diagnosis — rather than pretty sure.

In fact, as a general rule, most types of insurance, including Medicare, Medicaid, private insurers, and workers comp, reimburse physical therapists for most types of diagnostic testing.

How much more can physical therapists bill for diagnostic testing? It totally depends on the type of test and the extend of the testing, but on average, insurers can pay around \$400 to \$500 per EMG/NCS session — compared to \$70 to \$100 for a Physical Therapy session without it. That's just the average, which means that many PTs are earning three to 10 times more than they do when they aren't using diagnostic testing.

In short, because diagnostic testing is so effective, it has meant that physical therapists who use it have achieved a gold standard in medical and physical therapy care. It's one of those few instances in life where everybody wins. The patient achieves better outcomes — and faster, which means they're hopefully in less pain for less time. The insurers are happy to have more efficient and affordable outcomes. Because it saves money for the insurer to have the physical therapist get it right the first time, the insurer pays more for that treatment, and the physical therapist receives more income.

So thanks to diagnostic testing, there are better clinical outcomes, higher revenues, higher profit margins (which in some cases exceed 30%, and as a bonus, at least for now, while the technology is still fairly new, physical therapists who use diagnostic testing can differentiate themselves from their competition. That means that they can attract more patients, which means better outcomes and more revenue. It's a constant cycle leading to healthier patients and healthier profits.

THE PROCESS OF ADDING DIAGNOSTIC TESTING TO A PT PRACTICE

If diagnostic testing is so wonderful, and if it's the gold standard, why isn't every physical therapist in the world using it? Three hurdles need to be cleared.

Money. As one can imagine, diagnostic equipment isn't cheap. For instance, an EMG unit can easily cost a little north of \$15,000, while an MSK Ultrasound unit can start from \$4,000. A practice can buy refurbished

equipment, but then you have to wonder if you're really giving your patients the best and most advanced care. So if you're adding EMG testing, MSK Ultrasound testing, VNG testing, SSEP testing, and so on, you will be outlaying some serious cash.

Why it shouldn't be an issue: As the old saying goes, you have to spend money to make money. That's how it always has been, and that's how it always will be, and this is the type of equipment that many insurers like to see physical therapists using.

Training. It takes time to learn how to perform, interpret and bill for diagnostic testing. There are systematic protocols, after all, for how one should handle an ultrasound transducer and how one should manage a patient's shoulder, elbow, lumbar spine, and other parts of their body that you may be testing. There are educational programs, however, that have comprehensive mentorship programs that allow the therapist to bill and get paid by insurance as they are learning. In many cases, you may be able to start billing insurance within a couple of weeks after you attend your first training.



Physical therapists can — and should — get certification to use their diagnostic equipment. Learning how to use a musculoskeletal ultrasound device with a scanner isn't necessarily difficult for a physical therapist, but it isn't like putting together a bookcase with an instruction booklet. Achieving RMSK (registered in musculoskeletal sonography) certification, recognized by AIUM and many insurance companies, is very important for the therapist who wants to achieve a higher level of practice. Physical therapists need to be confident that they know how to use an EMG unit and how to interpret the

findings — otherwise, you have a cool gadget that doesn't offer much. Becoming ECS (electrophysiology clinical specialist) board-certified by ABPTS provides you with full recognition by CMS (Centers of Medicare Services) and the ability to get full Medicare reimbursement for electrodiagnostic studies.

Mentorships. Not all education is the same. Receiving education for EMG/NCS or MSK Ultrasound sitting in front of a computer only or studying a book is not going to provide you with the clinical application skill that you need to perform competently these types of tests. Mentorships and clinical application are key to your success in this field. Completing an ABPTRFE approved residency program in EMG/NCS or a Fellowship program in MSK ultrasound can provide you with the education that can prepare you not only to pass the board certification exams but also to achieve excellence in clinical practice.

Why it shouldn't be an issue: As a physical therapist, you spend a lot of time on continuing education already. Every state has different continuing education requirements for physical therapists. For instance;

- In California, you're required to take 30 contact hours or 3.0 CEUs during their license renewal period.
- In Ohio, it's 24 CEUs.
- In Montana, you need 30 hours of continuing education every two years.
- In South Carolina, it's 3.0 CEUs every two years, and at least 15 contact hours of the 3.0 CEUs must be obtained through the completion of certified activities.
- In New York, you must complete 36 hours of continuing education coursework in a three-year period.

The point is, you're doing a lot of continuing education, anyway. Why should learning to perform diagnostic tests be any different?

Mainstream acceptance. Until patients come to expect a physical therapist to

be using diagnostic equipment, and until physical therapists see competitors using them, performing diagnostic testing will probably not become the norm. Often, medical professionals, whether in physical therapy or dentistry or some other occupation, need to be pushed in certain directions. It's similar to what life used to be like in the early days of the internet. For years, there were business owners who didn't believe they needed a website, and they didn't — until they clearly did.

Why it shouldn't be an issue: Physical therapists obviously should be doing what's best for the patient — and, ideally, not worrying about the time or costs involved in adopting new and advanced clinical knowledge, procedures, and treatments.

THE FUTURE OF DIAGNOSTIC TESTING

Physical therapists have a lot of incentive to bring more non-invasive and safe diagnostic testing into their practices for several reasons.

Everybody is getting older. Of course, that's always happening. But the aging of society has never been more apparent. In 2030, every baby boomer will be older than 65, which means that one out of every five residents will be retirement age. Generation Xers are close behind, of course, and by 2030, some will already be retiring.

Physical therapy patients are also getting younger. Meanwhile, youth sports injuries are up as well. The rise in youth sports is to blame — and credited — for that. It's surely a wonderful development that younger people are interested in exercise and fitness, but it

is also creating more patients for physical therapists. Assuming that trend continues, that's another reason to upgrade a physical therapy practice's diagnostic testing.

Labor shortages are another incentive to embrace diagnostic testing. When you consider physical therapist and healthcare labor shortages and how a physical therapist's practice may someday find itself understaffed, if it isn't already, you can see how faster and better equipment can make the difference in a patient's life — and also in the physical therapist's life.

Student debt is skyrocketing. Physical therapists who invest the time, effort, and resources to learn diagnostic testing, can achieve higher pay from insurances and from employers which helps them get out of their student debt faster.

Society seems to be hurtling toward a perfect storm of potential problems — as we get older, and our planet reacts badly to the pandemic, geopolitics, and climate change. Granted, no matter what's going on in the world, it's a fact of life that people will always be in pain, and there will always be injuries, though it can sometimes feel as if there are more ways to injure oneself.

That may be just a feeling. There were certainly plenty of injuries in Sanderson and McMillan's time. Beyond the soldiers who barely made it through World War I and might have suffered far more if it weren't for physical therapy, workplace accidents were far more common than they are today. Automobiles were far more dangerous to ride in, and football played with feeble

safety gear. People were in as much need of physical therapists as they are today.

But what hasn't changed is that yesterday and today, physical therapists are interested in improving the lives of their patients. This is why, sooner or later, you're going to find a variety of diagnostic testing equipment available in every physical therapist's office. The future may not be here yet, but it doesn't take a physical therapist to diagnose that it's coming. It's time for diagnostics in physical therapy!

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