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Military Progresses in Identifying, Treating Brain, Mental Injuries

By Donna Miles
American Forces Press Service

WASHINGTON, Sept. 22, 2010 – Nine years of conflict has revolutionized the way the military treats its combat wounded, Vice Adm. Adam M. Robinson Jr., the Navy surgeon general, told American Forces Press Service.

The past years of conflict have witnessed improved battlefield care and well-oiled medical evacuation and trauma-care networks that are saving lives that in past wars would have been lost. There've also been huge advances in treating amputations and spinal-cord injuries.

Just as dramatic, Robinson said, are the cutting-edge developments in identifying and treating brain injuries, including the mental and psychological effects of war.

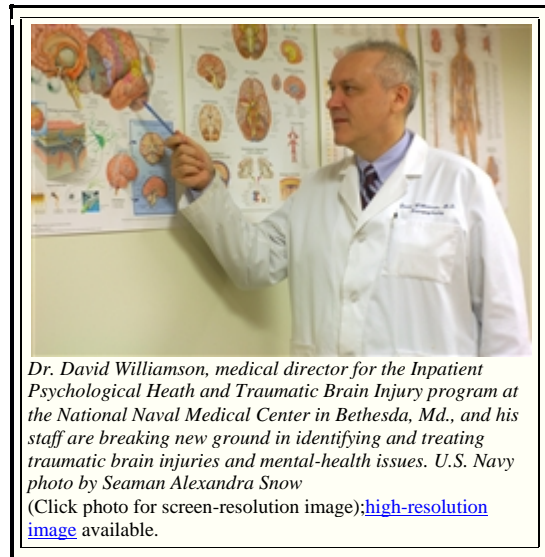
“We have finally, as a military and as a medical service – Army, Navy and Air Force – come to grips with the fact that war creates injuries that are not seen, injuries that are just as life-changing and as devastating as amputations and other physical injuries that come back,” Robinson said in a sun-lit conference room here at his Navy Bureau of Medicine and Surgery headquarters.

“And we have done tremendous work in assessing and treating and giving stability and a context to men and women who have been injured in the war and suffered these unseen injuries – the ones you can't make out, the ones the X-rays don't show, the ones for which the blood work doesn't show the differences, but that certainly are there,” he said.

Exposure to roadside bombs and other blasts causes physical changes in the brain, and as a result, how it functions, Robinson said.

“When you are in a blast, there are actually neuron-cognitive changes that occur in how the brain and the synapses and the brain connections – the wiring of the brain – actually work,” he explained.

Robinson said hormone and chemical levels fluctuate as well, often resulting in emotional and behavioral changes.



Dr. David Williamson, medical director for the Inpatient Psychological Health and Traumatic Brain Injury program at the National Naval Medical Center in Bethesda, Md., and his staff are breaking new ground in identifying and treating traumatic brain injuries and mental-health issues. U.S. Navy photo by Seaman Alexandra Snow
(Click photo for screen-resolution image); [high-resolution image](#) available.

“This is not just about being disoriented,” he said. “You are not just disoriented from the blast. You are disoriented because you are in the blast, and then the blast causes a change in how your brain functions. People have been very, very slow to come to that conclusion, but it’s true.”

But except in the case of severe traumatic brain injury -- defined as a penetrating head wound -- these wounds can be difficult to diagnose, and symptoms often aren’t immediate.

“When you break your arm, I can do an X-ray and can show you the break,” Robinson said. But for troops with moderate or mild TBI, “we are finding that there may be changes in the neural psychological and neural cognitive pathways that we are just beginning to learn and understand.”

Robinson touted tremendous strides in addressing severe TBIs, with life-saving physiological, chemical and operative advancements. “All of that has come together ... [so that] many of the severe traumatic brain-injured patients who heretofore we did not think were capable of surviving have, in fact, come back and are now leading productive lives,” he said.

Dr. David Williamson is on the front line of these advances as director of the psychological health and traumatic brain injury team at the National Naval Medical Center in Bethesda, Md.

“This is a dedicated team of professionals who have a mission to serve just one category of medical disorder,” he said. “Instead of breaking the staff up by medical specialties, we are a team broken into the category of a clinical problem: the psychological health and brain-injury effects of combat.”

Operating from within a wing of the National Naval Medical Center known as “7 East,” the team includes a combination of brain specialists: Williamson, a neuropsychiatrist; as well as a neuropsychologist who conducts highly detailed memory, speech, calculation, concentration and other cognitive tests.

Specialists in psychology and social work round out the team, which works hand-in-hand with trauma surgeons to assess every single wounded warrior treated at the hospital, and intervene immediately when they diagnose brain injuries or mental-health complications.

Williamson cited the increase in craniectomies -- surgical procedures to remove part of the skull to allow the brain room to swell without being squeezed -- as one of the biggest game-changers in treating traumatic brain injuries.

Historically, many people with brain injuries ended up dying because their brain got squeezed when it swelled, ultimately killing the brain tissue, he explained. Now, forward-deployed surgical services often can prevent this through life-saving craniectomies.

“That means we have more severe brain injury patients that are surviving,” Williamson said. “So the challenge for us is treating more severely brain-injured patients through rehabilitation and later phases of care.”

As it works with the hospital's trauma team to identify brain injuries in combat casualties and determine their severity, the PHTBI team increasingly relies on vestibular testing to flag problems within the part of the inner ear that controls balance, Williamson said.

This semi-circular canal system, made of three fluid-filled donut-shaped voids of bone, can get damaged by blast waves, he explained. "Nothing physically hits your head, but a pressure wave through the skull can rupture these fluid-filled sacs inside bones in the skull," he said. "It causes dizziness, coordination and balance problems and sometimes, double vision. And all that leads to headache and slows rehabilitation."

Patients diagnosed with vestibular problems work closely with physical therapists to "reset the equilibrium of those systems and get them working properly" through exercises focused on head movements, balance and hand-eye coordination, Williamson said.

"That's an injury that's frequently been missed," he said. "This therapy has proven very helpful."

Meanwhile cognitive rehabilitation is helping patients restore brain function. "If you train brain systems that are only partially functioning, you can build up their strength and efficiency just like a weakened arm if you do weight training on it," Williamson explained.

Cognitive therapy consists of a series of drills – memory tasks, reading tasks, analytical reasoning tasks – all focused on retraining the brain, he said.

"In addition, brain injury treatment programs are using the virtual environment to extend what we can challenge brains with," Williamson said. Specialized video games and other computer-based programs provide visual, spatial, language and coordination tasks. A driving simulator enables them to hone their driving skills under the watchful eyes of a trained therapist.

The PHTBI team also uses specialized equipment to monitor electrical activity within the brain and identify a frequent complication of brain injuries: seizures.

"Everyone recognizes when seizures make you go unconscious or you are convulsing," Williamson said. "But you can have partial seizures where you have changes in your ability to think or your emotional regulation or your general level of alertness, caused by a little area of electrical abnormality."

So the team conducts electroencephalography, continuously over the course of five days, to test for those abnormalities. Patients who exhibit them typically are treated through medication.

But the PHTBI team hasn't limited its efforts to drugs and conventional medicine. "Our physical medicine rehabilitation team is open to all holistic therapies and alternative therapies as well," he said. "We refer people for acupuncture for pain management. We do various types of non-medical pain interventions, nerve stimulation, nerve blocks and so on."

The biggest challenge in treating moderate and mild TBI, Robinson said, is that there's typically no outward sign of injury, making it difficult to identify.

“With mild TBI, you know you are different. You feel different, but you look absolutely the same to those around you,” he said. “You may act differently to those who know you really well, but you can take tests and do all sorts of different objective instruments and you don’t necessarily see the differences.”

Often it’s a family member or loved one who picks up on personality or behavioral changes and sends up the red flag. “We’ve had spouses come in and say, ‘The person I sent to Iraq or Afghanistan is not the person who came back,’” Robinson said.

Robinson said he believes that nobody returns home from combat without at least some degree of post-traumatic stress.

“If you are involved in combat and combat operations, you have post-traumatic stress,” he said.

Even those not physically involved in combat, but operating within the combat theater, are at risk, he said. “If you are exposed to the tension and to the stress of a deployment, you are a candidate to develop post-traumatic stress,” he said.

“I did not say you have a disorder,” Robinson emphasized. “So when I talk about PTS, I don’t add the ‘D’ for ‘disorder.’ Because we know that if we treat it and treat it effectively, we can actually obviate the disorder. If we can stave off the ‘D,’ we are ahead of the game.”

(Editor’s Note: This is the first in a series of four articles about the military’s revolutionary new approaches to treating patients with traumatic brain injuries and post-traumatic stress.)