



# CHRONIC PAIN AND CO-MORBID BRAIN INJURY FROM IED TRAUMA

The case study described in this article presents several interesting and important issues in pain management. Some issues are found generally in the treatment of chronic pain but other issues discussed are more pertinent to veterans. Indeed, some of the issues specific to veterans may be even more specific to veterans injured during Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF) than previous military conflicts.

One pain management issue that occurred with this injured veteran—and is likely specific to OIF/OEF veterans—is the co-morbidity of cognitive problems together with chronic pain complaints. Certainly, the pain management literature is replete with documentation of post-traumatic stress syndrome (PTSD), depression, and other mood and anxiety disorders arising out of chronic pain states. However, there is less information on cognitive issues co-morbid with chronic pain complaints.

Many veterans injured in OIF/OEF are injured by an improvised explosive device (IED). These devices cause a high rate of injury to the head and extremities, which are regions of the body less protected from body armor. These IEDs convert several types of potential energy into forces

that injure or kill soldiers. The explosive itself, in synergy with the accelerant it is combined with, can produce intense heat that produces severe burn injuries. The explosive also forces out shrapnel at a high velocity that can penetrate the tissues and organs of its victims. Indeed, most IEDs now use nails and small metal shards because of the high velocity they achieve when expelled and the ease with which these small, hard metal objects can penetrate the body.

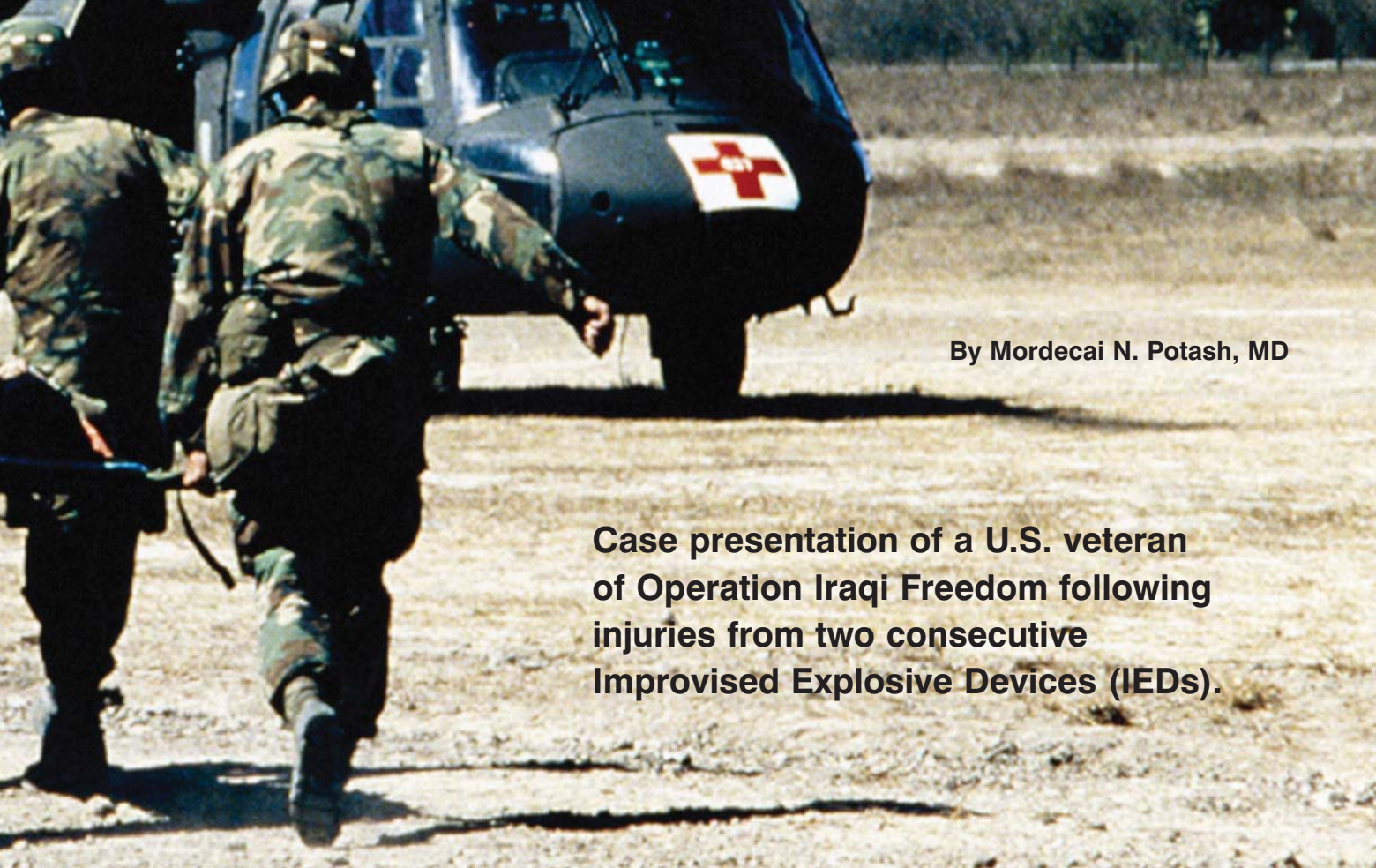
What is also being better appreciated are the injuries caused by intense changes in air pressure caused by the IED's shock waves. The devastating effects of these changes in air pressure were recently described by Ronald Glasser in the *Dallas Morning News*:

“The detonation of any powerful explosive generates a blast wave of high pressure that spreads out at 1,600 feet per second from the point of explosion and travels hundreds of yards. The lethal blast wave is a two-part assault that rattles the brain against the skull. The initial shock wave of very high pressure is followed closely by the ‘secondary wind’: a huge volume of displaced air flooding back into the area, again under high pressure. No helmet or armor can defend against such a massive wave front...

It is these sudden and extreme differences in pressures – routinely 1,000 times as great as atmospheric pressure – that lead to significant neurological injury. Blast waves cause severe concussions, resulting in loss of consciousness and obvious neurological deficits such as blindness, deafness, and mental retardation. Blast waves, causing traumatic brain injuries, can leave a 19-year-old private who could easily run a six-minute mile unable to stand or even think.”<sup>1</sup>

The lethal air blast range of vehicles loaded with explosives (per the ATF explosive standards for vehicle-borne IEDs) varies from 100 feet for a compact sedan to 600 feet for a semi-trailer. In addition, the hazard of flying glass extends far further from the epicenter of explosion than formerly appreciated: 1,250 for a compact sedan to 7,000 feet for a semi-trailer IED.

As indicated above, these pneumatic injuries preferentially injure the nervous tissues, the lungs, and the sinuses. Mostly because of these IED injuries, there are strong and consistent indications of a high proportion of chronic head injuries in OIF/OEF veterans. Recently, Dr. Michael J. Kussman, acting VHA under secretary for health, testified before Congress that 25,400 service members have



By Mordecai N. Potash, MD

## Case presentation of a U.S. veteran of Operation Iraqi Freedom following injuries from two consecutive Improvised Explosive Devices (IEDs).

been injured in Operation Iraqi Freedom, and another 1,227 wounded in Operation Enduring Freedom, since the start of the conflicts.<sup>2</sup> Of these, totals, about 65% have been injured by IEDs and 28% of that total suffered significant brain trauma resulting in cognitive problems. This has resulted in nearly 4,850 service-members with significant brain injuries and cognitive problems, along with pain issues from the IED explosions as well.

The following case is based on an actual veteran's presentation to the Behavioral Pain Management Program at the Southeast Louisiana Veterans Healthcare System. Although details are kept as accurate as possible, certain details have been changed in order to protect the patient's privacy and confidentiality. Portions of the medical record have been recreated, but not duplicated, to clarify clinical documentation of complex situations in comprehensive pain management.

### Case Presentation

Mr. Smith [not his real name] is a man in his late 20's and a recent veteran of Operation Iraqi Freedom. He presented to a regional clinic of the Southeast Louisiana Veterans Healthcare System in order to begin to transfer his healthcare from active duty services received at a major mil-

itary medical facility in the Southern United States to the Veterans Healthcare System. Mr. Smith first presented to the VA through a clinic in South Louisiana in December, 2005.

Mr. Smith was first assessed in a primary care clinic. Mr. Smith brought with him healthcare notes from military medical bases that were several inches thick. The clinician noted that Mr. Smith had severe and on-going pain management issues as well as psychiatric issues. The primary care clinician renewed Mr. Smith's expiring medications for pain management and referred Mr. Smith urgently to the Behavioral Pain Management Program. However, Mr. Smith declined the referral to Behavioral Pain Management. Instead, he stated that he wanted to "move forward" with his life and just see the primary care clinician.

The coming months brought on-going complaints of side effects from medications, worsening psychiatric complaints, and episodes of severe pain—despite medications employed. The primary care clinician explained to Mr. Smith that his situation needed specialist care in pain and mental health issues and Mr. Smith accepted the referral and was finally seen in Behavioral Pain Management in March 2006.

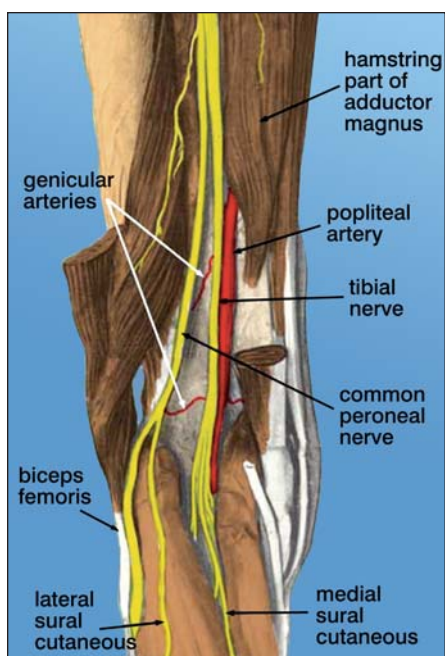
Mr. Smith was comprehensively evalu-

ated and a copy of his military medical record was reviewed. Meanwhile, reports of his injury were carried by major news outlets for reasons that will become clear below. These news outlets provided stories, pictures, and videos of Mr. Smith's injuries and were reviewed by the Behavioral Pain Management staff. From these various sources of information, the following narrative was pieced together.

### Narrative of Injury

Mr. Smith was a healthcare specialist in the U.S. Army and was in good health until late September 2004, when he was severely injured by two vehicle-borne improvised explosive devices (VB-IED) during a ceremony in Iraq for the opening of a new civilian facility. The Iraqi National Guard had been charged with checking vehicles for VB-IED prior to the ceremony.

Mr. Smith was at the ceremony when a pick-up truck exploded about 20 meters away from him. Just prior to the explosion, Mr. Smith and his company were handing out candy to children and were surrounded by children when this first blast occurred. This blast sent multiple pieces of shrapnel into Mr. Smith's jaw. The blast had decimated the children surrounding Mr. Smith and his company, with scores of children dead. There were



**FIGURE 1.** Locations of Mr. Smith's leg injuries (tibial and sural nerves; popliteal artery)

several injuries in Mr. Smith's company, perhaps all, and the company began to retreat from that position.

At this time, or soon thereafter, on-lookers rushed in to help the many children who were dead, dying, or in different states of shock or severe injury. About half hour later, a grey sedan nudged into this crowd and exploded. This explosion occurred behind Mr. Smith and his company and sent shrapnel into Mr. Smith's lower extremities and seriously injured others in his company. This explosion also killed many civilians who had rushed in to help the children. Mr. Smith soon lost consciousness after the second blast. These events were recorded by news outlets present to report on the civilian ceremony and, inadvertently, captured this coordinated and deadly terrorist attack on film.

Mr. Smith was stabilized and transferred to military medical facilities overseas and then to the United States. Mr. Smith was found to have bilateral open non-displaced fibular fractures and multiple soft tissue wounds to the lower extremities. He required several skin graft procedures to wounds on the left lower extremity. He was also found to have multiple traumatic nerve injuries to the lower extremities, including the sural and tibial nerves (see Figure 1). Serial EMG & NCS studies were done which demonstrated neuropathy and sensory deficits in the

lower extremities.

Mr. Smith was also found to have suffered a mandibular fracture with avulsive injury, necessitating removal of five teeth. He also underwent inter-maxillary surgical fixation to promote bone re-growth to aid in placement of dental implants.

### Pain and Cognitive Symptoms

During his time of treatment in the United States, Mr. Smith began having severe pain in the back of his left leg/knee. He also had pain in his face and jaw. Mr. Smith was treated with several different pain medications. He was eventually placed on methadone 20mg three times a day with oxycodone 10mg / acetaminophen 650mg for breakthrough pain. The major problem he had with pain medications was a sense of fuzziness or sedation.

Interestingly, he related that his sense of "fuzziness" or difficulties with attention, memory, recall, and complex thought, did not improve with lowering the doses of pain medications or even when pain medications were changed to non-narcotic alternatives (but with oxycodone 10mg/acetaminophen 650mg continued for breakthrough pain). Once at the VA Clinic, his pain medication was changed again to sustained-release morphine, which also did not relieve his cognitive symptoms but, instead, caused intense constipation. He was changed back to methadone and his constipation eased. However, he still complained of cognitive problems (namely, stupor and sedation), saying; "The world is going on all around you and you don't know what is going on."

Mr. Smith's pain was most prevalent in the popliteal region of his left leg. Pain was less intense—but still severe—in other areas of his left and right legs. He described the pain as pulling, grabbing, ripping, and burning pain. With pain medications, his numeric pain rating—on a zero-to-ten numeric scale—varied from 3 to 6 during the day. During periods of time when he briefly ran out of medication, left medication at home, or forgot to take medications, his pain score quickly increased to 7 to 10 out of 10.

Mr. Smith was also evaluated by a psychiatrist and found to have depressive symptoms as well as Post-Traumatic Stress Disorder (PTSD). The psychiatrist included the car explosions, as well as earlier incidents during his military tour, as the causative factors for his PTSD.

At the end of a comprehensive initial

assessment, our Behavioral Pain Management Program developed a multi-axial assessment to diagnose Mr. Smith's conditions following the format of psychiatry's multi-axial assessment. This allowed our team to describe pain issues and emotional/psychological consequences of pain, other psychiatric issues, medical diagnosis and treatments, social, environmental, and occupational issues—all relating to an overall assessment of functioning. Mr. Smith's assessment is summarized in Table 1.

### Cognitive Issues Complicate Follow-Up Treatment

Mr. Smith was given a series of regular appointments for follow-up at two week intervals to address his mental health issues and on-going pain complaints. Mr. Smith missed a series of these appointments in a row, missing them even when called and reminded of appointments. He was finally asked to come in right away. Mr. Smith related that he was not purposefully missing appointments, but forgetting his appointments. He had also forgotten to attend evaluations for compensation and pension (C&P) examinations. Mr. Smith understood that these C&P exams were difficult to arrange in post-Katrina Louisiana and were clearly set up to financially benefit him. We also solicited comments from Mr. Smith's family and they also had noticed Mr. Smith's forgetfulness, loss of cognitive sharpness, difficulty with attention/concentration, and difficulty organizing complex tasks. Both Mr. Smith and his family commented that these problems were completely non-existent prior to injury.

With additional brief cognitive testing, our program added the additional Axis I diagnosis of 'Cognitive disorder due to medical condition (Traumatic Brain Injury).' We began a trial of methylphenidate at 20mg per day in divided AM and Noon doses and then increased the total dose to 40mg. We also modestly increased methadone from 40mg per day in divided dosing to 60mg per day in divided dosing to better control pain complaints. Over the summer of 2006, Mr. Smith's pain control and cognitive abilities moderately improved and Mr. Smith was satisfied with his progress. He began to consider returning to work or school. He also completed his C&P examinations and was awarded 40% service-connected compensation for his injuries.

**TABLE 1. PAIN ASSESSMENT OF MR. SMITH USING PSYCHIATRIC MULTI-AXIAL SYSTEM**

<b>Axis I</b>	1. Pain disorder due to medical condition 2. Post traumatic stress disorder due to military trauma 3. Cognitive disorder not otherwise specified due to military trauma (Added after initial evaluation)
<b>Axis II</b>	No personality disorders assessed
<b>Axis III</b>	1. Chronic pain due to multiple traumatic nerve injuries of both lower extremities requiring multiple surgical procedures 2. Episodic pain mandibular fracture with avulsive injury requiring multiple surgical procedures
<b>Axis IV</b>	Disabled due to military trauma with upcoming compensation and pension exams for medical and psych issues — 40% service connected disability awarded (after C&P examinations)
<b>Axis V</b>	Global Assessment of Function (GAF Score) is 50; Corresponding to severe pain and severe behavioral and psychological complaints causing severe impairments in functioning

**Initial assessment of pain included the following findings:**

1. Pain was most intense in the back of his left leg, behind the knee.
2. Pain was described as pulling, grabbing, burning, and ripping pain.
3. Pain was most intense in the popliteal area (see Figure 1), but also extended in the bicep femoris as pain worsens.
4. Pain worsened as the day went on.
5. Also had sensations of deep bruising.
6. With Methadone and Oxycodone 5mg/Acetaminophen 325mg tab, pain was 3-4/10 with spikes to 5-6/10.
7. When he ran out of pain meds, pain was excruciating and unbearable, clearly a 10 out of 10.

**At the time of the assessment, his medication regimen was as follows:**

1. Bupropion (Wellbutrin SR) 150mg sa tab sig: one tablet by mouth twice a day for depression.
2. Duloxetine HCL 60mg oral cap sig: one capsule by mouth daily.
3. Methadone HCL 10mg tablet sig: two tablets by mouth three times a day for chronic pain.
4. Oxycodone 5mg /acetaminophen 325mg tab sig: 1-2 tablets by mouth three times a day as needed for breakthrough pain.

**Third Party Diversion/ Misuse of Medications**

In late summer of 2006, I received an urgent call from Mr. Smith. He revealed that he had been estranged from his wife for the past several weeks and that on the previous day, his wife stole his medications—including his opiate-based pain medications and his methylphenidate psycho-stimulant—and subsequently overdosed. She was taken to an area hospital, stabilized, and transferred to an inpatient psychiatric facility. Mr. Smith was now out of medication and requested an urgent prescription renewal of those stolen medications. Knowing that this

was a complex situation which would involve pharmacy services, clinical services, and law enforcement, I immediately took the following steps:

1. Documented all the information the patient conveyed to me.
2. Advised the patient to report the theft to law enforcement officials.
3. Directed the patient to bring a copy of the resulting police report to the clinic (Mr. Smith presented the next day with a police report that documented the theft of medication).
4. Discussed the specifics of the report with law enforcement officials (the officer indicated that the Sheriff's Office was

following the case. However, they were not planning on pressing charges as long as Mr. Smith's wife complied with inpatient psychiatric treatment and had no further incidents or behavioral problems suggestive of drug abuse. The officer also confirmed his belief that Mr. Smith had no direct role or knowledge in this theft of medication and attempted overdose.)

5. Communicated and reviewed the police report with the pharmacy staff about replacing the stolen medications this one time (Pharmacy agreed but placed an alert on his prescriptions).

6. I then engaged Mr. Smith in a long discussion about preventing misuse or diversion of his medications in the future. This included reviewing his controlled substance therapy agreement with our program. Mr. Smith agreed to buy a safe where he would store his medication, except for a three day supply he would keep in a pill bottle on his person. Mr. Smith also agreed to pick up all his medication in person, instead of allowing his wife or other family members to pick up his medications. These conditions were also added to his controlled substance therapy agreement.

In the months that followed, Mr. Smith reported that he and his wife had reconciled. Also, his symptoms remained well controlled and Mr. Smith returned to gainful and challenging employment with the support of his family.

**Case Epilogue**

A problem developed when, five months after the theft, Mr. Smith's wife presented to the clinic to pick up his medications. An alert had been put on his prescriptions at the time of his initial theft, so the pharmacy immediately notified our program. I called Mr. Smith and told him that, because of his wife's theft of medication, we would not release medications to her. I instructed Mr. Smith to present to the clinic to pick up the medication himself. While Mr. Smith seemed annoyed by our insistence on this point—saying that his wife's overdose occurred "some time ago"—he did follow our directions. In the months that followed, Mr. Smith returned to work and asked if medications could be delivered to him. We were able to accommodate him by sending medications by bonded courier to his house or place of business and required delivery to be verified by his driver's license and signature verifi-

cation which was then uploaded to the pharmacy's computer.

### Discussion

We did not have access to a neuro-psychologist who could formally test for Mr. Smith's cognitive deficits. Instead, we relied on clinical indicators such as his report of cognitive "fuzziness" and missing appointments despite his intention to attend these appointments. Furthermore, we sought input from family who knew Mr. Smith before and after his injury and could describe the cognitive changes that they had observed, as well as how these changes had interfered with Mr. Smith's social, family, and occupational level of functioning and participation in the usual and customary family and social activities.

Seeing that Mr. Smith had not responded adequately to bupropion, we began a trial with methylphenidate, an amphetamine based psycho-stimulant. Although beyond the scope of this article, psychostimulants have been used successfully to treat cognitive problems developing from a diverse range of medical conditions, including HIV infection, cancer, and transplantation. They have been employed to treat symptoms from traumatic brain injuries, but usually injuries occurring from civilian accidents. Fortunately, Mr. Smith responded well to methylphenidate and it is our hope that this will encourage other practitioners to entertain trials of psychostimulants for patients with comorbid cognitive difficulties and chronic pain.

Another issue that we encountered in our treatment of Mr. Smith was far less specific to OIF/OEF veterans but familiar to every provider of chronic pain management services, namely, the diversion and misuse of his medications by a family member. In this case, I believe that we were able to successfully address this issue due to several actions we took after becoming aware of the diversion of medications. The first action was the careful documentation of how we became aware of the diversion. We took pains to record the "who, what, where, why, and how" as carefully and as completely as possible at the time we got the information. Secondly, we required reporting of the diverted medication to law enforcement and used that report to open up communication with law enforcement about the theft. In this case, our communication with law enforcement was beneficial to everyone. We

were able to independently confirm that diversion of medication had, in fact, occurred, and that our patient likely had no planning or participation in the diverted medications. Law enforcement was able to confirm that the medications—in this case, multiple controlled substances—dispensed to Mr. Smith were being prescribed as a legitimate medical treatment with supporting medical documentation. In fact, law enforcement commented that they wished other medical providers were as communicative as we were. And the patient was aided because our communication with law enforcement allowed the clinic to replace diverted medications.

Lastly, we took the opportunity to review with Mr. Smith his controlled substance therapy agreement and make ap-

propriate changes to that agreement. Like most pain management practitioners, we employ a controlled-substance therapy agreement. We don't employ that agreement as a way of "catching" our patients and "kicking" them out of our program. Instead, we use the agreement as a written understanding and as a template to start discussions about preventing diversion and misuse of medications, should those issues arise. We certainly made changes to Mr. Smith's agreement, including specifics on locking up the majority of his medications as well as who was allowed to pick up his medications. These specific changes were then integrated in our behavioral pain management treatment plan and our collaboration with pharmacy services. When Mr. Smith's wife attempted to pick up his medications months after the theft, we reminded Mr. Smith of the changes in his agreement and why those changes were made. Truth be told, Mr. Smith was not "a happy camper" when we pointed this out to him, but he accepted our decision because he had been involved in the decision-making process all along.

### Conclusion

The treatment of Mr. Smith, as well as other veterans of OIF/OEF, have presented us with new challenges within the field

of pain management. Chiefly, we are being confronted with a growing number of patients with co-morbid chronic pain complaints and severe brain trauma and its attendant cognitive issues. Although brain injury has always been a feature of the trauma of military combat, IEDs take this level of injury to a new and devastating level that presents a real challenge to those of us tasked with helping these veterans.

Besides these unique pain management issues, working with OIF/OEF veterans also presents issues familiar to pain management practitioners, such as avoiding diversion or misuse of medication and reducing the risk of addiction. We employ the help of family, friends and, when appropriate, law enforcement to help us achieve these goals and recom-

*"Although brain injury has always been a feature of the trauma of military combat, IEDs take this level of injury to a new and devastating level that presents a real challenge to those of us tasked with helping these veterans."*

mend that other physicians consider this approach as well.

Finally, most of these veterans, prior to injury, were young, vigorous, moral, and motivated. For those of us tasked to treat these veterans, whether through our outpatient practices, through our hospitals, or through the Department of Veterans Affairs, it is our obligation to do what we can to restore their strength, support their spirit, and encourage them to set new and challenging goals for themselves as they go forward with their lives. The specifics of these goals may need to be examined within the context of their injuries, but this does not diminish the possibility of a noble and worthwhile life. ■

*Mordecai N. Potash, MD, is Assistant Professor, Tulane University School of Medicine, Department of Psychiatry and Neurology Director of Behavioral Pain Management Services, Southeast Louisiana Veterans Health-care Services.*

### References

1. Glasser, Ronald. Bomb blasts leave invisible injuries too. Opinion Section, *The Dallas Morning News*. Published 05/06/2007. [www.dallasnews.com/sharedcontent/dws/dn/opinion/points/stories/DN-glasser\\_06edi.ART.State.Edition1.42f3621.html](http://www.dallasnews.com/sharedcontent/dws/dn/opinion/points/stories/DN-glasser_06edi.ART.State.Edition1.42f3621.html) Accessed on May 23, 2007.
2. Pueschel, Matt. Congress Examines Reported Problems With DoD-VA Health Care Transition. *U.S. Medicine*. Posted 05/22/2007. [www.usmedicine.com/dailyNews.cfm?dailyID=320](http://www.usmedicine.com/dailyNews.cfm?dailyID=320) Accessed on May 23, 2007.