



## **Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE) Webinar Series**

**February 12, 2015, 1-2:30 p.m. (ET)**

### **“Stress and Anxiety Following Traumatic Brain Injury”**

Welcome and thank you for standing by. At this time, all participants are in a listen-only mode. Today's conference is being recorded. If you have any objections, you may disconnect at this time. And I would now like to turn the conference over to Sherray Holland.

Thank you. Apologize for the delay. Good day, and thank you for joining us today for the DCoE Traumatic Brain Injury February webinar, "Stress and Anxiety Following Traumatic Brain Injury." My name is Sherray Holland, and I am a TBI clinical educator, providing contract support for the Defense and Veterans Brain Injury Center. I will be your moderator for today's webinar.

Before we begin, let's review some webinar details. If you experience technical difficulties, please visit [dcoe.mil/webinars](http://dcoe.mil/webinars) to access troubleshooting tips. Please feel free to identify yourself to other attendees via the chat box, but refrain from marketing your organization or product. Today's presentation references and resources are available for download from the files pod and will be archived in the online education section of the DVVIC website.

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Throughout the webinar you are welcome to submit technical or content-related questions via the Q&A pod located on the screen. All questions will be anonymous. Please do not submit technical or content-related questions via the chat pod.

I will now move on for today's webinar, "Stress Anxiety Following Traumatic Brain Injury." Human behavior is a result of the constant interaction between the organism and its environment is a belief of the early 20th century psychologist, Clark Hull.

Current research notes when injury or stress occurs, behavior reinforces the optimal biological conditions of survival. This is just as true today when a service member survives both a stress of injury from a brain insult and the effects of a concussion or MTBI, when either stress or TBI may be repetitive and highly paced or frequent deployment environments.

When TBI occurs on the battlefield, both a TBI and stress or fear response occurs. If a threat or anxiety becomes overwhelming, the service member may revert to protective mode, including exacerbation of post-traumatic stress disorder, family conflict, alcohol, or substance abuse, or maladaptive reactions.

Discussion will include a variety of evidence-based assessment and treatment strategies related to stress anxiety following TBI.

At the conclusion of the webinar, participants will be able to describe the complex interaction between the stress of anxiety, stress and anxiety during the recovery course of TBI, examine and select strategies for treating comorbid symptoms with the core symptoms of TBI, and lastly, discuss the integration of evidence-based practices into the assessment of stress anxiety following TBI.

Dr. Hopewell is an assistant professor in the Department of Psychiatry and Behavioral Health at the University of North Texas Health Science Center in Fort Worth, Texas. He is the former TBI Center's director of neuropsychology and behavioral health. Former Defense and Veterans and Brain Injury Center, or DVBIC, site director at the Karl R. Darnall Army Medical Center in Fort Hood, Texas. He was awarded a bronze star medal for meritorious service as a major in the U.S. Army Medical Service Corps, in support of the Operation Iraqi Freedom.

Dr. Hopewell received his MS in clinical psychology from California School of Professional Psychology, Alliant International University. He received his MA and PhD in clinical psychology from the University of North Texas. Thank you for joining us today, Dr. Hopewell.

Well thank you very much. I appreciate being invited to participate in this seminar, and I've been watching the people signing in. One person, Christina, I won't mention full names, but Christina and I work together, and she can certainly vouch for the stress and the construction of TBI, because that was what we had in our clinic working. And I see other people from Fort Bragg and other places. I was on the faculty of the medical school in North Carolina for two years and went down to Fort Bragg frequently. And the other memory that I have is my father was getting elderly. He was a prisoner of war in Germany and it was the next to the last trip that we had together. We went down to Fort Bragg and spent the day touring around.

So appreciate everybody signing in. And the introductory slide here is somewhat tongue and cheek, but this is fairly typical in the theater in the type of combat that we're facing now, not only combat explosive devices or incoming rounds but also stress. This is in Mahmoudiyah, I was down there for a teaching program we had. We had a clinic there, and so stress and TBI really just go together. It's a comorbid disease or illness.

And I think first slide here I have to -- there we go, and then I can do it with remote. I don't really have any disclosures, except presenting some research that we have collected both at Fort Hood and other places. But other than that, no disclosures, and my views, of course, don't reflect the DVBIC or Department of Defense, or now, the University of Health Science North Texas.

Your learning objectives are going to be to identify various ways in which anxiety -- and when I say "anxiety," I really mean stress as well. I'm using those pretty much in conjunction with each other. And they can be co-morbid or can influence the symptoms in the recovery course, certainly of traumatic brain injury. Also, when I say "traumatic brain injury," or "TBI," that can either be concussion or more severe manifestations of the injury, as we all know.

Number two, explain why it's critical to treat the co-morbid symptoms, such as anxiety along with the core symptoms of TBI. Number three, familiarize yourself with assessments that are frequently used in evaluating anxiety. I'll present some that are well known, used by most professionals, also a couple of novel ones that are good ones, and we would hope people would use more frequently. Also review recent innovations in the joint assessment of anxiety in TBI. And finally, understand and deploy strategies to choose appropriate treatment modalities and how to integrate those with the treatment.

One thing I also noticed, I guess the moderators asked the people to sign since -- I assume since this is related to stress, to put stress reliever and what they do for stress relief. And so jumping to that, that's important. That's one of the most important things we can do. I am currently, in my job here at the medical school, directing the psychotherapy program. We just built a new -- well we moved into a new

building, built a new clinic, so we're starting a lot of things, and I find myself more frequently asking the patients what do you do for hobbies. What stress relieves do you have? What do you do normally? What are you interested in? If you've had hobbies, why did you stop? What's the barrier to doing that? Because, as we should all be aware, leisure, stress relief, and relaxation activities are really critical.

Years ago, Howard Jackson and I, which I'm going to present part of that research, but Howard is in Britain. He's a very well known, neuropsychologist, runs a residential treatment center, and we worked for years on Lisa Christensen [ph] on concepts of the rhythm of life as part of rehabilitation, and that rhythm of life includes organizational strategies, re-ed strategies, organizing your day. But it also includes building in leisure and stress management activities. So just to stress this here, those kinds of stress management strategies should be built in to treatment, and then the treatment does not occur just in your classroom or just in your office, the treatment occurs in the patient's life or in the soldier's life throughout their life to help them establish a new rhythm of life, a new rhythm of improving, a new rhythm of healthy behaviors and activities.

Here's a definition. I'm not going to read all of these things, because people obviously can read, or you can look it up in DSM-5. But your anxiety disorders include features of excessive fear and anxiety and that, and that is -- again, excessive is beyond what we would normally expect. Fear is part of that. Fear is response to real or perceived imminent threat. Those who have had combat experience working with soldiers you know that fear is very real and fear goes into -- fear overlaps what actually happens on the battlefield, because we become, then, hypervigilant, and especially, unfortunately in society today, there are many things to be fearful of, so people become hypervigilant, and when that's an extreme it becomes maladaptive behavior. Related to that are panic attacks, where the anxiety and stress just hyper arouse the entire nervous system. Anxiety disorders differ from one another.

One of the other things that I'm doing here now is training new staff on the DSM-5 and differences from DSM-4 and DSM-5, and in trying to do that, it's really a very difficult task, because there's so many types of anxiety disorders, even differentiated in the DSM-5. The list kind of goes on and on; phobias, obsessive compulsive reactions, disassociate reactions, and many of those are incorporated in our posttraumatic diagnosis that we see, where people become avoidant of situations or overly anxious or disassociate. These are all different differentiated from normal fear and anxiety in that they're excessive, they persist, and they interfere with appropriate functioning.

One of the things to remember in working with patients, especially -- well either PTSD or TBI patients, which I certainly stress, you've heard other people stress it, the research stresses this more and more, is that we want to normalize the experience. I think one of the most important things that can be done in treat our soldiers and people responding to stress and who have undergone concussive events is to normalize that for them, to explain that, to educate them, and to help them to understand that those reactions are normal reactions. They're expected reactions. They may be unpleasant. They may be maladaptive, but they do occur after these kinds of injuries. That really can't be stressed enough.

Also, one of the things that we did at Fort Hood and at the clinic, one of the main points of therapy was an educational program, which ran for some length, to explain to patients these types of things, and I always pointed out to them that kind of make them think of jumped a little bit; I said this is the only treatment you'll ever receive for concussion. And, of course, they would look at me and kind of probably wonder what I was talking about. And I said, "Well, we're getting other treatments." We're getting treatment for headache and for this and for that and for the other thing.

Education is the only evidence-based treatment, really, for concussion that has been recognized as such. The other treatments are treatments for what? They're treatments for symptoms which occur, that are comorbid to the concussive injury, such as treatment for headache is not a treatment for concussion, it's a treatment for headache, the treatment for the symptom of headache. So that education and these educations of these are normal reactions, people experience them. Being educated will help you to learn how to cope with stress, how to cope with concussion, how to cope with people who don't understand what you're going through, how to cope with getting back into life, how to cope with getting a healthy normal rhythm life going is a significant part of the treatment.

As you can see from the slide here, the stress reactions generally fall into about four separate categories, physical, emotional, cognitive, and behavioral. And with concussion and TBI, the frequent complaints are what? They're complaints of I can't concentrate as well as I used to. I can't focus. I can't recall. People are talking, I'm in a conversation, I'll forget what I'm doing, forget such and such. And these are cognitive symptoms which are co-occurring with both concussion and stress disorders, with any number of stress disorders, in particular PTSD. We'll talk a little bit more about the physiology of that later.

So in doing that, and part of the education with our soldiers is to explain that we're not going to worry too much about where that comes from because we know that that can also occur with PTSD, and the neuropsychologists cannot parse that into 25% of your memory problem is due to concussion, 75% is due to depression of PTSD. There's no way, really, to do that currently. Probably not ever. But the key is that you address the problem and you treat the problem and you help people to understand it, educate them, and you give them strategies where they can improve that, and they will improve their cognitive functions. There are also some pharmacological improvements that could be done as well.

The moderator has indicated that people generally like case studies, and they are quite good for a number of reasons, and I always try to include a couple here. And this is a real case study. A 20-something-year-old sergeant was a volunteer, was in combat, grenade exploded on the battlefield. Somebody threw it at him. So he was removed from active service and put on medical hold, basically status, worked for three years doing that. Actually worked at print shop. Seemed to be doing better, so he was called and reexamined for military service. Examination was marginal inconclusive. Sergeant came in, had two cane. Held his head oddly [indiscernible] class. I had a number of complaints, but he had been working and been working satisfactorily. Well the examination was done by a psychiatrist. The psychiatrist formed the opinion that he was [indiscernible] and didn't want to return to combat. The soldier complained or appealed this, and so there was an inquest.

During the inquest, it came out that the treating psychiatrist had done a lot, had provided a lot for the soldier, doing vocational work, work with plants, animals, music therapy, occupational therapy, again, some educational therapy. One of the main accusations was that he had used some electrical therapy, which was kind of like -- kind of a variant of alpha stem or something and that he had isolated the soldier when he was overreacted or something.

So then what do we do in hearings and forensic and legal cases? Well you pull in another expert. And as we all know in court hearings or something, if you ask three psychiatrists or three psychologists the same question, you'll get five different answers is one of the jokes. So a civilian psychiatrist was called to rebutt this. This civilian psychiatrist didn't participate in the war at all, even though he could have. Sat out the war, just kept seeing his own private patients, although everybody else was involved in the war, and he decided that he was not malingering, but had organic damage. And then he went on to lecture the rest of the ward about how they were supposed to be doing some other exotic or impractical treatment. The newspapers caught wind of all this and, of course, this is in the newspapers and so psychiatrists and arguing and newspapers exaggerated everything.

Was this a case that could occur in your clinic any day this week? I know this is a case that walked into my clinic essentially probably several times a week in the years that I was running the TBI clinic. However, this case I didn't have a picture. I had a picture and I had to take it out because I didn't have copyright for the picture. The picture is of Sigmund Freud, because this is a case of Sigmund Freud, and the point is that I don't think the presentation or the problems faced by soldiers with concussive injuries and stress and PTSD has really changed in any significant way from when we first started looking at this, which was at least the first World War, if not before the first World War. But this was a real case.

And what Freud did was Freud -- I was kind of disappointed in Freud in this manner. Freud, again, the people that are out working in the field treating the soldier, he berated them and wanted them to all be doing psychoanalysis with patient, which, of course, wouldn't work.

But this is what we're facing today, is how much has a patient been damaged organically from blast exposure? How much of the residual symptoms or the persists symptoms, how much are they related to stress reactions? How do those interplay? What's the best method of treatment? How do we work with that? I have several slides. I'll kind of flip through these somewhat quickly.

But in looking at anxiety, Steven Stahl has a very good way to do this, and if you can see bottom of the slide, these are all included in Third Edition of "Clinical Psychopharmacology," which he publishes. He's very well known for his pharmacological work and for addressing this. And one of the things that we want to do is look at this particular symptom of anxiety and deconstruct it into its component parts, and we can provide a much more effective treatment.

We had a lecture just two weeks ago here at the medical school on -- actually, we had several recently. But this particular one is looking at genotypes, and I'll talk about that in a minute, and phenotypes, and how if we can identify the genetic components of anxiety or other disorders we can tailor where the future of medicine is going to be tailoring medical treatments and pharmacological treatments toward various components.

So here we have anxiety, made up into fear, panic, phobia on one hand, and then worry on the other hand, symptoms of that. The amygdala-centered circuit running through the amygdala, which is responsible for fear, is the circuit that modulates fear, panic, and phobia. The other symptoms here, worry, anxiety, rumination, obsessions, seem to be mediated more by the clinical cortico-striatal-thalamic-cortical circuit. I've got a picture of that. But that's just a different circuit. They're all interrelated. And the amygdala links in functionally with many other important brain structures, the prefrontal cortex, the thalamus, which also processes pain; the hypothalamus, which processes some of the key hormones and neurotransmitters that result in PTSD; and brain stem of the raphe nucleus, locus coeruleus. I'm not pronouncing that very well. But those are structures which generate the neurotransmitters, serotonin, epinephrine, and so forth. And then we look at generalized anxiety disorder and pull that out separately, panic disorder, fear, again, related through the amygdala over the frontal cortex, and so forth.

And where we're going with this is that genetically we're looking at some aspects of stress and PTSD, which, of course, vary among people. One of the reasons that these vary is because of both phenotypes, people have different genes and genetic histories and phenotypes, and also because of different things in the environment. But when we look at the statistics from Vietnam forward about PTSD, we find that the statistics early on right after the Vietnam war were quite exaggerated. There were a number of reasons for that. But they were basically double what we determined later that they actually were. The American Psychological Association and some of its official work, and other literature, these have shown that of people exposed to severe trauma, 85% of people do well. They are able to tolerate trauma, able to get through. They don't develop formal criteria for PTSD. The incident rate for PTSD remains about 15%, although we think that has risen some with the recent conflicts because of redeployment, redeployments and so forth.

Other percentages don't develop PTSD. We think -- here on the left-hand side of the slide -- part of the reason for that is that they have probably more resilient circuits, the fearful fight stressor is a stressor that Stahl and other researchers use to measure brain circuit reactions. And what the resilient people have more typically is a long SERT of genotype. SERT is a transporter. It's a serotonin transporter, and what it probably does it is probably results in more serotonin being in the synaptic gap and less gets taken back up. So the individual, we think, has more serotonin naturally available to them, which makes them somewhat more resilient.

On the right-hand side we have people with a different genotype of SERT, in which we think that the serotonin probably gets taken up more quickly. There's less available in the synaptic gap, so these people are more vulnerable towards a deficiency of serotonin. When that becomes compromised due to stress, the amygdala becomes hyperactivated, kicks in, and then this leads to major depressive disorder, PTSD, or anxiety disorder, and it also depends on the number of life stressors, which, with our soldier population, is directly dependent on the number of redeployments and the op tempo that we're going through, as well as chronic stressors.

And then I put right in the middle of here you add in TBI or concussion with that mix and you have, of course, a dual diagnosis or dual disorder, which can take quite a toll on an individual. The way that the PTSD factor takes a toll is through the what we call the HPA axis, which is the adrenal glands generate nor epinephrine and adrenaline, and this is in a circuit that then affects the hypothalamus and the pituitary gland, which involves cortisol and other hormones. The end result is that there's tremendous sympathetic -- activation of the sympathetic nervous system, and not only is that activated in a fight or flight response, but since this is dumped into the system, and in the system for such a long period of time, that there is a persistent hyperarousal that just continues if these symptoms continue on a long period of time.

Also, when I educate the soldiers and talk to them, they had to understand this these are basically hormones, and hormones are designed chemically to have long-lasting effects. They don't go away quickly. They're designed to have lasting effects on the individual. This is always a quote that stuck with me over the years, and, of course, Audie Murphy was from Texas, was in Dallas. There's a house in north Dallas where he lived for a while. At one point it was a restaurant. I don't think it is now. But very strong presence of Audie up in our part of the country. And he was asked, "How do you get over the war?" And he said, "I don't think people really ever do." I think there is some truth to that in that you certainly don't ever forget those events, and they have long-lasting effects on us. Although certainly people can improve and can function well. And, as is well known, Audie Murphy had depression episodes. He had a lot of pain, so he got into some opioid abuse because of the pain, and had difficulty from that.

One of the things that stress causes in the brain and in concussion, and has taken a blow and may have some damage there to be begin with, depending on the severity of the injury, depending on the cascade of inert chemicals, some of which are toxic to cells, depending on repeated blows, if there's concussion or support. But then the presence of stress has long been known that that creates changes in the brain, rapid aging in the body, and in the brain itself.

And what happens -- two things happen -- is that the frontal cortex in PTSD shuts down so that then allows people to have rapid responses, and the hippocampus and hippocampal areas become overactive in terms of looking for fearful things or being hypervigilant. And over a period of time; however, there is growing body of evidence that the hippocampal areas will actually atrophy and show infection to that damage. When we first noticed this on functional MRI, the question was, well does it really cause the damage or do people have -- or the subgroup of people who have smaller hippocampi and that's why they're more vulnerable to PTSD. The evidence seems to point that the damage is actually caused by the PTSD, that that, indeed, is true. And so we can have long-standing brain changes both from the concussion and the stress.

One of the things -- I just include this because, again, as I mentioned, I'm training the staff here with the new modification of DSM-5 and some of the changes between DSM-4 and their has been a little bit of a change in terms of stress and PTSD categorization and that DSM-4, these were -- PTSD and acute stress disorder were included under anxiety disorders. And in DSM-5, the category is trauma and stress-related disorders, and that includes one of the changes reactive attachment disorder, not important for this context, really, just inhibited social engagement disorder. But PTSD, acute stress disorder, and adjustment disorder, so anxiety and stress, were all included in this trauma and stress-related disorder category, if you're using transition to DSM-5.

Also, I don't have a slide here. I did one for a grand rounds that I'm doing it in a couple of weeks, and just didn't think about it. I probably could have included it. But there have been some differences with the PCL checklist for PTSD, the PCLM, in that there are a couple of additional changes there, and those forms are not necessarily equivalent now if you're going to use the PCL in conjunction with DSM-5.

Here's another case study, and this is the Red Baron, who is really Freiherr, that's German, and of course, von Richthofen. And many people know about his combat experience or his success as an aviator, one of the few people that won the Pour le Merite, which was the highest Prussian award, and

he's wearing that on his uniform. But what people don't know, and many people don't know, is that he actually had a concussion, and this is a classic example of, again, a case that which could see today if he walk into our office.

What happened was he was flying and a machine gun rammed, went through the cockpit, hit him in the head, and fortunately didn't penetrate his skull as far as I can tell. Apparently it caused a depressed skull fracture, shattered, and then bounced off. But he had a depressed skull fracture with shards of skull. Apparently he lost consciousness or had significant alteration of consciousness and was partially blind, and, miraculously, he was able to come back to just in time to get the aircraft back under control, and he basically crashed. But since he was able to control the aircraft and bring it in, he survived. And there are pictures of that crash of his aircraft, which I didn't include here.

He was hospitalized. Didn't just have one surgery, actually had multiple surgeries for all these bone splinters. A concussion was diagnosed. It was recognized. And it was also recognized that he had PTSD, although, of course, in those days the English would call it shell shock. The Germans had different terms, but the Germans did recognize that he had nervous anxiety reaction to combat. He insisted on returning to duty. The physicians actually advised against it, and there's an extensive medical evaluation, which was written at that time, which was basically accurate. It said he had concussion and PTSD symptoms, and the doctors didn't want him to go back to flying.

Well he did, and what happened was that he flew into lines that were manned by Australians. He got fixated on another aircraft. This is also a system of TBI, is excluding other things, becoming fixated, not aware of other things. He got violent. And he followed this English aviator into dangerous territory and was shot. They now think by an Australian from the ground. They've done a lot of work on that, but was shot and that caused his death. So the combination of concussion and PTSD really, really led to his death there.

In terms of being stressed, when we look at anxiety and stress, I guess people's immediate reaction or immediate thinking is lower your stress from combat. You're in a combat environment and so forth. But the reason I point out here -- and I added a few things -- is look at other areas of stress also. Look at other etiologies of stress. Look at all the things that impact an individual that impact their psychological makeup. Impact stress. He was stressed at being grounded. He was actually the commander of the unit, so those of you who have military backgrounds and those of you who work with military obviously, if you're the commander of the unit, you have a great deal of responsibility, probably feel more responsibility than many other people. I can't be grounded. I expect my men to be out here flying. Expect them to do their duty. How I can sit behind a desk and not do that. So just the fact of being grounded, very high achieving ambitious individual, it was hard on him. Also, he was separated out from his comrades out flying and so forth.

Now I was [indiscernible] 785th in Iraq and, of course, I've seen this other times too. But one of the main problems that we had in a COSC unit like that is, when we're treating people, one of the things that are apparently concerned about is they don't want to be separated from their buddies and from their units. That unit cohesion is essential, and you want that cohesion to be there. And it's also very anxiety provoking when people get separated. So if we're trying to treat people and their buddies are out on patrol, even if it's for a day or two, that causes stress significantly. Stress is being a perceived failure.

Also, here is a national hero. So he kept saying, look, I'm a national hero, if I sit on the ground and don't fly, I'm a failure. And he was extremely anxious to resume his duties. The point is that it's not just the combat, but there are other stressors in people's lives; how they're perceived by their family, how they're perceived by their comrades, what their duties are. So look at all those avenues of stress and see how that is going to impact down and impact their recovery from TBI.

This is another case that I published in European Medical Bulletin quite a while ago. I've never seen a case like this again. It's quite fascinating. But neurologist, Steve Hefrin [ph] was in neurology clinic with me there at Landstuhl years ago, and this was 12-year-old girl who suffered a concussion after falling off a motorcycle. Was driving it without a helmet, fell and hit a curb, and she developed what's called

hemiballismus. It's a very rare symptom. It's seen normally with older patients because it can be associated with a bleed, which basically interferes with basal ganglion, the basal ganglion or the striatal areas of the brain, which are involved in motor movements and extrapyramidal movements. Those of you who are familiar with either Parkinson's disease or the neuroleptic drugs, which result in extrapyramidal side effects, pill rolling, rigidity, cogwheeling. The area of the brain that's responsible for that is basal ganglia, a lot of the basal ganglia.

Hemiballismus is flailing movement on one side of the body, the leg and the arm for example, because in a stroke those are usually damaged unilaterally. So she came into the hospital. We got a baseline of the number of episodes that she had of this flailing. We then treated her both with some mild medications, I think for mild antidepressant if I remember all these years. But treatment is primarily behavioral. So I treated her behaviorally with behavior modification, and also counseling. And you see the dramatic decrease here of the symptoms until they disappeared.

I think about a month later she came back in. It spiked up again. And what happened was she had to take a test school, and by developing the symptoms she was avoid taking the test. So we dealt with that and the symptoms disappeared and went away. But a very fascinating example of anxiety and that occurring in concert with concussion. The concussion cleared up and she was doing okay academically. But certainly you have to look at both the anxiety and the concussion together to treat problems like that.

Now one of the innovative ways that we started looking at stress and anxiety symptoms was with an event which we call the "Traumatic Event Sequelae Inventory." This inventory was originally designed for worker's comp cases and normed on something like 70,000, 80,000 workers comp cases who had been hospitalized for injuries. Dr. Christopher and I then took this and we also -- originally it was a quality assurance program that we had. We were both in permission survey in 2007, at General Hospital, so we were using its for quality assurance and we were screening patients and providing appropriate treatment. And we wound up getting about 10,000 patients, soldiers, mostly from the 4th Infantry Division. We actually calculated and analyzed the scores on over 6,000. It's very short. One advantage is it's very short, it's 39 items. They're very simple. It doesn't take much of a reading education. We collect the information on a number of deployments. And it's also, by doing this, it's broken into a variety of symptoms, which I'll show you in a minute, which were associated with stress. And this is what we did.

We eventually collected this and presented it to hospital commander as a more formal internal study to show that how we were going to be setting up the TBI clinic, how we were going to provide treatment, organize that among our treatment team, and one thing we found here that I included in this is that when we looked at patients who had concussion but weren't really anxious and weren't really stressed that much, they scored much lower than people who had conjoined concussions. So high scores on this, high stress and concussion bumped up the scores by at least one level, and we also found a gender difference in that we know that females typically tend to be more vulnerable to things like PTSD, and so we found that females tended to be injured more severely if they had both concussion and stress disorders.

So another indication of looking at your patient population, the diversity of the population, and tailoring your treatment to what people actually need and to help them recognize that there may be some differences in tailoring it to what they need. Also, since with the GWAT -- the war has lasted so long, still going on, of course, and with the multiple deployments, everybody's aware we had many reserve people coming in, especially at Fort Hood. We were the largest deployment platform, so we had a lot of older folks. And I'm not going into it here, but we analyzed it in terms of age, and we had folks who were much older than you would typically see in previous conflicts being injured and also stressed and so forth.

And then this is a patient, again a real patient that came to Camp Liberty in Iraq. For those of you who don't know, Camp Liberty is out by the airport, in kind of the lake area where there are palaces and lakes. And what I did was I was a circuit rider. I was primarily based out of Liberty, but I went around to several fobs and camps in that area. And we also head from Blod all the way south to Mahmoudiyah. So I went up there and went down to Mahmoudiyah. I was the brain injury consultant for the theater, the DCCS. They asked me to do that so I traveled around. But this patient was Camp Liberty, and he walks in one day and he says, Hey, you want to see me get blown up? Actually he was referred for memory loss, for

memory difficulty. He couldn't remember things. He was having trouble focusing. That was the basically the original referral, and he asked me if he wanted me to see him get blown up. I'm thinking, what in the world are you talking about.

It turns out that -- and that did not -- something's not showing there. I'll figure out what it is here in a minute. [inaudible]. But he had a flash drive that was taken all a security camera, so I was actually able to watch. A vehicle pulled up behind him at a gate in Baghdad and blew up directly behind him and his buddies. And so it was just fascinating to see what actually happened, because you hardly ever get to see it. You have people describe it, this happened to me, that happened to me. But it was amazing. But this is his TESI results, and here the TESI is divided into clinical issues, social withdrawal, hopelessness, inadequate self care, disassociation, dysphoric mood, depressed mood, concentration deficit, general functional disturbances, and so he scored quite high on this, and he's severe on everything else too. The red is most severe and also what I thought correlated correctly with symptoms experienced by Richthofen. I thought that was fascinating. And, yeah, here is the MPI.

Oh, I know what was missing here. For some reason it's not -- yeah, what did not show up here for some reason is the RBANS results. So he was given an RBANS, and memory and memory processing. Immediate memory and delayed memory were the lowest scores here. So he's presenting with memory problems. It shows up on the RBANS. He presents with very high stress levels here. And here's his MMPI. Highest scores are depression, which is 93. Scale seven used to be known as psychasthenia, that measures anxiety, rumination, all those symptoms that I showed you before, they were subsumed under Stahl's anxiety phenotype, measured by scale seven.

For those of you familiar with the MMPI, you get a code for this, and the two-point high code is a 2.7, and that code is typically associated with depression, anxiety, stress disorders, any reactive depression anxiety, a single episode measure of depressive disorder, those types of things. It turned out that his cognitive symptoms from the concussion actually cleared quite nicely, and as we treated it him, we found out he was having severe home-front problems, especially with the spouse, and these were severe enough to where they were causing, actually, most of the symptoms. I put him on Zoloft, I think Ambien. I don't have the results here. But we treated him. He wasn't sleeping, so we put him on Ambien to help sleep. Put him on a trial of Zoloft, which helped quite a bit, and did counseling, and he recovered.

So after treating him asymptomatic, recovered quite nicely and dealt with whatever was going on at home. So, again, the combination of TBI, concussion, anxiety, and by addressing the anxiety components, we got good results, and we didn't focus on you can't remember things because you're brain damaged. That didn't seem to be the case, and so he didn't see himself as a brain damaged person, was quite happy with his treatment and was pleased with the result.

Now these, I don't think are cited very much, but back in the '80s we used to present this to National Brain Injury Association, Texas Brain Injury Foundation. I think it's changed its name now to the Texas Brain Injury Association. But they're still good classification, and I think they're very useful, and I think they're helpful in that this is not a spectrum disorder just from one grade I can't to another. But I think concussion is best conceptualized as being falling into different clusters, kind of like migraine headache. Migraine is not a linear disorder but has different cluster presentations, and type one is an uncomplicated concussion in which people generally recover quite nicely, and these are the majority of concussions, especially in civilian life, and we know people do well, especially after uncomplicated concussions.

Type two is concussion complicated by emotional factors, and this is the type that we generally see in combat, with concussion, stress, deployment stress, op tempo stress, PTSD stress, that sort of thing. Type three, we also see in combat frequently, and the is concussion complicated by other medical factors. Well what are the medical factors you're going to have? What is the primary or the main symptom about other medical factors? I think the most frequent medical factor is pain. And I'm just looking here.

I haven't been checking the people typing in questions. Somebody asked how long was the patient on Ambien. The patient we referred to earlier was probably on Ambien about three or four weeks, and then recovered for normal sleep patterns, so just to answer that question.

Again, frequent comorbid disorder is pain, so always check. Sleep disorders and pain, along with stress, PTSD, and concussion. Sleep disorders are frequent. Pain is frequent. They both contributed cognitive disorders and you're not going to make any progress if someone is not sleeping well. Sleep is probably -- in fact the other part of that survey that we did with the 4th Infantry Division was sleep disorders were the most frequent symptom experienced by everybody in any category however you looked at, because we know that soldiers have sleep disruptions because of the nature of the jobs.

And then type four are your cumulative or repetitive concussions, which are the most dangerous because they result in repeated injuries, repeated concussive damage to the brain and so forth. And those folks are quite susceptible to anxiety on top of it. And then type five are your concussions which are more factitious or perhaps simulation, usually those are probably documented or doubtful. They present with bizarre presentations and there may be secondary gain with that. But that, unfortunately, is a distinct category. The good news is organically they're intact, and the good news is they do respond to treatment if they're treated. Bad news is they're difficulty and sometimes they're not recognized.

Just to quickly give you an example, I talked about Dr. Jackson and also breaking the assessments of anxiety to different components, and one thing that we found when we looked at this over the last 20, 30 years and continue to be true today, is that there are a few personality batteries designed for brain injury. You know, most of the personality tests, like MMPI, were designed and originally normed on psychiatric patients, then later on somebody gives them to brain injured patients, gets them different norms. But very few have been specifically looked at in terms of brain injury population, and sometimes traditional batteries, the Halstead Reitan, for example, essentially ignored personality factors. It just concentrated on organic types of factors.

So back in the '80s we did an international project of five medical centers in Great Britain, five in the United States, and as far as I know it's the largest personality study that's ever been done specifically on brain injury. That was reported in Journal Blain [ph], and what we did was we used the Katz-Lyerly Scale, which a lot of people are not necessarily familiar with, but it's a very important scale, been cited over 200 times since it was developed in 1963, and it develops measures for assessing adjustment, patterns of disturbed behavior, psychopathology, uses everyday language. It's easy to use.

And what we did was we, initially with this study, we had patients -- we had family members rate patients before their injury and after their injury. We also used a control group of spinal cord patients, so we were able to look at orthogonal analysis of the symptoms that were actually due to the brain injury and not due to other factors like pain or injuries like quadriplegia or whatever. And the slide is a little bit disorganized here, but we broke out analyses with belligerence, irresponsibility, speech disorder, paranoia, bizarre behavior, and cognitive dysfunction, I think is one, and perhaps sleep disturbance. But we were able to identify key factors directly related to personality change with brain injury.

This is a particular patient we had in rehabilitation. The red columns represent the pretest, when he started treatment, and the green line is after treatment, where we saw a decrease in most of the symptoms. The speech -- and since this slide is disorganized, I can't remember exactly what the other ones there in the middle are -- were symptoms that weren't too bad to begin with. The other symptoms were personality changes like belligerence and being irresponsible, and he improved markedly. We then developed that into another exam, which we're using now.

But for this particular slide here, we went back and used the TESI that I showed you before, quick to give, easy to give. This is down Mahmoudiyah, and this was actually given to Iraqi civilians, so we didn't have to go through -- they weren't detainees, we didn't have to go through any of the problems of legal issues with that. But the troops down there were trying to help the local civilians who had been traumatized, and, you know, war in that area everywhere. It's just unbelievable just how much trauma these folks had been through. Everybody had somebody in their family who had been killed or died or dragged off or

kidnapped or captured, and they had been injured, the house destroyed, and this is just a slide from prison camp where my father was in Germany, and living conditions, living out in the open with a tent and cooking with little -- they used to make little cook stove out of [indiscernible] cans, and just illustrates the stress of war doesn't change much. People are subjected to this kind of thing, and that's what the Iraqis that we had were subjected to.

Now I'm sorry this slide is apparently didn't come through in the conversion. But I can explain easily what they were. We took that and looked at, again, factors, and we divided it into systemic factors such as cardiac effects, endocrinological effects, dermatology effects, people have rashes and boils and cardiac problems. So by using that simple stress measure, we were able to look at medical systemic effects in several different systems that they're affected by stress. We then broke that into other dimensions in terms of, again, cognitive effects, irritability, can't get along with family, substance abuse, and we're using those to provide guidance to work with folks.

Now we took all of this, mainly the Katz-Lyerly data, and we put it back into what we now call "neuropsychological impairment correlates." The advantage here is that this could also be a family member or a clinical person or a therapist rating an individual on their problems. And so they can be rated and come up with dimensions of stress like that that break into treatment patterns.

Finally, we do want to look at when stress becomes either overwhelming or when there are other issues related to stress. What happens when people dissimulate or engage in behavior which we would classify as factitious or whatever. One of the things that happened to us at the TBI clinic at Fort Hood was actually, this is amazing, this actually happened three or four times. We were evaluating patients and they start to tell us, "Well here's what happened to me, and here's how I got hurt" or whatever, and they're telling us a story, and they wouldn't realize that they're telling the story to the person who was there at the time and knew the story wasn't correct.

For example, we had one fellow who came in and had said that he was in the middle of all the shootings and all this. We check into it and we found out he was in El Paso. Well his story was that he had a brain injury in Iraq, I think, [indiscernible], had PTSD from that, and then had been as Fort Hood during the shootings. It turned out he never deployed to Iraq. He was in Japan in a garrison job, and when the problems happened in Fort Hood, he was in El Paso. And he's sitting there telling the people who went through the incident. So pretty amazing what you can see at time.

This example is actually a civilian patient who fell from a car. She had been purchasing clothing, wholesale clothing. Had a retail store, and so she was on a shopping trip and she was purchasing clothing. She was trying to put in the car and fell. She was up on top of the car for some reason and fell and landed on her rear end and said she had a headache. No real indication she hit her head but her elbows hurt. But since she was purchasing agent for a company, she's then suing company. And came in and this is her copy, initial copy, of the complex [indiscernible], which is total aberration, as everyone can tell. It turned out that it was completely factitious disorder, just related to legal issues, and they eventually threw her claim out.

This actually was a soldier, and the grey figure here -- the figure itself is not copyrighted and this was not taken from one of the copyrighted tests, so we can do it here, and there are alternate figures as well. But just to illustrate. He's trying to copy this figure. This particular soldier came in and was asymptomatic. He had simply had been referred over on a routine basis by [indiscernible], and, in fact, his wife kept calling up to the clinic and was asking, "Well, why are you seeing him, he's not having any problems." And we were discharging him and sending him back to duty, and I can't remember what happened, but something happened.

He then start claiming problems. And he did have the some respiration problems. A vehicle caught on fire and he breathed some smoke, and so he was being treated for that. Then he came in and started do this, he draws little boats to the [indiscernible] figure, and then here's a recall trial, and he draws me in a boat and an airplane. What that has to do with anything, I don't know. It got worse and worse. Came in one day, couldn't remember his name and has to look at his own name tag to figure out what his name is,

all the while, he's functioning fine. He's driving, working. We called his supervisors, was doing okay at his job. But he deteriorated, deteriorated, developed what I thought was a pseudodementia, was in a wheelchair. Finally went to the medical board and was separated. So, again, a progressive factitious disorder. So you'll see some of these occasionally.

What you typically look for with factitious disorders are a large number of complaints, especially if they're atypical or bizarre. For some reason we went through a rash where people couldn't tie their boots, and which I thought was interesting. So we had a whole series of people who couldn't tie their boots. Again, this guy is looking at his name tag to remember his name. Those are bizarre symptoms that aren't really related to concussion.

Large numbers health-care practitioners being consulted, bouncing from person to person. The more you dig, you find there's probably premorbid second pathology, and test performance is not consistent with what they're doing in terms of community functioning, such as performing poorly on the tests but driving a car or vehicle just fine. And I don't remember if I have it on the next slide or not. Yeah.

The other thing that we noticed years ago is that there's also maybe an avoidance of contacting recognized treatment programs or contacting the Brain Injury Association or the clinic that actually -- so they're running around seeing everybody else but they're not in contact with Brain Injury Association, with DVVIC, with the TBI clinic.

And this 39 ducks praying in the street -- and there's nothing wrong with praying. In fact, we need to address the spiritual component, people do, and that's extremely important in their recovery. But the reason it's mentioned here is with 39 duck, is that a few years ago some hysterical patient supposedly manifested his 39 personalities as ducks and what was kind of famous case. This particular patient actually did have an injury. Nobody doubted that. He had been seen at the clinic, had been diagnosed and treated, and we had MRI evidence of injury. In fact, he had 39 small hypotense areas that showed up on the MRI. Everybody new that. There was no question about it. He was treated appropriately. And he then went about his business.

He was assigned to the border battalion. He went through his medical board separation. And something like two years later, he comes back in, claiming symptom after symptom that he can't study in college and can't get an over-the-college course and so forth. So I looked into this, found out that he had failed out of college three times before he ever came in the armed services. This was kind of a pattern. He just didn't do well in those environments. And it wasn't anything new. And time was getting short, he was going to go through his medical board. There was nothing that we could do in our classification that would change his medical board classification. We had already given it to him. And our recommendation was that we spend the remaining time that he have helping him with studying strategies and memory strategies, helping him to do better with what he's trying to do in college and the job that he would have when he got out.

He didn't want any part of that. He wanted to go and get more MRIs, and for some reason was convinced that somebody else was going to find a brain injury that was causing this and do something else. We never could understand what it was. And so he and his family had a big gathering out in the middle of their street in housing to pray for him, and kind of a histrionic way to do things, and never did what we recommended. So wasted a lot of time, and the end result was the same that we had done all along. But we think it was a way to kind of deflect the stress from not doing well at school and, you know, put it back on the brain injury or something. Again, you see activities of daily living pretty well maintain. Again, he was doing things quite well, except for his complaints.

And sometimes you see people with bizarre behavioral outbursts that doesn't seem to fit PTSD or anything else. And also pain complaints, which sometimes pain is there, and it gets worse and worse and they say, "My pain is caused by brain injury." So you have to investigate all these factors in order to treat people appropriately. It looks like we have about ten more minutes to wrap up and we'll have question and answer. And we are coming to the end here, I think.

This comes from the VA/ DoD working group consensus, which is involved in the VA publication on concussion and PTSD 2004, and the overall consensus on how to deal with this is, again, develop supportive therapeutic alliance, work with a specific primary care provider to coordinate treatment, as in the case that we just -- we had that with the case I just presented, but, again, he goes outside the system consulting everybody else. But that coordination is crucial so that the team can work together, so we can work together.

I'll finish up with these Xantho pharmacological treatments. Obviously consult with mental health providers, have a clinical team approach, and use your evidence-based treatment modalities when you're doing that. Stahl has -- this comes out of not his brain injury pharmacology but more just with PTSD and anxiety, so I left it at that, because these are certainly different components, and all very similar.

But the first level, first line strategies are pretty much applicable all of them, in that the serotonin reuptake inhibitors and the SENRIs, serotonin norepinephrine reuptake inhibitors, like Effexor as an example, we have a DoD level-A rating. They have the best evidence that's been in evidence-based practice, so your serotonin and norepinephrine reuptake inhibitors are usually your first line now with these disorders. Second line include some of the other agents. TCAs, we've found most useful would be something like Trazodone for sleep at night. It's an older tricyclic antidepressant. And also Gabapentin is quite useful because it's addressed as both pain and sleep. And right in the middle he has Benzodiazepines, which have a little warning sign there. And in terms of the DoD recommendations, those are also recommended as either not really being useful or used very judiciously, be careful with it.

Up on the top, occasionally you'll see patients who are not only not sleeping but also instead of putting on weight they're losing weight. So Premeron or Mirtazapine is also good a good agent for those kinds of patients. This is for your anxiety therapy. I've got the Benzodiazepine marked there not because it's preferable. He's got it listed as first line. Again, your SSRIs but he also has, if you'll notice, if you'll notice Buspar out to the side, and if you use these agents be careful with the Benzodiazepine. Use them very briefly. Monitor them, and we'd prefer not to use them. And I would much prefer Buspar. A lot of times I would start people on that. Or if they were on Benzodiazepine, the other strategy is to taper that off and go to Buspar. You'll have better success. You don't have the dependency issues.

Panic pharmacy, again, SSRIs, and the same thing here with social anxiety. So these are -- those are your acronyms. Those are your pharmacologic agents, which are now pretty much tried and true and will work with your psychotherapies to help. Again, look at ethnic differences, gender differences, phenotype differences, and try to tailor your treatment towards the person's needs and try to help them. We found the presentation we had two weeks ago that something like 30% of people were not responding to pharmacological therapy because when we ran their phenotypes, that had a phenotype that was not compatible with that medication. And nobody really knows how to do that perfectly now, but the field of medicine is moving in that sort of direction.

And then to wind this up, in terms of stress, I don't know of things that are much more stressful than this. This came from Texas A&M University, and these were a group of pilots that went on a particular mission in 1970, but between them, they flew 1,401 Vietnam combat missions. It was pretty stressful, and every one of them has been pretty successful, bankers, engineer, general CEOs. But this just demonstrates that people can handle stress. Now they didn't have concussions obviously, but can handle stress, can handle factors that can lead to PTSD. They are not disabled victims but lead successful lives, and especially with the young soldier population, people that have 30, 40, 50, 60 years of life ahead of them, this is where you want your soldiers to be. You want them to be resilient. You want them to be treated successfully. You want them to see themselves as I overcame this. I'm a survivor. I'm a winner. I can persevere. I can learn to take care of myself. I can learn healthy choices. I can learn to live a wellness program, and I can get on with my life and be successful.

So I think we'll go to references. So very much appreciate the opportunity to provide a lecture today, and I guess we're going to do questions and answers and so forth here.

Thank you, Dr. Hopewell, for your great presentation. If you have any questions for our presenter, please submit them now via the Q&A pod located on the screen. I wanted to do a product for you. March is Brain Injury Awareness Month. With more than 500 activities planned, DVBIC is well poised to promote brain injury awareness among active duty U.S. Service members, reservists, national guardsmen, and veterans, and/or their families, and the health-care providers who serve them.

Please join us on March 2nd at 1:00 p.m. Eastern Standard Time for the International kickoff event, which will be broadcast from the Walter Reed National Military Center, with optional online participation via Adobe connect. The TBI educational forum, Best Practices and Current Research, will highlight clinical pearls and promising research that will impact your practice, TBI Care in the VA Health-Care System and Concussion Prevention. This event takes place on the regularly scheduled DCoE March TBI webinar, and registration will be announced at a later date.

In addition to DVBIC and DCoE, we'll participate on the March 18th, Brain Injury Awareness Day on Capitol Hill organized by Congressman Bill Pascrell Jr. and Thomas Rooney, co-chairs of the Congressional Brain Injury Task Force.

Throughout March, the DVBIC Facebook page will be highlighting TBI information and resources for service members, veterans, family members, and health-care provider, as well as Brain Injury Awareness Month events. Finally, to promote brain injury awareness in March and beyond, DVBIC has developed an 18-by-24 poster with the slogan "Change Your Mind About Brain Injury; Prevent, Recognize, Support. This poster is free and may be ordered as [dvbic.dcoe.mil](mailto:dvbic.dcoe.mil).

It is now time to answer questions from the audience. If you have not already done so, you may submit questions via the question pod located on the screen. We will respond to as many questions as time permits.

So, Dr. Hopewell, I have one for you. Is the TESI, the Traumatic Event Sequelae Inventory, typically done by a behavioral health specialist, or is it something that a primary care provider can do in their setting?

No, it could be done by either one. And if people are interested in that, I gave the website link, but I'm more than willing to have you contact me if anybody has any trouble locating materials or anything that we reference, because these aren't really widely published, but I think they're very useful. But certainly it can be given by a primary care person. The presentation I'm going to give in a couple weeks, I pulled -- the presentation is on screening instruments, by coincidence, and I pulled an algorithm from one of our NTFs. I don't even know where it came from, so I wouldn't even mention where it came from. It's very good, and it shows a screening with the PDHQ, which is screening for depression given in the primary care clinic.

The nurse case manager looks at those, pulls ones that are, you know, elevated in the score, and there's an algorithm to refer them on to behavioral health, social work, psychology, a very nicely written algorithm, and I'm using it as an illustration as to how screening instruments can be used in primary care and getting people where they need to go. So that's an example.

TESI could easily be used for the same thing, or if it's given by a mental health professional, you give a print out of clinical problems that I mentioned here, such as cognitive issues, pain issues, irritability and so forth, so it could be used either way.

Great. Thank you, sir. The next question is how do you differentiate the factitious disorder from malingering?

Factitious disorder, well I think the primary differentiation is conscious volition is what most clinicians will address, and it's hard, it's very difficult. Malingering is a clear indication that the person is faking something. They know they're faking it. They're doing it deliberately. There's a deliberate component to

it, volitional component, and it's done for a particular purpose, such as gain, secondary gain, monetary gain or something. Obviously we may not always know that because patients also don't want that known.

Factitious disorder, however, is generally felt to be more of an unconscious disorder in that the person is, as best we can tell, they're probably not doing it deliberately or willfully. It may be more because of emotional disorders, emotional problems, and so it's more of an unconscious reaction. But it's clearly a psychological issue, and when you're talking about brain injuries or, again, in classic terms with Charcot and Freud, looking at paralyses and so forth, what the thinking is is that the medical organic component is intact. The person is not really a paralyzed person. The person doesn't really have a brain injury, but they're presenting symptoms that similar to that. But if they're doing that because they're overwhelmed emotionally, they have a stress disorder, it's not deliberately done for a clear secondary gain, it's more likely to be placed in the factitious category, but factitious simply meaning that it's not an organic problem, it's an emotional one, mimicking the organic difficulty.

Great. Thank you, sir. And the last question is regarding the last few slides that you had on the pharmacotherapy. So are there any pharmacotherapy differences when treating an acutely injured patient versus a patient with persistent anxiety, and if so, what would those recommendations entail?

Well with somebody who is acutely injured, it also depends if you're on the battlefield or not. The battlefield presents a particular problem because we want to get people back to the units and back functioning. You also can't do that with sedating, you know, soldiers or giving them things that are going to create cognitive difficulty. You don't even want that in garrison, because of the equipment people are using or so forth.

But for acute injury, I would probably be more likely to use a Benzodiazepine agent for a short period of time, and a sleep agent to, again, quickly reestablish sleep and get them to feeling better, and then taper back down with that. Probably on a longer basis probably want to build up something like serotonin agent like Zoloft, and built it up over a period of time where the person is getting used to the medication, and it's having a longer-term period of effect. Also have to look at any of these medications, if the person hasn't been on the medication before and doesn't matter, let's just take Zoloft or Effexor for example, then it takes a while for their body to get used to it, and you're going to be starting with slower doses and building that up.

So with acute injury, I guess getting the symptoms under control, reestablishing the normal rhythms and getting them to function, and with the longer-term injury, looking at moving into a maintenance phase and maintaining progress, and improving their wellbeing in the long term.

When we look at, again one of the things I'm doing here with the therapy program and with both medications and psychotherapies, you want to look at the initial phase of treatment, which is issue of suicide, sleep, and vegetative symptoms, then there's a maintenance phase, and then there's long-term continuity factors. I think I got that backwards. There's continuity phase in the middle to look at are people really improving or do they need augmentation, and then you have your long-term maintenance phases, keep them well, keep them from relapsing, keep them from having other problems.

Thank you, sir, appreciate that. So I just want to thank, Dr. Hopewell, for this wonderful presentation today, a lot of great information, love the case studies and learned a lot about different medication treatments and different management.

So I want to say, after this webinar please visit <http://continuingeducation.dcri.duke.edu> to complete the online CE post-test and evaluation and download your CE certificate or certificate of appreciation -- excuse me, certificate of attendance, apologies. The Duke Medicine online CE evaluation and post-test will be open through Thursday February 19th until 11.59 p.m. Eastern Standard Time.

To help us improve future webinars, we encourage you to complete the feedback tool that will open in a separate browser on your computer. To access the presentation and resource list for this webinar you may download them from the files pod on the screen or at the DVbic website, [dvbic.deco.mil/online-](http://dvbic.deco.mil/online-)

education. An audio recording and edited transcript of the closed caption will be posted to that link in approximately one week.

The chat function will remain open for an additional ten minutes after the conclusion of the webinar to permit attendees to continue to network with each other. The next DCoE Telehealth in Technology webinar topic is "Clinical Benefits of Technology in Behavioral Health Care," and that's scheduled on February 19th, 2015, from 1:00 to 2:00 p.m. Eastern Standard Time. The next DCoE Psychological Health webinar topic, "Physical Symptoms and Mental Health," is scheduled for February 26th, 2015, from 1:00 to 2:30 Eastern Standard Time. And lastly, the next DCoE TBI event, "Traumatic Brain Injury Educational Forum: Best Practices and Current Research," is scheduled for March 2nd from 1:00 to 3:00 p.m. Eastern Standard Time.

I want to thank Dr. Hopewell again, and thank you all for attending and have a great day. Thank you.

That will conclude today's conference. Thank you very much for your participation. You may disconnect your lines at this time.