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► PERSPECTIVES FROM THE FRONTLINES

LESSONS RELEARNED: EXPERIENCES OF THE 286TH EYE SURGICAL TEAM DURING OPERATION IRAQI FREEDOM

By: Former LTC Sean M. Blaydon, MD, FACS, MC USA

Foreword by: Robert A. Mazzoli, MD, FACS, COL (Ret) MC USA

Perspectives from the Frontlines focuses on lessons learned (and relearned) from deployed providers. In this installment, we feature a detailed recollection from Dr. Sean Blaydon, MD FACS (then Army LTC) who deployed with the 286th Eye Surgical Team during the initial expeditionary phase of Operation Iraqi Freedom in 2003. As the first surgical element sent to support initial ground phase operations, the challenges faced by the 286th were markedly different than those experienced by all subsequent deployed ophthalmologists, who have had the relative luxury of working in fixed facilities and mature theaters rather than performing mobile operations out of tents under the highly fluid and ambiguous operational circumstances known as “the fog of war.” Given that any new war necessitates at least an initial expeditionary and highly mobile phase (but that prior conflicts demonstrate can extend for years) I enjoin all readers to pay close attention to Dr. Blaydon’s words and experiences, which read as a veritable textbook of lessons learned. Sadly, but predictably, many of those lessons are actually lessons re-learned—a review of COL (Ret) Frank La Piana, MD’s, recent exceptional memoir in

this newsletter from his Viet Nam experiences 40+ years previously [<https://vce.health.mil/Resources/Products/Newsletters>] should strike distressingly familiar chords—demonstrating once more that failure to incorporate and perpetuate hard-won successes and to maintain a high state of readiness for the next war invariably leads to institutional amnesia and regression. The hard truth is that when lives and



LTC Anthony J. Johnson, MAJ Sheri L. DeMartelaere, and LTC Sean M. Blaydon. (Source: Sean M. Blaydon, MD, FACS)

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eyesight are at stake, we can afford neither. At the same time, Dr. Blaydon highlights the need for keen forethought and awareness of anticipated casualties and circumstances, and the absolute necessity to maintain flexibility to address contingencies.

While almost every paragraph of this memoir contains important observations and lessons, we have highlighted several specific areas of relevance and added further thoughts at the end of the text. I realize this article is long, but I consider it sufficiently important that I make no apologies for providing it in its entirety as Dr. Blaydon submitted it. It deals with contemporary issues of our contemporary war and illustrates the hazards of ignoring contemporary lessons as we enter a contemporary period of decreased armed conflict. It will be up to us to decide how—not if—to make our improvements permanent.

— R.A.M.

An Army Surgical or Medical Team is a small unit of physicians, nurses, and enlisted support personnel that are used to augment the capabilities of an Army Combat Support Hospital (CSH or “CaSH”). Our unit was designed to be self-sufficient regarding personnel and supplies, but once in theater it would become operationally attached to a designated CSH.

Our particular Medical Team was the 286th Eye Surgical Team out of Brooke Army Medical Center (BAMC), Fort Sam Houston, Texas. There were three ophthalmic surgeons on the team, all from BAMC. I had been assigned as the replacement for the previous Commander in 2002. We were to be placed under the tactical control of the 1st Medical Brigade, 13th COSCOM, Fort Hood, Texas. In January 2003, the 286th Eye Surgical Team was made up of seven personnel: myself, an oculofacial plastic and orbital surgeon; LTC Anthony J. Johnson, a cornea and anterior segment surgeon; MAJ Sheri L. DeMartelaere, a

comprehensive ophthalmologist; LTC Marla R. Loring, an OR nurse; SFC Erin A. Blakemore, our Non-Commissioned Officer (NCO)-In-Charge; SGT Delina Walker, an OR Tech (all from BAMC); and MAJ Kimberly A. Fedele, a nurse anesthetist out of William Beaumont Army Medical Center, El Paso.

We always thought of the 286th as being more of a

“hypothetical” team. Training consisted of occasional M16 qualification at the range. There was no field training and we were completely unaware that there was actual medical equipment

assigned to us. So, when the 286th Eye Surgical Team was tasked to deploy to Kuwait in January 2003 for Operation Iraqi Freedom (OIF), there was a sudden sense of anxiety and urgency among the team members to quickly get adequately prepared [\[Click here to see Lesson Learned \(LL\) 1 on page 9\]](#). When we were taken to the 286th storage cage in a warehouse on Fort Sam Houston, we discovered half empty chests and surgical instruments strewn across the floor. There were two full-sized, disassembled Leica microscopes without their large Army green storage chests, and not one, but three old and heavy Bronson external electromagnets. After inventorying the scattered surgical instruments, we realized we had only one complete set that would be more appropriate for abdominal surgery.

After review of the available equipment and supply lists, the actual equipment existing in the 286th storage cage, and discussing what our needs were likely to be in a field environment, the team decided that we would need to start from scratch [\[See LL 1\]](#). Much of the equipment was outdated and too bulky.

We made the decision to have at least one plastic and two anterior segment sets. We made suggestions for deletion of certain equipment and replacements that would make the team more effective, efficient and more “mobile.” For instance, we had no use for the heavy Bronson magnets and instead ordered a rare-earth magnet.

The Leica microscope was a heavy, standard, floor standing, hospital-type ophthalmic operating microscope. While it was a fine operating scope for a hospital, we did not feel it was practical for our upcoming deployment as it would be difficult to move, requiring a fork lift, difficult to set up,

has a large footprint, and has many lenses and prisms that could be easily knocked out of alignment if it were bumped or dropped. We decided to take one of these microscopes with us, but purchased a more “portable” ophthalmic operating microscope that could be set up and taken down quickly. BAMC had ordered two such scopes for humanitarian missions to Central America and they had proven to be easily transportable [\[See LL 1\]](#). The Welsh Portable Missions Ophthalmic Microscope (Endure Medical, Inc., Cumming, GA) is a floor mounted scope with an optional binocular assistant’s head that packs up into two carrying cases. The floor mount consists of a lightweight telescopic tube tripod that folds up and fits into a tube case that can easily be carried over the shoulder, weighing only 27 lbs. The transformer, arm, and heads of the microscope pack up into a suitcase weighing only 54 lbs and are therefore easily carried by one individual. The microscope comes with Zeiss optical heads, so the optics are excellent. The scope focuses manually rather than with foot pedals and servers as on the large

“After review of the available equipment and supply lists, the actual equipment in the 286th storage cage, and discussing what our needs were likely to be in a field environment, the team decided that we would need to start from scratch.”

Leica microscope. This was desirable during a long deployment as the microscope would be less likely to be down-lined due to mechanical breakdown [See LL 1].

The vitrectomy system assigned to us was a Storz Premiere Microvit Vitrectomy System, which was an older and heavy unit. While this was the state-of-the-art vitrectomy system a decade before, it was not very practical for an initial field deployment as it was heavy, took up a lot of room when packed in its case, would be easily damaged if bumped or dropped, and required compressed nitrogen to function. There were more practical “portable” vitrectomy systems available that would better suit our needs as a mobile Eye Surgical Team. The Syntec VitMan Portable Vitrectomy System (Syntec, Inc., Winfield, MO) was a small unit weighing only 45 lbs and measuring 6” x 21” x 19” that packed up into a small suitcase. It had excellent fluidics, could be used for posterior and anterior segment work, and ran on compressed air rather than nitrogen. It had an integrated air pump that allowed operation independent of the hospital’s compressed air if necessary. A few of us had used this machine during humanitarian missions to Central America. Our goal was to have the largest pieces of equipment be the slit lamp and one Leica microscope. To our Company Commander’s credit, we got everything we asked for within weeks of putting in our requisition.

We were most uncertain about how many expendable items to pack. MAJ DeMartelaere created a list of drugs, anesthetics, suture and other expendables that we felt we needed at a minimum in order to manage combat injuries and routine ophthalmic disease that might be encountered on a deployment. BAMC ophthalmologists had deployed numerous humanitarian missions to Central America over the previous ten years, which helped in deciding what the minimum requirements might be for our upcoming deployment [See LL 1]. We



MAJ Sheri L. DeMartelaere and LTC Sean M. Blaydon in an operating room in Kuwait. (Source: Sean M. Blaydon, MD, FACS)

ordered enough supplies to allow us to care for at least 40–50 casualties before being restocked through regular supply lines. We bolstered this minimal requisition with other “acquired” materials during the weeks leading up to our deployment.

On March 2, 2003, we received our deployment orders to Kuwait. Interestingly these orders were from FORSCOM and not from MEDCOM. In fact, it turned out that the Surgeon General’s Office was unaware of our tasking even up to the moment we boarded our flight out. At this point our feelings ran from sheer pride from having been given the responsibility of caring for our soldiers near the frontlines of what seemed to be inevitable war, to anxious concern for the loved ones we were to leave behind. No one in the military had much doubt over the previous several months that some sort of military action was to occur, despite the “diplomatic” efforts that seemed to be unfolding in the press. Whatever our personal feelings at the time, we all felt ready. On March 12, we were bussed up to Fort Hood. There we packed our 6,000 lbs. of equipment onto USAF palettes, then unpacked them, then packed them, then unpacked and packed them a third time. Our initial exuberance and excitement started to meet the true reality of Army deployment, that of “hurry up and wait.”

On March 19, we finally flew out of Fort Hood on a commercial charter flight, with news coverage suggesting military

action was to start at any moment. When we landed in Milan, Italy, for refueling, we learned that the President had ordered an air strike on one of Saddam Hussein’s palaces in Baghdad. We finally arrived at the Kuwaiti International Airport 30 minutes prior to the first SCUD missile attack on Kuwait. We had piled onto an

“...our feelings ran from sheer pride from having been given the responsibility of caring for our soldiers near the frontlines of what seemed to be inevitable war, to anxious concern for the loved ones we were to leave behind.”

Airport shuttle bus when the sirens started to wail and a loudspeaker announced, “lightning, lightning, lightning.” A siren, followed by “lightning, lightning, lightning,” indicated that an incoming missile has been detected. Suddenly people were yelling instructions to don our gas masks and put on our protective chemical Mission Oriented Protective Posture (MOPP) suits. We donned our masks, but our MOPP suits were still in our duffel bags back on the plane. We sat there in the heat sucking wind through the masks for about 30 minutes, watching the Kuwaiti driver standing outside the bus smoking

a cigarette wondering what all the fuss was about. We soon learned that, hours before, our troops had crossed the border into Iraq. We eventually got our MOPP suits out of our luggage and put them on and would wear them for the next two weeks. Over the following 24 hours we seemed to spend a great deal of time in the bunkers wearing our chemical protective gear. After several weeks, the SCUD attacks seemed to occur much less frequently as our troops gained territory in Iraq, and eventually, thankfully, we were allowed to take off our MOPP suits and rubber overboots.

Within hours of our arrival, we were informed that we would be attached to the 47th CSH at Camp Wolf, right there between the two airfields of the Kuwaiti International Airport. It was our understanding that our equipment would be loaded on the same aircraft we flew out on, but since we ended up flying out on a charter with short notice this did not happen. We were told our equipment would leave on a cargo flight the next day out of Fort Hood. Unfortunately, that did not happen and for a week no one could tell us where our equipment



LTC Sean M. Blaydon and a young Iraqi patient. (Source: Sean M. Blaydon, MD, FACS)

was located. On March 23, the first casualties arrived at the 47th CSH, one of which was an ocular injury [See LL 1,2]. Luckily our equipment had arrived that afternoon, so around midnight we were outside in the dark going through our chests searching for the necessary equipment to do the case. We quickly assembled the portable microscope in the operating room. The casualty was a Marine with a badly ruptured globe from a rocket propelled grenade (RPG). We were successful in repairing his injury and then watched him get interviewed by Diane Sawyer from ABC News the next day. At this point the casualties started to come in waves with rapid outdoor triages occurring almost nightly. Most of the casualties had already undergone stabilizing surgery by Army Forward Surgical Teams (FSTs) and the Navy's Forward Resuscitative Surgical Team ("Devil Docs") prior to being evacuated to the CSH for more definitive procedures. We were the only U.S. ophthalmologists on the ground, so many of these patients still had open globes. It was during these early weeks of the war that reality set in as young men and women were brought in with horrifying injuries: lost limbs, open abdomens, and extensive burns. We were humbled as many of these badly injured young Soldiers and Marines expressed disappointment at not being able to return to their units.

It became clear that most of the casualties suffered polytrauma, often with both facial and limb injuries requiring a multiple surgical team approach [See LL 2]. The ocular injuries were complex and often involved the periorbital adnexa and face. We felt fortunate to have both a cornea and oculoplastic surgeon as part of our team. These multi-team surgical procedures were often occurring simultaneously, side-by-side in the two ISO container operating rooms of the 47th CSH. Since there was limited space in these ISO container ORs, and we never knew where we would be operating on any given case, the 286th was never permitted to put up the larger Leica

scope. The portable scope we brought with us ended up being invaluable during the first 4 months of our deployment. One issue that we did not foresee was the vibration of the OR ISO container floor. Since the floor of the container is quite thin and supported off the ground, any movement in the operating room caused a trampoline effect. We eventually worked out a system whereby we would ask the orthopedic surgeons to stop moving for a second when we wanted to pass a suture.

Unfortunately, while a Neurosurgical Team and Eye Surgical Team were assigned to the 47th CSH, there was no Head and Neck Surgical Team. The only otolaryngologist in the OIF theater was a retired Army Reservist who no longer performed surgery. I believe the thinking was that any facial injury requiring reconstructive surgery could be transported back to an echelon IV or V facility. However, we were starting to see more Iraqi civilian injuries. These patients needed to have more definitive treatment as we had no idea what, if any, follow-up they would receive later. We found ourselves addressing many of these facial injuries with the aid of the general surgeons.

Most of the injuries we encountered were complex injuries to the cornea and/or severe periorbital adnexal trauma. Having both a fellowship-trained oculoplastic and corneal surgeon allowed a more comprehensive approach to these injuries. I picked up many useful techniques from LTC Johnson in the repair of complex corneal lacerations, and LTC Johnson was keen to get experience in dealing with far more extensive injuries to the periorbital region than he had seen in residency [See LL 2]. These skills would serve us well later in Iraq. MAJ DeMartelaere had learned that she was accepted into an oculofacial plastic surgery fellowship right before we were deployed; the experience she had during our 4 months in Kuwait and the succeeding 3 months assisting the Neurosurgical Team back at Camp Wolf would be invaluable when she started her



LTC Blaydon, MAJ Markov from Macedonia, and a Bulgarian Army physician. (Source: Sean M. Blaydon, MD, FACS)

fellowship the following year.

In June, we received a call from Major Andrew Jacks, a British Army ophthalmologist located in Al Basra, regarding a young Iraqi boy with an intraocular metallic foreign body. His issue was that he did not have the appropriate equipment to perform surgery. We had plenty of vitreoretinal surgical instruments and equipment, so he and his patient were flown in to Kuwait [See LL 3]. While LTC Johnson assisted, Major Jacks was able to successfully remove the foreign body utilizing the rare-earth magnet and the portable vitrector we had thought to bring on our deployment.

We soon learned to tolerate daily life at Camp Wolf, from the deafening generators supplying us light and air conditioning, to the Porta Johns scattered around the camp. After sleeping in what was to become the morgue (mortuary affairs) for two nights, we moved temporarily into more crowded tents. We finally moved into quite spacious and air conditioned Bedouin style tents with wooden flooring set up by Kellogg, Brown and Root (KBR), a subsidiary of Halliburton. For the next 3 ½ months we were to call those tents our homes [See LL 4].

The 47th CSH itself was made up of DEPMED Temper tents that were

environmentally controlled with connecting air conditioners. The hospital tents were quite comfortable, but only as long as the generators kept running. The unsung heroes were the maintenance crews taking care of those generators outside in the desert heat. At this point in our deployment it was pretty hot during the day (90°+ F) and cold at night, with the occasional rainstorm. However, by May the temperatures had started to soar into the 100–110° F range and we were to see no more rain or clouds for another 7 months.

We continued to receive a steady stream of casualties throughout April and May 2003. We were given daily situation reports (SITREPS) and learned from CNN or Fox News how our forces were doing in Iraq. We were hopeful, given how rapidly the war was going, that there would be fewer casualties and that we would be going home in the not-so-distant future. On May 1, we watched the President declare “mission complete” and the end of “major combat operations” aboard the USS Abraham Lincoln. Indeed, the number of casualties coming to the 47th CSH started to dwindle in June and it looked good for us to re-deploy home. What we did not appreciate was that the 21st CSH and 28th CSH up in Iraq had assumed the role of the 47th CSH down in Kuwait and were still treating many U.S.

casualties and an ever-increasing number of Iraqi civilians and Enemy Prisoners of War (EPW). At the end of June, we were re-tasked to move into Iraq and on July 4 the remaining team of five, minus one, flew by CH47 Chinook helicopter, with all our equipment, to the Baghdad International Airport (BIAP). MAJ DeMartelaere remained in Kuwait with only a minimal amount of equipment to take care of ophthalmologic sick call, and any casualties that might still be transported there [See LL 1,5]. After a rough night at BIAP, we were transported by UH60 Black Hawk helicopter to the 28th CSH, with our equipment transported by ground the next day.

The 28th CSH was located in the middle of the desert in an area called LSA Dogwood across the Euphrates River, southwest of Baghdad. Conditions at Dogwood were dramatically worse than what we had become used to in Kuwait. We were truly in the middle of the desert where nothing seemed to grow and the sand drifted in and out of the camp, but yet so tantalizing close to the lush banks of the Euphrates only a few miles away. The sleep tents had seen better days having been battered by the summer’s dust storms. Without daily sweeping our sleep cots would disappear under a pile of desert sand. Eventually we gave up fighting it and accepted the sand as part of our lives. On several occasions scorpions and camel back spiders could be seen crawling across the floor in the tents, so that the routine of shaking one’s boots out every morning was imperative. While the sleep tents were not air conditioned, the hospital TEMPER tents were, but the extreme heat and sand had taken their toll on the generators and AC units. Conditions became very hot for about five hours a day as the AC units would sputter along trying to keep up. August is the hottest month of the year in Iraq and temperatures soared over 140° F during the day and stayed in the 90s at night.

Within 5 days of our arrival into Iraq, the person commanding convoys into the city was transferred north. The Deputy Commander approached me as someone ideal to be the Assistant S5 (civil affairs)

and to command convoys into Baghdad (30 miles away) to transport Iraqi patients to Medical City Hospital [See LL 6]. Having only arrived in Iraq 5 days prior, I was more than a little anxious about the thought of travelling on back roads in a small convoy, but at least I got off Dogwood and saw some of the country.

In August, we finally got the word that the 28th CSH would pack up its tents and move into a fixed facility within the Green Zone, up the street from the Coalition Provisional Authority (CPA). By August 15 much of the hospital was already packed up and moved. The advance party had prepared the fixed facility so that the rest of the equipment and personnel could move over a 5-day period and have little impact on medical care within the Area of Operations (AO). However, just as the Emergency Medical Treatment (EMT) section was being packed up, we got the word that the UN Headquarters Building in Baghdad had been hit by a large car bomb. The initial word was that we would be receiving 50 casualties, but after a few hours none had arrived. Then in the early hours of darkness the first wave started to come in by Blackhawk MEDEVAC helicopters. Most of the casualties were sent to the 28th CSH and not diverted to other facilities as many of the injuries were either ocular or neurological and the 28th CSH at Dogwood had the only Eye Surgical and Neurosurgical Teams in Iraq. The injuries were pretty severe with numerous open globes and facial injuries, to include one Canadian gentleman with a 2-foot-long, 2-inch-wide aluminum bar (what was once a window sill) embedded in his left orbit and frontal lobe of his brain. We operated for about 16 hours before one of the neurosurgeons and I were transported to the fixed facility in order to prepare it for further casualties. LTC Johnson remained at the 28th CSH-Dogwood. He would continue to operate for another 24 hours with little sleep and was instrumental in saving the vision of numerous patients. Eventually the rest of our personnel and patients were brought

to our new home in the Green Zone.

The Green Zone was a 4-square-mile section of Baghdad where the various Ministries of Saddam's government, to include his presidential compound, were located. This was also the area of concentrated bombing that occurred for all to see on CNN and Fox News, the epicenter of "Shock and Awe." The results of this bombing were evident everywhere. The new home of the 28th CSH would be the Ibn Sina Hospital, once the private hospital for Saddam, his family, and favored Baathist Party members. It was in this facility that Saddam's son, Uday, recuperated after his failed assassination in the early 1990s. The building itself was built in the 1960s and was showing its age and years of neglect secondary to a decade-long embargo. The hospital escaped much of the looting that occurred in other hospitals, no doubt because the locals were afraid to enter it. Thus, much of the advanced and expensive ophthalmic equipment remained intact and in good working order, to include a second generation Nidek excimer laser, numerous Nidek argon and YAG lasers, and five Haag Streit slit lamps. After finally getting the eye clinic set up at the new facility, cleaning up our living quarters under a real roof, and buying a large carpet from one of the Arabic translators, I was informed that I had been chosen to fill a new tasking elsewhere. I was to be re-assigned as Chief of Clinical Operations for the Combined Joint Task Force Seven (CJTF-7) Surgeon at Victory Base at the other end of Baghdad. This would mean I would be performing operational duties of some sort instead of clinical ophthalmology and leave LTC Johnson to cover the service without any relief.

Victory Base was located on one of Saddam's newer presidential compounds right next to the airport. His palace was situated in the middle of an artificial lake. Unfortunately, while the palace was quite impressive, I would find out that my new home was right back in a tent. Victory Base was the home of CJTF-7 and V Corps headquarters commanded by LTG Ricardo

Sanchez. The Surgeon's Office had about 12 officers and 10 enlisted personnel working in it, each with several laptop computers. Medical reporting, medical operation planning, policy directives, and coordination occurred through this office. For the first week or so I spent most of my time trying to learn as much as possible about the functions of this office. Soon projects started crossing my desk. At the end of September, the CJTF-7 Surgeon, COL Donald Gagliano, who happened to be a vitreoretinal surgeon, sent me down to the Multi-National Division Center South (MND-CS) AO headquartered in Babil (Babylon) to tour all the aid stations and hospitals from the various coalition troop contributing nations. For two weeks, I slept in a tent less than 50 feet from the walls of the ancient city of Babylon. With the aid of Polish security, I traveled to An Najaf, Al Hillah, Ad Diviniyah, Karbala and Al Kut visiting the aid stations and hospitals of 15 different nations. Many were from former Soviet bloc countries such as the Ukraine, Georgia, Slovakia, Hungary, Bulgaria, Latvia, and Poland. Once I was finished I was able to put together a matrix of medical capability within the MND-CS region, visibility we did not have before. My next project was to assist in the effort to stand up a coalition hospital at the now infamous Abu Ghraib prison northwest of Baghdad. I never did

"The injuries were pretty severe with numerous open globes and facial injuries"

see this open before I left Iraq, but priority had been given for a \$2.9 million facility to be constructed that would be completed in the fall if the prison should stay open. Iraqi criminals and security detainees injured while fighting our troops or during the process of laying roadside Improvised Explosive Devices (IED) were filling up the 28th CSH in Baghdad reducing the ability of the hospital to surge in the event of mass casualty events. A prison hospital would provide a facility in which to transfer these

individuals allowing more of the beds at the CSH to be used for U.S. troop and Iraqi civilian casualties. It would also provide a higher standard of medical care for internees held at the prison where there were only three of four aid stations manned by a few Army physicians, PAs and medics. However, given the investigation of prisoner abuse at Abu Ghraib the following year this project never came to fruition.

My new responsibilities in the Surgeon's Office required that I leave the post often; we did so in two Ford Explorers assigned to our office. Leaving post meant dressing in full battle dress with protective vests, Kevlar helmets, and weapons with magazines loaded. By October, injuries to our troops from IEDs were on the increase. IEDs had become the weapon of choice by foreign and Iraqi insurgents against military convoys. IEDs consisted of mortar rounds, shells, mines, or packed explosive that were hidden within mounds of rubble, concrete blocks, soda cans, and even dead animals. They could also be strung from trees, lamp posts, and bridges. They were usually remotely detonated with devastating results. Aside from the concussive effect of the explosion, the blast showers the intended victim with shrapnel, nails, glass, or pieces of rock and concrete. Turret gunners were particularly vulnerable as the top half of their bodies were exposed to the blast. Unfortunately, many of the ocular injuries we managed could have been avoided, or at least been less severe, had the service member just worn adequate eye protection.

In December, anticipating we would soon be re-deploying home, I returned to the 28th CSH to assist LTC Johnson in inventorying our equipment. I happened to be at the 28th CSH when car bombs went off outside the gates of three different coalition compounds in Karbala, all of which I had visited back in September. LTC Johnson and I continued to operate for 16 hours straight taking care of about six patients with devastating eye injuries. I learned much from LTC Johnson that day. He had gained



LTC Blaydon and LTC Johnson going home. (Source: Sean M. Blaydon, MD, FACS)

enormous experience managing such patients while holding down the fort on his own during the previous 4 months. Many of these casualties were from Bulgaria. The Bulgarian contingent was

“Unfortunately, many of the ocular injuries we managed could have been avoided, or at least been less severe, had the service member just worn adequate eye protection.”

headquartered at Camp India just on the outskirts of Karbala where the barracks were situated close to the front gate resulting in more injuries at this location.

We finally received news that we were to be replaced in February, and indeed the 1967th Eye Team arrived at the end of January. We completed our equipment inventory and I signed most of our equipment over to the Commander of the incoming team. On February 4, seven months after entering Iraq, LTC Johnson and I (the other five members of our team having been re-deployed home months earlier) flew by C130 down to Camp Wolf (now renamed Camp Wolverine), Kuwait.

We were supposed to stay there for another week waiting for a C5 “Freedom Bird” to McGuire Air Force Base, New Jersey, but found ourselves flying to Fort Bragg with an element of the 82nd Airborne Division after staying in Kuwait for only one night. We arrived at Fort Bragg, North Carolina on February 6. On the morning of February 7, LTC Johnson and I, with 14 overweight equipment chests, two 9 mm pistols and four M16 rifles between us, arrived at the San Antonio airport.

During our 11 months in Kuwait and Iraq the 286th Eye Surgical Team performed 129 ruptured globe or corneo-scleral laceration repairs (a good portion of which were repaired by Dr. Johnson), 15 globe explorations, 15 primary enucleations (only 4 of which were on U.S. servicemen; however, we learned later that an additional 10 patients went on to have a secondary enucleation at an echelon V facility in the United States), 120 complex eyelid and facial laceration repairs, 17 orbito-facial fracture repairs, and even 1 strabismus surgery. Unfortunately, 22% of our patients had bilateral injuries. Approximately 70% of our patients were from United States and Coalition forces. The remaining 30% were made up of Iraqi and foreign national civilians (many of them children), and Security Internees or EPWs. We received

minimal to no feedback from echelon V facilities regarding any of the patients that were transported back during this initial year of OIF. Communications started to improve during the end of our deployment.

Eye protection continued to be a significant problem during the first year of OIF. We saw many eye injuries that would have been completely preventable had the serviceman worn eye protection. Even the Sun Wind and Dust goggles usually seen sitting on top of Kevlar helmets would have offered some protection. The only pair of Army Protective Eyewear List (APEL) approved eye protection I encountered in Iraq during my whole year there was a pair of BLPS brought by an Army ophthalmologist. Protective eyewear was not a required part of the battle dress when leaving post. With the increasing incidence of roadside IED attacks it became increasingly clear to line commanders that eye armor should be part of force protection. We also found that young soldiers were more likely to wear the protection if it looked attractive and did not interfere with the use of their weapon. We were gratified to see that by the end of our deployment unit commanders were starting to purchase and demanding the wear of ballistic eyewear. Today the APEL contains many choices from popular manufacturers of outdoor, tactical, and ballistic eye protection such as Wiley X, Oakley, ESS, Smith, and Revision.

Our experience as the first ophthalmologists mobilizing with the invasion force going into Iraq was different from those that deployed there after us. The combat, diplomatic, and political situation on the ground was fluid and unpredictable. There was no way to know how long our deployment was to be and certainly was longer than any of us anticipated. This had a significant effect on morale, even among combat troops. Living and working conditions were harsh as the CSH and medical teams moved into Iraq behind front line troops. We did not move into fixed facilities that future teams would later experience until 7 months into our deployment. In general, most

surgeons deploying to OIF came from CONUS medical centers and had minimal long-term field experience. Deploying surgeons, particularly in the first year of military operations, need to remain both physically and mentally fit to meet the unanticipated challenges that these operations pose. While most surgeons feel like they have seen it all, the injuries that occur in combat can be horrendous and are frequent. This can have a psychological effect on medical personnel, even years later. Being flexible is also important. The cause and type of injuries will change over time. The command structure might be different and the decisions regarding hospital movement, setup, location, and re-deployments will be based on circumstances not immediately apparent to medical personnel.

The annual Tri-Service Ocular Trauma Course has been invaluable in teaching the fundamentals of treating ocular and periorbital trauma, especially for those not exposed to a significant amount of trauma during their training. However, it is crucial that those military ophthalmologists deployed in theater be invited as instructors for future courses so that more advanced techniques and lessons learned can be passed on to future generations of surgeons. This is particularly important in the management of periorbital soft-tissue trauma, which can be intimidating for many ophthalmologists coming out of residency training. While it may not have been by design, the fact that the 286th Eye Surgery Team had fellowship-trained sub-specialists in both cornea/ anterior segment and oculoplastic surgery significantly improved the care of the types of injuries we encountered in theater. The 1967th Eye Surgery Team that replaced us in February 2004 also had both a cornea and oculoplastic surgeon as part of their team. Sub-specialists very quickly share useful techniques amongst each other. By the end of our deployment, LTC Johnson was much more confident in his abilities to repair complex periorbital and facial injuries. To this day I still rely on techniques and pearls

shared with me by LTC Johnson in dealing with complex corneal lacerations.

After the first year or two the support structure for surgeons rotating into theater becomes fairly well established with logistics being the responsibility of the hospital. In our case, we had no idea what support we would have once in theater, and in fact we did not know where we would be attached until we arrived in Kuwait. Given this we chose to assume that we would be responsible for all our supplies to include drugs, suture, anesthetics, instruments, etc. As it turned out the 47th CSH in Kuwait was low on many of these supplies and for a time we were supplying the hospital until the logistics support was better established. The knowledge we gained on annual BAMC ophthalmology medical missions to Honduras ended up being significant. We had beta tested many of the more mobile


“While most surgeons feel like they have seen it all, the injuries that occur in combat can be horrendous and are frequent.”

pieces of equipment we took with us to Iraq. MAJ DeMartelaere had been Mission Commander on at least one of these BAMC medical missions. The experience she brought to the team in ordering and packing supplies made it much easier for us to prepare for our eventual deployment. Medical missions should, in my opinion, be a part of residency training. Benefits include knowledge gained on how to lead and support a medical mission, an appreciation of cultural diversity and sensitivity, exposure to public health issues and volunteerism, and improved clinical and surgical skills — all beneficial to military surgeons.

The biggest story regarding medical care in Iraq and Afghanistan is the rate of survival after suffering a battlefield injury. While much media attention is on the number of troops who have died during Operations Enduring and Iraqi Freedom, it should be pointed out that the survival rate

after a battlefield injury is currently around 90%, far higher than any other conflict in U.S. history. While this is partly due to more effective body armor, it is also thanks to vastly superior and more rapid surgical care being provided in the field. The ability to perform advanced and definitive repairs to the globe and periorbital adnexa that is on par with what would be received in the rear is now achievable and expected. Soldiers with traumatic amputations to two or three limbs or with devastating head and eye injuries who would not have survived in past conflicts are now being saved. The time from point of injury to earliest surgical resuscitation is as little as 20 minutes. The average time from battlefield injury to care in a stateside hospital is 3–4 days versus as much as 45 days during the Viet Nam War. What all this means is that there are now more young men and women surviving incredibly mutilating injuries with amputated limbs and devastating brain injuries. How well these men and women are cared for and able to return and function in society remains a question.

In closing I would like to thank my team members for their sacrifice, professionalism, service to their country and incredible compassion. It would have been so much more difficult for me had it not been for their support and friendship. My greatest memories will be of my fellow teammates and soldiers. I would like to take this opportunity to thank the tremendous number of people who demonstrated support for me and our team and all the troops deployed overseas. I heard from so many members of the American Academy of Ophthalmology (AAO) and American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS) and even folks I have never met. I took with me all the skills and advice of my many mentors; and in particular COL (Ret) Frank La Piana and Col (Ret) John Shore who were both instrumental in my training as an oculoplastic surgeon and both of whom served in Viet Nam. Lastly, I would like to thank my wife Cindy and all spouses and loved ones left at home to

take care of our families. 

Sean M. Blaydon, MD, FACS
ASOPRS Fellowship Program Director
TOC Eye and Face
Austin, Texas

PREVIOUSLY

- + Lieutenant Colonel, Medical Corps, U.S. Army
- + Commander, 286th Eye Surgical Team
- + 47th Combat Support Hospital, Kuwait (19 March — 4 July 2003)
- + 28th Combat Support Hospital, Baghdad, Iraq (4 July 2003 — 4 February 2004)
- + Director, Ophthalmic Plastic, Orbital & Reconstructive Surgery
- + Director, Ocular Trauma Service, Brooke Army Medical Center, Fort Sam Houston, San Antonio, Texas

Lessons Learned

Highlighted in this memoir are lessons learned by the 286th Eye Surgical Team during OIF. Unfortunately, the problems they encountered have burdened military ophthalmologists throughout many conflicts. Persistent issues such as lack of equipment, personnel, and preparation can be addressed by the following recommendations:

1. Members of an Eye Surgical Team should assemble, check all their equipment and supplies, and review plans for activation at least once a year. The service ophthalmology consultant(s) should ensure that all this is accomplished and that personnel, equipment, supplies, and plans for activation are updated as necessary. To familiarize military ophthalmologists with the equipment and supplies they will have made available to them on deployment, consideration should be given to making ophthalmic DEPMEDS materials available for use at the Tri-Service Ocular Trauma Course and during the conduct of humanitarian missions. As the combat arms train as they fight, military medicine should train as they practice in war. The Tri-Service Ocular Trauma Course is necessary but not sufficient in itself.
2. Military combat trauma is systemic polytrauma involving multiple organs and structures. Similarly, military combat

ocular trauma is complex ocular polytrauma involving multiple ocular structures. Polytrauma, of the eye and its adnexa and of other regional and non-regional structures, often presents in multiple casualties and requires the interaction of surgeons from different specialties for its appropriate management. These include neurosurgeons, ENT/maxillofacial surgeons which constitute with the Eye Surgical Team the Head and Neck Team. The Eye Surgical Team should be comprised of fellowship-trained ophthalmologists, anterior segment, posterior segment, and oculoplastic specialists to ensure that optimal care is provided, since there is no delayed primary closure in ophthalmic surgery and the first surgical procedure performed is the definitive one in determining the ultimate outcome.

3. Deployed ophthalmologists should expect to be required to provide care for allied and host-country casualties to include children and the aged and therefore be prepared to do so. The United States will also have allies and coalition partners who may augment its capabilities, therefore it is important for deployed ophthalmologists to be aware of the resources that are available to them in theater.
4. Deployed ophthalmologists may have to both live and operate in austere conditions. This further underscores the need for proper equipment and supporting personnel so that these issues do not exacerbate already challenging conditions.
5. Flexibility is necessary as tactical conditions change and relocation may be necessary.
6. Deployed ophthalmologists should be prepared to take on many roles, including administrative tasks. They must be in good physical condition, be competent in the use of their personal weapons, be prepared to function outside of their military occupational specialty, and understand the mindsets and objectives of their medical and non-medical superiors.

N OW SEE THIS

TRAUMA & DAMAGE CONTROL OPHTHALMOLOGY

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VISION CENTER OF EXCELLENCE FOCUS ON EMERGENCY OCULAR CARE: OPEN-GLOBE INJURY

Emergency management of ocular trauma and damage control ophthalmology (DCO) are necessary for both the ophthalmic and non-ophthalmic communities. To this end, VCE is sharing quarterly emergency management tips for the ophthalmic and non-ophthalmic communities as well as DCO principles specifically for the ophthalmologist.

In this issue of Frontlines, we share established principles for treatment of open-globe injuries presenting with herniated vitreous and intraocular tissue by both first responders and ophthalmologists.

Full-thickness lacerations and penetrations of the cornea and sclera are

termed “open-globe” injuries because they expose the structures and contents within the eye, allowing them to extrude through the open wound. At the same time, an open-globe injury is an entryway for bacteria and other organisms to enter the eye, resulting in devastating infection. In combat, open-globe injuries can result from severe blunt trauma or from shrapnel and foreign objects. Non-combat open-globe injuries are also common and can be caused by blunt trauma from a fist or a baseball bat, or from sharp objects, such as a needle, nail, knife, broken stick, or a glass shard. The vitreous, choroid, retina, iris, and lens will often partially or completely extrude through eye lacerations resulting in devastating loss of vision. Open-globe injuries are emergency situations and require immediate ophthalmologic care.

Further principles regarding combat-related ocular trauma need to be developed and formalized. VCE is currently developing DCO principles, which will encompass the following: *Necessity, Urgency, Adequacy, and Avoidance.* **V**

Necessity - Addresses aspects of care that must be applied at a particular point of care prior to transfer to the next level of care. The need for immediate intervention largely depends on severity of injury.

Urgency - Addresses the time frame in which any necessary treatment or intervention must be performed. Severity of injury will dictate urgency with which the eye must be treated.

Adequacy - Addresses how meticulous or definitive repairs must be. Repairs for severe injuries must be meticulous, where the first repair is typically the final one. However general practitioners and ophthalmologists must also identify injuries for which repairs can be ignored, or be temporized and revised later.

Avoidance - Addresses interventions that should not be performed in order to effectively manage the eye injury.



Navy CDR Kevin McGowan models the correct placement of the rigid eye shield. (Source: Graham Snodgrass, U.S. Army Public Health Command)

Emergency Management of Open-Globe Injuries: For Non-Ophthalmic Providers

PRINCIPLE 1: Suspect an open-globe injury in any casualty who has:

- Been in the vicinity of an explosion
- Fragment wounds of the head and/or foreign bodies embedded in the eyelids and periocular area
- Foreign bodies embedded in the cornea, conjunctiva, or globe
- Any laceration or injury to any part of the eye that would otherwise be protected by spectacles or goggles
- Loss of vision following any injury involving the face, eyelids, or globe
- Intraocular contents such as iris, lens, vitreous, retina, or choroid/uvea outside the eye. Prolapsed tissue may look like debris, such as dirt or other foreign object. Be careful not to wipe this away
- An abnormally deep or shallow anterior chamber (the space between the cornea and the iris-pupil)
- A pointed/peaked rather than a round pupil
- Eyelid laceration (which may cover a globe laceration) and/or periocular lacerations
- Blood in the anterior chamber or back of the eye that blocks the normal red reflex

- Subconjunctival blood, especially if dark brown and elevated like a thickened clot
- Clear fluid leaking from the eye
- Decreased eye movements
- Deformed globe

PRINCIPLE 2: Do not put pressure of any type on a known or suspected open-globe injury.

- Applying pressure may further extrude intraocular contents and thereby convert a repairable eye injury to a non-repairable one
- Do not attempt to measure intraocular pressure
- Do not patch the eye
- Do not perform ultrasound on the eye
- Do not allow head wrap to go over unshielded eye

PRINCIPLE 3: Shield the injured eye to prevent additional damage.

- Place a rigid metal or plastic shield over the injured eye in a way that it does not touch the eye and hold in place with tape
- MCEP/APEL eye wear or a Styrofoam or paper cup can act as a temporary shield

PRINCIPLE 4: DO NOT attempt to repair an open-globe injury, just shield and ship.

- Evacuate the casualty expeditiously to the nearest military treatment facility (MTF) with an available ophthalmologist

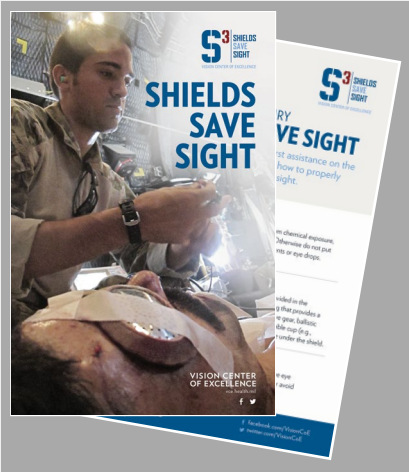
PRINCIPLE 5: Do not apply any ophthalmic or non-ophthalmic drops or medications to any eye with a known suspected open-globe injury.

Learn more about rigid eye shields and how to place them:



Link: <http://vce.health.mil/Resources/Products/Videos/VCE-Eye-Injury-Response-Training-Video>

Download a copy of our *Shields Save Sight* handout:



Link: <http://vce.health.mil/Resources/Products/Brochures/Saving-Sight>

Damage Control Ophthalmology: For Ophthalmologists

DCO PRINCIPLE 1: Management of the repairable eye must be orderly and precise.

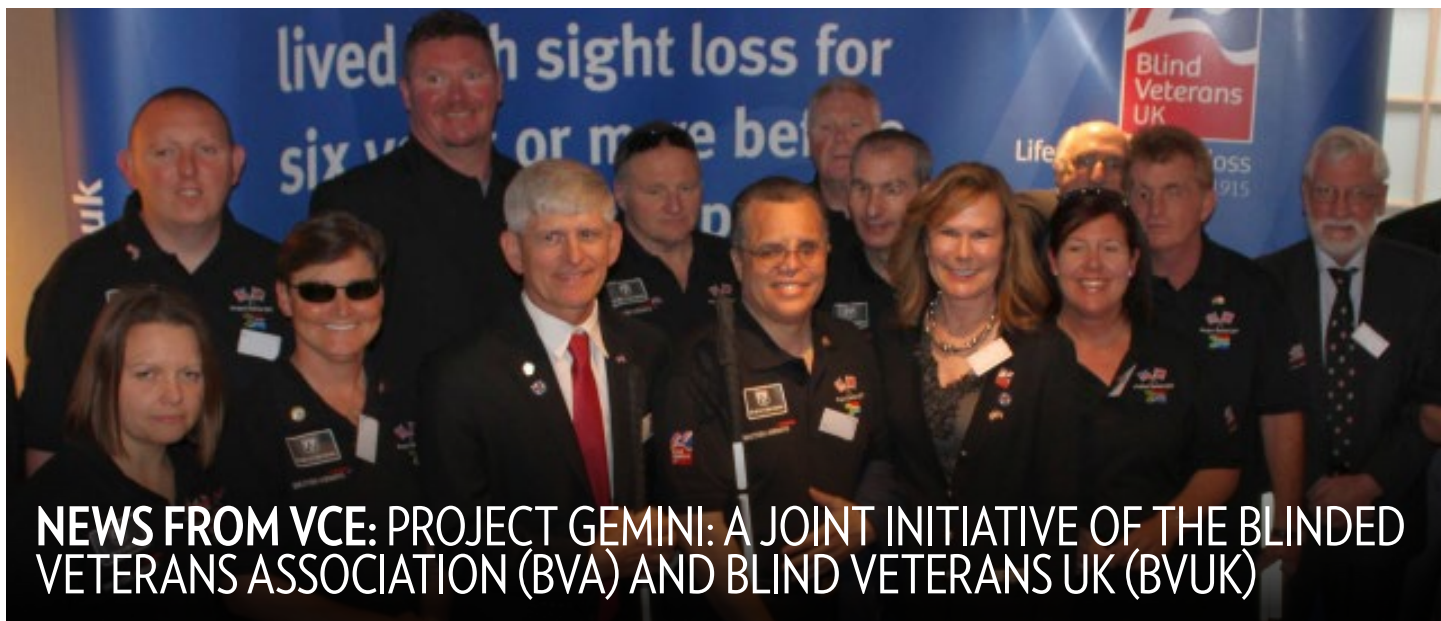
- Remove herniated vitreous from the wound either manually using Weck-Cel sponges and Vannas scissors or employing a portable vitrector (if available)
- Reposition herniated intraocular tissue using a cohesive viscoelastic such as Healon GV, unless more than 24 hours have elapsed since the injury and/or if the tissue is not recognizable as a result of disruption and/or necrosis
- Remove all intraocular or embedded foreign bodies that interfere with wound closure. Those that do not interfere with wound closure do not require immediate removal
- Evacuate the casualty to a Level 4 MTF for further management by a posterior segment (retina-vitreous) specialist

- + **Necessity** – Critical
- + **Urgency** – As soon as possible
- + **Adequacy** – Meticulous – Inadequately repaired open-globe injuries lead to blindness and loss of the eye
- + **Avoidance** – N/A

DCO PRINCIPLE 2: Management of the fragments of the non-repairable eye and other intraorbital soft tissues must be meticulous.

- Excise all fragments of the globe especially retinal and uveal tissue to help prevent sympathetic uveitis
- Retain all viable non-globe tissues to facilitate orbital reconstruction
- Employ only non-porous implants
- Ensure that the casualty has eye protection and understands the necessity of wearing it

- + **Necessity** – Critical – Sympathetic uveitis can blind the fellow eye
- + **Urgency** – As soon as possible
- + **Adequacy** – Meticulous – Removal of all retinal and uveal tissue is mandatory
- + **Avoidance** – N/A



NEWS FROM VCE: PROJECT GEMINI: A JOINT INITIATIVE OF THE BLINDED VETERANS ASSOCIATION (BVA) AND BLIND VETERANS UK (BVUK)

British, American and South African blind Veterans attended the "Life Beyond Sight Loss" seminar. (Source: Blind Veterans UK)

Established in 2011, Project Gemini’s objective is to enable Veterans supported by the BVA and BVUK to share experiences and knowledge in the areas of blind rehabilitation, adaptive technology, and advances in vision research. Through an exchange program, Veterans visit their counterparts across the Atlantic to strengthen this partnership and raise public awareness about combat eye injuries.

On 5 April 2017, as part of a week-long visit to the National Capital Region, members of BVUK visited the Vision Center of Excellence at Walter Reed National Military Medical Center, where they met experts in vision care and rehabilitation to learn about the evolution of blind rehabilitation and management of war eye injuries. VCE Executive Director CAPT Penny Walter discussed the Center’s goals of improving vision health, visual quality of life for Service members and Veterans, and ongoing efforts to enhance readiness. Retired Army COL (Dr.) Robert A. Mazzoli, Director of Education, Training, Simulation, and Readiness at VCE, presented an overview of military ocular and combat casualty care over the last 100 years, highlighted lessons learned and advances made in military medicine that can improve civilian practice, and stressed the importance of wearing eye protection.

Similarly, Gulf War I and Gulf War II era blinded Veterans from BVA and two blinded Veterans from the St. Dunstan’s Association for South African War-Blinded Veterans visited BVUK in London from 21–27 May 2017. The group visited the residence of the American ambassador and participated in activities such as blind bowling, kayaking, and hatchet-throwing. On 24 May, BVUK hosted the research and innovation seminar series “Life Beyond Sight Loss” where topics such as Veterans’ eye trauma, vision disorders associated with traumatic brain injury, and advances in vision care and rehabilitation from WWI to today, were discussed. Presenters included Robert A. Mazzoli, MD, FACS, COL (Ret) MC USA; Glenn C. Cockerham, MD, Col (Ret) MC USAF, Chief of VA Ophthalmology Services; Kimberly Cockerham, MD, FACS, LTC (Ret) MC USA, Stanford University Department of Ophthalmology Oculofacial Plastics, and Thomas Zampieri, PhD, Maj (Ret) U.S. Army, BVA Director of Government Relations. Also in attendance were Surgeon General British Defense Medical Services Vice Admiral Alasdair Walker and Dr. Renata Gomes, Director of Research and Innovation at Blind Veterans UK.

Life Beyond Sight Loss Seminar Presentations

Advances in Military Ocular and Combat Casualty Care – Translating Lessons Learned in War to Peacetime Practice
Robert A. Mazzoli, MD, FACS, COL (Ret) MC USA

Shell Shock and Traumatic Brain Injuries with Sight Loss
Glenn Cockerham, MD, Col (Ret) MC USAF

Advanced Technology for Stabilization and Restoration of Vision in Military Ocular Injuries
Kimberly Cockerham, MD, FACS, LTC (Ret) MC USA

Veterans Blind Rehabilitation Services from First World War to Today
Thomas Zampieri, PhD, MAJ (Ret) U.S. Army

Conference Presentations

The following presentations highlight contributions from VCE staff and collaborators.

Recent Presentations	
<p>American Society of Ophthalmic Plastic & Reconstructive Surgery (ASOPRS) 2017 Spring Scientific Symposium 22–25 June 2017, Fairmont Waterfront, Vancouver, CA</p>	
Invited Lecture	
<p>Advances in Military Ocular and Combat Casualty Care: Translating Lessons Learned In War To Peacetime Practice Robert A. Mazzoli, MD, FACS, COL (Ret) MC USA</p>	
Upcoming Conferences	
<p>Military Health System Research Symposium 27–30 August 2017, Gaylord Palms Resort & Convention Center, Kissimmee, FL https://mhsrs.amedd.army.mil/</p>	
Podium Presentation	Poster Presentation
<p>Forward Surgical Care: Comparison of a Novel Trainer to a Traditional Swine Model for Training Providers in Lateral Canthotomy/Cantholysis Chris Calvano, MD; Robert W. Enzenauer, MD, BG (Ret) MC ARNG</p>	<p>ABCs of Eye Trauma Robert A. Mazzoli, MD, FACS, COL (Ret) MC USA</p>
<p>Blinded Veterans Association 14–18 August 2017, Jacksonville, FL http://bva.org/</p>	

A new Optometry Residency Program with a focus on traumatic brain injury (TBI) at Walter Reed National Military Medical Center (WRNMMC)

The WRNMMC will soon launch a 1-year-long optometric residency program that will have a focus on care of TBI-related vision disorders. While the details of this program are still being finalized, the implementation of this optometry residency program can establish a DoD pipeline that will enable greater capacity for TBI-related vision care at a regional center of excellence. This program will help train optometrists to specialize in TBI-related vision care to not only provide care at their home military treatment facility (MTF) but also support other MTFs that treat Service members with TBI.

For more information contact the WRNMMC Department of Optometry at (301) 319-7001

**Please do not contact VCE with inquiries for this program.*



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