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TRANSCRIPT - GR 12 09 22 "The Only Winner in War is Medicine: An Overview of Tactical Combat Casualty Care" Brad Bennett, PhD FAWM FACSM, Captain, Medical Service Corps, U S Navy (retired), Prehospital, Wilderness and Tactical Medicine Research and Development Education and Training Consultant

UVA Medicine Grand Rounds

00:13:22

Good afternoon, everybody. We're gonna go ahead and get started. Welcome to medical ground rounds today. I'm really honored and privileged to introduce a friend of mine. Captain Brad Bennett Brad is

- from the Us. Navy retired now, but who had a very distinguished career, and I think, for our medical grand rounds perhaps provides a unique perspective that we don't hear around military medicine
- in his career. He's a former tactical paramedic, as well as an applied physiologist, who for nearly 20 years served on the Department of Events Committee on Tactical Combat casualty care which I think we'll hear quite a bit about today.
- he also had numerous leadership positions within medical education. Within the Us. Military, including serving as Vice Chair and the Military and Emergency Medicine Department at the uniform services
- University of Health Sciences and Bethesda, as well as being the commanding Officer and Field Medical Service School lead at the Us. Marine Corps Base in Camp Pendleton, California, as well as the commanding
- officer of the Naval School of Health sciences in Portsmouth, Virginia, Brad and I have gotten to know each other over the years, and really it's an honor to invite him back. He also served as president of the Wilderness Medicine Society as an expert in, I think field medicine and look forward to hearing his perspective today. So, Brad. Welcome!
- Oh, good morning, and happy holidays. Most importantly, this is a topic of mine that I've been committed to for, as Mitch said, over 20 years having been a professor at our Us. School of Medicine as our past president.
- Jim Zimbabwe would say, this is your school of medicine. I was very proud to go there after 15 years, serving with all types of operational forces looking at how we can improve to do their mission without the tremendous overlay of heat and cold and altitude and hyperbaric guide medicine. I was able to train with physicians in 82, and especially called Undersea medicine, and I did undersea medicine and research, and did research on submarines and I and I'm still a diver, and I still enjoy going into clear and warm water. But without further ado let's jump into this. We have a 50,000 mile view the beginning of today what we call technical combat

casualty care and where it has evolved, particularly during 15 critical years of operation and during freedom and operation.

- Iraqi freedom. So these are my disclaimers particularly. I have no association with any of these products that you're going to see some of my colleagues say, but I am looking for a conflict of interest, particularly because it pays may pay well.
- These are our objectives. We're going to talk about really the common causes of battlefield injury, the point of injury
- We're going to explain really the overall arching 3 goals of the technical combat, casualty, care and henceforth you're going to hear t triple, c. That's what represents that we're going to describe trauma guidelines that committee generates evidence based and how we and how and how we go through that process. Who are the people that do that? And where do we publish?
- And how do we keep it updated? Most importantly, like any any practice guideline?
- And then we're going to talk about some of the evidence that we have looked at for many, many years. Now that really talks about the improvement of trauma care at the point of injury and you're going to see the dyed of wound rates historically, has always been low. So I have a figure to really show that very clearly where the focus should be so. This is a gentleman that was a founding member of the Committee on Tactical Combat Tragedy care. He was the lead trauma surgeon before charity was flooded out in New Orleans, Norman lived on lived in the French quarter and every now and then he would host the committee. After our meetings the area to come to his home on Bourbon Street in the residential area and we lost Norman in 2,015, and so everything that we think about what we do on this committee is, dedicated to Norman. Norman had the ability to walk in, and he would literally greet everybody. Truly a Southern gentleman, but he also would walk up to you, maybe as a resident or a chair, a medical student, 150.
- And just look here, right in the eye, and makes this quote: what do you be done for the good of mankind lately and you take a big swallow, and you know, and you get humbled when you're around Norman. But a walking textbook of trauma literature.
- A Southern gentleman never challenged anybody always well balanced in his delivery and his rationale by saying that isn't going to work guys.
- So there's been a long historic relationship. Let's just go back to World war one.
- as Bassel Pruitt says here, and quoted at the bottom, he's a former trauma surgeon, retired. Colonel. He was really kind of the father that burns center that we've all heard about down in San Antonio. And now we have many others in its image that have come from that primar critical Pierre Burn Center. So Basil was the editor of Journal Trauma and in his later years, like all of us, we tend to reflect on our career and kind of write general articles, and I remember reading this and I still use it today to really talk about that relationship before wars start any war. Any conflict trauma enhances the military combat, casually care the whole spectrum of care from the point of injury all the way through the echelons of care that we'll see into definitive one rehabilitation with the Va, so that relationship goes back and forth. But now, if you step into Vietnam World War li. Korea long protracted conflicts or wars.
- The progress in the advancement of a research in critical care then translates back to the civilian world just as it's done in the last 15 years.
- So I love this title. How a Basel calls it the symbiosis.

- So let's just step back and take a look at differences between battlefield trauma. What's going on compared to civilian trauma.
- I've been using this slide for a number of years, and we'll talk about some caveats, but in the military it's hostile fire. It's overwhelming psychological, emotional, physical kinds of weaponry that are used today.
- It's usually dark, because tactically, that's when people want to operate always in environmental extremes. And that's where my first half of my career really focused on less than the impact on the operator in environments penetrating versus Blunt. It's huge. It's always been huge high percentage of people on the battlefield. It's penetrating trauma for one weaponry or another very low, blunt trauma typically aircraft that go boom has a lot of blunt trauma but on the streets of us all of our all of our trauma training is centered around high vehicle, mass and accidents and trauma to humans. So blunt trauma has been the focus in the Us.
- So it's an imbalance. It's an imbalance on the military field. Usually far forward. You have limited equipment, limited manpower. You need to think about your tactical strategies because bad tactics get people injured and killed long delays typically because of weather. overwhelming firepower, air, superiority. Do you have it or not will limit the ability for an evacuation platform? What we call opportunities of lift certain services have dedicated
- Helicopters for picking up, injured and wounded. and with NATO services, forces supporting operation, enduring freedom. Operation. I, the Brits particularly had dedicated medevac equipment to physicians, senior medics, multiple individuals be doing multiple trauma interventions in the air, amazing capability at great risk to them up in the air, flying into areas where most people would be running away and across the services. You have basic medics to mid-level, to super high independent duty train medics in Germany that do trauma training in medical centers. Here. Richmond Uva is still an ongoing center for special forces medics. We tend to use what I call tongue-in-cheek, the knife and gun club communities. So I grew up in Los Angeles tremendous amount of penetrating injury in those communities. So emergency teams are dealing with penny training trauma. Get the gang wars as well as the blunt trauma off the interstates and the high volume Dave County. Houston. These are centers now where each service trains their trauma teams before they deploy and they take over service.
- And so they're getting a lot of penetrating trauma. Whether it's slow velocity. It could be knife, lones, or moderate velocity pistols, and in high velocity, or a high caliber, high capacity, magazine kinds of things that we all hear about today.
- So, as I mentioned, these are great established standardized trauma training for the basic medic all the way up to physicians and the problem is, as I said, These are all centered around blunt trauma historically but our advance is over 20 years, and a lot of our trauma surgeons and emergency surgeons have tremendous input into these higher level from a courses. And so we're seeing a lot of the translation of what we have published with evidence is now getting into these higher, level, standardized courses in the Us.
- So Ron Bellamy retired kernel, vascular surge, and there weren't trauma surgeons in Vietnam. They were vascular surgeons was a professor at us and he would always do a lecture in the course that I ran as a course director, very humbled, guy.
- But these data here that he did called the wet Med Data was nearly a 6,000 case review of cases of how people die on the battlefield.

- So you can just scan through those. But I'm going to highlight.
- What drove the triple, C. Is what is in circle.
- So in Vietnam, in these 6,000 cases 9,000 sorry 9 of those who were injured, exaggerated before they got to any definitive care.
- In many cases it was a single injury in a single extremity devastating a very small percentage, and it still shows up today have airway obstruction. You think about a higher or slow velocity weapon that shoots some sort of a bullet that goes through the mandible hits the mandibular artery blows out for a tissue and your bleeding. And what do we always do with trauma cases
- you put them on their back.
- So not only are they drowning in their own blood, but there's fragments so lots of railway obstruction correctable, absolutely correctable.
- Ron showed 5% of the 6,000 head tension pneumonia not too advanced with medics. Back in Vietnam a sticking 14 gauge needles and anterior second inner fossal space or mid axillary, a fifth inner cost of space, as we do today.
- Even we're using 10 gauge, because 10 gauge showed more effective than a 14 gauge. But there's lots of problems that the literature shows and doing that. But it is something that's trainable and correctable. So these 3 drove the triple, C. Right from the beginning because I've always said, thanks to Ron Bellamy, Dr. Bellamy good data drives decisions, but it takes people to do that up here. I circle this one because this now shows up as something that potentially is correctable.
- If you have the right team at the right place with that patient, and we'll talk about the advancement of that.
- The rest of these are really non-correctable with these types of weapons today as our teams that review every single mortality case that comes into Dover Air Force Base.
- The Armed Forces Medical Examiner Office, made up of forensic pathologists and other physicians review every case have 4 h before the family who is waiting to receive their loved one.
- So cat scans all kinds of scanning anything that was intervene, such as a needle they're supposed to stay on the body, and they do tremendous review. And we get a lot of good data that looks at potentially preventable cause of death.
- That relationship with that office in Copsy Committee on Technical combat. Kazakh was very. I'll use the word again symbiotic and they put together powerpoints on every particular trauma case such as turn tickets and failures To use a turnic, it correctly. Surgical airways failures to do a surgical airway. Usually, in the worst case, scenario night time someone is shooting at you, and you're trying to do a surgical airway and not have good vision because you can't have lights, lights, or something. People shoot at.
- So, thanks to Ron and others that have used this model that you'll see these good data are continuing to evolve and drive trauma care.
- So this slide I briefly mentioned that the point of injury the Kias historically, are always very high. Injury is incompatible with life and exaggeration but the research has always been looking at.
- How can we improve the diet of wound rates, infections, and so on, that occur, and people might make it into the tertiary definitive care, and then they expire 4 or 5 days later.
- That's always got the attention, because this one seems to be unmanageable.

- How can you take excellent individuals highly trained, and have them right up in that immediate area. Threat great threats to them to be able to manage these people within minutes.
- We're still looking for volunteers for that. But, to tell you the truth we now have surgical teams up close going after Bellamy's 10% correctable torso hemorrhage that data drove decision-makers in the Department of Defense to take highly specialized physicians, senior medics and put them far forward in small teams 7 to 10. PIN it on the service to work on those potentially correctable torso exaggeration.
- So before T. Triple, C. Came out with the first guidelines this is what was going on by medics cross all the services.
- Tournaments have always been shunned. They've always been around.
- If you know anything about civil war medicine as we used to teach on the side to our medical students. Officers used to have tourniquets in their pockets, but they weren't trained to use them, and they would still bleed out because there was no training, no understanding.
- Who had tunicates back then. Surgeons right controlling, bleeding for amputations that were going on to minimize infections, etc.
- We had no such thing as the hemisstatic dressings. I kind of took the lead on that at least in the last 5 6 years, and drove a change, and got more hemistatic dressings added, based on my research and my training. And then everybody else agreeing after the data becomes to reviewed we chased a shock forever for years, particularly in Vietnam.
- Everybody got large board needles 2 leaders just to begin. Why. to keep profusion pressure up in critical organs. That's the bottom line. But what did we do then? And what did we do for decades after that carried over into Ems creating the I atrogenic coagulopathy? We didn't know a heck of a lot about it. We were chasing the tail.
- Keep someone away from shock. Keep pressures up but now we're chasing the tail of how we manage. Then the calligalopathy that was being created. I be morphine, was around forever, surrets. We've all seen them. The big problem with that years ago was always Iv and Corm and Medics had a certain protocol. You give it to them, and you have to wait. And now I'm still at a 9 or a 10 on the pain scale, and I want to be down in a 2 or 3. When our when our first guidelines came out, in 97, published in Military Medicine Journal.
- We shipped it to Iv morphine because I am just wasn't cutting it for severe pain and you'll see shortly. We've come a long way from civil War era analges other things here that are highlighted, you know. If you can't get an ivy starting, you know again, you're chasing that shock concern. You know, medics for doing cut downs not their basic medic. They wouldn't get that training, but your special forces, Medic, who can work on cadavers, and they work on animal models historically, and that becomes problematic, particularly when it's your best friend. He might be doing it in a, in a in a in a laboratory here at Uva, working on Cadaver done a lot of training on cadaver kind of a anonymous, fascinated guy always love getting in and doing work on anatomy and working on trauma skills. But when it's the worst case scenario, it's night time and it's your sergeant, your best buddy. You're trying to do a cut down
- that could be your worst procedure ever, and never ever established a vascular line so cut Downs went away a long time ago. So what is T. Triple, c. It really is a unique set of guidelines

- centered around phases of care on the battlefield that will explain. But focusing on penetrating trauma. Yes, everybody's trained to deal with blood trauma but the big focus, as you'll see with data here coming up next.
- It's trying to manage that exaggeration and bleeding out. So what you see here is one of our lead trauma surgeons now retired Colonel Brian Eastbridge.
- Clearly he appreciated what Ron Bellamy did in Vietnam and so Brian and his team most of them from our committee a number of other surgeons did a study published
- nearly 4,600 cases, and how people die on the battlefield. Well, you can see really quickly from that previous bar graph that still we have a high percentage of Kias.
- But what drove the interest in the outcome of this that it drives today in civilian trauma care
- is this 24% potentially preventable injuries and that's what drives us on the committee.
- and that's what drives civilian trauma teams based on all the work that we've done over the last 20 years. That these numbers should be down in the single digits. So this is a this is a fundamental paper. Here's another slide from Brian's, showing again that Hebridge, 91%
- people will hemorrhh. He's on the battlefield, and many of this is correctable, particularly as I mentioned extremity. Hemorrhaging targets were really the primary drive in the earliest days and still today in t triple, c. Because these many cases not trunkle the junctional and extremity bleeding. Now we have the ability he broke it out, Extremity trunkle the hard one non-compressible tissues. What we're speaking about and then? Junctional functional difficult areas to manage traditionally a new term for you. They are non-turnicable areas.
- So it's a different approach that we've taken. They came to uses when I was there in the early nineties, looking for ways when I say they, the father of T. Triple, c. Colleague of mine, Captain Frank Butler, Junior, retired former navy seal half the time when he wasn't doing clinical practice in a hospital. He 50% of his time was focusing in on Navy special warfare trauma care
- and always trying to improve it. So he would get Navy Seal Korman coming to him and saying, hey, Doc you know atls for us is great, but it's not our world. We need penetrating.
- And so they came to uses to pull some of us together, Before this all began looking at. How can we come up with a specific, penetrating, driven trauma guidelines and I remember those days I was early at the University sitting in most of it. I wasn't a major player at that time.
- and they look through all of this, and then they put together a report that ultimately
- became the first guidelines.
- So question that I'll throw out to everyone is. Is it possible to take that 24% in Brian's data published in Journal trauma and drive it down into single digits? Can that be done with training our technology or a combination of both. Certainly it is a combination.
- So that drives what we do just one to show you the first paper that Frank Butler came out with 2 other physicians that I serve with it uses.
- So these were the early days. All evidence based heavily. Reference Peer reviewed, and then Frank went around to various civilian societies, you know. Certainly we're in College of Surgeons, the Atls Our good friend Norm McClain was the Founder, and the President and the Director of the pre-hospitable Trauma Life Support Manual Standard Course went to National Association of Emts went to the Wilderness Medicine Society where I was president. We got many, many physicians that are used to treating people in austere environments.
- That's why there's this symbiosis between military trauma care and wilderness medicine.

- That's why I was asked by my chair within months of arriving at uses. Brad, I want you to go to the Wilderness medicine site. They do austere medicine. There's limited manpower limited resources, delayed evacuation from people falling using high height read about it every day. Unfortunately people falling by accident or doing high-risk kinds of activities and not surviving it. So that's that relationship where I was kind of the bridge between the committee and willingness medicine, and I've been translating T: triple, c. Trauma guidelines to will this Medicine Society for 1520 years.
- So we rolled out the first generation that you just saw to the special forces. They're the ones out there far forward. Not a lot of support not a lot of ability to get helicopters in. Bring other reinforcements in in firefights.
- Certainly no physicians, no surgeons at that time for Ford. so we rolled it out to those units here and then we ran it by these organizations, and they endorsed it early on. Nobody was doing it. Of course they were going to endorse it. It's all evidence-based it wasn't too difficult to convince when you got to Norm and explain talking to his colleagues on Mary College, a surgeon's committee on Trauma and many others like Norman.
- So these are objectives. T. Triple, c. Treat the casually, prevent additional casualties.
- and complete the mission and maybe foreign to us in the medical field, because that's that tactics, part good tactics and good medicine will win the day and that's why t Triple c. Is driven around tactics and what you should be doing and what you should not be doing, based on the position you're in with that casually on the battlefield.
- So we use this mnemonic. This is interestingly, I'll tell you a little side story when I was in in Peru just recently doing some global health travel medicine and will of this medicine throughout Peru. So we use this mnemonic. You see here massive hemorrhage, airway, respiration circulation and head injury, Tbi and hypothermia. It's really more appropriately called trauma induced hypothermia another area that I've champion not only on the committee, but also the Wilderness Medicine Society, because everybody gets accidental hypothermia.
- This is a different thing trauma, and these type of thermal.
- They die with one or 2 core temperature changes.
- because there's multi-factoral things going on besides the body just getting cold when you're traumatized, as we all can appreciate
- So this doomatic drives, how we do our guidelines, and how we publish them phases of care. As I mentioned it's all based on tactics. When you're in a firefight and what the operators call a 0 in target. Someone can see you in a site.
- You're not going to be doing. Cpr: You're not going to be putting a turn on. You're not going to be doing a heck of a lot.
- That's why tourniquets went from aid bags pockets to on their vest right here to be able to self administer tourniquets. Everybody today in the military who
- deploys whether you're a physician, a nurse, a medic, a cook, a driver, a commanding officer, carries Turnic. It's not only one, but 2, because one of something in the field, whether it's wilderness, medicine, or in the battlefield, is 0, they break, they get lost.
- and 2 of something becomes one. That's an AD age that I've been teaching. It comes out of the special forces community where we do most of our work. Most of our trauma Guidelines are in this tactical field care, because this individual now is getting off the 0 to end Target out here

and behind some covering concealment we can rapidly do our trauma assessment, using the March protocol. Look for those things that are causing death and we can all appreciate that exaggeration and airway right on the top 2, and then tactical field care. This is generally on the battlefield near the point of injury depending on air, superiority or not they come in. They pick them up 1, 2, 3, whatever it is, and they lift them and fly them, depending on the next echelon of care. And I'll hold off that thought until the next slide to talk about what those are. So those are our 3 phases of care and here you have more individuals supporting you. You have oxygen.

- You have maybe some blood products today that we'll talk about and you have more capability to start doing intervention. Multiple people working on an individual all at one time because of the poly trauma it's massive.
- Let's just break this slide down real. Briefly, we're talking about increasing levels of medical care capability particularly surgical capability all the way here into Rehab.
- There's different ways of getting to these echelons of care it could be a rotary could be fixed.
- but level one is basically Buddy care self-care Medicare on the field.
- The next level of care could be a battalion aid station.
- That's for Ford. Usually it's one train feature away so they might be behind a mountain behind a group of trees, but still in the zone where munitions could be redirected at them. So it's still a threat. Environment going back to Bellamy's pie chart. Remember that 10% correctable torso injury we now I mentioned have far forward surgical teams as I mentioned anywhere from 7 to 10.
- What are they doing? Damage, control surgery.
- damage control. So they're stopping. The major Bleeds could be tying something off
- or just clamping off a vessel delayed closure long bones that are broken. Might have an or pitting surgeon. Not always, but you might. They fix 8 long bones pelvis, etc.
- And everybody gets flown. Then to a combat support hospital because we're in Iraq and Afghanistan for over 1015 years we basically have a level one trauma capability.
- some holding capability. But we usually don't hold on to casualties like World War 2. We turned to duty was a statistic.
- We never sent people up.
- We always get them back doing something, but today, maybe after the more definitive surgery, maybe still delay it. It could be a close.
- They fly off then from combat, support hospitals to Germany launch stool.
- Trauma Hospital. Thanks to the Germans
- that we have Army Navy Air Force trauma teams that rotate like 6 months.
- and they're receiving these casualties years ago before T. Triple, c. And all the advancements that we have done.
- particularly in the resuscitation area damage, control, resuscitation.
- Another term along with damage control surgery, thanks to Dr. John Hulk, on retired trauma surgeon from the army who's been the lead, not only in the military, but also showing the same benefit on decreasing mortality, but damage, control, resuscitation, damage, control, surgery a huge individual on all levels of trauma care.
- these are the kind of people that volunteered to be on this committee that I was doing blessed to learn and publish with.

- So after launch stool families may come over to Germany to their see their loved ones because they could be there for a week or 2, and then they get flown to one of our large receiving hospitals. Now Walter Re. Bethesda and down in San Antonio those are our 2 receiving hospitals that they'll go through repeated surgery, as you've heard and then go into rehab not only there, but other places like the Va. So that's our echelons of care.
- But here is the critical point about why I spend time talking about this. This is a critical care team loading up one of these casualties in theater, and then taking them off, most likely in Germany or the Us. But this is how they come fully automated in these critical care teams that the Air Force has championed. It's their planes that they have retrofitted over the years to a flying mobile Icu always looking for volunteers to join those, if you want to do critical care in the military. Absolutely incredible what they do. We never flew unstable patients until this era
- called sea cat teams fabulous.
- What they do. People may be getting 10 unit transfusions in route to launch stool.
- Incredible and before more definitive surgery. So how are our guidelines kept current?
- We can kind of move quickly now. We chartered Kotsey Committee on technical.
- Come back casually here in 2,001. I was the commanding officer at Ring Core Base, Camp Pendleton in charge of training all of the combat. Corman. Not every Navy. Korman is a combat. A lot of them work in Tertiary cares, hospitals.
- but it's that Corman. It goes through basic core school. Then he comes to marines, and he's going to be signed to be the do with the battalion and there are many docs in the pavilion. But These are young men and women.
- They come there, and this is before and after 9 11 we got really serious because people were going to war and they were graduating and being assigned immediately.
- And so that's when I joined the committee, because they wanted to roll it out now to all the services and maybe medicine supports the marines. You may know that may not.
- That school was a Marine Corps school I reported to a two-star ring general in charge of all burning core training and God bless him, Tom Jones. I knew him as a colonel. I used to bring him up to the medical students and give a lecture about your job as a graduate right out of Pg: One you're being assigned as a battalion surgeon. They call them just a young Pg: one level doc to the marines during time of war. It's kind of a scary time for physicians but he'd come up to the medical student. Talk about his expectations for you as a battalion, certain serving with him as a battalion commander little small, stocky guy, and even cuss and piss and moan that I'd make it come up from Quantico through the traffic to uses, and they have to drive back through it, and he'd walk out the door and says, commander. I'll see you next year.
- He became my boss, and that was a blessing, because they don't know medicine.
- We know trauma care, and I had marines, and what we call fleet marine force Korman in that school. So I joined the committee and I'm that guy right there. Medical trauma Educator. I'm. The only Phd. Everybody else's physicians and senior special forces, medics who have been there with tremendous experience who can literally go to toe, if you will, with Norman and say Norman Great idea. But, sir it doesn't work in our environment.
- So, trauma certain are used to having patients come to them, whether it's in Vietnam or whether it's in a level one trauma center and the medics and Corman are out in it and there are certain things you can do and can't do based on that. So it takes a team.

- And over the years we pulled in many different sources of inputs into the committee and that makes it so vastly better that we're listening to everybody
- Every time we have a meeting this committee comes in and special invites and we get a lot of input to make us as good as we can be.
- All evidence based. So today quickly go through these.
- Today we're still doing phases of care as you saw the 3 phases still very aggressive with tourniquets. We have more options, and 3 that started in 2,005.
- Oh, now we're up to about 10 that have been vetted, based on critical review criterion.
- He must have got us. We started with one we got 2 more added still doing aggressive needle thoracostomies. But we worked on technique and improvement and quality and understanding what's going to make that catheter kink so many things in a tactical environment to be successful. So we can minimize that small percentage of tension pneumothorax that occur that slide up on you slowly, and all of a sudden it slams and they drop complete cardiovascular collapse because of that pressure on the mediastinum and the pressure on basically stroke volume, cardiac output airway. We continue to improve. I'll talk a little bit about that set up. Lean forward, got sticking people on their back. Recovery positions, head up new data shows us that intubation, subglottic, nasal, oral farringtons in these kinds of trauma patients you're circling the drain. And unfortunately, a lot of these interventions do not help this kind of patient.
- And so the critical thing, whether you're sticking in you tube in or just doing a recovery from, an unconscious patient in their recovery position, head up on their own.
- We still want to optionate ventilate.
- We're always thinking about how best to protect that our way, if necessary. We're doing a and open surgical cricothyrotomy.
- Just a few more of our techniques that we do. We certainly have moved into Ios.
- we now have triple option analgesia
- depending on the level of severity.
- Medics and Cormann now have options.
- Earl transmucosal fentanyl citrate right there between the cheek and gum. Anybody's been around for a while we used to talk about that smokeless tobacco.
- Take these pain levels of 9 and 10 from not only 1, 2, but 3 traumatic amputations with IED blast and knocking them down to 2 and 3, the given the appropriate pain control. And now, of course, ketamine as permeated, Don't really see morphine anymore.
- Ketamine is just been incredible for all levels of trauma care.
- hypothermia prevention we need it. In the pill packs we get antibiotics on board. Someone is got a reflex can swallow transamnic acid now is standardized throughout the US. For trauma care junctional devices. Pelvic binding. That's one junctional device right there in that groin area and then we have created a whole new category that's beyond T. Triple, c. Is this prolonged casualty care?
- New program has now permeated all services to deal with that casualty for 1, 2, maybe 3 days, before we can get evacuation in.
- And so it's. It's a great hand off to these individuals. Every trauma guideline that we
- create, new or enhanced It's written up and peer, reviewed and published in the Journal of Special Operation, Medicine. comes out of the military independent group for the military.

- And this is how we get recognized, because anybody in the Us. Worldwide gets to see these papers and make changes.
- Pta. P. H. Tls. Was always a civilian that Norman explain created.
- I was blessed that he asked me to write 3 chapters. We we decided to come out with a military version that has the street side medicine, as well as the 13 chapters on t triple. C.
- Norman asked me 3 years ago to write, and many years ago I've done 3 updates on the civilian side for him on the what I call the environmental trauma heat, cold lightning, etc.
- We're in the public domain. The committee in Grassroots individuals. Now we're established command with funding at the highest level.
- It's in the public domain called Deployment medicine.com. All of our courses, all of our guidelines, all the videos, all the training materials are available for services and anybody else emt's paramedics programs. so this is just incredible where we've gone and having this level of support.
- So how do we know that it's working? I'm: going to punch through a couple of these.
- This is just one example.
- One of our members. Russ caught walls. A physician army
- did a study with Rangers. He was the Ranger surgeon, Us. Army Rangers, a special forces group and they made t triple, c. At least his commander did the highest level look at this number in their own database. They drove this dod y across all services down to 3%.
- And there's a reason because their commander, then Colonel, but now retired General Stanley Mc. Crystal, you see here made T. Triple, c. Medical Training top 5 priorities and so it is. A trainable phenomenon to drive down preventable deaths rusted another study, looking at the golden hour.
- Golden hour was a theoretical concept that came out of Baltimore shock trauma years ago.
- Well, we were the first ones that actually did research because we have our own trauma a data and show that yes getting to surgical surgical care
- does matter.
- But a lot of people will never make it within the hour we call that years ago even the platinum 5 min.
- That's why they die so quickly on the battlefield case, fatality rate. The percentages of people that you're studying that are injured is to percent who die in that larger figure of injuries.
- And you can see in these wars, and where we drove it down to this has been reported. It needs to the medicine report, and other studies have showed consistently not only our K. I's dropped.
- But our case, fatality rate or died of wounds really doesn't change because it's pretty superior across the board. So these this is feedback statistical feedback that we're doing something right.
- I showed this slide again because I'm just going to highlight these areas of what we have actually done.
- So before 2 triple C started. This is a special forces, surgeon.
- He's got 3 improvised tourniquets on, and still examined.
- Narrow is bad, Wide is good. Why does orthopedics and surgery have a pneumatic that's 5 to 6 inches wide.

- So I mentioned briefly that tourniquets have always been discouraged because the fear of exchemic response and loss of that limb still vital today. But the evidence shows, thanks to John Craig or orthopedic Return Surgeon with hundreds and hundreds of papers John has done in in 15 years. He's just an incredible machine that tourniquets do work and tourniquets. Don't cause problems as long as they're removed within that 2 h window. So our guidelines are very specific about how to use a turni kit, how to transition, to turn it to hemo static agents in a pressure bandage.
- This is John here, getting a an award, a Thank you from Frank Butler, our first chair, and father of T. Triple, c. And one of our meetings. John was in in the desert in Iraq and was directly involved with this study, showing the benefits of training up people not only in the field, but in the receiving hospitals there, how you can save lives. These are the current generations of the lead target called combat action. They They make it in different colors for training for Ems. So it stands out or tactically for technical teams, whether it's civilian or a military. We just published the study. Recently a critical 8 Criterion Review of tourniquets that are out there and the cat still made it in the seventh and sixth generation. The soft, tactical turn naked was one of the original. They've gone to a wider belt now that made it, and these others are brand new, they got added, and then we looked at 2 new Maddie extremity turnicates that are quite effective, but a bladder in the tactical environment, a bladder being nomadic is not a good thing it it's eventually going to lose its ability to hold Air
- Junctional trauma is huge.
- The review of the anatomy very difficult to know exactly where your Major Bleeder is non-tornicable. You can't just have someone trying to put pressure on that, because you don't know what the major bleeding is but we've come up with 3 devices. This is just one
- Sam Sheinberg. You may know him from the Sam Splints. The orange splints was earthquake. Surgeon vietnam dedicated his life and his company and he has been a major supporter of department defense, came up with 2 nomadic bladders that she will very rigid that get puffed up into one or both areas if necessary, and it's also a pelvic sling based on his previous engineering design on the appropriate pressures and locations to stabilize the pelvic injuries.
- And again, everything we do gets published. These are 2 lead papers for the junctional tournnicus that we've come out with and this is the most recent one I know. We're running out of time.
- The Ebola has revolutionized non-compressible injury in the a order coming through the for moral artery up into one of 3 zones depending on where the bleeder is. All of these catheters have standardized links, so they know exactly what zone they want to go into and this is the first evidence-based intervention to deal with non-compressible
- These kinds of things takes a team medics. Don't do this but These are physicians and advanced medics far forward putting these in so we can give some time
- some time before we get to that definitive far-forward surgical team that could go in and do a thoracotomy, if you will lapendectomy and find that major bleed and tie it off. But they continued to do research, and we found that intermittent a collusion of the Roboa
- gives us more time before we need to stop and get into a surgeon's hand. So many papers now have come out since 2,016. I believe that it continued to look at different procedures that buy more time.
- This was the major paper that had evidence based on this large team from the committee.

- Lots of interest in this and an area that Hasn't been able to be addressed the other area that we address is now fluid resuscitation. This came out in 214. We just updated in 21, and this is our priority fluid resuscitation.
- Low, tighter, oh, whole blood! We have many, many, everybody in the Rangers. Everyone gets to learn how to do a transfusion on each other and saving lives.
- and then go down to pre-screen low, tighter, O bounds component all part of the damage control, resuscitation that Dr. Hoepfner showed that mortality plummets when you're getting a one to one to one ratio. Those working critical care, emergency care know this already. You don't see this anymore on the list and this was the primary fluids, and these are the pressures that we shoot, for if you have a tbi or not little bit higher pressure with Tb: I has shown evidence base to be more beneficial. Then that balanced approach.
- Okay, Where? Where are we in time? Okay, we're right at I'm. Just going to get to the final points and summarize. I'm. Just addressing some of the airway challenges came up with an algorithm to do an awake crico early and not last for the needs of transitioning all of our information now into these standardized civilian trauma courses working on national standards to drive that preventable death in civilian trauma. And this huge report that John Hulka was part of the civilian team in 2,016. It's trying to dry, preventable death in the Us. Trauma death down towards 0.
- I did a major report with my committee members came to a wilderness medicine meeting in 2,016 champion, one of those top all about how to transition to the civilian world. Stop! The bleed nationwide program came right out of our committee with Frank and others working with civilian trauma to try to find a way like Cpr. Stop the major bleed, based on
- all of the craziness that goes on with weaponry in our society.
- So t triple, C is symbiotic, like historically developing in the late nineties now taught to everybody in NATO, have picked it up as well force multiplier and truly one not solely, but one of the reasons why survival has improved on the battlefield. So my final thoughts are these: what drives me and the committee members is that we want to minimize these kinds of ceremonies. Heroes, as we call them, being flown home to their loved ones and having less of these, like an Arlington less little girls and little boys growing up without their fathers or their mother and more of these, more of these kinds of reunions.
- Mothers, fathers, sons, and daughters of our Americans, coming home to these kind of reunions, and then these kind of reunions, old warriors embracing tremendous gratitude in this case to a disabled marine, probably from an led blast so I never stopped thanking our troops to do what they do.
- It drives me to do what I've done for 20 years, and it continues to drive me to be on this committee. So thank you. I know the time is limited.

Unknown Speaker

01:11:27

Bye.

UVA Medicine Grand Rounds

01:11:35

Thank you, Captain Bennett, for a phenomenal talk. Thank you for your service as well. I think this is very, very important research, as you noted for keeping our troops who are injured overseas and in combat safe. I think as you into that towards the end of the talk, unfortunately on the home from the civilian side of things, we're sort of plagued by the ongoing epidemic that is the mass casualty shootings in our nation.

- It sounds like there's a lot of symposium sort of applying your research to that field. Do you know anything about sort of the training from a medical education perspective in the civilian realm, or for emts and paramedics just sort of given the ongoing nature of this problem.
- So I appreciate your question. It's focused on the medical piece because I like you and others, are affected psychologically, emotionally a, and from a political standpoint what is taking place, and why people do what they do with these kind of weapon trees
- that. That's a piece that none of us can really take on in any one time, but it can't be denied. It has to be worked on everything that John Holcomb and others like him have done to bring.
- So he would come right back, sit out with his trauma colleagues in San Antonio, where he was based as the commander of the Institute of Surgical Research for the Army. That really was the main research center that drives to triple C research and start looking at the data.
- using damage control resuscitation models. I just showed a little bit, Tsa, and your ratio of blood products, one to one to one and they would do multi-center studies prospectively stop the study when they saw a mortality deployment you know 30% improvement. So that's been ongoing that's the big change that John and others brought to the civilian trauma world.
- on the Ems side believe it or not, even in the East Coast, not saying the west coast is any more advanced, I'd say the east coast is threshold blood.
- Roboa is being used only when there is a physician who rolls on a unit where physicians, as you know in Europe, are the ems they're doing rebo in the streets in London and other places in Europe for that non-compressible area they can't wait to get to a surgical team.
- It you'd be blessed to be in a level one center
- when I was up to us. We had so many level. One trauma centers around you, and if you were going to have a problem on the Beltway, you know that that'd be a place to be so
- so just to end those principles, the damage control, resuscitation, damage, control, surgery, have been rolled out to civilians community now for a long time, and it's proven itself. Ems has benefited from hemesstatic dressings and tourniquets, and on and on and on. Hopefully. I've answered your question.
- Thank you. Thank you for your time. Thank you, Mitch.
- for a lot of time, but very much for really interesting perspective. We don't usually hear this, so I think, hearing about this entire branch of medicine.

Unknown Speaker

01:15:07

You just don't even know about it. And seeing the incredible change.

UVA Medicine Grand Rounds

01:15:21

Yeah.

- yeah, it's just been incredible. But to be part of this family. People interested the volunteers our time beyond their full time jobs to do this over 20 years.
- So if anybody wants to reach out to me. please seek the Chief Resident or seek Dr. Rosner. My door is open to you, or whether it's literature. Further discussions about trauma care
- and anything that you ever want, and that's also for the online people.
- I offered that as well. My door has always been open to anybody as a commanding officer is a person involved in this committee, and I'll be speaking at the State's Trauma
- Conference in April that riverside health
- drives, but it's a statewide. It's going to be in Williamsburg. I'll be talking about trauma. Induce hypothermia again. Something that occurs, but not a lot of people are aware of it unless you're a surgeon.
- So thank you again.