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# J SOM

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THE JOURNAL FOR OPERATIONAL MEDICINE AND TACTICAL CASUALTY CARE



## *Inside this Issue:*

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- › Burn Casualties in Prolonged Field Care
- › Ongoing Series: Clinical Corner, Human Performance Optimization, Infectious Diseases, Injury Prevention, Operational Medicine in the Austere Environment, and more!

*Dedicated to the  
Indomitable Spirit  
and Sacrifices of  
the SOF Medic*

A Peer-Reviewed Journal that Brings Together the Global Interests of Special Operations' First Responders



## Translating Military Advances in External Hemorrhage Control to Law Enforcement



**Dr. Frank Butler**  
**International Association of Chiefs of Police**  
**26 October 2015**



### Disclaimer

*"The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Departments of the Army, Air Force, Navy or the Department of Defense."*



### Thanks!

- Committee on TCCC
- Joint Trauma System
- USA Institute of Surgical Research
- Dr. John Holcomb
- Dr. Rich Carmona
- Dr. Lenworth Jacobs
- Dr. Norman McSwain
- Dr. Stephen Giebner
- COL (Ret) Russ Kotwal
- COL Brian Eastridge
- MSG (Ret) Harold Montgomery
- COL (Ret) John Kragh
- Dr. David McArdle
- Dr. Alex Eastman
- Mr. Ray Casillas
- Mr. Mike Meoli (SEAL, Ret)
- Dr. Dave Callaway
- Dr. Mel Otten
- Dr. Peter Pons
- Lt Adam Falk
- CAPT (Ret) Barney Barendse
- Dr. David King
- Dr. Scott Coyne
- Mr. Dom Greydanus



## Bottom Line Up Front

- Law Enforcement Officers should routinely carry **tourniquets and hemostatic dressings** while on patrol or on missions
- Law Enforcement Officers should obtain training through National Association of Emergency Medical Technicians (NAEMT) courses on how to use these items.
  - Bleeding Control (BCON – 3 hrs)
  - Law Enforcement First Responder (LEFR – 8 hrs)
  - Tactical Emergency Casualty Care (16 hrs)
  - Tactical Combat Casualty Care (16 hrs)



## Individual First Aid Kits (IFAKs)

*At this point in time, the US Military has more experience with tourniquets and hemostatic dressings than any other organization in history. (14 years of war and 50,000 + casualties)*



Cost: \$128

- In 2001 – very few American combatants had tourniquets - no one had hemostatic dressings
- In 2015 - no American combatant goes onto the battlefield without an IFAK that contains both



## Trauma Care Lessons Learned from 14 Years of War

- Most (76%) combat fatalities result from very severe injuries and are not preventable
- Most (87%) deaths occur prehospital
- Most (91%) of the deaths that are potentially preventable result from bleeding:
  - Non-compressible (internal) – 67%
  - Junctional (groin, axilla, neck) – 19%
  - Extremity (arm, leg) – 13%

*Eastridge – J Trauma - 2012*



## Combat Fatalities: Two Types

- Non-Preventable:
  - Helicopter hit by a rocket and explodes in mid-air
- Potentially Preventable:
  - Special Forces Soldier
  - Shot in the knee
  - No other major wounds
  - Bleeds to death



## The acceptable number of preventable deaths is – ZERO.



Christian Golczynski, 8, receives the flag that covered the coffin of his father, U.S. Marine Staff Sgt. Marcus Golczynski from Lt. Col. Ric Thompson during a graveside service in Wheeler, Tenn.



## Death from Bleeding

- I have 10 minutes to speak with you today.
- Imagine yourself just having been injured – and presently bleeding from a large artery or vein.
- You now have just about that long to live.
- Unless somebody stops your bleed.

*Dr. Jonathan Woodson  
Assistant Secretary of defense for Health Affairs  
White House “Stop the Bleed” Forum  
6 October 2015*





## Battlefield Trauma Care: 1970

“All seem uncertain regarding the best method to implement factual knowledge to the man most in need, the front line trooper....citing our ineptness in the field of self-help and first aid .....little if any improvement has been made in this phase of treatment of combat wounds in the past 100 years.”

CAPT J.S. Maughon  
Mil Med 1970



## Tactical Trauma Care at 8000 ft in the Hindu Kush



## Battlefield Trauma Care: 2001

- Based on trauma courses NOT developed for combat
- Medics taught NOT to use tourniquets
- No hemostatic agents
- No junctional tourniquets
- Large volume crystalloid fluid resuscitation for shock
- 2 large bore IVs on all casualties with significant trauma
- Civil War-vintage technology for battlefield analgesia (IM morphine)
- No focus on prevention of trauma-related coagulopathy
- No tactical context for care rendered
- Heavy emphasis on endotracheal intubation for prehospital airway management



## Tactical Combat Casualty Care (TCCC) : A Different Approach

- Battlefield trauma care research effort – Special Operations and USUHS: 1993-1996
- Combat environment and mission considered
- Combat medic training and equipment considered
- Project included input from combat medics, corpsmen, and pararescuemen (PJs)
- Evidence-Based – INCLUDING requiring evidence for current practice at that time
- Goal – To Prevent Preventable Deaths



## Tactical Combat Casualty Care (TCCC)

- First used by Navy SEALs, 75<sup>th</sup> Ranger Regiment, and Air Force Pararescue in 1997
- PHTLS, ACS COT and NAEMT endorsement 1999
- All of Special Ops adopted in 2005
- Now used throughout the U.S. military
- Allied nations and civilian sector
- Updated on an ongoing basis by the Committee on TCCC



## Battlefield Trauma Care: Now

- Phased care in TCCC
- Aggressive use of tourniquets initially
- Combat Gauze as hemostatic agent
- Aggressive needle thoracostomy
- Sit up and lean forward airway positioning
- Surgical airways for maxillofacial trauma
- Hypotensive resuscitation with blood products
- IVs only when needed/IO access if required
- PO meds, OTFC, ketamine as “Triple Option” for battlefield analgesia
- Hypothermia prevention; avoid NSAIDs
- Battlefield antibiotics
- Tranexamic acid (TXA)
- Junctional Tourniquets





## Tactical Combat Casualty Care

*The Prehospital Arm of the US Military's  
Joint Trauma System*



TCCC

- Medics, Corpsmen, PJs
- Combat Lifesavers
- All Combatant Self/Buddy Care
- Includes Tactical Evacuation Care

*Photo - MSG Harold Montgomery*



## TCCC: How Do We Know That it's Working?



## Preventable Combat Deaths from Not Using Tourniquets

- Vietnam - **7.4%** of total combat fatalities
- Iraq and Afghanistan – up to 2006 – tourniquets just starting to be used – extremity bleeding caused **7.8%** of total fatalities - no better than Vietnam
- Iraq and Afghanistan – up to 2011 – tourniquet use by now widespread in US Military - **2.6% of total fatalities – a 67% decrease**



## Tourniquet Outcomes in TCCC Transition Initiative Report

- **Sixty-seven** successful tourniquet applications identified
- **No** avoidable loss of limbs due to tourniquet use identified

*Butler, Greydanus, Holcomb  
2006 USAISR Report  
"TCCC: Combat Evaluation 2005"*



## Tourniquets – Kragh et al Annals of Surgery 2009



- Ibn Sina Hospital, Baghdad, 2006
- Tourniquets are **saving lives** on the battlefield
- **31 lives saved in 6 months period by the use of prehospital tourniquets (largely CAT and SOFT-T)**
- **75% of improvised tourniquets were ineffective**



## Tourniquets in the US Military

**"Tourniquets have been the signature success in battlefield trauma care in Afghanistan and Iraq. Based on the work of Army COL John Kragh and colleagues, the number of lives saved from this intervention has been estimated to be between 1,000 and 2,000."**

*Davis et al  
Journal of Trauma  
2014*

**And the "1,000-2,000 lives saved" estimate was made in 2008 – six years before the end of the conflicts.**





## Tourniquet Phobia

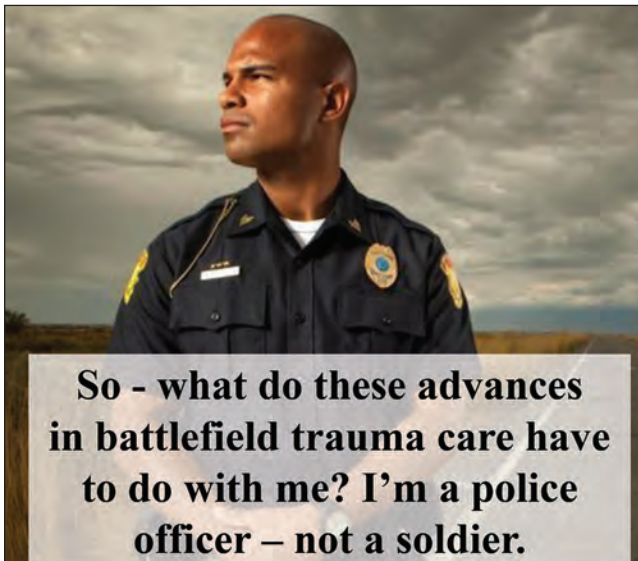
- **“But - I learned that tourniquets are dangerous and should only be used only as a last resort!”**
- **This is a medical “Urban Myth” that has cost the lives of thousands of casualties and trauma victims.**
- **Many thousands of tourniquets were used in the US Military in Iraq and Afghanistan.**
- **ZERO limbs were lost from tourniquet use in those two conflicts.**
- **2 hours of tourniquet time is very safe.**



## Eliminating Preventable Death on the Battlefield



- **Kotwal et al – Archives of Surgery 2011**
- **All Rangers and docs trained in TCCC**
- **U.S. military preventable deaths: 24%**
- **Ranger preventable death incidence: 3%**



**So - what do these advances in battlefield trauma care have to do with me? I'm a police officer – not a soldier.**



With increasing frequency LEOs themselves are exposed to Violent Penetrating Trauma



John Longobardo  
NY State Trooper

- 31 August 2006, Trooper Longobardo and SGT. Baker were shot with a .308 rifle.
- Trooper Longobardo returned fire while SGT. Baker, notified other Mobile Response Team members of the ambush.
- Sergeant Baker suffered devastating abdominal injuries requiring multiple surgeries and a lengthy recovery period...but survived.
- Trooper Longobardo had a severed artery in one leg and bled to death on scene.
- Today this would be considered a preventable death because neither he nor his partner had knowledge or access to a tourniquet.
- Trooper Longobardo had a wife and 3-year old son.



Slide – Mr. Mike Meoli

San Diego TACMED Series

San Diego TACMED Series



## The Tactical Edge 2012 Butler and Carmona

**TACTICAL COMBAT CASUALTY CARE:  
FROM THE BATTLEFIELDS OF AFGHANISTAN  
AND IRAQ TO THE STREETS OF AMERICA**

By Frank K. Butler, MD and Richard Carmona, MD

- **Our nation demands that the best possible care be provided to our military's combat wounded**
- **Do those who protect and serve at home deserve any less?**



## Tourniquets for Law Enforcement Officers – Who Benefits?

- **Injured Officers**
- **Injured crime victims**
- **Injured bystanders**
- **Motor vehicle accident victims**
- **Suspects**
- **The families of all of the above**
- **The Community and the Nation**







## Ft. Hood Shootings 2009 Officer Kim Munley

- 12 dead; 31 wounded on 5 Nov 09
- Officer Munley got the shooter
- She was in turn shot in both thighs
- Direct pressure and improvised tourniquets used by several physicians unsuccessful at controlling hemorrhage – went into shock
- Saved by Army 68W medic with a CAT tourniquet on left thigh



## Inaugural TCCC Course for LAPD and LAFD - 2012



- Life of an LAPD SWAT officer saved shortly thereafter - with a tourniquet

*Photos courtesy Mr. Ray Casillas*



## San Diego County Sheriff Deputy Dunford

21 FEB 2013  
Encinitas, CA



- Suspect hiding in attic shot a Deputy through a vent with a 12g slug.
- Slug hit above knee shattering bone and causing massive bleeding from femoral artery.
- Deputy Dunford, who had taken a TCCC course 2 months prior, pulled out his recently issued **C-A-T TQ** and stopped the bleeding.
- ER MD stated that he clearly saved the life of his partner.



TACMED Operator Course 12 - TCCC07EM3 Slide – Mr. Mike Meoli



## Police-Applied TQ Saves Mother of 3 in Atlanta



- Mother of 3 working in her kitchen
- GSW to the leg from a drive-by shooting
- Severe bleeding



## Police-Applied TQ Saves Mother of 3 in Atlanta



- Police officers arrived on scene
- Applied recently-issued CAT tourniquets
- Bleeding controlled – Mom survived



CAT Tourniquet, SGW, RT Lower Ext  
Friday night, Houston TX, March 2009



## CAT Tourniquet – patient lived


*Photo – Dr. John Holcomb*




**Injured transit police officer went into cardiac arrest following Watertown gunfight**  
*MBTA Transit Police Officer Richard Donohue remains in critical condition at Mt. Auburn hospital*

**CAMBRIDGE, Mass.** — Richard Donohue, the MBTA transit police officer critically wounded in a gun battle with the bombing suspects, had lost nearly all his blood and his heart had stopped from a single gunshot wound that severed three major blood vessels in his right thigh.


*\* No mention of tourniquet use in the story*

**Improvised EMS Tourniquet: Houston**  
 2013 -- Died



*Photo – Dr. John Holcomb*




**TQs in the Boston Bombing King et al – J Trauma 2015**

Tourniquet use at the Boston Marathon bombing:  
 Lost in translation

David Richard King, MD, Andreas Larentzakis, MD, Elie P. Ramly, MD, and The Boston Trauma Collaborative, Boston, Massachusetts

- 152 patients at five Level I Trauma Centers
- 66 extremity injuries – 27 tourniquets applied prehospital – all improvised
- *“Eight limbs presented to the ED with life-threatening exsanguination and had no prehospital tourniquet in place on arrival.”*
- *“At one collaborative hospital with detailed ED records and photos available, all six improvised tourniquets encountered were venous tourniquets and required replacement with a CAT tourniquet to prevent ongoing extremity exsanguination and effect hemostasis upon arrival in the ED.”*



Trauma Team  
 Memorial Hermann - Houston

CAT Tourniquet



- 2008 - 2013
- 105 patients
- Mortality decreased from 17% to 3.2% with tourniquets applied prehospital vs in ED
- No tourniquet-related loss of limbs

*Photos and data courtesy Dr. John Holcomb*



**Junctional Bleeding – Where you Can’t Use a Tourniquet**

- Groin, axilla
- Neck

**Use a hemostatic dressing!**




**CoTCCC-Recommended Hemostatic Dressings**



**Combat Gauze      Celox Gauze      ChitoGauze**

*\* Always apply with 3 minutes of firm direct pressure!*





## Combat Gauze When You Can't Use a Tourniquet

ORIGINAL ARTICLE


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Prehospital use of hemostatic dressings by the Israel Defense Forces Medical Corps: A case series of 122 patients

Avi Shina, MD, MHA, Ari M. Lipsky, MD, PhD, Roy Nadler, MD, Moran Levi, Avi Benur, MD, MHA, Yuval Ran, MD, MHA, Avraham Yitzhak, MD, and Eilon Glassberg, MD, MHA, Tel Hashomer, Israel.


**“The 88.6% self-reported success rate in junctional hemorrhage control is encouraging, as junctional hemorrhage is increasingly looked at as the currently most common cause of preventable death in the battlefield.”**

*Dr. Avi Shina et al  
Journal of Trauma 2015*




## Combat Gauze Save on Deputy Off. Michael DeWitt & Dpty Anthony Abutin

26 SEP 2012  
Lakeside, CA



- SDPD SWAT Officer Michael DeWitt took a TOCC class just 1 month before incident;
- On his way to work he stopped at a SD County Sheriff SWAT incident and helped direct traffic;
- When he heard shots fired he retrieved his M-4, Tac-vest with attached IFAK and went in;
- Deputies Perez and Johnson were each hit with high velocity rounds (.308);
- 3 deputies and Off. DeWitt extracted Dep. Perez and Sgt. Johnson to covered safety;
- Off. DeWitt pulled **Combat Gauze** from his vest and gave it to Dpty Abutin. They worked as a team and **packed it into the gushing shoulder wound** of Deputy Perez, **stopping the bleeding.**
- Trauma MD said **Combat Gauze saved his life.**

*Slide – Mr. Mike Meoli*



San Diego TAC/MCO Service Lakeside@sdnet.org



## Congresswoman Giffords Shooting Incident - Tucson

The New York Times January 13, 2011



Dr. Peter Rhee, at a memorial service Wednesday, has been an unofficial spokesman for Tucson.



## The Washington Post

Hot Topics Photos: Egypt unrest 'SWE' Julian Assange Daves Spam on Google Carolyn Hi

Help us help you. **Earn Reward**  
AOL's consumer panel - anyone can join!

washingtonpost.com > Nation

THIS STORY: READ WATCH Comments


### First-aid kits credited with saving lives in Tucson shooting

By Samantha Sennott/Star and Sun Staff  
Washington Post Staff Writers  
Friday, January 21, 2011, 9:57 PM

TUCSON - Some of the first deputies to arrive at the scene of the Jan. 8 shooting rampage here described a scene of "total chaos" on Friday, and they added that the carnage probably would have been much worse without the help of a \$99 first-aid kit that recently became standard-issue.



THIS STORY




## Washington Post 21 January 2011

In the end, 13 of those shot survived, while six did not. One of the injured, [Rep. Gabrielle Giffords](#) (D-Ariz.) was the last person still hospitalized until Friday morning, when she was discharged and transported to a [rehabilitation facility in Texas](#).


Doctors and law enforcement officials told reporters here that the incident would have been much worse without a small brown kit devised by David Kleinman, a SWAT team medic who had become concerned about rising violence.

Kleinman cobbled together the [Individual First Aid Kits](#) out of simple items used by combat medics in Iraq and Afghanistan: an emergency bandage pioneered by the Israeli army; a strip of gauze that contains a substance which coagulates blood on contact; a tactical tourniquet; shears that are sturdy and sharp enough to slice off victims' clothing; and sealing material that works especially well on chest wounds.


**\* Dr. Peter Rhee – E-mail 1 Feb 2011**  
**“.....a whole bunch of patients got Combat Gauze.”**




## San Diego Sheriff Issue (after repetitive practice TCC class)




TQ with holster for duty belt




Full IFAK on active shooter vest next to issued kevlar helmet stored in trunk of patrol car



*Slide – Mr. Mike Meoli*









## Tourniquets and Hemostatic Dressings in Active Shooter and Other Civilian Mass Casualty Events


Columbine Shooting Victims



Tragedy: April 20, 1999  
Columbine, CO  
53 Dead, 25 Injured






**We can sometimes do better at saving lives – and we should.**



## The Hartford Consensus: ACS Response to Sandy Hook

- American College of Surgeons
- FBI
- White House – Medical Policy
- White House Medical
- Asst Secretary of Defense - Health Affairs
- Asst Secretary of Homeland Security – Health Affairs
- Medical Section – Major Chiefs of Police
- ACS Committee on Trauma
- DoD Committee on TCCC







## Hartford Consensus I Dr. Lenworth Jacobs

Life threatening injuries in active shooter incidents such as those in Fort Hood, Tucson, and Aurora are similar to those encountered in combat settings. Military experience has shown that the number one cause of preventable death in victims of penetrating trauma is hemorrhage. Tactical Combat Casualty Care (TCCC) programs, when implemented with strong leadership support, have produced dramatic reductions in preventable death. Recognizing that active shooter incidents can occur in any community, the Hartford Consensus encourages the use of existing techniques and equipment, validated by over a decade of well-documented clinical evidence.

- **Emphasis is on early and definitive control of external hemorrhage**
- **Tourniquets and hemostatic dressings would help make this possible**



## Hartford Consensus III Dr. Lenworth Jacobs

- **Recommends tourniquets and hemostatic dressings for EMS/Fire and Rescue/Law Enforcement Officers.**
- **“All hemostatic dressings and tourniquets must be clinically effective as documented by valid scientific data. The Tactical Combat Casualty Care guidelines for the U.S. military contain objective evidence to support the safety and efficacy of the various options for tourniquets and hemostatic dressings.”**

**Lafayette Police Chief Credits Police Use of IFAKs with Saving Lives**



PERSONAL IFAKs worn by Police Tactical Team Members

**EMS Should Encourage their Law Enforcement Agencies to Carry IFAKs**

By AJ. Heightman

*“Aggressive, directed, point-of-wounding TCCC by non-medical troops in the form of self- and buddy-treatment, as well as continuity of TCCC by medical non-combatants represents significant enhancement in the initial echelons of casualty care.” JEMS 26 July 2015*



## White House “Bystander – Stop the Bleed”




Bystander “Stop the Bleed” Forum

October 6, 2015



- **White House meeting on this topic 6 October 2015**
- **Emphasis was on on BYSTANDERS being able to use tourniquets and hemostatic dressings**
- **Shouldn’t police officers be as well trained as bystanders?**



## Know What Your Officers Will Be Learning

U.S. doctor sanctioned for 'abhorrent and abnormal' troop training

- Incorrect messaging  
*Instructor drift*
- Inappropriate training
- Some vendor-supplied training is expensive
- *Need an inexpensive and assured standard!*


- "Shock Labs"
- "Cognition Labs"
- Arterial Blood draws
- Sternal IO insertion on volunteers
- Regional blocks by non-medics



## NAEMT Courses Advantages




- Approved curricula
- They QA their instructors.
- Have a system for establishing training sites
- Less expensive than commercial training vendors.
- Certification card at the end of the course.
- NAEMT registry of all who complete the course.
- Options:
  - Bleeding Control
  - Law Enforcement First Responder
  - Tactical Emergency Care
  - Tactical Combat Casualty Care



## Who Directs and/or Funds Trauma Kits and Training?

- Officer self-procured – not ideal
- **The Right Way**
  - Fire, Police, and EMS organizations should fund
  - Federal/State grants to get started
- Other Ways
  - **Philanthropy (Houston Model) – Rotary, Kiwanis, individuals, foundations**
  - State or federal law
  - Mandated for eligibility for HHS or FEMA grants



## Preventable Deaths in Law Enforcement

**In order to further reduce preventable deaths in law enforcement officers and mass casualty victims, we must know what the causes of these preventable deaths are as well.**

**WHO IS KEEPING TRACK?  
EVERY PREVENTABLE DEATH IS A CALL TO ACTION.**



## LEO-Applied Tourniquets Save 4 Lives

LAW ENFORCEMENT-APPLIED TOURNIQUETS: A CASE SERIES OF LIFE-SAVING INTERVENTIONS

David W. Callaway, MD, FACEP, FAAEM, Joshua Robertson, MD, Matthew D. Sztajnkrzyer, MD, PhD, FACEP

“The current case series demonstrates the life-saving potential of commercial tourniquets in the management of penetrating extremity trauma, even when applied by nonmedical first responders in the civilian setting (Table 1). Three of the 4 patients in the case series arrived at the receiving ED in extremis (Table 2), yet were successfully resuscitated and survived to discharge without major morbidity (Table 3).”

*Dr. Dave Callaway et al  
Prehospital Emergency Care 2014*





## Implementing the Hartford Consensus

THE HARTFORD CONSENSUS ON ACTIVE SHOOTERS: IMPLEMENTING THE CONTINUUM OF PREHOSPITAL TRAUMA RESPONSE

Peter T. Pons, MD,<sup>1</sup> Jesse Jerome, EMT-P,<sup>2</sup> Jeffrey McMullen, EMT-P,<sup>3</sup> James Manson, EMT-P,<sup>4</sup> James Robinson, EMT-P,<sup>5</sup> and Will Chapleau, EMT-P, NREMT<sup>®</sup>

<sup>1</sup>Prehospital Trauma Life Support, National Association of Emergency Medical Technicians, Clinton, Mississippi; <sup>2</sup>Denver Paramedic Division, EMS Education Department, Denver Health and Hospital Authority, Denver, Colorado; <sup>3</sup>Denver Paramedic Division, Denver Health and Hospital Authority, Denver, Colorado; and <sup>4</sup>American College of Surgeons, Chicago, Illinois; <sup>5</sup>Resident Advisor, Peter T. Pons, MD, 15430 Leyden Street, Brighton, CO 80602-6907

“ Three of the cases in our paper were police officers who were ambushed and sustained arterial injuries (Lakewood, Colorado July 2014 and Aurora, Colorado December 2014). There is no doubt that they would have exsanguinated without application of a TQ, in one case self applied and in the other two, buddy care.”

Dr. Peter Pons et al  
*Journal of Emergency Medicine 2015*



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  - **Tactical Emergency Casualty Care**
  - **Tactical Combat Casualty Care**



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- **In 2015 - no American combatant goes onto the battlefield without an IFAK that contains both**



Thank You!

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