Title: Tourniquet conversion webinar after action review report USAISR 2022

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Organization: U.S. Army Institute of Surgical Research (USAISR).

Scope: The work of this technical report is internal to USAISR.

Date of this document: first version December 14, 2021; final version March 2, 2022

Executive summary:

This technical report is an internal review of the U.S. Army Institute of Surgical Research (USAISR). It is an after action review of a webinar conducted on the topic of tourniquet conversion. The webinar was titled “Tourniquet conversion: starting the conversation.” The one-hour webinar occurred September 16, 2021 (Time Sep 16, 2021 01:00 PM in Central Time (US and Canada).
The webinar was hosted by the Special Operations Medical Association (SOMA), a non-profit, educational and professional association. The sponsor was the Teleflex Company. Note that the use of braces ([and]) delimit clarifying notes inserted by the author into pre-existing communications. Notably in a similar effort and soon after the webinar, the US Army introduced a task (number 081-000-2845) on Nov 8, 2021: Convert Tourniquet to Other Hemostatic Adjunct(s).

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Webinar information

Title, date, and time
Tourniquet conversion: starting the conversation. Webinar. September 16, 2021. Time Sep 16, 2021 01:00 PM in Central Time (US and Canada).

Abstract
Tourniquet conversion is a basic skill required by military medics. In Afghanistan and Iraq, the U.S. military had quick medical evacuation times, and casualties were able to reach definitive care rapidly. Unfortunately, evacuation times are unlikely to remain brief in future military settings. Civilian transport times vary widely from urban to rural areas under normal circumstances, let alone in an active violent incident or a mass casualty (MASCAL) incident. Complicating the discussion, there is a plethora of definitions/descriptions being used interchangeably (e.g. tourniquet down grade, tourniquet exchange, tourniquet upgrade, tourniquet replacement, etc…), which adds to the confusion. Tourniquet conversion protocols are not well established in either the military or civilian settings, and training varies greatly between organizations. This one-hour question based webinar will combine the scientific expertise of Dr. John Kragh and his years of tourniquet research, the hard-earned experience from the Ranger Regiment using their well-established tourniquet conversion procedure, and the current practices of tourniquet conversion in civilian law enforcement provided by Dr. Mike Shertz, Emergency Physician and Emergency Medical Services medical director.

Sponsor and host
Sponsored by Teleflex. Webinar Host: Christie Ross, SOMA.

Duration, time period
1 hour length, 1-2PM CDT

URL:
https://kellen.zoom.us/webinar/register/WN_GRLJCNa2RuKNvq0M34cWTgTC webinar;

Pre-webinar status
Participant, role: Kragh, panelist; Shertz, panelist; Fredrickson, panelist; Ross, host; Flores, QnA; Audience: Registrants [estimated 507]; Attendees [estimated 254, 30 nations of 6 continents]

Webinar talking points

Tourniquet conversion (TC) is infrequently done by individuals but commonly done by health systems.

Tourniquet use and TC aftercare often drop out of stories, conversations, health cards/records, and registries.

TC is an obscure task versus tourniquet application; TC is often unclear, unfocused, skipped, or forgotten.

Few caregivers get any TC experience, rarely a lot; experienced ones say TC takes time and can be hard.

People get ready: prepare now, before a need arises.

Awareness gaps exist: who does, teaches, supervises, and stewards tourniquet conversion?

TC caregiving, doctrine, research, development, education, training, and policy are all in flux now.

Start with an approved algorithm, practice, rehearse, and develop experience for individuals and systems.

In TC, novice: remove, beginner: assist, competent: practice, proficient: teach, and expert: steward.

Thermal management of injured limbs is a candidate research priority from casualty care committees.

TC interoperability gaps: diction, common framework, assisting, teamwork, handoff, transfer, aftercare.

What went well?

Professional, well planned, executed; far broadcast (30 nations of 6 continents); on time, on target; need/gap filled; registrant & attendee counts above predictions, enthusiastic/excited audience/conversation.

What would we do differently?

More or better SOMA-JSOM communication/awareness/broadcast; Q&A should request Qs ahead of time so at least the key topics of Qs can be addressed and prepared ahead of time for the actual seminar (answering the tsunami of Qs slowed the experts, temporarily taking them out of the conversation)

Associated files

MS Word and pdf: C TC tourniquet conversion FAQ dev Doc 8.9.2021 [made available ahead of time]
MS PowerPoint file: Tourniquet Conversion Webinar abbreviated [Rangers 2021 later algorithm]
Text file name: TC webinar text GMT20210916-180026_Recording of attendees 2021
Text file name: TC webinar attendee data 2021
MS Outlook file: TC webinar SOMATeleflex Tourniquet Conversion Webinar Recording email with attachments 2021
MS Outlook file: TC Conversion webinar Request approved to participate 2021 [military approval]
Text file name: TC webinar QA report [QnA, questions and answers in chat boxes]
link to file: https://kellen.zoom.us/rec/play/CnYX5uNxTwI2KgDuYaNkfaz5_fkkvvE7FV3Q47ZUR2-FMbQj8y6e8VbmTm6yHZZ80zWSTjZa4Oh30X7F.ch_PV6uPy2FQ1GtY

Tourniquet conversion FAQs: Frequently asked questions

What is a tourniquet conversion?

A tourniquet conversion is a caregiving intervention that removes or exchanges a limb tourniquet for another intervention, such as a wound dressing. The process is termed a conversion.

Why is tourniquet conversion important?

An emergency tourniquet is a tool to temporarily arrest blood flow to distal wounds. After wound bleeding is controlled, the mechanical stoppage of local blood flow, known as ischemia, must be reversed to restore flow and save the limb. Someone must do a conversion to minimize risk of problems caused by pressure, pain, and ischemia. Less ischemia reduces the risk associated with returned flow, called reperfusion.

Who performs a tourniquet conversion?

Anyone can try to convert a tourniquet, but typically a trained person will perform better. The most senior medical person available can supervise, assist, or perform conversion. Laypersons who are taught tourniquet use usually also remove tourniquets in class. Removal is the simplest conversion. Complex types of conversion require more skill, training, and supplies.

What are some types of tourniquet conversion?

Types include tourniquet removal, tourniquet-to-tourniquet conversion, and tourniquet-to-dressing conversion. A common prehospital tourniquet-to-tourniquet conversion is to remove a tactical tourniquet placed high on the limb and then place another at a site 2–3 inches above the wound thereby shortening the length of the limb portion remaining ischemic. A common hospital conversion is from a field tourniquet to a pneumatic (air-filled) tourniquet. A tourniquet-pressure dressing conversion removes the tourniquet, lessening the ischemic time, and replaces it with a pressure dressing.

Why are there different types of tourniquet conversion?

Health needs vary for different situations, patients, and caregivers. For example, an expert caregiver may convert a tourniquet early, near the point of injury. A competent converter may perform a tourniquet-pressure dressing in an ambulance. A proficient caregiver in an emergency room may convert a field tourniquet to a pneumatic tourniquet. Surgeons may perform conversions in an operating room. Some caregivers can perform simple conversions alone but may need an assistant for complex conversions.

How does one learn to do tourniquet conversion?

As one learns tourniquet application, one also tends to learn removal. In accruing experience in classes, rehearsals, or caregiving, one can develop skills beyond simple conversions. Manikins are good for practice, and pool noodles are an alternative. Development of skill in complex conversions takes further time and effort.

What are current challenges to converting a tourniquet?

Act early: tourniquet conversion is usually done within 2 hours of tourniquet application. Individual caregivers infrequently need to convert tourniquets and there is an infrequent risk of severe problems of limb loss or kidney failure; this makes conversion a low-volume, high-risk procedure. Learning about tourniquet conversion and ischemia-reperfusion takes time, so learn before you need it.

Are there guides to tourniquet conversion?

Shackelford SA, Butler FK Jr, Kragh JF Jr, et al. Optimizing the use of limb tourniquets in Tactical Combat Casualty Care: TCCC guidelines change 14-02. J Spec Oper Med. 2015;15(1):17–31.

Levy MJ, Pasley J, Remick KN, et al. Removal of the prehospital tourniquet in the emergency department. J Emerg Med. 2021;60(1):98–102.

National Association of Emergency Medical Technicians (NAEMT). Tactical Emergency Casualty Care (TECC) Guidelines for BLS/ALS Medical Providers. Current as of May 2017. Indirect Threat Care (ITC)/Warm Zone Guidelines. http://c-tecc.org/images/FINAL_TECC_ALS_BLS_Guidelines_052117_.pdf. Accessed 21 May 2020.

McEwen JA. Are there any guidelines on best practices for hospital admission of a patient with a pre-applied tourniquet? https://tourniquets.org/are-there-any-guidelines-on-best-practices-for-hospital-admission-of-a-patient-with-a-pre-applied-tourniquet/. Accessed December 14, 2020.

Where can I learn more about tourniquet conversion?

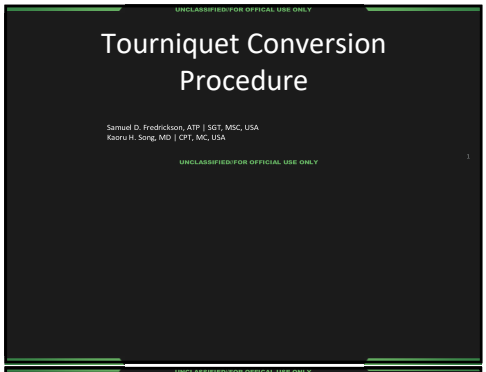
Drew B, Bird D, Matteucci M, Keenan S. Tourniquet conversion: a recommended approach in the prolonged field care setting. J Spec Oper Med. 2015;15(3):81–85.

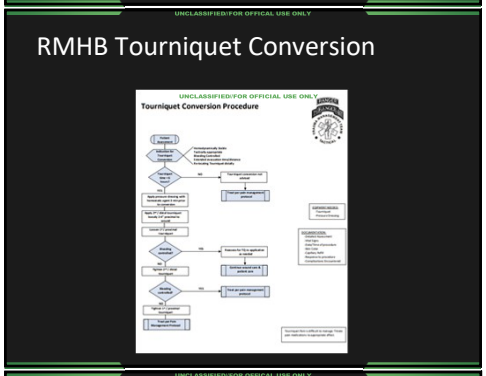
MacIntyre AD, Quick JA, Barnes SL. Hemostatic dressings reduce tourniquet time while maintaining hemorrhage control. Am Surg. 2011;77(2):162–165.

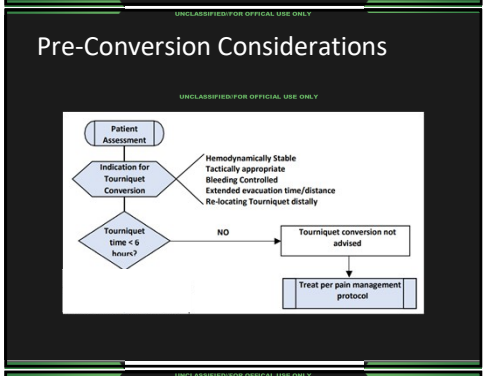
75th Ranger Regiment Medics. Ranger Medic Handbook. St. Petersburg (FL): Breakaway Media; 2020.

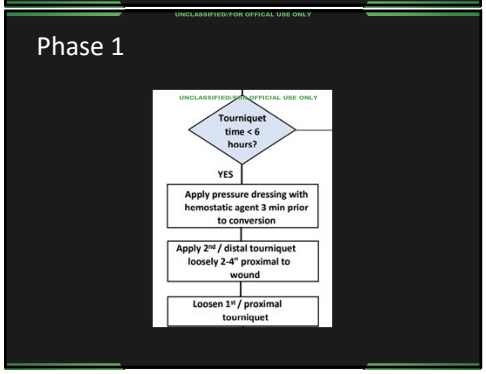
75th Ranger Regiment. Advanced Ranger First Responder handbook. 2021 edition. Oldsmar (FL): Breakaway Media; 2021.

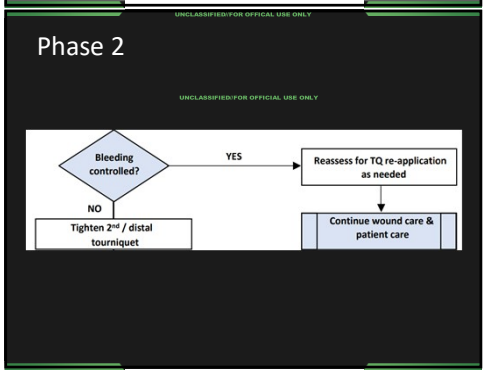
Ranger slides

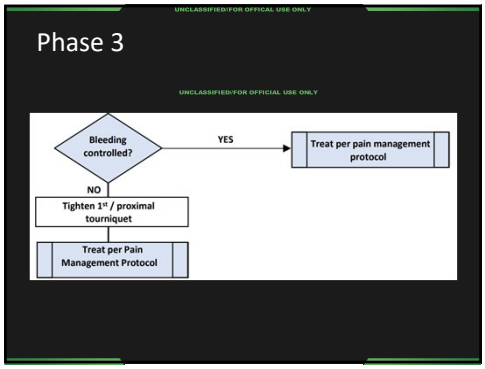


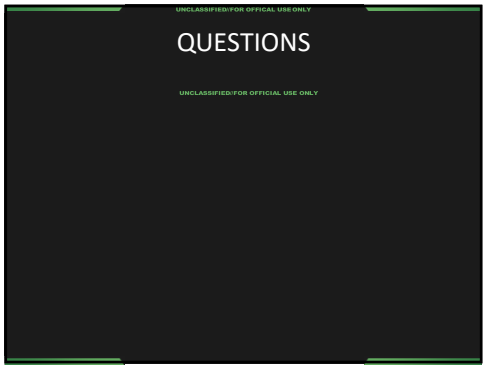












Question Report [redacted for asker identifiers]
Report generated 10/11/2021 12:56; Topic: Tourniquet Conversion: Starting the Conversation; Webinar ID: 987 0540 9907; Actual Start Time 9/16/2021 12:43, Actual Duration 80 minutes; # Questions: 43

Question Details, Question#, Asker Name, Asker Email, Answer(s), [post-webinar comments to report]

1 "So I'm a firefighter, First Responder, EMR and Stop the Bleed Instructor. My question is can you convert to a pressure bandage like an Israeli of blood flow is occluded with the TQ?" [Redacted for asker identifiers] "Dr. Shertz is speaking towards the end of webinar. I will relay EMS, Fire Fighters, and Law Enforcement to him during his presentation." [Kragh: This question appears to ask if a caregiver can convert a tourniquet to a pressure dressing; the answer is yes and the method asked about is basic. If the 'of' was a typo for intended 'if', then the answer is yes still; this technique of prior tourniquet control while packing or wrapping a wound is underappreciated, under-discussed, and remains an awareness gap especially among those caregivers who are not expert or proficient. The task is easier if bleeding is controlled.]

2 "When applying a TQ high and tight, is there any situation where you just don't apply a second one distal to the first TQ if it's needed?" [Redacted for asker identifiers] The question is unclear [The seeker of a rule tends to be a novice. If the second is needed, then it is indicated for placement. If there is no room available proximal for its site to be placed, it may have to go distal to the first tourniquet. The idea that the question presumes conversion site is not to be 2-3 inches from the wound seems like a complexity reducing heuristic, common among those less experienced. A 2021 JSOM publication addressed these issues.]

3 Does anyone have experience with using the iTClamp for TQ conversion? [Redacted for asker identifiers] I have lab experience with iTC but not with conversion to it. [There are many types of conversion, this is an unusual one. Rarely reported. Seems like all the principles are similar despite the change in device.]

4 Tourniquets used in surgery are the same as CAT or others? [Redacted for asker identifiers] Surgery tourniquets is pneumatic. [Very basic question of design, indicating unfamiliarity.]

5 From the LE [law enforcement] perspective there is less focus on conversion stateside as there are few agencies who operate in austere geographic settings. If this is a need in metropolitan arenas how can this topic find relevance to uniformed patrol? Should we as the training elements focus on PFC aspects with active shooter and MASCAL incidents? [Redacted for asker identifiers] "If you have time and interest, awareness may help by limited training. Scale the training amount to the perceived risk." [Prolonged need not conflate with austere. Prolonged time can be in the middle of the city such as Mogadishu in Black Hawk Down which one could call as having active shooters and MASCAL. The answer is yes, if the resources to train are available and the perceived need seems sufficient. The train wreck MASCAL in Philadelphia is an excellent example why US police may need to apply tourniquets and why they may need to convert them.]

6 When does tourniquet conversion become important? Never had to address this topic before. Why now? [Redacted for asker identifiers] "Conversion become a real problem at 6 hours or more. Conversion is important from the moment it is placed; it may buy some time but it comes at a cost." [The need to ask this question is why the webinar was needed. The question is the knowledge gap; the webinar was the gap fill as a wakeup call. People get ready.]

7 How many tourniquets should you are wear as a civilian first responder? 1 or 2? [Redacted for asker identifiers] I am Army doctor. I have one. I hope a civilian also answers you. [This question is off-topic, extraordinarily basic, and probably represents basic audience. They need a lot of this type of educational opportunity.]

8 How does tourniquet applied on a limb affects blood pressure of a victim with for example head injury or any other underlying medical issues? Anonymous Attendee "The answer is unclear. In general casualties have a mixed pattern of response which is unpredictable. Some pressures stay the same, some go up, some down" [this is an interesting question, perhaps from a caregiver interested and experienced in assessment/monitoring, a higher level skill than what most questions dealt with.]

9 Is there a time line on neuro compromise? Is that the same 2 hour time window? [Redacted for asker identifiers] live answered [This a forever rule-based question of the base audience, novices. The answer given live involved limb temperature cooling, a theme that Monty addressed more directly. The larger issue in thermal care of limbs because the limb can be cooled to protect it from ischemia and reperfusion but it must be short of freezing tissue. Further, tourniquets in cold weather hasten frostbite {tq frostbite} so warming and monitoring may be needed. Further, a tourniquet limb cannot protect itself from too much warmth so heaters can burn it. These issues are rarely discussed today albeit found deep in older literature. Major awareness/research gap for thermal care of limbs in TCCC. This idea of thermal management of an injured limb, suitable to higher tiers of TCCC provider, is especially important in prolonged field care or prolonged casualty care due to the major factor, duration of exposure, a key risk for excessive heat transfer, hot-to-cold. “Thermal management of injured limbs is a good candidate for a research priority” such as from the Committee on Combat Casualty Care. See Monty].

10 windmill fast or slow? [I guess release of rod during TC? Arc velocity?] [Redacted for asker identifiers] "If I understand your question correctly, you will loosen the windlass slowly." [This duration of release of tourniquet is goofy and sporadically described in literature about ‘slowly’ or one minute. So vagueness is one problem. Another problem is LOS (Level of Skill) of the user, the caregiver doing this subtask. Since they seek a rule, which indicates novice, our main target audience. This question was at the heart of why FLO Flores of Teleflex thought the webinar was needed. This point triggered our discussion about the duration of the step (unturning the rod to loosen the tourniquet, or as the user says here, windmilling). The step duration is important because the tourniquet acts arterial when fully tight and venous during the unturning. No one appears to appreciate the venous tourniquet because their intent is not venous effect; in essence the user overlooks the risk because they don’t know it exists. The problems of venous tourniquet are many, and the duration of its effect is important. 1 minute is OK rule for limit of venous tourniquet effect. Major awareness gap here.]

11 "On the topic of cooling, could you discuss the concept of purposely cooling a limb with a tourniquet applied?" Monty [redacted for asker identifiers] I will ask Dr. Kragh - after SGT Fredrickson speaks. [This was addressed live. Limb cooling science is extensive for a long time. I don’t see why this wasn’t incorporated into TCCC long ago. I suspect that TCCC wanted to anchor to novices, and never got fully into the topics which stratify to level of provider (what they call tiers now). This development would be on the higher tiers and guidance should scale by tier strata. As I foresee it, thermal care of limbs in TCCC is not for ASM, but minimal for CLS, minor for medic, and major for paramedic and above. This is plainly important awareness gap/research gap/potential TCCC research priority. “Thermal management of injured limbs is a good candidate for a research priority” such as from the Committee on Combat Casualty Care.]

12 For Dr. Shertz [redacted for asker identifiers] [I guess the question dropped out.]

13 "If you are in a situation where the TQ has been on for 6+ hours, prior to removal or attempt to convert, should you essentially prepare the patient as if you were treating a crush syndrome?" [Redacted for asker identifiers] "Yes, see DHA CPG Crush syndrome" [Dr-to-Dr Q&A, doctors talking to doctors about doctor stuff.]

14 "At what point would you treat TQ conversion as a crush syndrome? i.e. size or number of limbs with TQ, amount of time in TQ, etc." [Redacted for asker identifiers] "6 hours warm ischemia is main factor. Muscle volume is less clearly important but does raise the burden of myoglobinemia at least theoretically. Potassium tends to parallel myoglobin but not closely." [That the asker has no ranking of listed topics based on a physiologic scheme seems common as one may suspect of our base audience. This remains an awareness gap even among doctors, excepting some physiologists. However, the basic science seems reasonably worked out for first aid and limb cooling albeit it's difficult to implement in first aid or advanced first aid. The methods need research to develop steps, metrics, and performance parameters. Field trials and user preference studies are needed before a doctrine can be decided. "Thermal management of injured limbs is a good candidate for a research priority" such as from the Committee on Combat Casualty Care.]

15 I'm a veterinarian in the UK. Is there any work or records of conversion in the canine when tourniquet is used in the field? Thank you [redacted for asker identifiers], seems to be no reports to date

16 "Jersey City here. Would cooling the distal limb therefore extend the time before conversion becomes more urgent, either in the field or in a surgery facility. Any comments on this?" [Redacted for asker identifiers] It is unclear but likely helpful short of freezing tissue [tq frostbite idea in answer; Gap noted again: "Thermal management of injured limbs is a good candidate for a research priority" such as from the Committee on Combat Casualty Care.]

17 "Dr. Kragh just referenced the case in Afghanistan of 16 hours of TQ time without loss of limb. On the other end of the spectrum, is there any case history of serious sequelae after a short (<2 hour) length of application. Trying to understand the outliers on either end of the window…" [Redacted for asker identifiers] "Minor morbidity is infrequent, temporary, and of limited impact. Preponderance of evidence is good if users are trained such as in US Army." [Case reported 17yrs ago. "Thermal management of injured limbs is a good candidate for a research priority" such as from the Committee on Combat Casualty Care.]

18 "What type of training seems to ""stick"" the most for the 68W from your standpoint? How do you train on this skill at the individual up to BAS level? I want something that will stick with my National Guard medics. Thank you." [Redacted for asker identifiers] "Recommend hands on, go thru the steps. Hasty to deliberate for novices. Deliberate to pressure dressing for advanced beginner 68Ws." "Crawl, walk, run method and repetitions. Start with understanding the protocol and walking through it as a group step by step. Walk: individuals do it as a graded skill. Run: include it in a trauma lane" [This question is excellent because TC is not often done hands-on in TNG. Sometimes it's not even mentioned. Tourniquets drop out of the lesson plan after application, drop out of training, and drop out of rehearsals]

19 have there been any official and or unofficial studies done on length of time a tq can stay on vs temperature without tissue damage [redacted for asker identifiers] [Awareness gap: lab studies. Some related to limb cooling. "Thermal management of injured limbs is a good candidate for a research priority" such as from the Committee on Combat Casualty Care.]

20 Why is adding a distal TQ part of the protocol if relocating TQs is part of TCCC (marCh)? Anonymous Attendee I don't understand the question [perhaps point was raised by Ranger medic in their algorithm (newest version). Also this may be the same point raised above about distal to high and tight.]

21 Is it possible to get a copy of Sgt. Fredrickson's protocol? [Redacted for asker identifiers] Yes - Protocol will be available as part of the recorded version. If you send me your email. I will forward protocol. My personal email is [redacted for identifiers]. [Newest algorithm.]

22 Thank You SGT Fredrickson [redacted for asker identifiers]

23 thank you. Have the rangers had any practical experience of it in military working dogs (mwds) [dogs]? [Redacted for asker identifiers] I'm unaware of any TQs in our MWDs [reports rare tq use in MWD.]

24 For Dr. Kragh: is there any guidance on how to lower limb temperature while still working to maintain overall pt temperature and avoiding overall hypothermia? [Redacted for asker identifiers] [no method developed enough yet. This has not yet been listed as a TCCC research priority. Thermal management of injured limbs is a good candidate for a research priority such as by CoTCCC. The conversion gaps in the community and in research were confirmed and repeatedly mentioned by the audience, representing tourniquet end-users and their supporters (instructors, caregiving team leaders, and healthcare providers). Several in audience asked of thermal management of injured limbs.]

25 How much training are EM residents getting in TQ conversion? [Redacted for asker identifiers] Varies. Military get some. [The Q&A appear to miss conversion. The military does some training albeit unevenly among individuals, specialties, units, and services.]

26 Medics in extremely rural hours in the southwest occasionally manage TQ's for times exceeding 2 hrs so this topic is pertinent to civilian/tactical EMS as well. [Redacted for asker identifiers] Sure does. Some reports of that [Note telling time-austere conflation as ‘rural hours’.]

27 "My question for SGT.: for you, which TQ is the best for combat area?" [Redacted for asker identifiers] [Very basic, off-topic question maybe indicating low level of experience.]

28 "SGT Fredrickson, What is the Regiment standard for documenting the TQ placement time and conversion time? Is it just the TCCC card or do you record these times in different locations?" [Redacted for asker identifiers] "To record TQ time, the standard is to write it on the TQ itself, and on the TCCC card." [Higher level question of healthcare recordkeeping. Larger issue is handoffs, transfers, interoperability.]

29 "For Dr. Shertz, would it be beneficial for Civilian LE to provide information to ER staff about the circumstances which required the TQ usage, gunshot wound (gsw), edged weapon, impalement [Impale ref list]? We frequently apply and do not do any follow up with ER staff." [Redacted for asker identifiers] [handoff transfer.]

30 How often and how soon after TQ application in your experience will tourniquet pain be a real problem? [Redacted for asker identifiers] I was in a war hospital where many were in shock with stupor so few had bad pain. [Pain is an indication for TC.]

31 "As an emergency medicine PA in the Army it is understood that tourniquet conversion is part of the scope of practice for the medic. However, is tourniquet conversion within the scope of practice for the civilian paramedic or is this a locally trained and implemented protocol?" Anonymous Attendee [Doctrinal point of distinctions between settings indicating higher understanding of asker. This question

was near the end and may not have been answered in the scrum of the moment. Also it was ambiguous as to who was to answer it since it was bicameral.]

32 "I'm concerned about hypothermia....does active cooling of a limb distal to the placement of a tq increase the risk for hypothermia? Management of the patient includes active warming and cooling in this scenario.....seems like hypothermia is a greater risk... hmmmm" [redacted for asker identifiers] Conversion of cooled limb has its down-side and may take a hospital. [Excellent question of significant insight. I thought we said much the same in live webinar, and I recall saying much the same. Major awareness and research gaps in TCCC, not yet TCCC Research priority.]

33 '[redacted for asker identifiers] I generally advise 2. It allows for multiple limb issues in cases like MVA or if you need a second for a leg. [Redacted for asker identifiers] [I guess it was to answer how many tourniquets to carry.]

34 "To Dr. Kragh and Dr. Shertz: Any thought to use of modifiers such as an infusion of bicarb post two hours, prior to six hours?" [Redacted for asker identifiers] I lean on my doctor intensivist for such judgment. [Interesting question, relevant to PFC. Not much research. Not priority.]

35 "Dr. Kragh, is it more emergent to convert TQs placed tightly on smaller limbs, i.e. pediatrics or elderly? Would a TQ placed hastily by a non-medic on this population possibly because acute neurovascular damage due to tightening much tighter than necessary?" [Redacted for asker identifiers] "Tourniquet overpressure is risky. Stopping the bleed and pulse are good goals, not pain. We don't see many problems or complications of lay person putting them on too tight." [I don't understand why 'emergent' was the word as time is not pressure; some conflate risk of time with risk of pressure which the sciences are mostly separable. The tourniquet conversion concept objectives were developed and validated in a successful webinar.]

36 Hemodynamic stability has been mentioned as a requirement prior to conversion of a Tourniquet - what is the metric for this? Strong and Regular Radial Pulse? Femoral? Systolic? HR? [Redacted for asker identifiers] Radial pulse quality is pretty good. Overall pattern is better if you have the info. Trend is most valued. [Great Q from experienced paramedic instructor.]

37 thanks. Much appreciated [redacted for asker identifiers]

38 One of the criteria for conversion is that the patient not be in shock. Part of the criteria for determining shock is the presence of a weak/absent radial pulse. Josh Naylor and Andy Fisher (2020) concluded that the characterization of a radial pulse which is palpated is not an accurate of hypotension (shock) so how do you evaluate the presence/absence of shock? [Redacted for asker identifiers] [Much like Q36; I don't remember live chat on this point.]

39 "What level of provider (i.e. CLS, 68W, 18D, etc.) is the target for teaching tourniquet conversion? Especially given the threat of large scale combat operations in semi permissive environments with large casualties/long evacuation times. Yes ideally it is someone who understands the physiology but the senior medical providers are going to be spaced out" [redacted for asker identifiers] "Common soldiers learn removal, the simplest conversion. Hasty to deliberate is next level Most medics should have tourniquet to pressure dressing type of conversion. There are multiple types of conversion available."[I think that the who target is not 1 but many, graded/scaled to how much to mention/teach/do: 0 to much. I think this graded point was mentioned (maybe twice) in live webinar, too. That it would be one asked for is likely a complexity reduction heuristic.]

40 "Thank you for highlighting the weak correlations between BP's and pulse locations Dr. Shertz! (Deakin et al, 2000)" "[redacted for asker identifiers]

41 "Reference austere Civilian injuries. If there is a lot of trauma, i.e. multiple fractures. Should first responders forego conversion to avoid further internal damage from shifting fractured bones?" [Redacted for asker identifiers] [This seems a scary question to raise as if the limb cannot be handled well in the field, that the risks of clumsy handiwork need to be weighed against ischemia-reperfusion. The slippery slope to first do no harm in leaving a tourniquet on when it's indicated to come off seems like a pursuit of rationalization to do less, a recipe for inaction.]

42 is this webinar available to watch again [redacted for asker identifiers] [yes]

43 Thank you gentleman. Very helpful info. I'm interested any follow up or additional discussions. [Redacted for asker identifiers] [Seems to ask for follow-on education/webinar.]