

War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES

INTRODUCTION

It has been nearly 2 years since russia launched a full-scale invasion of Ukraine. (Yes, it is on purpose that we write russia with a small letter - following a recommendation of our national linguistic authorities). Here you must understand that this **war** actually started in 2014, following our Revolution of Dignity, russian annexation of our Crimea, and hostilities against our military conducted by the russian-backed separatist in our Donbas region.

In the past 2 years, the scale of this war has drastically expanded. The number of casualties has dramatically increased. Consequently, we have made numerous observations and gained a lot of experience regarding **tactical medicine**. At war of this magnitude things are vastly different, and these differences must be accounted for in any guidelines on tactical combat casualty care.

We are honored and humbled to share our experiences and recommendations with all of our Ukrainian colleagues and international partners. We did not come up with anything revolutionary or incredibly novel. But definitely reasonable and practical for the settings we are currently in. Sooner or later another global war will ensue, and we want all of us to learn from our lessons. Please remember that those have been paid for in ultimate sacrifice of our Ukrainian defenders and international volunteers.

Before we move on with our 10-part series of publications, we need you to understand who we are. We also need to refute one rather misguided definition.

We are the Medical Service of the 1st International Legion of Defense at the Armed Forces of Ukraine. Our legion is an infantry assault unit, and we are currently operating in one of the toughest frontline locations. Our service members going out on their combat missions are first and foremost warfighters. Our medical team of experienced doctors, nurses and medics, not only takes care of the injured, but also provides tactical medicine training and re-training to our warfighters.

IT'S NOT A LSCO, IT'S A WAR

It has been brought to our attention that our international military partners tend to refer to the war in Ukraine as LSCO (Large Scale Combat Operations). We disagree with this definition. It's not a LSCO, it's a war.

What happens along the **2650-km**-long Ukrainian frontline is far larger than operations. It consists of both small-scale and large-scale combat operations, plus many non-combat ones. We are achieving INTERnational strategic interests and protecting INTERnational interests. It is a **WAR**.

We need you to realize that with Finland's accession to NATO, NATO's current border with russia is **2555 km** long. History likes to repeat itself, and those who forget the history let it happen again.

COMBAT READINESS WHILE AT WAR

Anyone who has ever served in combat most certainly understands, that active engagement in an armed conflict changes the mode of operations for the military organizations. Units that may have previously needed months to achieve the level of combat readiness, suddenly must maintain a permanent state of such readiness, regardless of their ongoing losses, or challenges with logistics. The larger the conflict, and the longer it lasts, the more difficult this task becomes. Even the most sophisticated armed forces in the world would be no exception to this rule.

Since nearly 2 years the Ukrainian Defense Forces are constantly operating under the emergency conditions of war. We must continue to train large numbers of servicemen-assaulters, rapidly and effectively, while adapting our focus and priorities to the dynamics of this war. The technological advances in weaponry and the ever-changing strategy most certainly influence the conditions of casualty care delivery, or even the injury patterns most prevalent at a given time. That requires ongoing analysis and an adaptive approach to achieving medical readiness of the combat forces, or the actual provision of combat casualty care. And that is what our recommendations pertain to, which is clearly reflected in our terminology. We are at war, training **warfighters in an assault unit** on basic tactical medicine, as opposed to all service members (ASM) under peacetime conditions.

UKRAINIAN FRONTLINE REALITY & THREATS TO CASUALTY CARE DELIVERY

The way of conducting combat operations along the Ukrainian frontline varies greatly from any other recent armed conflict. This variability must be reflected in the overall training of warfighters, including tactical medicine. While we truly recognize the excellent framework of TCCC (Tactical Combat Casualty Care) guidelines, we must adapt them to our substantially different combat environment. Weaponry with much higher kinetic energy, combined with extreme proximity of the enemy, result in different threats, extended periods of care delivery in the field, and delayed casualty evacuations. The principle of having the casualty continue to return fire during CUF (care under fire) phase remains relevant, but only for shooting battles. These are far less frequent. Hence we shift focus to more commonly occurring threats, i.e. artillery and mortar fire, attacks of kamikaze drones, or detonation of explosive devices. In reference to tactical field care (TFC), warfighters must realize that securing the perimeter goes much further than a classic scenario with risk of direct enemy contact. It also involves monitoring the activity of enemy drones, checking for a variety of anti-personnel mines nearby, communication with the UAV operator who is guiding the group, and so on. Then comes the evacuation on foot - being the rule rather than exception. Kilometers of slow movement, during the most critical time for a severely injured casualty. There is no way to drive up there - the corridors leading through the minefields are too narrow, the enemy is using remote mines, while shelling with heavy weaponry is long and repetitive. Any vehicle attempting to approach the area will be destroyed, especially in broad daylight. And that is why our field evacuations are mostly prolonged and delayed.

With this introduction we hope to have provided you with a solid framework and a point of reference for our analysis and recommendations regarding basic tactical medicine in today's near-peer war.

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War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 1



The approach to tactical medicine training and organization of tactical medical support in the Ukrainian Defense Forces requires a thorough revision. Everyone, somehow related to this topic, understands it deeply, discusses it widely and pursues it persistently. As a medical service of an infantry assault unit, we see this need every day, currently taking care of the wounded in one of the most difficult frontline locations.

Till this day, the number of casualties and fatalities encountered by our providers has been that substantial, that we have a sample large enough to support our proposal of changes. Throughout 2022-2023 it has been developed by our team of physicians (specialists), experienced tactical medicine instructors, and methodologists. We intend to share our findings in a series of thematic posts and accompanying materials.

So why modify anything if we have studies and guidelines from other countries? Honestly, Ukraine recognizes the excellent framework of the TCCC guidelines. On a daily basis it helps our Defense Forces to transform from Soviet-style field medicine to modern combat casualty care. For almost 10 years, we have been implementing

a translated version of the TCCC guidelines developed by the U.S. Armed Forces in context of the NATO operations. Yet now, we need to transition from the translated version to the adapted one. The adaptation must account for what is needed here and now, that is the needs of our units in their actual operational environments.

We do not question the comprehensiveness nor the relevance of these existing TCCC guidelines. We only draw attention to the issues which arise when attempting to apply them in a substantially different combat environment. We observe a collision with our existent training standards and curricula. Also, misalignment with our norms of tactical medical support, and systemic failures when rapid training for a large number of military personnel is needed. Therefore, it's our goal to find alternate solutions and share the outcome of our efforts. We believe that first and foremost, the following steps must be taken towards transformation:

- Modifying basic tactical medical training for the warfighters;
- Rostering and training of junior combat medics, assigned to tactical groups with well-defined job responsibilities. This instead of squad medics (we detest the Soviet term “gunner-sanitary service provider” – *although in English that may actually sound quite humorous. After all gunners are surely responsible for a certain form of “field sanitation”*);
- Establishing opportunities for training and retraining within the units;
- Introducing adaptable equipment standards depending on the combat operations and the organizational structure of the prehospital stages of casualty care.

Our suggestions are by no means novel. They entail a rational redistribution of tactical medicine skills and equipment, in relevance to combat operations. Our materials and recommendations focus on the following:

- Tactical medicine knowledge and skills minimum for warfighters and junior combat medics in the assault units;
- Tactical medical equipment and supplies minimum for warfighters and junior combat medics;
- Tactical medicine training programs for warfighters and junior combat medics developed by our staff and based on the training experience of our medical service.

Priority skills for warfighters should include hemorrhage control and circulatory support, especially the complete algorithm of tourniquet (TQ) application – starting with application on top of clothing in CUF (care under fire) phase, to TQ

replacement and conversion once moved to cover (TFC phase). They should also learn how to prevent and treat hypothermia.

Each squad of an assault unit should have at least 2 junior combat medics with more advanced skills and equipment. One junior combat medic must accompany the group during each combat mission. Junior combat medics are first and foremost combatants, but must perform the warfighter tactical medicine skills more confidently. They should also be able to apply nasopharyngeal airways (NPAs), and chest seals, perform needle decompression, immobilize limb fractures, and administer intramuscular (IM) injections of certain medications – primarily tranexamic acid (TXA), analgesics and some other. TXA administration may prove vital for casualty survival.

We propose not to include NPAs and chest seals in individual first aid kits of warfighters. At the same time we recommend increasing the number of tourniquets, wound packing gauze, bandages, and supplies for hypothermia management in their aid bags. A group's junior combat medic should have an expanded kit or a small backpack with additional supplies for hemorrhage control, NPAs, chest seals, decompression needles, immobilization splints, and a case with medications for IM administration.

In our opinion, the optimal duration of basic tactical medicine training for the warfighters is 3 full training days. Junior combat medics should begin with the same basic 3-day course, and continue for another 3 days to reach their level of training. For both groups, the key to developing quality tactical medicine skills is daily scenario work in small groups, which takes up the majority of time in the training programs. We believe that as part of proposed changes, it is critically important to create opportunities for further training and honing of skills within the units.

We have placed the cost against the value. We are convinced that ensuring unit access to high quality combat casualty care and evacuation resources, training center and unit supply of manikins and consumables, while eliminating bureaucratic obstacles to these improvements – will cost substantially less than compensations for death, rehabilitation, or disability, caused by untimely care of low quality. Not to mention the value of life, health, and combat effectiveness of every Ukrainian defender.

Also here you can find a link to a [Google drive folder](#) with documents regarding our proposed changes (in Ukrainian and English). The entire series consists of 10 publications explaining key points on each topic. We hope to provide you with a useful resource. Let us turn this effort into a constructive discussion on the evolution of combat casualty care in the setting of modern day war.

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War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 2



Why currently available tactical medicine guidelines cannot be fully implemented in our frontline setting?

It is important to recognize that TCCC guidelines are based on the concept of so called “golden hour”, i.e. a short period of time following the injury, being the optimal window of opportunity for casualty care. In case of the critically injured it is vital for their survival. And indeed, thanks to rigorous operational planning and application of the TCCC guidelines, during 2001-2017 combat operations in Afghanistan and Iraq, the U.S. Armed Forces achieved major increase in survivability of their most critically injured. Three key interventions (tourniquets, blood transfusions, and prehospital transport within 60 minutes) were associated with 44% of mortality reduction (1). In our case, however, the opportunity to discuss systemic implementation of the “golden hour” concept in the active frontline locations, has not yet presented. In a near-peer war it may not be the question of quality in tactical medicine or evacuation resources, but rather a matter of airspace control, superior firepower (artillery), mass deployment of combat drones and mine clearance operations.

The tiered system of care delivery, based on the different levels of training, namely ASM (All Service Members), CLS (Combat Lifesaver), CMC (Combat Medic/Corpsman) and CPP (Combat Paramedic/Provider), was designed to ensure increasing level and quality of care within the “golden hour”. As the timeframe of care delivery increases, the latest weaponry is utilized, and evacuation conditions deteriorate, this very system collapses. For objective reasons, tourniquets (TQ) are not being reassessed, TQ conversion to pressure dressings doesn't happen within 2 hours of application, TXA is not being administered within 3 hours of injury, or hypothermia takes its deadly toll. And this is just the tip of the iceberg, merely few of the reasons why it proves so hard to prevent fatalities in our operational environment. Even though the TCCC-related statistics recount all of these as causes of preventable death.

To direct casualty management over any prolonged period of time in austere and hostile environments, Prolonged Casualty Care (PCC) guidelines were developed. In all practicality the goal was to aid small teams operating in very distant environments with no access to systemic medical care, and/or limited evacuation capabilities. In other words they were not designed for wars of this magnitude or even large scale combat operations. Tiered levels of care described by the PCC guidelines are tied to changing locations and platforms of care delivery, increasing time intervals, and ultimately require highly trained providers. Any treatments and procedures that would be recommended past 4 hours since injury are reserved for the CMC and CPP levels of training. Not surprisingly, the ongoing management of the critically injured with significant blood loss, CPP guidelines entrust to the CMC and CPP providers. They not only have the skills, but also the tools and the necessary know-how to handle such patients. Then what should be done if such a highly trained medic can't reach the injured, nor the injured can be delivered to him for any 5-10 hours? For the time being we have a missing link. Neither TCCC nor PCC guidelines, staffing rosters or training programs foresee a medic who can deliver ongoing advanced care directly at the fighting positions.

The International Legion is an infantry assault unit. Most other combat units in the Ukrainian defense forces conduct (or will do so soon) operations similar to ours, in comparable environments. Therefore we are convinced that our knowledge and recommendations can facilitate the development of basic tactical medicine guidelines for wars of this magnitude. Over the past 22 months our warfighters have conducted both offensive and defensive operations in a variety of frontline locations. Every few months the enemy has changed their tactics, and is likely to continue doing so. Hence at this stage, tactical medicine solutions must focus on thorough basic training, optimized equipment and flexible design of the prehospital chain of care.

For the time being a comprehensive trauma registry does not yet exist in Ukraine. We do not have the data for evidence-based changes in the existing guidelines, staffing rosters or training programs. This statistical query should begin at the prehospital stage. We need comprehensive information on the setting, mechanism

and type of injuries. We must also document all the treatments, handovers and monitoring data. Furthermore any dynamic changes in the patient's must be noted. This pertains to the fatal cases as well. All the information must be passed onto the hospital phase, and data collection should continue through rehab to completion of treatment. The information gathered should then be analyzed and organized, despite the wartime legislation restricting disclosure of quantitative data. Right now, it's not a witch hunt for the guilty of insufficient re-organization in nearly 10 years of war. We aren't looking to determine what experience or sample size (injured-deceased) is comprehensive enough to support any proposed changes. The question is whether we can change quickly enough to have a chance of succeeding?

Let's leave the ideal TacMed bubble, and direct this discussion on our recommended changes towards the Ukrainian frontline reality. Let's acknowledge the losses and the mistakes that led to them. Let's set priorities and determine what constructive actions may lead to more effective combat casualty care at the tactical stage. And let's not forget, that TCCC was introduced as an experimental concept, and successfully applied by a few innovative units in Afghanistan, well before the U.S. Department of Defense Trauma Registry was ever developed (2).

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REFERENCES:

1. Howard JT, et al. Use of Combat Casualty Care Data to Assess the US Military Trauma System During the Afghanistan and Iraq Conflicts, 2001-2017. JAMA Surg. 2019 Jul 1;154(7):600-608.
2. Butler FK. Two Decades of Saving Lives on the Battlefield: Tactical Combat Casualty Care Turns 20. Mil Med. 2017 Mar;182(3):e1563-e1568.

War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 3



What tactical medicine knowledge and skills must a warfighter acquire before his first combat mission?

To bring the most crucial help to the wounded in the toughest of frontline locations, and to train thousands of warfighters quickly and effectively, we must change our priorities regarding tactical medicine training and standard issue equipment.

Taking current injury patterns into account, warfighter's knowledge and skills must prioritize hemorrhage control, circulatory support, tourniquet (TQ) reassessment/replacement/conversion, and hypothermia management. Please refer to the accompanying "Knowledge and Skill" document. It follows the analogy of the TCCC Skills Set by Provider Level (01/SEP/2023), and lists basic tactical medicine knowledge and skills for a warfighter in an assault unit.

The experienced tactical medicine instructors may find this change challenging. What may seem like forever, they've been telling the warfighters to apply TQs to limbs effectively (high-and-tight when under fire), not to ever loosen them, and leave the rest to the medics. However, as we are nearing two years of full-scale invasion,

it became evident that in our circumstances this approach does not not always work as promised. A tourniquet is merely the first step – quick and necessary, but also traumatic tool to control life-threatening extremity hemorrhage. It's more or less a “ticking bomb with a timer set at 2 hours”. Our warfighters must realize that, and know how to “deactivate” it as soon as the opportunity presents.

Why do we insist that warfighters must know how to reassess and convert tourniquets? The answer is quite simple and correlates directly with the demands of today's combat environment. Handing out tourniquets to warfighters mandates teaching them a full algorithm of TQ application – from placement, through reassessment, to replacement or conversion. Our observation: when warfighters lack understanding of potential risks and complications related to TQ application, an unacceptably high incidence of post-tourniquet syndrome, avoidable amputations and fatal cases ensues.

And how did we conclude that skills of nasopharyngeal airway (NPA) and vented chest seal application are best left off to junior combat medics? TCCC courses do not teach these skills to the ASM-level trainees. They get first introduced at the CLS level. Both the NPA's and chest seals are included in the warfighter's individual first aid kit, in accordance with the Ministry of Health Order #6, dated 05/JAN/2017, based on the AC (All Combatants) TCCC level recommendations at that time. And our Ukrainian volunteer organizations, which help close the gap between demand and official supply of IFAK components, use similar reference standards. Consequently, it seems logical and justified that training groups attempt to teach our warfighters how to use them. Especially if we account for the 2001-2011 U.S. Armed Forces data on death on the battlefield. 7.9% of potentially survivable deaths were caused by airway obstruction, and 1.1% by tension pneumothorax. (1) Unfortunately, we did not find any studies which showed what percentage of these deaths could have been prevented by NPA's or chest seals.

Furthermore, contrasting our observations with current state of training and NPA supply to our warfighters, we are yet to see a single case of correct application performed by them. And that throughout the entire period that our medical service has been operational. If there have been such cases in your units, please share them. Hereby, we certainly recognize the systemic challenge of equipping the warfighters with appropriately sized NPA's.

In recent years, chest seal research has focused on and proven superior effectiveness of the vented ones in comparison with the non-vented. It has also emphasized the need to continue monitoring for signs of tension pneumothorax, with subsequent decompression if detected. That in itself calls for a medic/CLS-provider. Otherwise a warfighter would need to acquire CLS-level skills.

That's where we go back to our reality. The one in which starting from zero, and in no time, we must effectively teach a wide range of critical skills to a warfighter. Those include hemorrhage control, circulatory support, and complete TQ-

application algorithm. With that in mind, we recommend to shift focus from lesser to greater evil. What do you think happens when in a day, or just a few hours, and without sufficient practice, one tries to teach a person how to use everything that goes into the IFAK? We see the aftermath thereof on a daily basis (example in the picture - vented chest seal applied to lower back wound with a fragment in subcutaneous tissue).

Now, management of hypothermia is a skill requiring additional attention during warfighter training. With prolonged or delayed evacuation during cold weather season, all injured suffer from varying stages of hypothermia. As noted in the Joint Trauma System Clinical Practice Guidelines, hypothermia leads to nearly twofold increase in mortality. Since multiple cases of death from hypothermia have been observed, even in the absence of hemorrhage, warfighters must know how to recognize hypothermia, and treat it.

In summary, we emphasize once again, that it is critical to focus on basic skills during tactical medicine training for the warfighters. Lead them to automaticity. Avoid information overload and don't try to squeeze in some additional "useful" skills.

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REFERENCES:

1. Eastridge BJ, et al. Death on the battlefield (2001-2011): implications for the future of combat casualty care. J Trauma Acute Care Surg. 2012 Dec;73(6 Suppl 5):S431-7.

Accompanying document: Recommended Knowledge & Skills Standard

RECOMMENDED KNOWLEDGE & SKILLS STANDARD
Tactical Medicine - Warfighter (W) & Junior Combat Medic (JCM) - Assault Unit
1st International Legion Medical Service
Armed Forces of Ukraine

INTRODUCTION TO TACTICAL MEDICINE	W	JCM
Goals of tactical medicine and phases of casualty care	X	X
Care Under Fire (CUF)	X	X
Tactical Field Care (TFC)	X	X
CASUALTY ASSESSMENT		
Rapid casualty assessment - MARCH	X	X
Trauma-assessment of casualty		X
MASSIVE HEMORRHAGE (M)		
Massive external hemorrhage control in tactical medicine	X	X
Signs of massive external hemorrhage	X	X
Hasty tourniquet application	X	X
Rapid assessment for massive hemorrhage (blood sweep)	X	X
Deliberate tourniquet application	X	X
Wound packing	X	X
iTClamp application		X
Application of direct pressure	X	X
Securing of (junctional) packing	X	X
AIRWAY (A)		
Airway assessment and treatment in tactical medicine	X	X
Airway positioning-sit-up/lean forward	X	X
Head-tilt & chin-lift / Jaw-thrust maneuvers	X	X
Recovery positioning of a casualty	X	X
Nasopharyngeal airway (NPA)		X
RESPIRATION / BREATHING (R)		
Assessment of respirations in tactical medicine	X	X
Determination of respiratory dysfunction	X	X
Penetrating injuries of the chest/vented chest seal application		X
Needle decompression		X
CIRCULATION / BLEEDING CONTROL (C)		

Assessment and control of non-massive bleeding	X	X
Signs of hemorrhagic shock	X	X
Tourniquet reassessment and replacement	X	X
Tourniquet conversion to packing and/or pressure dressing	X	X
HYPOTHERMIA & HEAD INJURY (TBI) (H)		
Prevention of hypothermia	X	X
Active rewarming of casualty	X	X
Identification of head and eye injury	X	X
Assessment of mental status with AVPU scale		X
Rigid eye shield	X	X
MONITORING		
Basic assessment of vital signs	X	X
Reassessment of casualty care	X	X
MEDICATIONS		
Analgesic therapy in tactical medicine		X
Antibiotic therapy in tactical medicine		X
Administration of oral medications (PO)	X	X
Administration in intramuscular medications (IM)		X
Paracetamol (PO)	X	X
Meloxicam (PO)	X	X
Moxifloxacin (PO)	X	X
Tranexamic acid (TXA) (IM)		X
Meloxicam (IM)		X
Nefopam (IM)		X
Ondansetron (IM/ODT)		X
BURNS & FRACTURES		
Burn assessment in tactical medicine	X	X
Burn dressings		X
Fracture assessment in tactical medicine	X	X
Splinting of extremity fracture		X
COMMUNICATION & DOCUMENTATION		
Communication in tactical medicine	X	X

Communication with casualty	X	X
Communication with command regarding a casualty	X	X
Evacuation request	X	X
Casualty care card	X	X
EVACUATION		
Casualty drags & carries	X	X
Casualty transport on a stretcher	X	X
Preparation of a casualty for evacuation	X	X



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INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 4



What must be included in an individual first aid kit (IFAK) of a warfighter in an assault unit?

1. Tourniquet – 2 pcs. And 2 more attached to gear in TQ pouches. That makes it a total of 4. Possibly with experience, we will conclude that this number must be changed. Now, it is important to equip the entire unit with identical tourniquets. All the warfighters must train to automaticity with the same TQs they are going to use on combat missions. We understand it's unrealistic to stock training centers with entire sets of all tourniquets approved, so they are available for practice with the particular units. That's why tourniquet skills must be additionally honed once at the unit with their specific TQs.

How to solve the problem of low-quality tourniquets? We propose to approve and purchase only these TQs which have been recommended by the Committee on TCCC (CoTCCC). We know that TQs of certain Ukrainian manufacturers are currently undergoing CoTCCC review, and we root for them sincerely. However, as long as there is no fully-fledged tourniquet testing and certification center in Ukraine, we believe that our proposed approach is the most reasonable.

And what to do with the incomputable number of unknown quality tourniquets supplied to our military? How to get objective information from the units, when demand is reported as met at 100%? And what if we do a reset? What if we assumed that at time of purchased TQ distribution each unit had 0% (due to variability, some substandard, and others of high quality, yet in need of replacement, being dirty and worn-out after 6 months of wear-and-tear on vests, in IFAKs and medical aid bags)? This way we would no longer be dealing with the possibly inaccurate bottom-up reporting of numbers. We would get reliable information from top to bottom, well-defined with regards to quality and quantity. Of course, it would be more costly, but it would offer that much needed reset with regard to centralized supply of high quality tourniquets.

2. Hemostatic gauze for wound packing – 2 pcs. There are plenty of options, both CoTCCC-recommended and others (Krovospas, Hemostatik, etc.), that all get the job done.
3. Gauze for wound packing without hemostatic agent – 2 pcs. Compact, vacuum-packed, and compressed.
4. Israeli bandage 6” – 2 pcs. Unlike with TQs, here we have numerous alternatives of sufficient quality on the market - effective compression bandages of different kinds. Your warfighters should practice with the very kind they are going to use on their combat missions.
5. Thick elastic bandage – 2 pcs. For securing of packing in the junctional areas, and for pressure dressings.
6. Nitrile gloves - sized for a warfighter – 2 pairs. Choose durable.
7. Trauma shears – 1 pc. Go for high quality.
8. Military thermal blanket 210x160 cm – 2 pcs. We are talking about thermal blankets that have olive, khaki, or camouflage coating on one side. Obviously, camouflaging a casualty with a non-reflective blanket, when enemy's UAV can easily monitor the entire battlefield and evacuation route, is somewhat arbitrary. But if camouflage is available, it should be used for better protection of the casualty and the evacuation crew.
9. Chemical warmer – 4 pcs. During winter and midseason, it's a mandatory component of an IFAK for a warfighter in an assault unit. May combine reusable ones, which heat up quickly and cool down faster, with chemical warmers that activate upon contact with air, heat up more slowly but retain heat longer.
10. Permanent marker – 1 pc. Thin, blue or black.

11. Adhesive tape 2.5-cm-wide roll – 1 pc. Useful for securing anything, including thermal blankets.
12. Reinforced small tape – 1 pc. Very handy for additional fixation, and in combination with adhesive tape it will facilitate access to the “packaged” casualty for re-assessment.
13. Pill pack (paracetamol 1000 mg, meloxicam 15 mg, moxifloxacin 400 mg) – 1 pc. We could dedicate an entire write-up to it. Here we just need to mention, that when you are preparing them, use generic names of active ingredients, note exact dosage, and expiration dates. Know that convenient pill packs, which allow for taking all medications separately or together, are already manufactured in Ukraine.
14. TCCC Card – 1 pc. Unfortunately, even with proper training, we rarely receive completed cards from the warfighters or combat medics. Typically they get filled out by the evacuation crews. Sadly, very few units actually get it done. Our unit currently uses an enhanced version of the form DD1380, which we have restructured after the MARCH algorithm. It actually makes sense, for the warfighters in assault units, to fill out their cards with personal information (full name, unit, allergies) upon receipt of the IFAK. Let’s move away from superstitions and collect data for statistical analysis.

All this equipment fits into one large pouch or 2 smaller ones. Some manufacturers may need to update their pouch design to fit all this content, adding some elastic bands to store bandages and alike. IFAK equipment should be organized logically in order of application, and standardized throughout the unit.

If a warfighter receives (or already did) more extensive tactical medicine training, it makes sense to expand their IFAK content. Depending on their combat settings and the overall chain of casualty care, it is definitely worth doing. However, we continue to emphasize the priorities in combat casualty care delivery. None should carry a boatload of equipment, even if it’s cheap and takes up little space.

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Accompanying document: Minimum Equipment Standard - IFAK Warfighter

MINIMUM EQUIPMENT STANDARD
Individual First Aid Kit - Warfighter - Assault Unit
1st International Legion Medical Service
Armed Forces of Ukraine

#	Item	Unit	Count
1	Tourniquet	pc.	4
2	Hemostatic gauze for wound packing	pc.	2
3	Gauze for wound packing w/o hemostatic agent	pc.	2
4	Israeli bandage 6"	pc.	2
5	Thick elastic bandage	pc.	2
6	Nitrile gloves - sized for a warfighter	pair	2
7	Trauma shears	pc.	1
8	Military thermal blanket 210x160 cm	pc.	2
9	Chemical warmer	pc.	4
10	Permanent marker	pc.	1
11	Adhesive tape 2.5-cm-wide roll	pc.	1
12	Reinforced small tape	pc.	1
13	Pill pack (paracetamol 1000 mg, meloxicam 15 mg, moxifloxacin 400 mg)	pc.	1
14	TCCC card (modified form DD1380)	pc.	1

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INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 5



How to teach tactical medicine to warfighters in assault units?

There is never enough time for training, hence it must be used effectively. Our current Basic Military Training (BMT) program allocates 13 instructional hours to tactical medicine. We think it is insufficient, and wonder if it's possible to optimize it without changing the number of hours. We could add full tourniquet application algorithm (including replacement and conversion), and wound packing procedure (using a wound simulator with artificial blood, rather than a fist). Here we could skip instruction on casualty extraction from a tank, IFV (infantry fighting vehicle), or APC (armored personnel carrier). In fact, a given unit may be utilizing entirely different technology, and warfighters should train as they fight, that is with the vehicles owned by their unit. Starting from scratch it won't be enough for quality development of the necessary skills, but an appropriate foundation will be laid, and time won't be wasted. Assuming that tactical medicine will be taught according to the program, of course.

Basic tactical medicine training for the warfighters – how long should it last? In our experience – 3 training days are optimal.

Day 1: Hemorrhage control. Care under fire/threat (CUF): hasty tourniquet application and casualty movement to cover; tactical field care (TFC): MarCh, deliberate tourniquet application, wound packing and securing of packing, replacement of tourniquets in case of isolated extremity injuries. Practice scenarios with the acquired skills.

Day 2: Tactical field care (TFC): MARCH. Practice scenarios with the acquired skills.

Day 3: Review of CUF and TFC + preparation for evacuation. Student assessment scenarios. Summary scenarios with all the skills.

Eight hours of instruction make up a training day. 80% thereof should be dedicated to interactive sessions and scenario work. Next – review sessions of the 3rd day of training program to be conducted by the platoon and company medics on a monthly or bimonthly basis, whenever possible, best in field conditions.

On purpose, the entire first day of training is exclusively dedicated to massive hemorrhage control in the setting of isolated injuries. Warfighters also perform more extensive tourniquet work in case-scenarios with a conscious casualty, who has no airway or breathing issues. After all they will deal with such casualties most often.

When it comes to CUF skills (such as: communication – “hasty” tourniquet application – casualty movement to cover), we believe that unit sergeants and instructors should be responsible for training the warfighters to automaticity, during tactical drills in their unit. Again, we emphasize that effective training should be conducted with the same tools that the warfighters will be equipped with.

The way of conducting combat operations along the Ukrainian frontline must be reflected in the overall training, including tactical medicine. Having the casualty continue to return fire during CUF phase remains relevant, but only for shooting battles. Students should rather focus their attention on other, more commonly occurring threats, i.e. artillery and mortar fire, attacks of kamikaze drones, and detonation of explosive devices. In reference to TFC, one must realize that a shelter safe enough to take body armor off a casualty may be nowhere near. Securing the perimeter goes much further than a classic scenario with risk of direct enemy contact. It also involves monitoring the activity of enemy drones, checking for a variety of anti-personnel mines nearby, and communication with the UAV operator who is guiding the group, etc.

In our recommendation documents we use the terminology “hasty” and “deliberate” with regard to tourniquet application procedures. Let’s explain a little more in detail.

■ Hasty tourniquet – whenever a life-threatening extremity hemorrhage is noted during care under fire/threat, a hasty TQ is applied rapidly over the clothing on the affected extremity. TQ location must be clearly proximal to the site of bleeding. If

that site is not immediately evident, the tourniquet must be applied “high-and-tight”, as proximal as possible on the injured limb.

Here a thought for the tactical medicine instructors: “Spanish shame” – after years of teaching tactical medicine realizing that hasty tourniquet is not synonymous with high-and-tight TQ. In case of a distal injury to the extremity, and an evident source of bleeding (e.g. shrapnel in lower leg, stepping on a Butterfly Mine, or traumatic hand amputation), hasty TQ implies placement over the clothing, clearly proximally to the site of bleeding, and not exclusively high-and-tight. “Ukrainian horror” – realizing the number of preventable high amputations from these high-and-tight tourniquets left on extremities without re-assessment, replacement or conversion for any 5 to 10 hours in our combat environment.

■ Deliberate tourniquet – if during TFC phase, there is evidence of a life-threatening extremity hemorrhage, a tourniquet should be applied directly to the skin, 5-8 cm (2-3 inches) proximal to the bleeding site.

When teaching deliberate tourniquet application, one must hand a pair of trauma shears to the warfighter. At minimum they should simulate cutting through the clothes, while at best, they should actually do it. Make it a habit to require TQ application directly to the skin during practice. Or otherwise in combat, just like in training, it will be placed over clothing. It is necessary to emphasize repetitive practice of high-quality ■ wound packing skills, and ■ securing that packing effectively, especially in junctional areas. Wound simulators with artificial blood should be utilized.

■ Airway management and ■ respiratory support also require warfighter’s attention and appropriate actions. We find that standard TCCC ASM course content is sufficient for instruction on these topics. During training, our instructors simulate different breathing patterns for the trainees to recognize them. We’ve had some success with this approach.

Minding the complexity of our combat environment, and thus the setting of casualty care delivery, we are currently testing our 2-step approach to training the warfighters on ■ TQ replacement and conversion. It should be performed as soon as possible, within the 2-hour window after tourniquet application. We emphasize indications and contraindications to this procedure, along with ongoing re-assessment of the casualty and the site of injury. Development of hemorrhagic shock in the field may preclude both replacement and conversion of a hasty tourniquet. Beside it, even properly applied high-quality TQ can loosen over time due to elasticity of the material. Therefore, it must be reevaluated, and re-tightened if needed. Reassessment is also necessary if pressure dressings are applied for an extended period of time. They may get displaced, or eventually restrict blood flow, and require re-application.

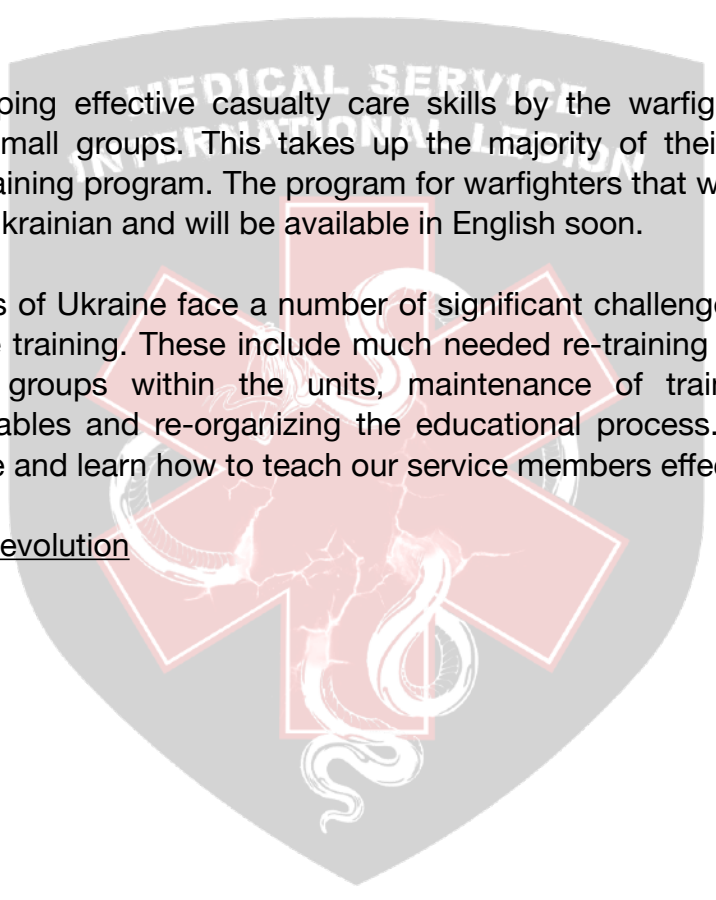
■ Hypothermia management, both prevention and treatment, is another important aspect of warfighter training. It is mandatory to practice packaging the casualty in thermal blankets, while simulating application of chemical warmers. During cold-weather seasons priorities of care should be reviewed and revised. Early prevention of hypothermia in a combat casualty is a must. This may result in MARCH algorithm being followed out of order. However, massive hemorrhage control remains the top priority.

Such approach to warfighter training on tactical medicine may only succeed if combined with the concept of an adequately trained junior combat medic at a unit level. A warfighter must know when to alert a medic, while frequently reassessing care delivery, vital signs and casualty condition until handover to the next echelon of care.

The key to developing effective casualty care skills by the warfighters, is daily scenario work in small groups. This takes up the majority of their 3-day basic tactical medicine training program. The program for warfighters that we follow in the unit is available in Ukrainian and will be available in English soon.

The Defense Forces of Ukraine face a number of significant challenges with regard to tactical medicine training. These include much needed re-training of instructors, forming instructor groups within the units, maintenance of training facilities, restocking consumables and re-organizing the educational process. Yet we must rise to the challenge and learn how to teach our service members effectively.

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War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 6



Position, skills and duties of a Junior Combat Medic (JCM).

For the time being each squad of an assault unit has a “gunner-sanitary service provider” assigned to them. That’s post-soviet heritage in terminology right there, previously known as a “platoon gunner-sanitary service provider” – a position that was largely replaced by a platoon combat medic in 2017. However, assault units do not currently work as squads, but as even smaller combat groups. Therefore, if care delivery at maximum proximity to the casualty is the goal here, we must recognize that 1 such squad “gunner-sanitary service provider” is not enough. Besides it, this position still lacks clearly defined or regulated duties, support and training pathway.

Once again we are getting back to our complex operational environment in the active frontline locations. We emphasize our need to rapidly train a large number of servicemen-assaulters, while providing them with sufficient knowledge, skills and equipment for ongoing casualty care in the setting of delayed evacuation. That means directly at the fighting positions. At the same time we understand that it is currently impossible to rapidly supply each combat group with an adequately trained combat medic, capable of caring for the severely injured. Not to mention,

that the tactical conditions would readily prevent effective deployment of all the equipment necessary to care for such casualties.

A workable solution involves the concept of a junior combat medic (JCM – carrying on the terminology tradition of a combat medic/senior combat medic). Each squad of an assault unit would have 2 JCMs assigned, 1 gets to accompany a combat group on each combat mission.

JCM is first and foremost a warfighter-assaulter. Therefore he must acquire the same skills as other warfighters in a group, though augmented with additional tactical medicine training. He will also receive an expanded selection of tactical medical equipment, and perform additional procedures. Basic knowledge and skills of a junior combat medic conceptually compare with a TCCC CLS-level provider, and include the ability to administer critical medications. *(Please refer to the accompanying document in part 3, for an overview of JCM's knowledge and skills).*

Looking at the massive hemorrhage control (M) skills, junior combat medic will additionally learn how to work an iTClamp. That may help solve some issues with securing of packing in poorly accessible areas, especially axillary.

The ability to apply the AVPU scale for the level of consciousness assessment, will allow the JCM to monitor the casualty for worsening ability to maintain a patent airway (A). For that very reason he will be trained on nasopharyngeal airway (NPA) application, having performed the procedure on the warfighters in his group. As a result he will know their particular NPA sizes, and individual conditions of NPA application.

Knowing how to recognize respiratory (R) dysfunction, and localize penetrating or sucking chest wounds, JCM will learn how to apply a vented chest seal. He will know the mechanism and signs of a developing tension pneumothorax (PTX). As needed he will burp the wound or perform needle decompression.

At first glance, seemingly the most controversial of JCM skills – namely intramuscular (IM) injections. Our choice is supported by the fact that it's much faster and easier to teach, compared with intravenous (IV) access. We can count on it being performed in combat setting.

Research has shown that prehospital administration of tranexamic acid (TXA) within 3 hours of injury, and preferably within the first hour, may lower mortality from massive hemorrhage. However, according to the TCCC guidelines, TXA would need to be administered by a combat medic. Yet he may fail to reach the casualty within the required timeframe. And that's why we entrust TXA administration to a junior combat medic, who is much closer to the casualty.

Because of its pharmacokinetic properties, TXA given IM is just as effective as IV or IO (intraosseous). Side effects are minimal. It reaches its peak concentration within

3.5 minutes and achieves bioavailability of 97% (1). IM administration of TXA is also reflected in the 2022 recommendations of the Joint Royal Colleges Ambulance Liaison Committee – i.e. British EMS service.

To provide analgesia, when casualty cannot swallow their pill pack content, JCM can administer IM meloxicam, and add IM nefopam for moderate to severe pain. We advise nefopam, even though it is not included in the TCCC guidelines, because:

- Its analgesic effect is similar to low-dose morphine;
- It works synergistically with other analgesics incl. paracetamol and meloxicam;
- It does not cause platelet dysfunction;
- It does not lead to respiratory depression;
- It can be given every 6 hours.

Most common side effects of nausea and vomiting, which may occur with rapid IV administration of nefopam, do not occur with the IM route.

Given the significant incidence of mild traumatic brain injury (mTBI), which may present with nausea and vomiting, we recommend that junior combat medic carries ondansetron, both for IM and ODT (orally disintegrating tablets) administration. The latter for patients without altered mental status.

Providing care to casualties with head and eye injuries (H) will largely fall within the responsibility of JCMs. They will also need to know how to apply dressings to different complex wounds, or recognize and immobilize fractures. To battle hypothermia, our medic will acquire skills and resources for active rewarming of the casualty.

We count on it, that in context of packaging the casualty for evacuation, our group JCM will complete the casualty care card, and forward all the data necessary for statistical analysis to the next stage of care.

Junior combat medics are already assigned to the groups, work at the fighting positions, and deliver casualty care within many unit. But it is necessary to formalize their role within a unit, define their duties, also organize their training and support system. Ultimately, they must participate in planning of medical operations.

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War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 7



What should be placed in a medical aid bag of a junior combat medic (JCM)?

How to load up all the gear necessary for effective casualty care in the field, without overloading yourself to the point of being ineffective as a warfighter and a medic? That's the very question that junior combat medics must answer when packing up their aid bag. Let's not forget that a JCM is first and foremost a fully-fledged combat force-unit in his group. The settings of combat operations certainly influence the extent of medical procedures, and the amount of equipment that a junior combat medic can pack up.

IFAK's distributed to the warfighters, for as long as they are standardized (*see part 4 of our series*), remain the primary source of medical gear utilized by the junior combat medic. Yet in tactical conditions it is not always feasible. Furthermore, if it is necessary to provide ongoing casualty care over an extended period of time, one may need to repack a wound, changes dressings, etc. That's why a JCM cannot really avoid doubling-up on the medical supplies already available in the warfighter's IFAK.

Here is our proposed minimum equipment standard for a medical aid bag of a junior combat medic (on top of his own IFAK):

1. Tourniquet – 4 pcs.
2. Hemostatic gauze for wound packing – 3 pcs.
3. Gauze for wound packing w/o hemostatic agent – 3 pcs.
4. Israeli bandage 6” – 2 pcs.
5. Israeli bandage 4” - 2 pcs.
6. Thick elastic bandage - 3 pcs.
7. iTClamp – 2 pcs.
8. Nasopharyngeal airway (NPA) - 4 pcs. Most commonly used sizes are: 28Fr, 30Fr, and 32Fr. It is actually best to have the junior combat medic practice NPA placement on the warfighters in his group. As a result he will know their particular NPA sizes, and individual conditions of NPA application. Regarding NPA sizes, we must stress that same-size NPA's from different manufacturers may vary in length (up to 2-3 cm), and have significantly different diameters. This must be taken into consideration when ordering the NPAs.
9. Vented chest seal – 4 pcs. The advantage of vented over the non-vented chest seals is research proven. There are numerous reviewed and recommended options, such as SAM Vented Chest Seal, HyFin Vent, H&H H*Vent, Halo Vent or FoxSeal. Also a number of those shown to be ineffective - Rhino Rescue, Black Front, and other from unknown Chinese manufacturers that we don't recommend.
10. Decompression needle – 3 pcs.
11. Thin elastic bandage – 4 pcs.
12. Trauma shears – 1 pc.
13. Adhesive tape 2.5-cm-wide roll – 1 pc.
14. Permanent pen-marker – 1 pc.
15. TCCC card (modified form DD1380) – 2 pcs. They should already be in the warfighters' IFAKs, pre-filled with personal information, but it is worth having a few spare ones.
16. Nitrile gloves - sized for the medic – 8 pairs.
17. Rigid eye shield – 2 pcs.
18. Flexible immobilization splint – 2 pcs.
19. Triangular bandage – 2 pcs.
20. Reinforced small tape – 2 pcs.
21. Military thermal blanket – 4 pcs.
22. Chemical warmer – 6 pcs.
23. Pill pack (paracetamol 1000 mg, meloxicam 15 mg, moxifloxacin 400 mg) – 2 pcs. As adjunct to pill packs already placed in the warfighters' IFAKs.
24. Paracetamol 500 mg (tab.) – 10 pcs. Additionally, for the casualties who require ongoing pain management.
25. Tranexamic acid (TXA) 10% 500 mg (amp.) – 8 pcs.
26. Ondansetron 4 mg (amp. and/or ODT) – 4 pcs.
27. Meloxicam 15 mg (amp.) – 2 pcs.
28. Nefopam 20 mg (amp.) – 4 pcs.

29. Syringe (5 mL) with needle – 6 pcs.
30. Syringe (10 mL) with needle – 2 pcs.
31. Injection needle 21G/23G – 6 pcs.
32. Alcohol swab – 20 pcs.

Additionally: A soft stretcher or a Sked/Yuta-like small drag stretcher - 1 pc. Obviously, soft stretchers are more lightweight and compact, but they are ineffective for the purpose of carrying a casualty over a long distance, with high risk of coming under fire for the evacuation team. That's why, depending on how the evacuation process is organized, it may be reasonable to equip one of the warfighters with a drag stretcher.

What kind of an aid bag should a JCM carry? All the gear listed above fits into a waist/shoulder CLS-type aid bag, with a compact medication pouch and external pouches for the tourniquets, or a small medical backpack, that does not hinder their performance of combat duties.

A junior combat medic who gets assigned to an evacuation team needs different gear: large drag stretcher, equipment for active rewarming of casualties, such as Ready-Heat, HPMK, Blizzard Blanket, etc. If the settings of combat operations necessitate more extensive casualty care, it is necessary to help the JCM meet this demand. That may require additional training, a different backpack with content, planning and organization of additional support for their role in the chain of casualty care delivery.

We understand the enormous amount of work required to restructure the Defense Forces medical support system. New standards of medical support at the tactical stage of casualty care must be set to ensure access to sufficient resources. A junior combat medic should not need to worry how to resupply consumables and medications, or how to quickly receive a new medical aid bag/backpack, if it gets damaged in combat or destroyed by mice storming all trenches and dugouts. And it must be done right now.

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Accompanying document: Minimum Equipment Standard - Medical Aid Bag JCM

MINIMUM EQUIPMENT STANDARD
Medical Aid Bag - Junior Combat Medic - Assault Unit
 1st International Legion Medical Service
 Armed Forces of Ukraine

#	Item	Unit	Count
1	Tourniquet	pc.	4
2	Hemostatic gauze for wound packing	pc.	3
3	Gauze for wound packing w/o hemostatic agent	pc.	3
4	Israeli bandage 6"	pc.	2
5	Israeli bandage 4"	pc.	2
6	Thick elastic bandage	pc.	3
7	iTClamp	pc.	2
8	Nasopharyngeal airway (NPA) (28Fr, 30Fr, 32Fr + additional sizes for the warfighters in a group)	pc.	4
9	Vented chest seal	pc.	4
10	Decompression needle	pc.	3
11	Thin elastic bandage	pc.	4
12	Trauma shears	pc.	1
13	Adhesive tape 2.5-cm-wide roll	pc.	1
14	Permanent pen-maker	pc.	1
15	TCCC card (modified form DD1380)	pc.	2
16	Nitrile gloves - sized for the medic	pair	8
17	Rigid eye shield	pc.	2
18	Flexible immobilization splint	pc.	2
19	Triangular bandage	pc.	2
20	Reinforced small tape	pc.	2
21	Thermal blanket	pc.	4
22	Chemical warmer	pc.	6
23	Pill pack (paracetamol 1000 mg, meloxicam 15 mg, moxifloxacin 400 mg)	pc.	2
24	Paracetamol 500 mg (PO; tab)	pc.	10
25	Tranexamic acid (TXA) 10% 500 mg (amp.)	pc.	8
26	Meloxicam 15 mg (amp.)	pc.	2

27	Nefopam 20 mg (amp.)	pc.	4
28	Ondansetron 4 mg (amp. and/or ODT)	pc.	4
29	Syringe (5 mL) with needle	pc.	6
30	Syringe (10 mL) with needle	pc.	2
31	Injection needle 21G/23G	pc.	6
32	Alcohol swab	pc.	20



War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 8



How to train a Junior Combat Medic (JCM)?

A trained warfighter in an assault unit assigned the role and designated to the position (*whenever it gets established*) of a junior combat medic needs additional training on tactical medicine. In our opinion this training should be conducted already at the unit, during formation or deployment. It's important to select the warfighters capable of mastering the extra skills, and even better - willing - to take on the JCM's role.

Beyond the basic 3-day tactical medicine course for the warfighters, a JCM completes an additional 3-day training program. It expands their skills and opportunities to prevent the majority of avoidable deaths in the setting of combat operations on the Ukrainian frontlines.

Day 4-5: Scenario-based assessment of basic-level knowledge. Tactical field care (TFC): Extended MARCH algorithm: iTClamp, NPA, vented chest seals, needle decompression, TXA. PAWS: dosing and administration of basic medications, intramuscular injections, complex wound care, and fracture immobilization. Scenario-work corresponding with these skills.

Day 6: Preparing for casualty evacuation. Scenarios with prolonged evacuation, requiring reassessment of casualty condition and care delivery. Final scenarios and testing on all the skills.

Each training day consists of 8 training hours. Approximately 80% of that time is dedicated to practical interactive sessions and scenario work.

Next - monthly or bi-monthly, whenever possible, an extra day of scenario-based training. Best conducted by the unit medics to refine the skills and exchange experiences, preferably in field conditions.

Primary goal of care delivery, common for all - control of massive hemorrhage (M). On top of warfighter-level skills, we recommend adding the ■ iTClamp application to the JCM skills set. With appropriate theoretical and practical teaching on this topic. JCM must be ready to assist the warfighters with hemorrhage control, in cases they cannot manage independently (e.g. junctional hemorrhage).

Airway (A) management skills expand to include ■ nasopharyngeal airway (NPA) application. Learning how to size and place the NPA is accomplished during training, and then mastered while working with the warfighters in JCM's group. We have a few tricks to help the trainees overcome their psychological barrier to performing invasive procedures. Picking the most indecisive trainee, our instructors playing casualty direct the trainee to place that first NPA on them.

Teaching junior combat medics how to manage respiratory (R) dysfunction requires diving into respiratory anatomy and physiology, and how it is affected by chest trauma. Having learned how to recognize open and sucking chest wounds, JCM will know how to effectively apply ■ vented chest seals, based on indications. They will be able to recognize worsening respiratory distress or other signs of expanding tension pneumothorax, and manage it. Acquiring the skill of ■ needle decompression requires attention to correct determination of decompression sites, and the actual manipulation itself. It is best taught on special simulators or improvised phantoms (*chest wall fragment with ribs from your friendly butcher*). In our experience of training the medics, the skill of correct decision-making on decompression, and acting upon it, is key - whether the outcome is positive or negative. This must be practiced in scenarios.

■ Intramuscular injection (IM) skills are pretty straightforward. Following comprehensive instruction and practice on the technique of preparation for injection, performing this manipulation on simulators, and training on each other with saline injections, JCM will be well prepared to administer IM medications to casualties.

We understand they are merely junior medics, and more warfighters than medics. That's why we devote less attention to teaching pharmacokinetics, complications of administration, dosage calculation formulas, and so on. We keep it as simple as possible: recognize the "enemy" (bleeding, pain, vomiting - "red flags" for administration), pick your "weapon" (necessary drug), know the threats (standard dosing), load the "weapon" (draw up the necessary volume into a syringe, or pick

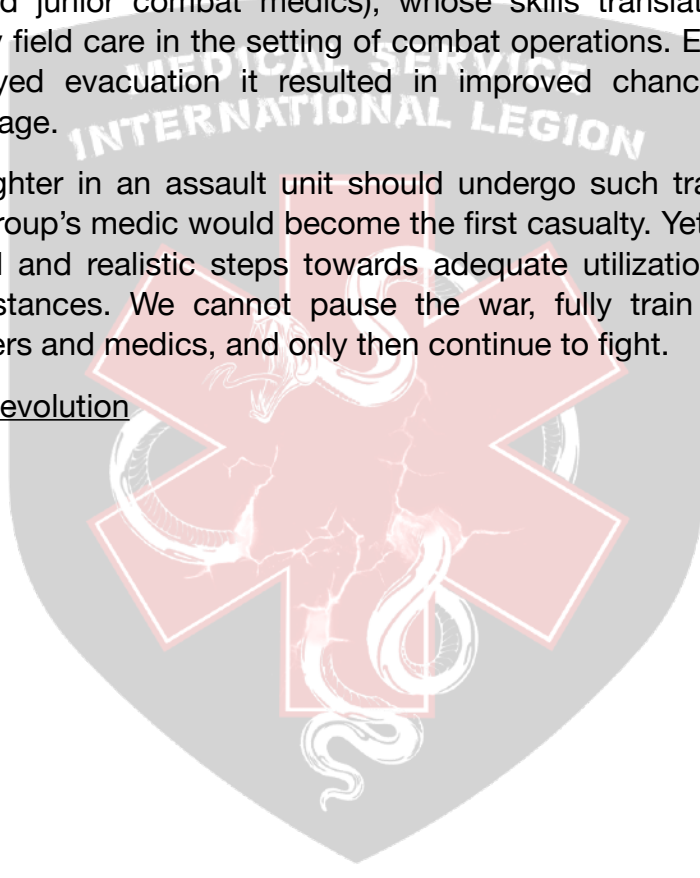
the right pre-filled syringe), aim at the “enemy” (IM administration), and report to command (write it down on the casualty card).

In scenarios with prolonged evacuation and taking temporary cover trainees work on decision-making regarding tourniquet conversion, airway control and hypothermia management. Thus everything that requires frequent reassessment of casualty condition and care delivery.

Both the courses for junior combat medics and those for warfighters are focused on repetitive skills practice and complex casualty care scenarios. Skills engrained to automaticity will take over in stressful conditions, when decision-making process is reduced to specific algorithms and simple actions. There are not too many of them for a junior combat medic. The proposed changes are based on our experience with the warfighters (and junior combat medics), whose skills translated into timely, decisive and quality field care in the setting of combat operations. Even in cases of prolonged or delayed evacuation it resulted in improved chances of casualty survival or limb salvage.

Ideally, every warfighter in an assault unit should undergo such training. There is always a risk that group’s medic would become the first casualty. Yet it is necessary to begin with small and realistic steps towards adequate utilization of guidelines relevant to circumstances. We cannot pause the war, fully train the necessary number of warfighters and medics, and only then continue to fight.

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War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 9



Chest seals - are they mandatory in every warfighter's IFAK?

The effectiveness of chest seals in the prehospital management of penetrating chest trauma in combat settings is well-researched and scientifically proven. However, we should ask the question on who should be handling this tool, and whether every warfighter needs it in their IFAK? Given this topic leads to fierce arguments and controversial discussions, we decided to address it separately.

Combat trauma research has shown that hemopneumothorax, resulting from both blunt and penetrating chest trauma, ranks third among the most common causes of death on the battlefield, accounting for approximately 1.1% of all preventable deaths (1). Vented chest seals are more effective than occlusive dressing and should be used primarily (2, 3). Application of non-vented chest seals increases the likelihood of casualty requiring needle decompression and/or finger thoracostomy at some later time. Vented seals are superior, but do not obviate the need for casualty reassessment and continuous monitoring for the development of tension pneumothorax.

Martial law in Ukraine prevents us from disclosure of absolute numbers. Yet we must note that our medical service has already handled thousands of wounded and deceased. Among cases examined at the stabilization point, about 4% of patients were diagnosed with chest trauma, while only 0.75% had penetrating injuries. Only 20% of the chest seals applied collectively by the warfighters, combat medics and medevac medics were placed as indicated, that is for open and sucking chest wounds. In certain cases, instead of chest seals, we observed “lumbar”, “femoral” or “tibial seals”. At the same time, more than 50% of casualties with indications for chest seal application, did not receive them prior to arrival at the stabilization point. Yet it did not lead to death from tension pneumothorax, even in the setting of delayed evacuation from the battlefield.

We understand this may be perceived as “survivor bias”. Based on the information available to us, in about 5% of fatalities, penetrating chest injuries led to death. Death could have been caused by cardiac trauma, injuries of the great vessels, and/or tension hemopneumothorax. Chest seals were not utilized in over 87% of these cases. We don’t know the reason why chest seals weren’t applied - those could have been objective and in-executable in the settings these deceased combatants were in. Yet we know, that both units and volunteers are trying to put quality chest seals in our warfighters’ IFAKs, and train them on the correct application procedure.

Without doubt, the value of lives saved with chest seals cannot be overestimated. However, the statistics we observe, show that penetrating chest trauma is relatively rare in current patterns of combat trauma. Furthermore, despite the efforts to train everyone on chest seal application, they are rarely used where needed, and sometimes applied where they have no impact on casualty survival. Perhaps then, at the level of combat casualty care delivered by the warfighters, chest seals aren’t really that needed?

We certainly want every casualty who can be saved to survive, and care delivered not to result in greater losses. But do we really need to know how to apply chest seals? Yes. However, let’s note that application of chest seals is not included in the TCCC ASM-level skills set. In our opinion, an important reason for it is the fact, that effective management of penetrating chest trauma and tension pneumothorax cannot be taught quickly to all. Mere application of chest seals is not the solution to this problem. Hence training time spent on chest seals, is time not used on mastering more vital skills.

So what’s the solution? Providing comprehensive TCCC CLS-level training to all the warfighters. Unfortunately, as previously stated, for us it remains an unrealistic goal at this point in time. That’s why we propose an alternative solution, namely training focused on the major issues for the warfighters and junior combat medics (JCM) at the groups. JCM is the one to master management (albeit temporary) of penetrating chest trauma and the resultant tension pneumothorax. Chest seals are best left in place where decisions are also made to perform decompressions, i.e. in hands and in aid bags of junior combat medics.

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War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - PART 10

ПРИОРИТЕТ ЕВАКУАЦІЇ (A) Невідкладний (B) Пріоритетний (C) Звичайний

КАРТКА З НАДАННЯ ДОМЕДИЧНОЇ ДОПОМОГИ В УМОВАХ БОЙОВИХ ДІЙ

ПІБ: _____ ДАТА НАРОДЖЕННЯ: _____ ІПН: _____
 ПІДРОЗДІЛ (в/ч, бат, рота): _____ АЛЕРГІЇ: _____ ГРУПА КРОВІ Rh _____
 ДАТА ПОРАНЕННЯ: _____ ЧАС: _____

М МЕХАНІЗМ ПОРАНЕННЯ (позначте відповідне)
 кульове осколкове мінно-вибухове ДТП
 тупа травма падіння опік інше _____

Т ТЕРАПІЯ (позначте відповідне та заповніть таблицю)
М: ТУРНИКЕТ для кінцівок для вузлових ділянок
 ТАМПОНУВАННЯ з гемостатиком без гемостатика
 ТИСНУЧА ПОВ'ЯЗКА биндаж еластичний бинт
А: в нормі назофарингеальний повітрявід (НОП)
 крікотиомія ендотрахеальна трубка IGe
R: грудна наліпка кисень ШВЛ
 голкова декомпресія грудний дренаж
 2 МРП спереду П Л, час _____ П Л, час _____
 5 МРП збоку П Л, час _____ кров повітря

С: фіксація тазу тип _____ В/К доступ _____
 В/В доступ _____ плече голмілка грудина
 П Л рука інше _____

Назва	Об'єм	Шлях	Час
Рідини/Препарати крові			

Н: боротьба з гіпотермією (термоковдра грілки) тип _____
 щиток для ока (П Л) інше _____

МЕДИКАМЕНТИ

Назва	Доза	Шлях	Час

А: Антибіотик _____
 Інше _____
 пігулковий набір (парацетамол 1000мг, мелоксікам 15мг, моксифлоксацин 400мг)
WS: рани іммобілізація

ПРИМІТКИ

ДОПОМОГУ НАДАВАЛИ: (ПІБ, контакти)

С СИМПТОМИ ТА ПОКАЗНИКИ (заповніть таблицю)

ЧАС	Темп. тіла (градуси, місце)	Артеріальний тиск	Частота дихання	Вміст кисню в крові, %	Піхтотний (A), голос (V), Віль (P), неритмічний (U)	Шкала болю (0-10)

Casualty card - why fill it out?

In line with the TCCC guidelines, and following the IFAK standard of the U.S. Armed Forces, already in 2014, that is at the very beginning of war, our volunteer organizations started placing DD1380-like casualty cards in the IFAKs delivered to the Ukrainian warfighters. The purpose of this card is vital - gathering primary information on the injuries and care delivered at the prehospital stage, such as dynamics of the casualty condition and vitals, or medications and infusions administered, and who delivered all that care. Hence it is the very first step in following the entire chain of care delivery, treatment and rehabilitation of the injured. Once such information is filed in a trauma registry, statistical calculations ensue, and data is analyzed to develop and improve guidelines on combat casualty management.

Without a filled out card, all this information is communicated verbally or somehow retrieved from a variety of sources - namely from the injured themselves, casevac and medevac crews, unit's medical service or their headquarters. It can be confusing, controversial and inaccurate. Data points such as time of tourniquet application and conversion, or what medications were given and when - may

completely change clinical decisions. In combination with other factors it may significantly affect the quality of care at the stabilization point, and the extent of resource utilization. Excessive doses of TXA, unnecessary diagnostics and pointless procedures simply due to unclear timing of tourniquet application. Furthermore, difficulty establishing the causative and temporary relationships for the overall condition and symptoms of the casualty, or reviewing drug allergies already during active patient management. All such issues could be resolved with a casualty card filled out correctly. Pre-filled personal information could help prevent “patients vanishing” during evacuation or at the healthcare facilities around the country. So much time could be saved by the medical services and unit commanders on these avoidable patient searches.

It is not our intent to perform an in-depth analysis of the reasons why casualty cards are filled out so infrequently. And even if they get filled out, it doesn't lead to a process of casualty data tracking. Such would certainly lay the foundation for a trauma registry at the Defense Forces of Ukraine. It's possible (and critically necessary) to establish this process systemically. For the time being we will continue to share our experiences and developments.

The Ukrainian translation of the DD1380 form is publicly available. Minor flaw - till this day it is based on the antiquated CABC algorithm (just as the original form DD1380). In the process of selecting an optimal version, we based our casualty card, on a form created in 2017 by a working group at the 205th Tactical Medicine Training Center. It is interesting to see these cards being sold as “standardized casualty cards”. Unfortunately this standards has never been approved. As of today, the only authorized standard of primary medical documentation at the Armed Forces of Ukraine is the “form 100”.

We modified and improved basic casualty card following MARCH algorithm, and adapted it to our unit's requirements. We translated it into English and Spanish. We get it industrially printed and laminated, delivered already with a handy fold, so that it easily fits into the warfighter's IFAK (this card is slightly larger than the original form DD1380).

Based on the changes proposed by our medical service, we developed an improved casualty card form, considering the following:

- Additional personal information about the warfighter. The majority thereof can be pre-filled as soon as the IFAK is received;
- Fields to document timing of hasty and deliberate TQ applications, also timing of replacement and/or conversion (previously, this could only be noted in comments, in tiny print);
- Additional fields to record vitals and monitor the dynamics of casualty condition;
- MARCH+PAWS algorithms with prompts for the care providers;
- Visualization of the MSIT-report for patient handover to the next stage of care.

- A reminder of how crucial it is to know who delivered care at the previous stages, and have the possibility of contacting them for additional clarifications on the settings of injury and evacuation.

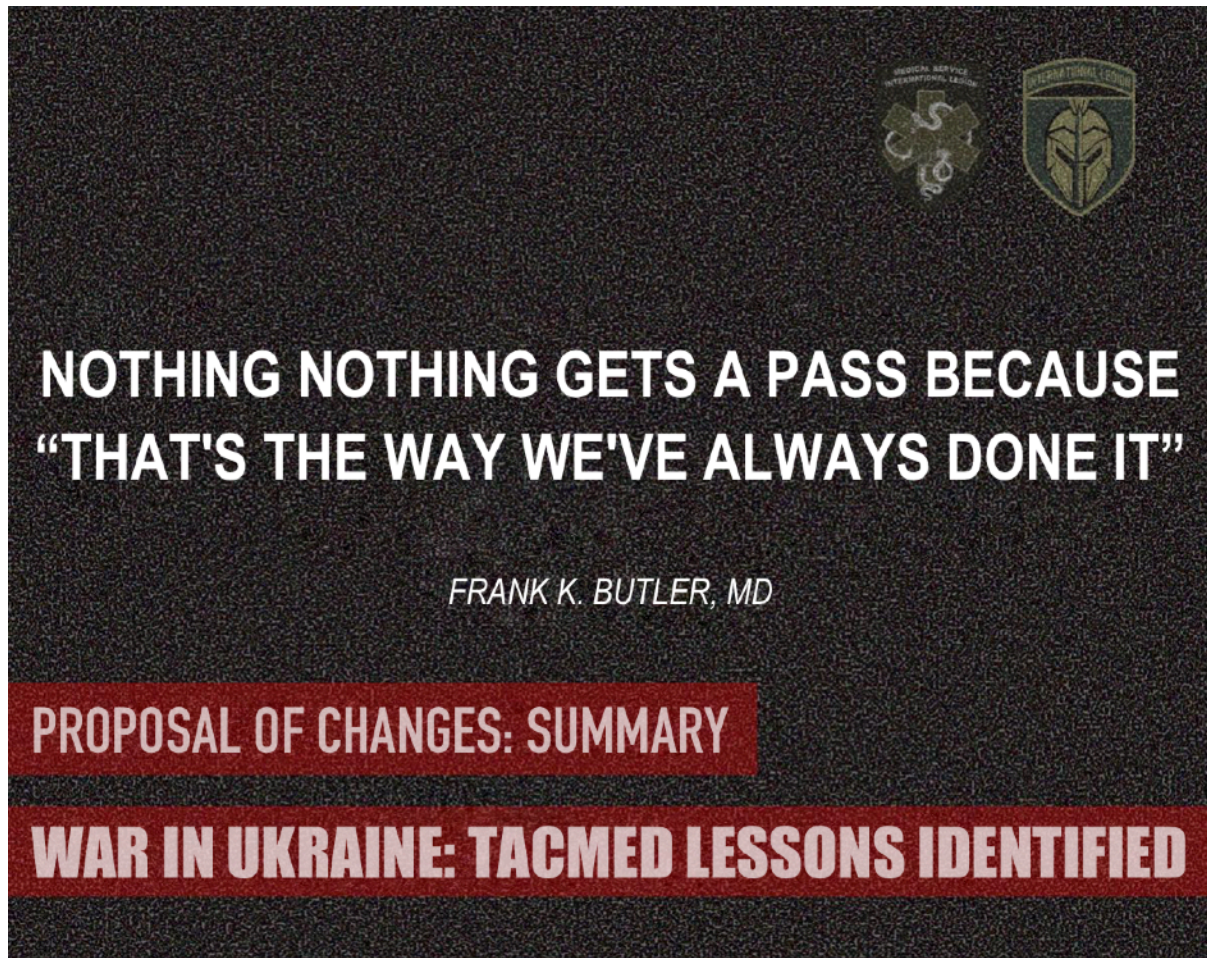
Thin marker in the warfighter's IFAK will do the job filling out some basic information. Junior combat medic will need an even thinner permanent pen-marker to document vitals and administered medications. Yet it's possible. And we must mobilize all our mental and physical resources to continue filling out those casualty cards, and keep collecting data on casualty care in tactical environment.

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War in Ukraine: TacMed Lessons Identified

INTERNATIONAL LEGION MEDICAL SERVICE: PROPOSAL OF CHANGES - SUMMARY



Is it possible that Ukrainians missed the moment when tactical medicine turned into a dogma, even though the concept it was being build upon, happened to be entirely different?

In summary of our series on “War in Ukraine: TacMed Lessons Identified” we decided to quote the founding father of TCCC, namely Dr Frank Butler. In his special report “Leadership lessons learned in Tactical Combat Casualty Care” (1) analyzing the path towards creating and implementing TCCC guidelines, he names the following lessons learned:

1. Nothing gets a pass because “that’s the way we’ve always done it”.
2. It doesn’t matter how good the plan is - if nobody is using it.
3. If what you are doing is not working, do something else.
4. Maintain an active search for good ideas - wherever they can be found - and process them as though lives depend on it.
5. Make needed corrections as quickly as additional evidence and experience is gained.
6. Effective strategic messaging is needed to inform and inspire decision makers.

7. Evidence does not drive advances in trauma care. People do that.
8. Lessons learned are not really lessons learned - unless we actually learn them.

Both their content and context vastly varies from ours, but remain 100% applicable to the wartime reality in Ukraine. In our opinion they reflect the need for change in tactical medicine. And they happen to relate to our proposal to apply the TCCC guidelines, so that they match the settings of our combat operations aimed at defending and reclaiming our country. And here we find it fitting to quote another statement from Butler's report: "Decisions about how best to care for the combat wounded must be made with the evidence at hand, not deferred for want of additional or higher quality evidence."

Sincerely open to constructive discussions, improvement, following the above lessons learned and learning some new ones.

REFERENCES:

1. Butler FK. Leadership lessons learned in Tactical Combat Casualty Care. J Trauma Acute Care Surg. 2017 Jun;82(6S Suppl 1):S16-S25.

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Respectfully,

Medical Service Team
1st International Legion of Defense
Armed Forces of Ukraine

Facebook: [Medical Service International Legion](#)

E-mail: medservice.legion.ua@gmail.com