Low-Resource Tactical Combat Casualty Care Training for Peshmerga Units in Remote Areas of Kurdistan

Daniel Taylor, EMT-P, TP-C, REMT[1]; John Murphy, MS, REMT[2]; Zahari Stolley, REMT[3]*

ABSTRACT

The Peshmerga are the official military of the autonomous region of Kurdistan, Iraq. There remains a high level of variability across Peshmerga units in medical equipment and training. Presumably, Peshmerga soldiers are dying from preventable causes of death due to combat-related injuries, just as US troops did before the introduction of Tactical Combat Casualty Care (TCCC) training and supplies. This report outlines the efforts of a small US-based collective to provide TCCC training at the TCCC for all combatants skill level to Peshmerga forces and develop members of the Peshmerga as trainers.

KEYWORDS: *Iraq; combat injuries; TCCC training; Peshmerga; medical training; Kurdistan*

Introduction

In June 2017, pockets of Northern Iraq, including Mosul and Tel Afar, were still controlled by Daesh, with other areas having been liberated only weeks or months before. Many of the units who made the liberation possible are part of the Peshmerga, the official military of the autonomous region of Kurdistan. Despite being unified under the name "Peshmerga," the force includes several militias that independently formed under different political parties, primarily the Kurdistan Democratic Party and the Patriotic Union of Kurdistan. The militias eventually pledged allegiance to the Kurdistan Regional Government (KRG) with the president of Iraqi Kurdistan serving as official military head. The substantial variability in training and equipment among various Peshmerga units reflects the heterogeneous composition of the force. Some units are trained and equipped by US Special Operations Forces, others are trained by conventional forces, coalition forces, and humanitarian groups. Units lack basic medical supplies and are largely funded and supplied by the individual members themselves out of necessity.

The Peshmerga have no frontline field hospitals and no more than 25 ambulances for more than 150,000 soldiers; the expectation is that an injured soldier will walk back to safety.[1] For perspective, a fully staffed US Marine Corps Infantry Battalion is 903 men[2] to whom are assigned 67 US Navy medical providers, including two physicians.[3] Using those numbers, the US Marine Corps would have a combatant to medical provider ratio of approximately 13:1. Presuming one medical provider per ambulance, that would give the Peshmerga a combatant to medical provider ratio of 6,000:1. In the lead author's regional experience, ambulances were often only staffed with a driver and no medical personnel to provide care during transport.

Tactical Combat Casualty Care (TCCC) was first introduced as the result of a Special Operations Biomedical Research project in 1996.[4] The US Military has seen a dramatic reduction in potentially preventable deaths on the battlefield after the introduction of TCCC concepts on a widespread scale in 2005.[5] A major portion of this decrease in preventable deaths has been as a result of TCCC recommendations to control life-threatening external hemorrhage with limb tourniquets and Combat Gauze (Z-Medica; www.z-medica.com/healthcare).[6] There was a 67% decrease in preventable death resulting from extremity hemorrhage after US Forces began to use limb tourniquets, as advocated for by TCCC.[6] As a result of its success on the battlefield, TCCC has now been recognized as the standard in the US military and TCCC training has been mandated for all US Servicemembers.[7]

In the US system, tourniquet application enables rapid arrest of extremity hemorrhage, allowing casualties time to be transported to a Forward Surgical Team (FST).[3] The cost of equipment alone for an FST is at least $200,000 (MA Ball, unpublished thesis, US Army Command and General Staff College), if not substantially more, without including the specialized personnel, infrastructure, security, and so forth that would factor into the cost. Establishing the next link in survival for the Peshmerga by following the US model is a much larger undertaking and outside the scope of this article. Even in the absence of an FST, casualties will fare better with early treatment of extremity hemorrhage and transport to a medical facility.[8]

The training we discuss in this article was focused on tourniquet application and other high-priority interventions per the TCCC guidelines. The training delivered reflected important updates to the TCCC guidelines by Shackelford et al.[9] that were developed to optimize the use of limb tourniquets.

The effort we describe was based on years of research and relationships developed by cultural anthropologist John Murphy, who is associated with a Seattle-based theatrical company that preserves the mythologies of extinct and endangered cultures. Murphy fostered strong personal and professional relationships dating back to the mid-1990s with many Kurds and Yezidi, an ethnoreligious minority that practices a monotheistic faith linked to ancient Mesopotamian religions. The Yezidi primarily reside in the Nivevah Province of Iraq and

*Correspondence to Dan@FrozenMedical.com
[1]**Mr Taylor** is at Austere Medical Initiative & National Center for Security and Preparedness. [2]**Mr Murphy** is at Austere Medical Initiative. [3]**HM1 (FMF) Stolley, USNR,** is at Austere Medical Initiative & Kosher Actual.

have populations elsewhere in the world due to displacement from conflict. In 2014, the Yezidi were singled out for eradication by Daesh, resulting in a genocide and mass graves across Kurdistan. The United States and United Kingdom took humanitarian and military action to protect the Yezidi in August 2014 at Mt Sinjar. Despite these efforts, as many as 4,000 Yezidi may have been killed and as many as 10,000 abducted and sold into slavery.[10]Before the full mission we describe took place, Murphy traveled to Kurdistan to meet with contacts in the Kurdistan Regional Government, Ministry of Peshmerga (MoP), and Yezidi communities to explore the possibility of a follow-on training mission. Murphy confirmed the suspected operational medical deficiencies—primarily a lack of frontline personnel with combat medicine training and a lack of TCCC supplies. As well as attending these meetings, Murphy, who also is an emergency medical technician (EMT) and remote EMT, tested small-group tourniquet training with the assistance of a translator.

Murphy worked with Peshmerga Brigadier General Ghudar Ali Joqi to facilitate permissions from the MoP and KRG and to arrange logistics to bring people back with him from the United States to train on several Peshmerga bases. The MoP also pledged to provide armed security and vehicles to transport the team. Members of the Yezidi community pledged housing and food for the team. With these agreements in place and the positive effect of the pilot training known, Murphy returned to the United States to secure funding and additional trainers.

Training was provided on two different Peshmerga bases over 2 weeks. The first unit was composed entirely of Yezidi women new to the military who were nearing completion of their military basic training. The second unit was composed of older, combat-experienced men, with a subset who had received at a regional hospital didactic and on-the-job training at a level slightly below that of local nurses, but who had no combat medicine training. Most members of the first unit are survivors of the genocide carried out by Daesh at Mt Sinjar.

In addition to providing the described training, the intent of this mission was to explore the various challenges associated with teaching in Kurdistan and to collect valuable information to enable future training missions.

Team

The in-country team consisted of three US citizens and four Iraqi Kurdish citizens from Yezidi communities. A fourth US citizen served as remote support for the operation. Three of the Kurds were Peshmerga assigned as security, and the fourth was a Kurdish civilian hired as a translator. The three Americans are the authors of this report: John Murphy, anthropologist and EMT, who made the mission possible; Z. Stolley, Navy Corpsman, TCCC instructor, and veteran of the Israeli Defense Force and Israeli Border Police; and Daniel Taylor, a civilian remote-site paramedic, tactical medicine instructor, and training developer. Stolley and Taylor served as the primary trainers in country. Murphy served as an assistant trainer and was responsible for predeployment and all in-country logistics, as well as serving as a liaison for the group to Peshmerga and KRG leadership. Joel Walker, HMC USN Ret, provided the remote support from Seattle, Washington. The group would form a 501c3 not-for-profit called the Austere Medical Initiative (austeremedical.org).

Travel, Security, and Communications

Travel and Security

The team traveled by commercial airlines and civilian vehicles. The choice to travel via civilian methods was intentional to decrease the risk of supply diversion and harassment by unfriendly state[11] or nonstate actors, and to limit the visual presence of Americans in an area with a known Daesh insurgency.[12] The visual signature of uniformed Peshmerga driving one to two Toyota HiLuxs was unremarkable for the area. This is in contrast to other aid workers noted in the region who were driving conspicuous sports utility vehicles or were part of convoys with obvious Western private security details. Real-time tracking of the group by Walker in Seattle was possible through use of a Delorme InReach Explorer global positioning system–based communicator (Garmin, https://www.garmin.com/).

Communications

The team's communication PACE (primary-alternative-contingency-emergency) plan components were as follows:

Primary: Smartphones using Google Hangouts and Signal connected via internal SIM cards or a mobile hotspot with a local SIM card

Alternative: UHF/VHF radios within in-country team (unencrypted), Delorme InReach Explorer for communication to remote support individual

Contingency: Nokia 105 (https://www.nokia.com/) with Local SIM card (KOREK)

Emergency: Delorme InReach Explorer SOS (Garmin)

Curriculum

TCCC training is now required for all members of the US Military.[7] The all deploying combatants TCCC skill set focuses on minimally invasive lifesaving interventions capable of being reliably performed by nonmedical providers. Although training students to that same level was desired, it was determined that it would not be practical to do so given time constraints and the language barrier while gaining any practical level of proficiency. It was anticipated that the time available might not be enough to deliver a full TCCC-AC course, so decisions were made by Taylor to deliver a reduced curriculum based on the TCCC All Combatants (TCCC-AC) guidelines.[13] TCCC-AC is one of two curricula for TCCC. The other curriculum is TCCC for Medical Personnel (TCCC-MP).[14] TCCC-AC is foundational for temporization of survivable combat injuries. TCCC-MP builds on TCCC-AC to allow for more definitive treatments and more effective stabilization of a casualty before delivery at a Role 2 facility. TCCC-AC and TCCC-MP guidelines define care as occurring in one of three phases: (1) care under fire, (2) tactical field care, or (3) tactical evacuation care.

The basic management plan for each phase defined in the TCCC-AC and TCCC-MP guidelines balances interventions needed with the tactical concerns to ensure timely application of appropriate emergency interventions while maintaining sensitivity to operations. To create the curricula for this program, the TCCC-AC guidelines were used, and training time and available supplies were considered. The following paragraphs describe the phases of care and deviations from the TCCC-AC guidelines.

Care Under Fire

Care under fire refers to the concepts of returning fire without specific tactical guidance, cover versus concealment, encouragement of a casualty to continue as a combatant if possible, applicability of self-aid, emergent moves of casualties (e.g., one- and two-person drags and carries), application of a tourniquet to life-threatening hemorrhage (self-aid and buddy-aid).

Deviations: Removing casualties from a burning vehicle or building and stopping the burning process were mentioned but were not trained for.

Tactical Field Care

Tactical field care refers to the concepts of maintaining security without specific tactical guidance, disarming of casualties with altered mental status, blood sweeps for identification of massive hemorrhage and arresting of that through application of a limb tourniquet or wound packing, recovery position for airway management, application of an unvented chest seal (commercial and improvised) for open chest wounds with burping as needed, and hypothermia prevention.

Deviations: There were several deviations to tactical field care guidelines; however, cardiopulmonary resuscitation was addressed per the TCCC-AC guidelines.

- Tourniquet application as proximal to the core on the effected extremity was emphasized and drilled. Application of a tourniquet direct to skin 2 to 3 inches above the bleeding site was stated as an option but was intentionally de-emphasized due to concerns about confusion regarding tourniquet application in care under fire. Taylor's reasoning was that application of a high and tight tourniquet when a more distal tourniquet would suffice was preferable to an unrecognized hemorrhage proximal to the distal tourniquet.
- Application of a second tourniquet in the event the first did not arrest hemorrhage was mentioned, but not trained for. Even the largest, most muscular members of the Peshmerga seen by the team were noted to be the size of a small to average American. The inference is that a single commercial tourniquet would be effective for those patients, whereas larger US Servicemembers may require two. Students were asked what to do if their first tourniquet failed to control hemorrhage, and they correctly answered, "apply a second."
- Wound packing was taught with nonhemostatic gauze because of an inability of the US team to donate hemostatic gauze directly to the students and scarcity of hemostatic gauze in the Peshmerga supply chain. Students were shown packages of QuikClot Combat Gauze (Z-Medica) and directed to preferentially use that if available. The emphasis was placed on good wound packing technique regardless of the material being used. Figure 1 displays wound packing materials.
- Airway management was taught per the guidelines with the exception of nasopharyngeal airways, again because of scarcity in the Peshmerga supply chain and inability to donate them to students. Chin lift, jaw thrust, and recovery position were practiced.
- Hypothermia management was discussed, but not emphasized or practiced, due to time constraints.
- Penetrating eye trauma, pain management, antibiotics, burns, and documentation were not covered.

FIGURE 1 *Wound packing materials training poster.*

Tactical Evacuation Care

Students were made aware that their education was limited. Rapid evacuation to a higher level of care was indicated if it was impossible to bring a higher level of care to the patient. During evacuation, students were directed to re-assess the casualty and any interventions that were provided, but this was not practiced.

Deviations: Hypothermia management was not emphasized or trained for. Documentation was not covered.

Training Aids

Several potential training aids were considered (Table 1). It was decided to use 11-in × 17-in laminated posters (Figure 2), and to use tape to indicate wounds placed on student role players (Figure 3) to support instructor's lectures and instructor's demonstrations. The posters proved to be a lightweight, durable, and useful training aid.

The Combat Application Tourniquet® (C-A-T; C-A-T Resources Inc.; http://combattourniquet.com/) would be the only commercial tourniquet students were taught to used, because that was what would be issued to them after training.

Training Supplies List

The list of training supplies was as follows: six G6 C-A-Ts; two QuikClot Combat Gauze training packages; four H&H Nonhemostatic Gauze Packages (H&H Medical Corp. https://buyhandh.com/); six 5-in emergency trauma dressings; one roll of red tape; five triangle bandages for improvised windlass tourniquets; and 10 11-in × 17-in posters (some double sided).

Given the resource-limited nature of Kurdistan, when these soldiers engage in combat, they may run out of commercial tourniquets. Planned "improvised" tourniquet kits were issued, and training was conducted on how to improvise an effective windlass tourniquet. The kits contained two triangular bandages and a threaded metal rod (approximately 7 in) for the windlass. The threaded rod was purchased locally and cut to size to highlight the ease of sourcing those items locally (Figure 4).

When improvised tourniquets are part of the plan, there are several important considerations: (1) The planned improvised tourniquet design must be tested before use to ensure it will

TABLE 1 *Advantages and Disadvantages of Training Aids*

Training Aid	Advantage	Disadvantage
Manikins	Potentially more realistic injuries, greater ability to correctly treat	Bulk, weight, cost
Projector and slides, electronic tablet	Small physical footprint with high degree of flexibility	Unpredictable power grid and high levels of heat and dust make electronics unreliable
Moulage	Medium fidelity, increased stress for students	Soldiers provide their own uniforms and damaging or dirtying was undesired. Increased reset time between scenarios.
Tape to indicate wounds	Quickly applied over clothing, low cost, easily carried, simple to change wounds between scenarios	Low fidelity, requires student buy-in for effective training
Laminated posters	Durable, lightweight, low cost to create and replace.	Low fidelity
Student role players	The patient perspective can be experienced by students, approximates their likely patients, no additional personnel required	Effectiveness depends on student buy-in and enthusiasm for acting, removes at least one student from performing skills during each scenario

FIGURE 2 *A selection of the 11-in × 17-in laminated posters used in training.*

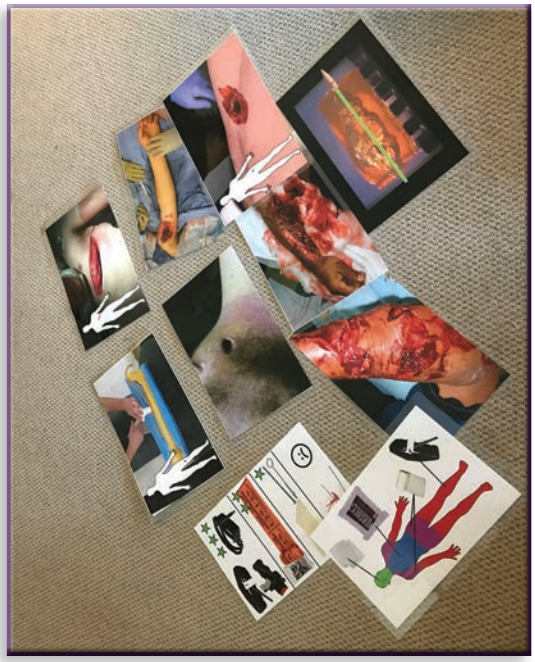

FIGURE 3 *Observation of group scenarios (standing, left to right, translator Ali [white shirt], Mr Murphy [brown shirt], and Peshmerga unit noncommissioned officer).*

Photo credit: D. Taylor.

FIGURE 4 *Cutting of locally sourced windlasses.*

Photo credit: D. Taylor.

reliably stop distal arterial flow. (2) The soldiers must practice constructing and applying the improvised device during their training. (3) All the necessary components of the improvised components of the improvised tourniquets must be carried by each individual in combat. Creation and use of spontaneously improvised windlass tourniquets were taught as an emergency alternative to planned improvised tourniquets and commercial tourniquets.

Medical Supplies for Use

Upon completion of training, students were issued an individual trauma kit (Figure 5) containing one C-A-T; two improvised tourniquets (i.e., four triangle bandages and two metal windlasses); one emergency trauma dressing; two chest seals; and two compressed gauze packages. Note: QuikClot Combat Gauze or another hemostatic agent recommended by the Committee on TCCC should be included in an individual trauma kit; however, due to the expense, this was impossible to provide to every student. The decision was made to include the compressed hemostatic gauze.

The members of the first unit trained who were selected to be trained as trainers had been the students Murphy worked with during his earlier trip. Before training with the team of three Americans, those selected as trainers were proficient in self-application and buddy application of commercial tourniquets. Their focus during the training of the rest of their unit would be learning how to deliver the training in the absence

FIGURE 5 *Issuing of individual trauma kits.*

of Western trainers. Those trainers became teaching assistants and used their limited English to assist with small group exercises when the translator could not be with every group. Taylor and Stolley evaluated and provided constructive criticism for those trainers and watched them instruct TCCC-AC–naive students on the final day on base without assistance. One of the challenges identified was ensuring that trainers had both the knowledge and confidence to instruct and correct their peers as needed. Although the Yezidi and Kurds are very progressive, women still have somewhat traditional gender roles and may be reluctant to lead or correct men. The lack of confidence extended to correcting peers of the same sex as well. The first unit trained was entirely female with a single male commanding noncommissioned officer. By the end of training, the members of the first unit demonstrated no hesitation in leading and correcting their female peers; however, it was unclear if that would extend to male peers, because of cultural norms.

The members of the second unit selected to be trained as trainers were previously trained to the level of the licensed practical nurse (LPN) by the Peshmerga; however, they lacked combat medicine training. Their knowledge of anatomy provided a foundation to build on TCCC-AC. The LPN-trained members of the second unit readily learned the TCCC-AC materials and were able to demonstrate teaching self- and buddy application of a tourniquet to their peers.

Lessons Learned

Language Nuances

The team experienced a cultural misstep when they asked the translator for a word other than "doctor" to describe their level of training. The term provided by the translator was said to mean "like a doctor," interpreted to be akin to a paramedic but actually meant "lay rescuer." This led to some amusement from the students because it was clear the team was using the wrong word.

Enhanced Communication With a Translator

On the basis of precourse conversations in country, the team recognized that the translator did not know the material being taught, which would make translating the meaning, as well as the actual words, more challenging. The team opted to provide an abbreviated version of the training to the translator so he better understood what should be taught.

Course-Specific Phonetic Phrase Book and Unified Instructor Phrasing

Trainers elected to simplify and shorten their language to aid translation. Many of the same phrases were intentionally used by all three Americans in an effort to reduce potential confusion. These phrases were written down phonetically and pronunciation practiced with several individuals, allowing the trainers to initiate a quick drill without interpreter involvement. Doing this in advance of the mission would have allowed for more practice time for the trainers.

Visual Communication Was Effective

The posters combined with demonstration were effective and made the translator's explanations briefer.

Written Communication in Advance of Training

Multiple levels of leadership were involved in communicating to base officials that training had been authorized and would be occurring on certain dates. Given the nature of communication through multiple people, not all concerned parties received the same message, leading to mismatched expectations. Providing commanders a written schedule in advance of training with general information could improve this communication. To preserve the ability to be flexible, a high-level view of each day with hours of training expected might be ideal. For example:

Day 1: 4 hours of training: basic trauma care
Day 2: 4 hours of training: trauma care and patient movement
Day 3: 4 hours of training: self-aid, scenarios
Day 4: 4 hours of training: equipment considerations, scenarios

Certificates of Completion

Even if the certificate does not carry the weight of a certifying body, the certificate is a significant morale item.

Anticipate Sick-Call Demands

Training was periodically interrupted or delayed by individuals in need of primary care. To alleviate this, the team eventually proactively scheduled a sick-call clinic and made that known to base personnel. In areas with disrupted health care, the presence of health care providers may prompt spontaneous presentation of patients. Politically, it could be detrimental to refuse to see those patients, even if the present role of the health care provider is educational, not clinical. The role distinction as well as the different levels of medical training may not be clear to local partners, resulting in all Western health care providers being perceived as doctors and able to treat all manner of conditions regardless of current diagnostic ability and gear cache.

Team Selection Relative to the Environment and Potential for Primary Care and Sick-Call Demands

Pre-mission planning expected that team members would only be treating one another for minor conditions or catastrophic injuries before delivery to a major city for evacuation. The ability of team members to run an impromptu clinic was an unintended result of their diverse backgrounds and judicious equipment-packing decisions.

Tourniquet Conversion to Pressure Dressing

The process of converting a tourniquet to a pressure dressing was discussed but not drilled on. Considering the extended evacuation time any casualty is likely to experience, and the

extreme pain caused by prolonged tourniquet use, students should have been better trained to convert a tourniquet to a pressure dressing. A future training mission would include time to allow scenarios to play out long enough to permit tourniquet conversion to a pressure dressing, per the TCCC guidelines[14] and the Prolonged Field Care Working Group Recommendations.[15]

Train-the-Trainer Planning Should Include Training Supply Allotment

One training equipment cache was brought. To fully set the new trainers up for success, however, they should be issued a set of training supplies including tourniquets and posters.

Wound-Packing Training Lacked Full Practice

Bringing or making in country a wound-packing trainer would enhance the training done on that skill. Another organization conducting similar training in Duhok created a low-cost wound packing trainer that could be replicated (Figure 6). Effective trainers can be made with varying materials based on availability (Figures 7 and 8).

FIGURE 6 *Low-cost wound packing trainer.*

Photo credit: B. Allegar.[23]

FIGURE 7 *Low-cost wound packing trainer.*

Photo credit: The Tourniquet Project.[24]

FIGURE 8 *Yoga blocks modified to be wound-packing trainers.*

Photo credit: Whisky Delta Gulf.[25]

Medical Patients Seen While on the Training Mission

We dealt with the following conditions during the mission: otologic complaints; a brucellosis outbreak; uncircumcised male patients with previous symptoms corresponding with a urinary tract infection; heat casualties; noninfectious chronic skin rashes; a middle-aged man who had profound jaundice of unknown etiology; chronic musculoskeletal complaints, especially low back pain; chronic localized pain after sustaining superficial combat injuries; dental complaints due to poor dentition and lack of dental care. There also were reports that several of the female soldiers, primarily younger than 18 years, had acute psychological distress and potentially symptoms of posttraumatic stress disorder. One episode of syncope and possible pseudoseizures were witnessed. Many of the female soldiers had been present for the genocide in Sinjar. No psychological health care was available.

Conclusion

Although the training provided was not as robust or in-depth as continental US TCCC courses, this mission demonstrated that a very small, under-resourced team was able to deliver training to areas of Kurdistan not currently served by larger organizations or militaries. With slightly more personnel, especially personnel who could be tasked with providing health care and assessing those needs more adequately, a slightly longer timeline, and slightly more funding, the Peshmerga could receive quite a significant amount of TCCC training. Providing this lifesaving training and nonlethal aid to our allies in the region can be done very effectively with little impact on other operations. In particular, as Daesh moves from a military occupation to an insurgency, maintaining a close working relationship with Peshmerga units may prove vital. Ongoing TCCC training could maintain this relationship with limited cost to US and coalition forces.

The significant impact of improved hemorrhage control in the prehospital phase of care for patients with severe extremity bleeding has been very well demonstrated in the military[16–18] and civilian sectors.[6,19] Provided that the techniques taught and supplies provided are used correctly, there is an expected decrease in the death rate. Due to limited resources and the fallout from the Kurdish independence referendum, including closure of the Erbil Airport, a rapid follow-on mission to assess impact was impossible. The desired follow-on assessment

would evaluate how many patients were seen by students and what the students did for those casualties. In addition, providing live hemostatic agents for student use would be an excellent addition to their kits, given the strong body of research supporting the benefits of hemostatic agent use.[20–22]Another item to assess during a follow-up mission would be the impact of the local trainers as well as any challenges they encountered delivering training.

Additional information about the project and downloadable versions of the posters are available at FrozenMedical.com/Kurdistan.

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Author Contributions

JM conceived the training effort. All authors contributed to obtaining funding and carrying out the mission. DT wrote the first draft of the manuscript. All authors read and approved the final manuscript.

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