Live Tissue Training Point Paper

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Bottom-line:

Live tissue training saves lives. The training empowers non-medical as well as medical personnel to be their best when their absolute best is needed in battle.

BACKGROUND INFORMATION

General:

1. For well over 50 years the U.S. Military has realized the value of Live Tissue Training (LTT). Because of the inherent sensitive nature, and obvious common sense logic; true scientific studies on the efficacy of LTT have never been sponsored. The absence of this data has become the battle cry of those questioning the efficacy of live tissue training; either to support the increased use of simulators, or to do away with live tissue training altogether.

2. However, one could say the same about live fire training; scientific studies have never been completed on the efficacy of shifting troops from lectures on a weapon’s functions, to sight picture and dry-fire, to static range-fire, to full-scale maneuver live fire. Regardless, we all understand and appreciate the training evolution. The logic is not questioned, and we would never send Service Members into battle with “simulation” as their only introduction to the weapons they fight with.

3. We don’t train pilots using “simulation only”, and perhaps a more poignant analogy, we don’t ask people to send their children to a pediatrician who is “simulator trained”. We don’t issue driver’s licenses based on simulator training; of course, the list is endless. Simulation is a training step; it is not the end of the training process. This is a real fact, especially when this training can make the difference between life and death for those serving our nation in harm’s way.

4. Opponents of live tissue training have made the point that medical personnel for the US Military should be solely trained in hospital emergency rooms instead of using live tissue. To suggest military medical personnel could receive adequate “trauma” training in a civilian emergency room is unsupported by reality. Hospital emergency rooms are staffed by teams of nurses, technicians, and physicians. Exchange programs do exist, but they have limited put-through; approximately 24 personnel every 6-8 weeks. Even this training is not a replacement for live tissue—it is an adjunct, and a hugely positive training enhancement.

5. However, Hospital medicine is not battlefield medicine; one is a clinical perspective the other is an operational perspective (respectively). The notion
that they are one in the same is a recognized “cause of death” on every battlefield at the start of every war. The subject of “operational medicine” is widely known in military circles, but is rarely addressed and is even less understood in civilian medical circles. If you are going to talk trauma medicine, you need to educate yourself on the differences—because there are very distinct differences.

6. In combat, medics don’t arrive on scene with a police escort. There aren’t red flares, people directing traffic, they don’t go “code three” and they don’t have an entire ambulance full of supplies and gear. They are not 15 minutes from a hospital emergency room where they will hand-off the casualty to a full trauma team. Instead they are trained and prepared to save life, and keep the casualty alive in austere high-threat conditions for hours on end. It is not the same medicine by any stretch of the imagination.

7. Combat medics work in the dark bloody dirt of some far away land trying to save a life while the enemy continues to try and kill them. They work alone, one medic to a given number of “fighters”. They manage whatever number of casualties the battle brings them as the fight rages on around them. They are priority targets for the enemy; easily identifiable by their medical bags and the fact they are bent over burned and bleeding casualties rendering aid. Kill or injure them, and the unit is crippled. This fact is why non-medical personnel receive the same training as medical personnel with some procedural exceptions.

8. Combat medics speak a similar but distinctly different language than their clinical counterparts. They think in terms of care under fire, tactical field care and prolonged care. They don’t think or act like a civilian paramedic—they cannot. Combat medics are trained to stop massive hemorrhage with tourniquets, pressure dressings and hemostatic agents because exsanguinations are the leading cause of preventable death on the battlefield. They learn to do surgical airways because faces are destroyed by improvised explosive devices. Blast and burn injury are common, along with the constant threat that while they are treating a casualty, a secondary explosive device is only meters away. They know how to place a chest tube because the casualty might be wounded in a mountain valley of Afghanistan, then evacuated by helicopter through a mountain pass that is 5,000 feet higher than the valley and delivered to a military hospital that is 3,000 feet lower than the point of injury. No chest tube for the flights and the patient dies. These are the kinds of issues combat medics and individual operators face every day. The spectrum of care they are expected to provide at any given moment exceeds what an entire civilian trauma center might encounter in a week or month.

9. Training to provide this level of care in war is the driving factor behind live tissue training. During Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), thousands of Service Members, medics and individual operators alike have been training in life saving, operational medical procedures—teaching them to be their best, when their best is needed at the point of injury in combat.
10. This training, beginning with classroom didactic, which follows the Committee for Tactical Combat Casualty Care (TCCC) guidelines, and the academic curricula of the Pre-hospital Trauma Life Support (PHTLS) Manual, Military Version Six; employs lecture on theory and science, practical exercise and simulation, and culminates in tactically relevant, scenario based, hands-on training involving live tissue.

11. As with live fire training, we recognize the progression to live tissue is absolutely the highest quality training we can offer our medics and individual operators. It saves lives.

Comparative Statistics:

1. The number of hogs that are slaughtered for food in the US alone averages 478,000 per day.

2. The number of hogs used in support of live tissue training by the largest contractor (annually training thousands of Army, Navy, USMC, and USAF personnel) is 2,900 per year. This is a fractional amount of animals used, and these are used to save lives on the battlefield.

3. For the US 2008:
   a. Meat consumption was 26,127 million pounds
   b. Pork consumption was 20,686 million pounds
   c. Poultry consumption was 43,114 million pounds
   d. Lamb consumption was 367 million pounds

4. Slaughter reports for the week of February 16, 2009
   a. Cattle slaughtered that week: 614,000 Since Jan 1 09= 3,881,000
   b. Hogs slaughtered that week: 2,236,000 Since Jan 1 09= 14,320,000
   c. Sheep slaughtered that week: 43,000 Since Jan 1 09= 274,000

   Source: USDA Market News

Simulation is not “good enough”:

1. On March 27, 2007, to the 110th Congress, first session, the following statement was made by Major General Gale S. Pollock, The Surgeon General of The United States Army “On any given day more than 12,000 Army medics—physicians, dentists, veterinarians, nurses, allied health professionals, administrators, and combat medics are deployed around the world supporting our Army in combat, participating in humanitarian assistance missions, and training throughout the world”.

Live Tissue Training & Ballistic Wounding Point Paper
2. General Pollack also stated in this testimony that “To date, more than 17,800 Combat Medics have received training in Medical Simulation Training Centers which use computerized mannequins that simulate human response to trauma”. General Pollack continued, “Use of live tissue best simulates the challenges and stress inherent in stopping actual bleeding.” Massive hemorrhage is the largest preventable killer of our Service Members on the battlefield. Now, in a effort to remove the pressure of animal rights groups, are we prepared to ignore this fact and limit training to simulators or conduct live tissue training without the traumatic effects of ballistic injury that simulate the very real possible types of injury our Service Members face in combat?

3. Medical Simulation Training Center programs simply do not have the capacity to meet the trauma training needs of the military. Programs typically allow training for 20 men (only) every 30 days; this does not come close to the volume of training needed by the Services.

4. Similarly, the military cannot afford widespread use of trauma training center programs without abandonment of their daily duties and decreasing the availability of healthcare to Service Members. The majority of medics requiring training cannot receive sufficient emergency case management experience in trauma centers. The put-through cannot keep up with the pre-deployment requirements.

5. The increased focus of the development and staffing of trauma training centers takes medics out of the fight and places them in the schoolhouse. Not the best strategy.

6. Live tissue training has proven to be a mainstay of military medical preparation for the treatment of combat casualties. These training programs are invaluable to our medics and individual operators; building individual proficiency and confidence in each Service Member’s ability to treat combat casualties (Blumenfeld et al, 1997).

Special Interest Groups:

1. With regard to special interest groups, these groups offer opposition to the use of animals in training based on the following:
   
a. The sanctity of life, and animal rights  
b. That there are alternatives (simulation) available which replace the use of live animals.

2. If the life of ONE American Service Member is saved at the cost of any number of animals used responsibly in live tissue training; it is without question morally and ethically justified. If any elected or appointed official, or military Commander, or staff officer believes otherwise, let them explain that “belief” to the American
people; let them explain the loss of life based on an appeasement strategy to the family and colleagues of the deceased.

3. The latter does not sanctify abuse of this privilege; and animal use in training for the purpose of saving human life is not abuse; it is justified and controlled use. The animal is completely anesthetized for the entire period that the model is used for training. Every measure is taken to ensure the dignity, the proper care and painless utilization of the animal during training. Animals are taken to a surgical plane of anesthesia, where they are constantly monitored by trained veterinary personnel.

4. Every possible step is taken to ensure the animal feels no pain during the training. So intense is this monitoring that the veterinary staff walk a fine line between pressing the model so deep into anesthesia, that even a slight increase in medication would in fact euthanize the animal. The animals are treated with dignity and respect during training; a far greater quality of life and utilization than a life spent in a stock yard awaiting slaughter for food. This gift of life, this sacrifice, advances the quality and preservation of human life to levels we could not possibly have reached alone.

5. Therefore, the use of live tissue training models to simulate battlefield injury is justified because the value placed on the lives of American Service Members is high enough to demand that those who respond to battlefield injuries receive the most advanced and most effective medical training. It is established through training logic and educational science that the most successful (well-documented) methodology for training medical personnel is to incorporate battlefield scenarios, high stress, rapid decision making methodical (automatic) application of accepted medical procedures, and logic (triage) complemented with live tissue models.

6. The educational objective is to bring together the retention and performance curves of each Service Member at the precise moment needed, immediately following the point of injury. It is scientifically documented that high-stress learning environments incorporating the sights, sounds, smells, and to a degree, danger of the battlefield, fuse these two critical performance objectives. The closer to the point of injury these curves merge, the more lives are saved. Consequently, the more time elapses before the Service Member remembers what to do, how to do it, and then executes; the more lives are lost. Seconds count for lives. If live tissue training translates into human lives saved; we have a moral and ethical responsibility to every Mother, Father, Brother, Sister, Spouse and Child to do what is necessary to make certain every possible action is taken to bring Service Members home alive.

7. Because the mission of operational units in the Armed Forces requires them to function in hostile environments with high likelihood of severe injury and or death under austere conditions without immediate available high level medical support, the use of a living battlefield injury model in the medical response training scenario is the most appropriate training methodology for military personnel.
8. In regards to the second point—alternatives to live tissue training. There are simulation models available. When these models are used appropriately, they have the potential to improve the total learning experience of trauma training. However, they are not a replacement for live tissue training—they are a progression toward it.

9. These models include the Simulab Corporations Trauma Man System and the Combat Trauma Patient Simulation System (CPTS). Most of the models available are currently being used by the military. However, these models do not replace all of the procedures necessary for training health care providers. If all of the procedures cannot be replaced with alternatives, then it does not eliminate the use of animals. Only live animals allow training for severe wound treatment such as gunshot wound debridement or amputation (Knudsen et al, 1996). For this reason, the notion that training might eliminate ballistic wounding, and amputation from the allowable live tissue POI is a preposterous and wasteful act. If this is done, it will shave perhaps the two most critical training objectives from live tissue training.

10. Ultimately, inanimate models can only replace animals in trauma training if they allow the attainment of a comparable level of proficiency for the given student population, level of training and educational objectives. To date, there have been no prospective studies comparing the use of animals and inanimate models in trauma training. None!

11. Ongoing educational research is still needed to validate long term retention of knowledge and skills, provide reliable methods to evaluate teaching effectiveness and performance, and to demonstrate improvement in patient safety and overall quality of care (Cherry RA, et al, 2008).

12. With Regard to Trauma Man (Simulab), this model was created to meet the needs of advanced trauma surgical skills courses. Its use is not applicable for hemorrhage control, the largest and preventable killer of our Service Members on the battlefield, according to General Pollack. In a study done at Fort Lewis, a hemorrhage simulator was used to train military medics (Mabry RL, 2005). However, the control group was a group that received no exposure to the simulator. There was no comparison to live animal hemorrhage training.

13. The problem with inanimate models is they provide predictable responses to performance. Again, quoting General Pollock "Use of live tissue best simulates the challenges and stress inherent in stopping actual bleeding." Military mass casualty incidents are an unfortunate reality in the 21st century, but there are few training exercises to prepare health care providers. Given the mobility and modularity of modern medical systems, the ability to provide critical care outside of the confines of traditional hospitals under unusual circumstances has become not only a reality and periodic necessity, but an expectation. Austerity amplifies the complexity of providing high level critical care because resources are frequently limited, providers are asked to fill unexpected roles determined by
necessity, security may be threatened and the population at risk and their afflictions can be highly diverse. (Venticinque, SG, et al, 2008). It is time to re-evaluate the pre-hospital teaching standards.

14. With regard to alternatives, the emphasis on using alternatives is not on the elimination of animal use, but on the elimination of avoidable animal pain and/or distress. Those who oppose the use of live animals misunderstand this notion and continue to demand that animals be eliminated from medical research, testing and education. The animals used in education and training comprises a small proportion of all animals used in research, teaching and testing.

15. The Combat Trauma Management courses employing live tissue training that are provided by contractors are designed to test and reinforce the application of knowledge with regard to patient stabilization and treatment on an injured animal-patient. The courses provide medics and operators with conditions similar to those found on the battlefield. The use of ballistic wounding in these courses is used to create a variation of wounds and environments to complicate patient management and increase training realism.

16. This may be the only exposure that Service Members are given prior to their first casualty of war. These life threatening wounds create arterial hemorrhage, since exsanguination is by far the single greatest “preventable” killer on the battlefield. This type of training is grounded in the requirement to observe, assess, triage and treat based on the severity of penetrating trauma. If this can only be discussed in lecture format with no practical applications other than injuries generated by surgical wounds, then the Service Members attending these courses will have been cheated out of opportunities that are unattainable in any other setting. As such, patients in their care will be the unwitting models for these medical providers’ first experiences with penetrating ballistic and blast injuries.

The Committee on Tactical Combat Casualty Care:

1. The TCCC First Responder Conference was held 9-11 September in Tampa, Florida. The intent for this conference was allow medics and corpsmen with personal experience managing casualties in combat to engage with medical trainers, equipment developers, and researchers to develop lessons learned and to propose future directions in battlefield trauma care. Combat medical personnel from across the DoD are invited annually to submit presentations.

2. Live tissue training was considered to be an invaluable element of combat trauma training by all attendees. To paraphrase the words of one participant; taking care of wounded casualties on the battlefield should not be the first time that our combat medical personnel see or deal with severe bleeding. Until a simulation technique is developed that is documented to equal the benefit of live tissue training in preparing medics to manage combat trauma, appropriately
conducted live tissue training should be supported as an essential component of combat medic training. (TCCC Jan 09).

3. The burden of wounds sustained in Operation Iraqi Freedom and Operation Enduring Freedom are ballistic and blast extremity injuries, specifically soft tissue wounds and fractures (Owens et al, 2007). Healthcare providers must be exposed to the type of injuries that they are likely to see in the battlefield. From these published reports, ballistic wounding training is vital for this exposure prior to deployment.

4. The defense Medical Training Center has for a number of years been conducting exercises to give Danish National Service surgeons and dentists the opportunity to observe gunshot wounds (Knudsen PJ et al, 1996). These exercises allow the Defense Medical Training Center to teach wound ballistics in a realistic setting.

5. Ballistic wounding and blast wound simulation in live tissue training not only prepares the Service Member to deal quickly and effectively with wounds on the battlefield; indications are it significantly reduces the effects of Post Traumatic Stress Disorder (PTSD). While prospective studies have not yet focused on documenting this fact; preliminary research through personal interviews and questionnaires has established this as a significant breakthrough.

6. There is evidence that live tissue training “pre-conditions” the minds and emotions of Service Members thereby lessening the incidence and impact of post traumatic stress disorder. A new program used to treat PTSD utilizes what the Army is calling “exposure therapy” to treat pre and post combat stress with video battlefield video games (Army Times, Sept 19, 2008).

7. There is evidence that the use of live tissue in pre-deployment combat trauma training lessens the severity and duration of PTSD. Scientific studies will lend more empirical evidence—but the indicators are present.

References:


