

Prehospital Trauma Life Support for Companion Animals and ‘Operational Canines’

This issue of the *Journal of Veterinary Emergency and Critical Care* features the Veterinary Committee on Trauma’s (VetCOT) Prehospital Trauma Care Best Practice recommendations for dogs and cats. The guidelines were developed under the purview of ACVECC’s VetCOT Prehospital Subcommittee that consists of subject matter experts in the various fields of prehospital medicine. For further information on VetCOT’s overarching mission, readers are referred to the following website <https://sites.google.com/a/umn.edu/vetcot/home>.

These guidelines should be considered as best practice clinical recommendations for the most common veterinary conditions that may be encountered in a prehospital scenario. The guidelines are applicable to all populations of dogs and cats with special considerations provided for the distinct sub-population of working dogs referred to as ‘Operational Canines’ or K9s (OpK9). Operational K9s encompass that special population of civilian working dogs specifically trained to serve society in a variety of settings and circumstances such as federal and civilian law enforcement (eg, Police K9s, US Marshals service), force protection (eg, U.S. Customs and Border Patrol, Transportation Security Administration), and search and rescue (SAR) operations. This unique group of dogs distinguish themselves from other categories of ‘working dogs’ (eg, sports and agility, guide, therapy, sled dogs) as they continuously place themselves in harm’s way to protect us, defend us, and preserve our freedoms. They have continuously proven to be a force multiplier in the success of many military, law enforcement, SAR, and humanitarian operations; therefore, the term “Operational Canine or OpK9” seems a more befitting term to distinguish this unique population of dogs from the rest of working dog community. The terms military working dogs (MWDs) and multipurpose canines (MPCs) specifically refer to the population of working dogs that serve the U.S. Armed Forces.

Unintentional injuries still remains one of the leading causes of death worldwide in people 1–44 years of age.^{1–5} For civilian trauma and military combat casualties about 40–70% of post-traumatic fatalities occur during *the prehospital period* before the casualty ever reaches a medical treatment facility.^{6–11} Many of these prehospital fatalities occur within minutes of the injury as a result of either massive exsanguination or severe brain injury.^{7–11} Unfortunately for this subset of patients, very little may be

provided in the way of medical aid at the point of injury (POI) to change this proportion of prehospital deaths. On the other hand, approximately 20–25% of prehospital fatalities are due to what is termed ‘preventable deaths,’ or deaths that can be prevented simply by implementing **early** and **appropriate** basic first aid techniques.^{10–16} For the human combat casualty, the three most commonly observed trauma-related *preventable deaths* are: hemorrhage from extremity wounds, tension pneumothorax, and airway obstruction.

The most common out-of-hospital preventable deaths for companion animals remains completely unknown. A retrospective analysis of 235 dogs presenting to a university teaching hospital for blunt trauma revealed that most dogs involved in this population were young, medium-sized dogs and suffered blunt trauma subsequent to vehicular trauma.¹⁷ The most commonly traumatized area was the chest followed by the abdomen. A large proportion of population (72.3%) suffered multiple injuries with the chest and abdomen being the most common concurrently traumatized areas. As of October 2015, the *K9 Officer Down Memorial Page* (K9 ODMP) (<http://www.odmp.org/k9>) has reported 26 Line of Duty OpK9 deaths for 2015. The causes of K9 deaths listed were classified into: *Animal related*: 2; *Automobile accident*: 1; *Drowned*: 1; *Fire*: 2; *Gunfire*: 4; *Heat exhaustion*: 11; *Poisoned*: 1; *Stabbed*: 1; *Struck by vehicle*: 2; and *Training accident*: 1. These are just a few of the OpK9 deaths that have been reported on the K9 ODMP; no doubt, there are more OpK9 deaths that have not been made public. Per the K9 ODMP website, heat-related injuries contribute to the greatest cause of deaths in OpK9s; this prevalence coincides with the personal experience of many of those that routinely work with and support the OpK9 population. Many of these heat-related deaths were non-duty related, but rather were subsequent to OpK9s being left unattended in patrol vehicles in which the air conditioning unit shut-off or was not even running and or the electronic heat monitoring alarm failed to properly work. Stojisih et al¹⁸ extracted data from two working dog and law enforcement officer memorial websites evaluating the causes of death of civilian law enforcement dogs from 2002 to 2012. Their analyses revealed 36.7% (318/867) of reported OpK9s deaths were categorized as traumatic in nature with the three leading reported causes of traumatic OpK9 deaths being:

vehicular trauma, 25.8% (82/318); heatstroke, 24.8% (79/318); and penetrating ballistic trauma, 23.0% (73/318). "Most heat-related deaths, particularly those subsequent to the K9 being left unattended in a patrol vehicle, would be considered a preventable death, by most." Despite the limitations of extracting data from these memorial websites (eg, retrospective in nature, inability to validate the data), the data do provide some insight into the nature and risk of injury OpK9s are exposed to while in the Line of Duty.

In the human trauma care community, history has demonstrated that expedient recognition of life-threatening conditions and provision of timely first aid at the POI can be life-saving.^{12-16, 19} The need for timely prehospital trauma care and rapid transport to a definitive care facility led to the development of formalized Emergency Medical Systems (EMS) that now exist in most developed countries today. EMS' mission is based on six general key functions: *detection, reporting, response, on-scene care, care in transit, and transfer to definitive care*. These six key functions are represented on the EMS 'Star of Life' symbol created by the National Highway Traffic Safety Administration.²⁰ The 'Star of Life' has become recognized around the globe as being synonymous with emergency medical care. Early on, prehospital trauma care training for EMS personnel, to include military combat and law enforcement medics, were primarily based off the principles taught in the Advanced Trauma Life Support (ATLS) course.^{15,21} Although ATLS principles have proven to be a very successful standardized approach for managing civilian trauma patients, it is most effective when applied in the setting of a well-resourced hospital emergency department or trauma center. As many of us know, the prehospital setting is a much different situational and logistical environment. Even in an urban civilian sector with established, well-resourced EMS teams and short transport times, the absolute value of applying ATLS principles to prehospital care remains questionable.^{15,21}

In 1981, the American College of Surgeons Committee on Trauma in cooperation with the National Association of Emergency Medical Technicians developed an ATLS Course for prehospital providers; this in turn was renamed *Prehospital Trauma Life Support (PHTLS)*.²² The PHTLS has the main goals of: a) gaining access to the patient, b) rapidly identifying and rendering aid of life-threatening injuries until the casualty can be evacuated to a higher level of definitive care, and then c) packaging and transporting the casualty to a designated trauma care center in the shortest amount of time possible.²² PHTLS principles focus on early, simple, and well-conducted medical interventions that will eliminate or mitigate the severity of preventable deaths and contribute most to improving survival and overall outcome.

Considering each situation is unique, PHTLS incorporates flexibility allowing the first responder the ability to adapt its principles to the scenario at hand. PHTLS does not require advanced medical knowledge or technical training; therefore, the skills can be easily learned and implemented by a wide range of paramedical personnel with varying degrees of medical knowledge and experience. PHTLS remains one of the leading training programs for prehospital emergency trauma care throughout the world. In low-income countries that do not have adequately established EMS services, the implementation of even basic PHTLS principles (eg, direct pressure hemostasis, simple airway techniques) has been shown to provide a beneficial effect in reducing trauma-related mortalities.^{20,23-25} Up until now, peer-reviewed veterinary-based PHTLS guidelines have not been developed or made available. One reason for this is that veterinary-specific EMS services have also not been (and still currently are not) available in most places. When an animal is injured, it is typically the owner or by-stander that witnesses the trauma (neither of which are usually medically inclined) that scoops the animal up and drives it to the nearest veterinary treatment facility. Some may feel that the continued lack of a veterinary EMS system precludes the need for developing veterinary-based PHTLS guidelines; however, there are many situations when paraprofessionals (eg, EMTs, paramedics) or other civilian personnel trained in human first responder care are first on scene and in a position to provide life-saving care to an injured animal. This is particularly true for the OpK9 in which their handler (unless injured themselves) is often the first responder. With that in mind and in an effort to decrease veterinary prehospital case fatality rates (CFR), then it is prudent that the veterinary community develop a set of evidence-based, prehospital care guidelines that first responders have access to and may be trained to utilize.

The prehospital guidelines included in this edition were developed based on the available evidence and clinical experience from those active in the field of prehospital medicine. On the whole, however, the veterinary community has not addressed many large gaps in relation to prehospital trauma care (eg, the lack of standardized guidelines, funding, training, logistical resources, research). Some important knowledge gaps include the lack of data regarding the types of prehospital injuries that are most prevalent, the proportion of veterinary casualties that succumb to prehospital injuries, and the data to objectively analyze what effects first provider interventions have on CFRs. Although we may expect a similar out-of-hospital CFR between people and veterinary patients, we probably should expect a different prevalence in the type of injury-related fatalities animals experience simply based on the inherent differences

between species (eg, anatomy, conformation, locomotion). The lack of veterinary-specific EMS services has precluded the gathering of prehospital trauma-related data and, therefore, has been a main contributor for some of this knowledge gap. In addition and up until recently, the lack of an established national veterinary trauma registry has served as another contributor for the insufficient gathering of data. To help close this knowledge gap, VetCOT has incorporated data fields into its trauma registry for recording applicable information related to the prehospital period (eg, injury type, resuscitative care provided). The prehospital data collected can be analyzed to help answer the many unknowns about the prehospital period that currently plagues the veterinary community and, therefore, will foster improvements in our recommendations for out-of-hospital care.

The Operational K9 and the Need for K9 Tactical Emergency Casualty Care

Despite marked advancements over the past 20 years in human EMS for high-threat scenarios (eg, active shooter events), advances in casualty care for the civilian OpK9 operating in a high threat environment have remained severely deficient. In 2009, a US Special Operations Command sub-committee convened to develop the Canine-Tactical Combat Casualty Care (Canine-TCCC) principles to help guide field care for MWDs injured on the battlefield.²⁶ In spite of their usefulness for providing care to MWDs in a combat environment, Canine-TCCC principles have limitations when attempting to apply them to the civilian OpK9. Since Canine-TCCC principles were developed with medical operations distinct to a 'battlefield' environment in mind, they fail to address factors that are unique to the civilian tactical environment (eg, available resources, operational environment, occupational hazards, injury risks). In addition, Canine-TCCC only addresses interventions for mitigating the three major preventable causes of death for human battlefield casualties (massive hemorrhage, upper airway obstruction, and tension pneumothorax). Canine-TCCC principles do not address other life-threatening conditions unique to all OpK9s such as heat-related injuries, gastric dilatation and volvulus, and illicit drug or explosive compound exposures. Finally, the original sub-committee that was formed to develop Canine-TCCC principles does not convene anymore; therefore, no process currently exist to review and update the Canine-TCCC principles in accordance with new available evidence-based data.

In 2014, the K9 Tactical Emergency Casualty Care (K9 TECC) working group was developed under the auspice of the human Committee for Tactical Emergency Casualty Care (www.c-tecc.org). The K9 TECC working

group's primary intent is develop best practice prehospital care guidelines for civilian OpK9s injured under high threat situations.²⁷ A diversified group of subject matter experts consisting of emergency physicians, veterinarians, EMS paraprofessionals, military professionals, tactical medics, law enforcement officers, K9 Handlers (law enforcement and SAR), and fire fighters make up the working group. The K9 TECC guidelines are written primarily to be utilized by civilian EMS/Fire, Tactical EMS, law enforcement officers and K9 Handlers. They are modeled off the human TECC guidelines (available at <http://www.c-tecc.org/guidelines>) and focus on interventions that are affordable, sustainable, and require minimal training and resources. Similar to the human guidelines, K9 TECC principles are incorporated into three dynamic phases of care: Direct Threat Care (DTC)/Hot Zone, Indirect Threat Care (ITC)/Warm Zone, and Evacuation (EVAC)/ Cold Zone. Fundamentally, the goals and principles for each phase of care will remain relatively same as human TECC; however, modifications are made to account for K9-related anatomical and physiological uniqueness. Since they are modeled after human-based TECC principles, K9-TECC should be easily learned and applied by various first responders. In developing their best practice recommendations, the working group extracted and translated data from available evidence-based medicine, lessons learned from MWD combat casualties, and end-user experience from the front lines to mold their final recommendations. K9-TECC principles will remain flexible, thus allowing the provider to adapt to any particular operational task or situational threat risk based on the organization's operational doctrine.

Other projects that the K9 TECC working group is tasked with include: developing a trauma registry and electronic patient care record specifically for OpK9s that non-veterinary EMS paraprofessionals may utilize; providing white papers and positional papers on important aspects related to OpK9 prehospital care; developing best practice recommendations for prolonged field care; evaluating components and making recommendations for K9 Individual First Aid Kits; fostering scientific research related to OpK9 prehospital care; and providing resources for first responders to facilitate their ability in providing appropriate and timely prehospital care to the injured OpK9. The K9 TECC group is also petitioning the AVMA and state veterinary regulatory agencies to legally allow human EMS paraprofessionals the ability to render emergency out-of-hospital aid to injured OpK9s. The working group has published two white papers entitled: "*Operational K9 Tactical Emergency Casualty Care (K9-TECC) Training and K9 Individual First Aid Kits (K9-IFAK) White Paper*" and "*Challenges Facing Prehospital Care for Operational K9s Injured in the Line of Duty.*" Both

white papers as well as more information about the K9 TECC working group may be found at www.k9tecc.org.

Final Disclaimer

The reader should remain aware that in the United States “practice of veterinary medicine” is defined and governed on a state-to-state basis. The requirements and exemptions for practicing veterinary medicine may be found in the respective state’s Veterinary Practice Act or in a section of the state’s laws that regulates veterinary medicine. As a result, the information provided in Prehospital Trauma Care Best Practice recommendations does not provide authorization for non-veterinary licensed personnel to practice veterinary medicine without the direct or indirect supervision from a licensed veterinarian. When used by non-veterinary licensed personnel (eg, EMS/Fire paraprofessionals, law enforcement officers, or K9 Handlers), these guidelines should only be implemented:

- For providing preveterinary emergency care to injured animals when licensed veterinary professionals are not readily available to render such care, AND
- In accordance with:
 - Their legal scope of practice for providing medical care to human casualties,
 - The laws of their respective state’s Veterinary Practice Act or statutes regulating veterinary medicine, AND
 - The laws of their respective state’s Practice Acts or statutes of their respective profession (eg, State EMS statutes)

To ensure the most appropriate and non-harmful care is provided to the injured animal, non-veterinary personnel with a high occupational likelihood for rendering out-of-hospital care to injured animals (eg, EMS/Fire, LE officers, and K9 Handlers) should pursue training in K9 anatomy, K9 first responder care, and K9 TECC procedures. Their training should be conducted under the direction of a licensed veterinary professional or a professional veterinary training organization that employs a licensed veterinarian as their medical director to oversee their training curriculum.

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