Attached is some info to chew upon at the upcoming VETCoT Prehospital meeting. I don’t anticipate half of the list will even get touched upon, but it may be more of a chance to make a road map for the upcoming year, as well, as decide what we as a committee decide is most relevant for us to tackle.

Our mission is to focus on how to best educate and provide awareness of our Veterinary PH initiative and provide support to both the veterinary and EMS / First Responder community.

Mission Statement: “To foster the awareness and enhance the quality of Veterinary Prehospital Care through advocacy, education, and research.”

Vision: Serving as an advocate for promoting the availability and quality of Prehospital Veterinary Care and advancing the interests of our profession and patients' needs. The main focus for our PH subcommittee is promoting excellence in Veterinary Prehospital Care through education and awareness. Combining this with those that have human EMS training and experience and inviting others from the human EMS field may really help mold our hospital based training into applicable Prehospital guidelines.

Completing this mission, our goals are the following:

a) **Develop and routinely update evidence based medicine (EBM) Best Practice recommendations and clinical policies for Veterinary Prehospital Medicine (similar to that of the American College of Emergency Physicians, [https://www.acep.org/Content.aspx?id=30060](https://www.acep.org/Content.aspx?id=30060)).**

2018 Accomplishments:

- **Informational:**
  - Fact Sheet on Opioid Toxicity and Naloxone Use in Operational K9s
- **EBM Journal reviews on:**
  - Prehospital Care of GDV, J Spec Ops Med.
- **Abstracts presented:**
  - Pharmacokinetics of Intranasal or Intramuscular Naloxone in Working Dogs, IVECCS 2018, Ciara Barr1; Amanda McGuire2; Mark Pennington2; Giacomo Gianotti1; Cynthia Otto1
  - Effects of Intranasal and Intravenous Naloxone Hydrochloride on Heart Rate and Respiratory Rate in Dogs. IVECCS 2018, Brandon Wahler et al.
  - M
- **2018 Conference lectures / classes:**
  - The Risk of Opioid Toxicity and the Use of Naloxone in Law Enforcement Canines: Myths and Truths. IVECCS 2018, Lee Palmer, DVM, MS, DACVECC, CCRP, NRP, WEMT, EMT-T, TP-C
  - "Operational Canine Point of Injury Medical Care For EMS Medical Directors.”, National Association of EMS Physicians (NAEMSP) annual conference, Palmer L, Smarick S.
  - Opioid Toxicity and Naloxone Use in Operational K9s – DEA / EPIC Conference, OH, Palmer L.

b) **Publish White Papers / Position Papers on key topics of concern in Veterinary Prehospital Care.**

Current / Ongoing Projects:

- Joint Position Paper with NAEMSP supporting an active working relationship/partnership between the Human EMS and Veterinary communities to enhance the availability and quality of prehospital care.
- Update to “Challenges Facing Prehospital Care for Operational K9s injured in the LOD” – includes updated State Legislation fronts
- Currently developing a manuscript for the veterinary community on how to interact and train prehospital community on preveterinary care – LESSONS LEARNED (see below)

c) **Promoting and pursuing prospective research and epidemiological analyses in the prehospital care environment (SEE ABSTRACTS attached).** Example on current ongoing research:

- **UPWDC** – DHS funded project evaluating the clinical effectiveness of Intranasal Naloxone (Narcan®), presented abstracts at IVECCs and AVMA:
- Auburn University – “Assessment of Prehospital Care in trauma patients presented to Trauma Centers”, currently under final revision, abstract to be presented at IVECCs.

- Prehospital antifibrinolytics (e.g., TXA, EACA) – NC State University evaluating PK/PD data of TXA in trauma K9s

- Gap Analysis/Critical Rebiew – Rethinking Heat-related Illnesses in K9s, PI: Janice Baker

d) Supporting legislation and policy developments to help make Prehospital care more available similar to the legislation in CO (SB 14-0139 Pre Veterinary Care Act) and OH Bill 187 that have already been passed. There are current movements in other States (eg. PA, ME, WI, etc.) which are making way to change legislation. We, as a committee, can provide a voice to support this movement.

**LEGISLATION UPDATES:**
Currently, the following states have passed legislation granting EMSPs some degree of legal authority to voluntarily render emergency preveterinary care to OpK9s:

- **Colorado, Senate Bill (SB) 14-039 “Preveterinary Care Act”, PASSED 2014.**

- **Ohio, House Bill (HB) 187, PASSED 2016.**

- **Maine PUBLIC Law, Chapter 338, 2018.“An Act To Protect Persons Who Provide Assistance to Law Enforcement Dogs, Search and Rescue Dogs and Service Dogs”, PASSED 2018**

- **Wisconsin, 2017 Wisconsin Act 166 (SB 435), PASSED 2018.**
  [https://docs.legis.wisconsin.gov/2017/related/acts/166](https://docs.legis.wisconsin.gov/2017/related/acts/166)

- **California, SB-1305, “Emergency medical services providers: dogs and cats”. PASSED 2018.**
  [https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1305](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1305)
  [https://leginfo.legislature.ca.gov/faces/billCompareClient.xhtml?bill_id=201720180SB1305](https://leginfo.legislature.ca.gov/faces/billCompareClient.xhtml?bill_id=201720180SB1305)

The following states have drafted legislation that is currently pending review and approval by the state legislatures:

- **Massachusetts, “Nero Police Dog Bill – 2019-2020”**

- **Pennsylvania, Section 8332(d) of Title 42 of the Pennsylvania Consolidated Statutes is amended and the section is amended by adding subsections to read: § 8332. “Emergency response provider and bystander good Samaritan civil immunity”.**

The following states have passed legislation providing EMS agencies the legal authority to transport injured Operational K9s in ambulances (aka “Transport Laws”):

- **New York, Senate Bill S4990A**

- **Mississippi Senate Bill 2091** that allows emergency medical staff to transport police dogs injured in the line of duty to a nearby vet or hospital for care. This went into effect 1 July 2018
Illinois House Bill 2661:

Michigan Senate Bill 1234

e) Developing the curriculum content for the Veterinary Prehospital Trauma Life Support course (basically the veterinary version of human PHTLS).
   - In regards to curriculum development for a VPHTLS program, PH subcommittee serving mainly to provide the medical direction and content and format oversight for the VPHTLS curriculum so that it truly remains “Best Practice” based upon available EBM
   - Certification process:
     - PH Subcommittee should not be the entity to establish or oversee certification process
     - May consider VETCoT’s Education subcommittee guide/oversee the course certification process, or having separate organization oversee the certification process, something similar to human side where most Prehospital Care course certifications, instructor’s qualifications, course site survey requirements, etc. are regulated by the National Association of Emergency Medical Technicians (NAEMT at http://www.naemt.org/).
   - Levels of curriculum to consider:
     - Basic (pet owners, handlers, EMRs/EMTs, other lay persons)
     - Advanced (veterinary personnel, paramedics, RN, MDs, etc)
   - Designated to specific communities:
     - Pet owners
     - Civilian LE and Military (K9 TECC Working group partnership)
     - Wilderness / USAR
     - Other

f) Collaboration with other prehospital care initiatives, eg. RECOVER, VETCoT educational committee, K9 Tactical Emergency Casualty Care Working Group, human PHTLS committees, etc.)
   - Consider inviting representatives from the Human EMS community (e.g. NAEMSP) to sit on the committee as advisors to help guide our future/process.
   - Collaboration with RECOVER Initiative and course certifications, don’t need to duplicate their CPR efforts
   - Manuscript + PPT slide deck of K9 TECC course in development to share
   - Establishing development of a National Association of Veterinary EMS (NAVEMS) similar to the relationship between ACoT and NAEMT in human medicine.

g) Establishing ad hoc committees:
   - These are my preliminary thoughts for agenda. To tackle these various agendas appropriately and efficiently, it may be best to establish these as ad hoc committees and appoint a lead for each to lead the process for each agenda.

Other Topics of Awareness / discussion for Meeting:

1. Sean Majoy – provide a brief overview of the process for establishing “Nero’s Law” in Mass. As well as the intent of Tufts to develop State Veterinary EMS protocols
   - Requires a collaborative working relationship between the State Veterinary Community (including VMA) and EMS Medical Director’s Office, with support/help from State legislator’s office to draft/push the bill through.
   - State specific protocols although the PH committee will develop a national template for Veterinary EMS Prehospital Care Protocols, similar to each State’s VPA or State EMS Protocols, then each State may
tailor these to their respective State EMS scopes of practice while maintaining the foundational principles set by PH committee.

2. **Lisa Peters** – share current case of Pyro and team effort, how the need for legislation and working relationship b/w EMS and Veterinary Communities works together

3. Currently working in conjunction with the National Association of EMS Physicians (NAEMSP) to develop a Position Paper supporting the need for Pre-Veterinary, Prehospital Care training for human EMS providers. This more authoritative/recognized support will provide support to EMS agencies nationwide that are seeking to develop K9 Medical Care training/programs for their agencies.

Sean Smarick L Palmer in conjunction with D. Scwartz (EMD Med Director) an 8-hour course entitled "Operational Canine Point of Injury Medical Care For EMS Medical Directors," at the National Association of EMS Physicians (NAEMSP) annual conference in Austin TX on January 8 2019. The whole point of this class was to bring awareness to EMS leaders regarding, not just the medical training needed for EMS providers for providing preveterinary care of injured OpK9s, but more so, awareness on the more logistical issues surrounding this effort that no one ever really considers. The main points we discussed included:

**LESSONS LEARNED:** main considerations when developing an OpK9 Veterinary EMS Program include:

a. **Legalities** of EMSPs providing prehospital, preveterinary care; Is there any reprisal for EMSPs providing preveterinary care when acting in an official capacity? Again, Nero's Law will help take care of this now

b. **K9 Pre-mission Medical Assessment** (where and how are you transporting the K9), (Is it a 24 hour ER/trauma referral Veterinary Hospital, do they have the staff and resources to handle traumatic injuries)

c. Understanding and appreciating the **K9-Handler relationship and Bond** (Treat the Handler and K9 as one entity, similar to a child and parent, the goal is to never separate, unless you have too)

d. Implementing disinfection protocols for equipment/vehicles used for humans that have come into contact with K9s. Do you have a separate K9 med kit on ambulances to avoid contamination?

e. **Controlled Substances**
   i. How do EMS agencies account for use of Controlled Substances in K9 patients?, (Some will ‘waste’ the drug)
   ii. Most EMS providers (civilian) do not carry near enough CS to maintain a K9

f. **KEY : Veterinary - EMS - K9 Team working partnership** which helps provide Veterinary Standing protocols, a training relationship, establish an Online Veterinary Medical Control capability, etc.
   i. NOTE: The training partnership goes both ways, not only does the Veterinary community provide training to EMS, but EMS needs to provide awareness and training to the Veterinary community so they understand the prehospital environment/operations (particularly related to Tactical EMS), as veterinarians do not receive this training nor typically operate in these types of prehospital environments.

4. **Awareness** – Xylazine is used as a cutting agent in illicit drug compounds, consider not only Naloxone, but ay also consider yohimbine or atipamezole in OpK9s presenting for illicit drug exposures and not responding appropriately to Narcan/Naloxone

**Research needed:** Anybody have any residents that want to perform some studies? 😊 Refer to the following for MWDs: Mil Med. 2018 Nov 1;183(11-12):258-260. doi: 10.1093/milmed/usy141. The Need for a Combat Casualty Care Research Program and Trauma Registry for Military Working Dogs. Orman JA et al. at [https://academic.oup.com/milmed/article/183/11-12/258/5038420](https://academic.oup.com/milmed/article/183/11-12/258/5038420)

1. Field anesthesia/analgesia, eg PK/PD of common EMS drugs for sedation/chemical restraint used Intranasal in K9s –ketamine, fentanyl, midazolam

2. Effectiveness of commonly carried human-designed Blind-airway insertion devices (King LTs, I-GELs) in K9s

3. Using ACLS drugs (naloxone, epinephrine) beyond expiration date and after storage in temperature extremes (stored in patrol vehicles) Some available date:

OBJECTIVE:
Naloxone is an opioid receptor antagonist that reverses life-threatening effects of opioid overdose. Since the 1970's, naloxone products have been developed as injectable solutions, and more recently as nasal sprays. Naloxone products have saved many lives in emergency settings. These products are routinely carried by public safety first-responders including fire fighters (FF), law enforcement officers (LEO) and emergency medical services (EMS). Now, they are also distributed through community access programs to the public. While public safety medications are monitored, those publically distributed are not, so expired products can be possibly found on-hand in an emergency. This study analyzed the quality and stability of expired Naloxone HCl Solutions for Injection, to assess their remaining efficacies and potential risks.

METHODS:
The samples were collected from EMS or law enforcement training supplies and expired returns, with expiration dates ranging from 1990 to 2018. Using standardized techniques, the remaining naloxyne was quantified, and the main degradation products, normaloxone (also known as noroxymorphone) and other possible species, were monitored and quantified systematically.

RESULTS:
Most tested samples were found containing more than 90% of labeled naloxyne, including those stored for nearly 30 years. The naloxyne degradation was slow, but generally correlated with storage time length. There was no significant amount of degradation products detected across all samples. Normaloxone was detected from some older samples, but all less than 1%. Therefore, although it is an opioid agonist, the risk caused by normaloxone should be low.

CONCLUSION:
This quality assessment demonstrates that expired naloxone products may still meet USP standards, even after many years. Further pharmaceutical, clinical and regulatory investigation should be conducted to confirm our findings, especially for new naloxone products with different formulations and routes of administration. Extending the shelf-life of naloxone products may have important financial and public health consequences in addressing future drug shortages and meeting the needs for this critical drug.


Conclusion: Recurrent epinephrine shortages impact EMS and hospital operations in the United States. Individual administrators may be hesitant to authorize use of expired pharmaceuticals due to perceived potential complications or fear of litigation. This study shows that the original parenteral epinephrine remains sterile and detectably pure more than 2.5 years after expiration. Further study of the sterility and chemical integrity of expired medications that had been subjected to the conditions of EMS vehicles may be a future research endeavor based on the aforementioned paradigm.

Temperature extremes for storage in the vehicles (Most applicable to Law Enforcement K9 Handlers); here is a good study to give them indications. Studies show that EpiPens may be stored up to 86°F for prolonged periods of time, and there is also a recent study looking at ALS drugs (including naloxone) carried by Parkmedics at extreme temps (45°C) and (-20°C), where in that study naloxone was one of the two drugs that did show the greatest heat dependent degradation (see below) ...


Abstract
STUDY OBJECTIVE:
National Park Service (NPS) Parkmedics provide medical care in austere environments. The objective of this study was to evaluate the stability of specific medications used by Parkmedics at extremes of temperatures likely to be faced in the field.

METHODS:
This is a bench research study conducted in the laboratory setting over a 4-week period. Parenteral medications were separated into 4 temperature exposure groups: A) 45°C (hot); B) -20°C (cold); C) hot then cold temperatures alternating weekly; and D) cold then hot temperatures alternating weekly. At study start and the end of each week, three aliquots...
from each group were sampled to determine the remaining drug concentration through liquid chromatography-quadrupole time-of-flight mass spectrometry (Agilent LC 1260- QTOF/MS 6550). Quantitative analysis was done using Agilent MassHunter Quantitative Analysis software. The mean drug concentration from triplicate aliquots was expressed as percentage of its baseline concentration to monitor the drug’s stability during storage.

RESULTS:
Eight medications were analyzed (atropine, diphenhydramine, fentanyl, hydromorphone, midazolam, morphine, naloxone, ondansetron). Hydromorphone, morphine, and ondansetron showed the greatest stability, at above 90% of original concentration in all study arms. Diphenhydramine, fentanyl and midazolam showed heat independent degradation, degrading the same way regardless of heat exposure. By the end of the study period, 51-56% midazolam remained in all groups. Atropine and naloxone showed heat dependent degradation, degrading more when exposed to heat. Atropine had the most degradation, being undetectable after 4 weeks of heat exposure.

CONCLUSIONS:
We recommend that EMS providers replace atropine, naloxone, diphenhydramine, fentanyl, and midazolam frequently if they are practicing in low call volume or high-temperature environments. Further studies will be needed to determine if re-dosing midazolam, naloxone, and atropine is the appropriate clinical strategy in this setting if adequate clinical effect is not reached with a single dose.

A systematic review of epinephrine degradation with exposure to excessive heat or cold
RESULTS:
Nine studies were included. Heat exposure resulted in epinephrine degradation but only with prolonged exposure.

CONCLUSION:
Temperature excursions in real-world conditions may be less detrimental than previously suggested. Freezing and limited heat excursions did not result in epinephrine degradation. Refrigeration of epinephrine appears to reduce degradation. However, the effect of extreme temperatures, particularly freezing, on autoinjectors is not sufficiently well established. More research in needed at clinically relevant high temperatures, with limited exposure to heat, and involving autoinjector devices.

Long-term stability of epinephrine dispensed in unsealed syringes for the first-aid treatment of anaphylaxis
Annals of Allergy, Asthma & Immunology. Volume 102, Issue 6, June 2009, Pages 500–503
Background: When epinephrine autoinjectors are unavailable or unaffordable, patients at risk for anaphylaxis in the community are sometimes provided with an unsealed syringe containing a premeasured epinephrine dose for use in first-aid treatment of anaphylaxis episodes.

Objectives: To study the stability of epinephrine solution in unsealed syringes under conditions of high ambient temperature, low vs high humidity, and light vs dark.

Methods: Forty unsealed syringes each containing an epinephrine dose of 0.3 mg (as a 1-mg/mL epinephrine solution) were stored at 38°C for 5 months, with 10 syringes at each of 4 different standardized storage conditions: dark and light at low (15%) humidity and dark and light at high (95%) humidity. Duplicate syringes were removed monthly from each storage environment and analyzed for epinephrine content vs control syringes.

Results: The epinephrine dose, expressed as the percentage remaining of the mean control dose, was below compendial limits (90% to 115% of label claim) by 3 months after storage at 38°C and low humidity and by 4 months after storage at 38°C and high humidity. Light had no significant effect.

Conclusion: In hot climates, if an unsealed syringe prefilled with an epinephrine dose is provided for the first-aid treatment of anaphylaxis, it should be replaced every few months on a regular basis with a new syringe containing a fresh dose of epinephrine.

Storage and Stability
Always store EpiPen® or EpiPen® Jr in the carrier tube with the blue safety release on until you need to use it. Store at 25°C (77°F); EXCURSIONS PERMITTED TO 15° - 30°C (59 ° - 86°F).

4. Other experiences, ongoing projects, research studies, etc?

PERTINENT ABSTRACTS:

Effects of Intranasal and Intravenous Naloxone Hydrochloride on Heart Rate and Respiratory Rate in Dogs
International Veterinary Emergency and Critical Care Symposium 2018
Brandon Wahler1; Turi Aarnes1; Phillip Lerche1; Richard Bednarski1; Carolina Ricco Pereira1; Butch KuKanich2; Jeffrey Lakritz1
Introduction
The objective of this study was to determine the effects of 4 mg intranasal (IN) and 0.04 mg kg⁻¹ intravenous (IV) naloxone HCl on heart rate and respiratory rate in dogs.

Methods
Naloxone, IV and IN, was administered to six dogs (mean age 6.8±1.6 months, mean weight 24.8±3.4 kg, three males, three females) with 7 days between treatments in a blinded randomized trial. Venous blood samples were collected immediately prior to administration and at 1, 2, 5, 10, 15, 30, 45, 60, 90, 120, 240, 480, 720, and 1440 minutes following administration of naloxone HCl for future determination of plasma concentrations of naloxone using a validated liquid chromatography/mass spectrometry method. Heart rates (HR), respiratory rates (RR), and gross behavioral changes were noted at all sample collection times. A two-way ANOVA with a Bonferonni post test were used to compare HR and RR data (p<0.05 was considered statistically significant).

Results
Baseline HR was 84±8 and 87±16 beats min⁻¹ for IN and IV, respectively. Baseline RR was 25±6 and 40±22 breaths min⁻¹ for IN and IV, respectively. There were no statistical differences in HR and RR between treatment groups at any time point. No behavioral changes were noted. Plasma samples are currently in process to determine the pharmacokinetics of intranasal naloxone administered via atomizer.

Conclusion
Administration of IN and IV naloxone appear to be well tolerated with no differences in HR, RR, or behavior between routes of administration.

Pharmacokinetics of Intranasal or Intramuscular Naloxone in Working Dogs
International Veterinary Emergency and Critical Care Symposium 2018
Ciara Barr¹; Amanda McGuire²; Mark Pennington²; Giacomo Gianotti¹; Cynthia Otto¹

Introduction
Due to the opioid crisis, working dogs are at risk for unintended exposure to potent opioids, resulting in potential overdose. This study examined the pharmacokinetics of intranasal or intramuscular naloxone used to reverse fentanyl sedation in working dogs.

Methods
This randomized crossover study enrolled ten working dogs (age 1.7±1 year, weight 26±3 kg). Fentanyl, 0.3 mg (average 0.01 mg kg⁻¹) was administered intravenously. Dogs were randomly assigned to receive either 4 mg (average 0.15 mg kg⁻¹) of naloxone intranasally (IN) or intramuscularly (IM) 10 minutes later. Sedation was assessed prior to and following fentanyl, and after naloxone administration. Blood was sampled for naloxone detection via liquid chromatography tandem mass spectrometry analysis prior to naloxone, then 5, 15, 30, 60 and 120 minutes after naloxone. Pharmacokinetic parameters were generated using a one-compartment model from mean plasma concentration-time data using non-linear regression software.

Results
Volume of distribution was 40.66 L kg⁻¹ for IM and 154.03 L kg⁻¹ for IN. Area under the curve was 555.8 ng mL min⁻¹ for IM and 249.3 ng mL min⁻¹for IN. Elimination half-life was 101.71 min for IM and 172.83 min for IN. Time to maximal concentration was 17.82 min for IM and 25.23 min for IN. Maximal concentration was 3.35 ng mL⁻¹ for IM and 0.9 ng mL⁻¹ for IN.

Conclusion
While naloxone concentrations were higher in the IM group, naloxone reversed fentanyl sedation in all patients, regardless of route. Thus, naloxone can be used via either route to reverse opioid overdose in exposed working dogs.

Comparison of Postexercise Cooling Methods in Working Dogs
Davis MS, Marcellin-Little DJ, O’Connor E 19(1). 56 - 60 (Journal Article)

Background: Overheating is a common form of injury in working dogs. The purpose of this study was to evaluate the relative efficacy of three post-exercise cooling methods in dogs with exercise-induced heat stress.

Methods: Nine athletically conditioned dogs were exercised at 10kph for 15 minutes on a treadmill in a hot environmental chamber (30°C) three times on separate days. After exercise, the dogs were cooled using one of three methods: natural cooling, cooling on a 4°C cooling mat, and partial immersion in a 30°C water bath for 5 minutes.

Results: Time-weighted heat stress was lower for immersion cooling compared with the cooling mat and the control. The mean time required to lower gastrointestinal temperature to 39°C was 16 minutes for immersion cooling, 36 minutes for the cooling mat, and 48 minutes for control cooling.
Conclusion: Water immersion decreased post-exercise, time-weighted heat stress in dogs and provided the most rapid cooling of the three methods evaluated, even with the water being as warm as the ambient conditions. The cooling mat was superior to cooling using only fans, but not as effective as immersion. The placement of simple water troughs in working-dog training areas, along with specific protocols for their use, is recommended to reduce the occurrence of heat injury in dogs and improve the treatment of overheated dogs.


Investigation of potential risk factors for mesenteric volvulus in military working dogs.
Andrews SJ, Thomas TM, Hauptman JG, Stanley BJ.
Abstract
OBJECTIVE To identify risk factors for mesenteric volvulus (MV) in military working dogs (MWDs). DESIGN Retrospective case-control study. ANIMALS 211 MWDs (54 with and 157 without MV [case and control dogs, respectively]). PROCEDURES Medical records (cases and controls) and necropsy reports (cases) were reviewed. Signalment, pertinent medical and surgical history, behavior and temperament characteristics, feeding schedules, and training types were recorded. Weather patterns for regions where dogs resided were researched. Data were evaluated statistically to identify potential risk factors for MV. RESULTS Risk factors significantly associated with MV included German Shepherd Dog breed (OR, 11.5), increasing age (OR, 2.0), and history of prophylactic gastropexy (OR, 65.9), other abdominal surgery (after gastropexy and requiring a separate anesthetic episode; OR, 16.9), and gastrointestinal disease (OR, 5.4). Post hoc analysis of the subset of MWDs that underwent gastropexy suggested that postoperative complications were associated with MV in these dogs but type of gastropexy and surgeon experience level were not. CONCLUSIONS AND CLINICAL RELEVANCE Data supported earlier findings that German Shepherd Dog breed and history of gastrointestinal disease were risk factors for MV. The MWDs with a history of prophylactic gastropexy or other abdominal surgery were more likely to acquire MV than were those without such history. These findings warrant further study. Despite the association between prophylactic gastropexy and MV, the authors remain supportive of this procedure to help prevent the more common disease of gastric dilatation-volvulus.


Miller L1, Pacheco GJ2, C Janak J3, Grimm RC3, Dierschke NA4, Baker J1, Orman JA3,4,5.
Abstract
BACKGROUND: Military working dogs (MWDs) are a major asset in the theater of operations. Their unique abilities make them ideal for tasks such as tracking, patrol, and scent detection. MWDs deployed to a war zone are exposed to harsh environments and battlefield dangers that increase their risk of disease, injuries, and death. Although canines have been used extensively in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), no published studies have reported detailed causes of death among MWDs deployed to these conflicts.
MATERIALS AND METHODS: Potential cases were defined as U.S. military-owned MWDs that died while deployed in Iraq (OIF) or Afghanistan (OEF) from January 1, 2001 through December 31, 2013 and identified from both official sources and unofficial sources, that is, online searches. Cases included in this study were limited to MWDs with data on cause of death obtained by abstraction from official veterinary treatment records (VTRs) from the Department of Defense Military Working Dog Veterinary Service, Joint Base San Antonio-Lackland Air Force Base, San Antonio, Texas, and Special Operations Forces units.
RESULTS: We identified 92 MWDs that died while deployed to OEF/OIF from 2001 through 2013 and had cause of death information from official VTRs. For both OEF and OIF, the most common training program was Multi-Purpose Canine (36.5% and 51.7%, respectively), followed by Improvised Explosive Detector Dog for OEF (34.9%) and Patrol Explosive Detector Dog for OIF (34.5%). Injuries were the primary cause of death for 77.2% of the MWDs for which we had cause of death data. The most frequent external injuries were gunshot wounds (GSW) (31.5%), explosion or blast (26.1%), and heat stress (9.8%). The proportion of deaths due to GSW was similar for OEF and OIF (30.2% vs. and 34.5%, respectively). However, a greater proportion of MWDs died from explosions during...
OEF than during OIF (30.2% vs. 17.2%, respectively). Diseases were the cause of death in 23.0% of the MWDs. The most common diseases were gastric dilation and volvulus (GDV, n = 3), pleuritis (n = 2), and sepsis (n = 3). Two deaths were associated with anesthesia-related medical procedures. A total of 8.7% of cases were missing cause of death, 8.7% were missing age, 32.6% of cases were missing data on necropsy, and 14.1% were missing data on final disposition of the body. Other variables of interest including number of deployments and duration of training had a very high proportion of missing values and thus could not be analyzed.

CONCLUSIONS:
Our study is the most comprehensive to date that reports causes of death of MWDs deployed to OIF and OEF. However, limitations in the available data lessen the potential of our results to inform improvements in training and point of injury medical care. Better documentation in VTRs and systematic data collection into an official MWD trauma registry could lead to improved training and facilitate further development and evaluation of guidelines to improve care of wounded MWDs in future conflicts.