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Working K-9 First Aid and Emergency Care

Jennifer Brown DVM, DACVS-LA, DACVSMR

Florida TF-2 FEMA US&R

Team Veterinarian

Canine Search Specialist

JOURNAL OF
Veterinary Emergency
AND Critical Care

Special Article

Journal of Veterinary Emergency and Critical Care **26**(2) 2016, pp 166–233
doi: 10.1111/vec.12455

Best practice recommendations for prehospital veterinary care of dogs and cats

Rita M. Hanel, DVM, DACVIM, DACVECC; Lee Palmer, DVM, MS, DACVECC, NREMT-T, WEMT, CCRP; Janice Baker, DVM, DACVPM; Jo-Anne Brenner, BA, EMT-I, EMT-T; Dennis T. (Tim) Crowe, DVM, DACVS, DACVECC, FCCM, NREMT-I; David Dorman, DVM, PhD, DABVT; John C. Gicking, DVM, DACVECC; Brian Gilger, DVM, MS, DACVO, DABT; Cynthia M. Otto, DVM, PhD, DACVECC, DACVSMR; Sheilah A. Robertson, BVMS (Hons), PhD, DACVAA, DECVAA, DACAW, DECAWBM; Elizabeth Rozanski, DVM, DACVECC, DACVIM and Brian Trumpatori, DVM, DACVS on behalf of ACVECC's Veterinary Committee on Trauma (VetCOT)

Abstract

Objective – To examine available evidence on prehospital care in human and veterinary trauma and emergency medicine and develop best practice guidelines for use by both paramedical and nonparamedical personnel in the approach to the prehospital care of dogs and cats.
Design – Systematic evaluation of the literature gathered via medical databases searches of Medline, CAB abstracts, and Google Scholar.
Synthesis – From a review and systematic evaluation of the available evidence, consensus guidelines on the approach to prehospital care of dogs and cats in 18 scenarios were developed.
Conclusions – Due to the lack of current evidence in the veterinary prehospital arena, best practice guidelines were developed as an initial platform. Recommendations were based on a review of pertinent human and available veterinary literature as well as a consensus of the authors' professional opinions. It is anticipated that evidence-based additions will be made in the future.

(J Vet Emerg Crit Care 2016; 26(2): 166–233) doi: 10.1111/vec.12455

Keywords: cat, dog, first response, trauma, VetCOT

Handler's Responsibility

- Healthy, immunized animal
  - Core vaccinations
    - Recommended vaccinations (AAHA)
- Provide preventive care
  - Rest, food, fluids, medications, etc.
- Monitor and bring canine health problems to medical team's attention
- Control dog for evaluation

Canine Health Maintenance

- Anticipated work hazards
- Work-rest cycles
- Anticipated work hazards
- Hygiene or decontamination at end of operational periods
- Water and food
- Daily assessment
- Evacuation plans

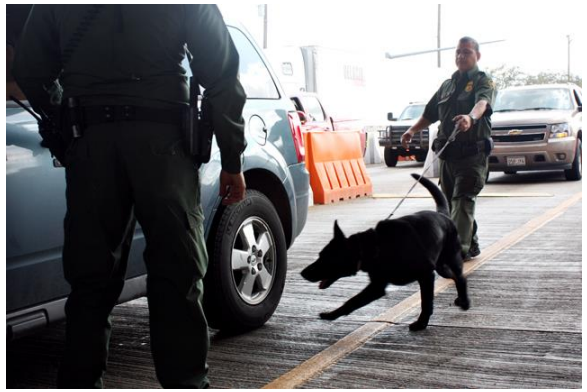
Anticipated Work Hazards

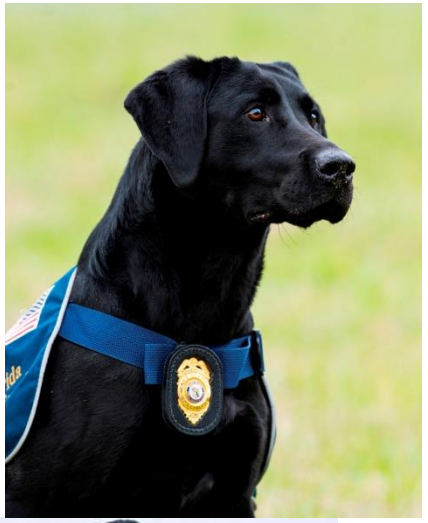
- Canine health threats
  - Trauma
  - Environmental Conditions
  - Hazardous materials
- Should be identified prior to work cycle where possible and continually assessed based on conditions.

End of Work Period Hygiene and Decontamination

- Important component at end of shift if there is potential exposures
  - Dogs will groom themselves and risk of exposure to toxins
- K-9 Decontamination needs may be different than human team members
  - Hair coat
  - Feet

Working Dogs





Working Dogs

- Search and Rescue
  - Urban
  - Wilderness
  - Tracking / trailing
  - Avalanche
- Search and Recovery (Human Remains Detection)
  - Urban
  - Wilderness
  - Forensics
- Patrol / Apprehension
  - Often dual purpose
    - Narcotics, firearms, bomb/explosives etc.
- Detection
  - Bomb
  - Arson
  - Narcotics
  - Bed bugs
  - Contraband
- Assistance
  - Guide
  - Hearing
  - Service / Assistance
    - Seizure Alert
    - Diabetic Alert
    - Psychologic
      - Post-traumatic Stress Disorder
    - Physical disabilities
  - Therapy

Search and Rescue Dogs

Urban Search and Rescue

- Search and Rescue dogs trained to identify live victims trapped in rubble
- Search and Recovery dogs trained to identify human remains
- Training is intensive and can take 2-3 years of training to get a FEMA Certified US&R dog

Deployment Injuries

- Scientific Literature
  - Injuries and illnesses in working dogs used during the disaster response after the bombing in Oklahoma City. Duhaime RA et al..JAVMA 1998 Apr 15;212(8):1202-7.
  - Deployment morbidity among search-and-rescue dogs used after the September 11, 2001, terrorist attacks. Slensky KA, et al. JAVMA 2004 Sep 15;225(6):868-73.
  - Injuries and illnesses among urban search- and-rescue dogs deployed to Haiti following the January 12, 2010, earthquake. Gordon LE. JAVMA 2012 Feb 15;240(4):396-403.
  - Injuries and illnesses among Federal Emergency Management Agency–certified search-and-recovery and search-and-rescue dogs deployed to Oso, Washington, following the March 22, 2014, State Route 530 landslide. Gordon LE. JAVMA 2015 Oct 15:257(8):901-908
- Post-Deployment Survey
  - Moore, OK (2013), CO Flooding (2013), Nepal Earthquake (2015), Hurricanes Sandy (2012), Matthew (2016), Harvey (2017), Irma (2017), Maria, (2017) Florence (2018), Michael (2018)

Incidence of Illness and Injury

- Oklahoma City, OK (1995)
  - Injury = 28%
  - Illness = 22%
- September 11, 2001
  - 68% illness and injury
- Haiti Earthquake (2010
  - 43% illness and
- Hurricane Sandy (2
  - Injury = 9%
  - Illness = 6%
- Moore, OK (2013)
  - Injury = 27%
  - Illness = 18%
- CO Flooding (2013)
  - Injury = 13%
  - Illness = 17%

What about Surfside????

- Oso Mudslides (2014)
  - 76% - injury
  - 79% - illness
- Nepal Earthquake (2015)
  - Injury/Illness = 25%
- Harvey (2017)
  - Illness = 5%
  - Injury = 5%
- Florence (2018)
  - Illness = 16%
  - Injury = 11%
- Michael (2018)
  - Illness = 6%
  - Injury = 33%

Incidence of Injury/illness

- Injuries in general more common than illness
- Fairly high incidence overall
- Incidence related to nature of the deployment
  - Hazards
  - Environmental
  - Duration
    - Shift
    - Total deployment length

Incidence of injury

- OK City
  - 28% 20 injuries (n=19)
    - Foot pad injuries were 18/20
- 9/11
  - 35% cuts or abrasions (n=34)
    - Only four required suturing
    - 70% on pads or limbs
- Haiti Earthquake
  - 22% wounds (n=6)
    - Predominantly foot
- Oso Mudslide
  - 76% (n = 19)
    - Wounds, abrasions, lacerations
    - Lameness

Injury

- Most common medical issue for deployed canines
- Musculoskeletal
- Integument
- Usually, minor
- Predominately footpad/limb wounds

Incidence of Illness

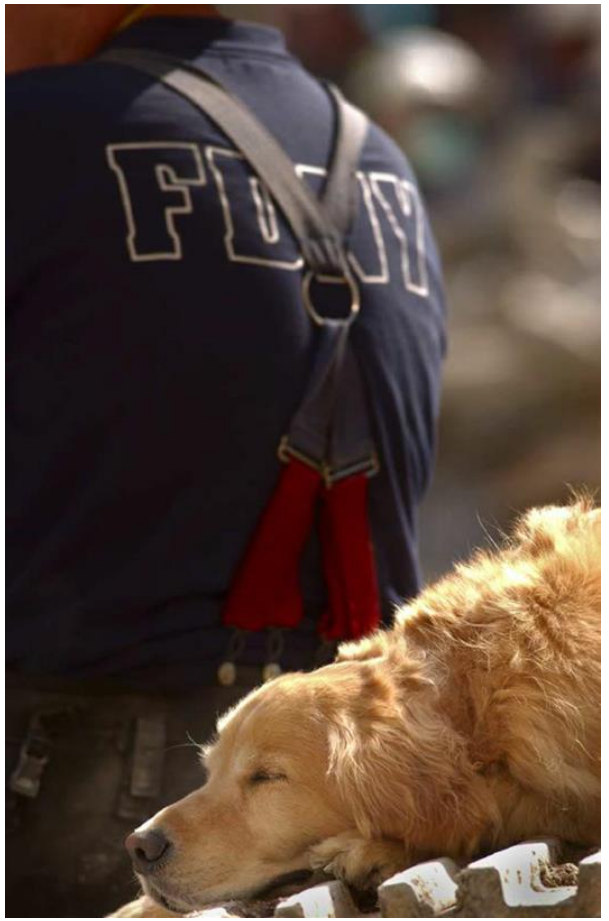
- 9/11
  - 21% gastrointestinal signs
    - Diarrhea (n=16)
    - Vomiting (n=5)
    - 23% weight loss
      - Most had decreased appetite
  - 14% dehydration (n=19)
    - Not related to work or deployment duration or shift
  - 24% fatigue (n=23)
    - 6/23 – heat exhaustion
  - 8% (n=8) respiratory disorders
    - All respiratory issues at WTC were in first 2 days
    - NO long-term respiratory issues in any dogs that worked WTC
  - 8% (n=8) lameness

Incidence of Illness

- Oso Mudslide
  - Dehydration (n=10)
  - Weight loss (n=5)
  - Exhaustion (n=4)
  - Diarrhea (n=4)
  - Shivering/hypothermia (n=3)
  - Ear infection (n=1)
  - Eye discharge (n=1)
  - Vomiting (n=1)

Illness

- Most common illness
  - Gastrointestinal
    - Primarily diarrhea
      - Generally minor
  - Dehydration
    - Overheating
    - Over-exertion
    - Decreased consumption
    - Gastrointestinal issues
- Fatigue
  - In appropriate work-rest cycles
  - Fitness?
- Other:
  - Urinary
  - Weight-loss
    - Decreased appetite
    - Input vs. output



Canine Fatalities
FEMA US&R

Fatalities

- Only 6 in FEMA US&R history
  - Predominantly training
    - 1 penetrating chest wound
    - 2 falls
    - 1 unknown
    - Fall/anaphylaxis

Lt. Winters

Penetrating Chest Wound

Lt. Winters

- June 4, 2010
- FEMA Certified - 7 year old male Belgian Malinois
- VA-TF2 training site; Virginia
- Beach, VA
- Slipped while entering the pile, but continued to search for about 3-5 minutes
- Handler noted a change in behavior after he came off the pile and that his mucous membranes were pale

Lt Winters

- Transported immediately to TF veterinarian
- DOA
- Chest tap post-mortem = blood in all 4 quadrants
- Post-mortem exam showed a puncture wound in the right axilla which penetrated the chest cavity
- No external bleeding
- Never showed signs of difficulty breathing

Lt. Winters

- Impaled himself on a 5mm diameter wire protruding about 8 inches above the concrete slab in which it was embedded
- Rebar is a common hazard in many training piles as well as real-world situations

Kinsey

Fall

Kinsey

- January 7, 2007
- FEMA Certified 9-year-old F-S Lab mix
- TX-TF1 training at Disaster City – College Station, TX
- 20-foot fall from roof structure
- When hander got to dog's location found her unable to use both hind limbs

Photo courtesy of Bob Deeds

Kinsey

- Presented in Schiff-Sherrington position
- No deep pain in LH
  - Progressed to absent deep pain in both hind limbs
- No motor either hind limb
- Subluxation of L2-L3 with vertebral body fracture

Milo

- March 29, 2017
- Training at TN TF-1 site
- Fall/collapse during search – seemed minor, kept searching
- Seemed like he was hot as the search progressed, so he was taken off the pile

Milo

- Off the pile
  - Not recovering well – excessively panting
  - Vomited
  - Transported to veterinarian
    - Their evaluation thought it was either heat or fall related
    - He was subsequently transported to a specialty hospital
  - Developed swelling of a leg and hip after a few hours
    - Ant bites discovered after being shaved down
    - Anaphylaxis was suspected
  - Ultimately died, presumed anaphylactic shock

Training Injuries

Dakota

- January 2, 2011
- 6 y.o. male Belgian
- Malinois
- FL TF-2 Training site
- Jumped down from twin- t onto pallet to exit pile
- Caught front leg in between slats of pallet
- Leg was grossly unstable
- Handler muzzled and transported immediately
  - No fracture stabilization on site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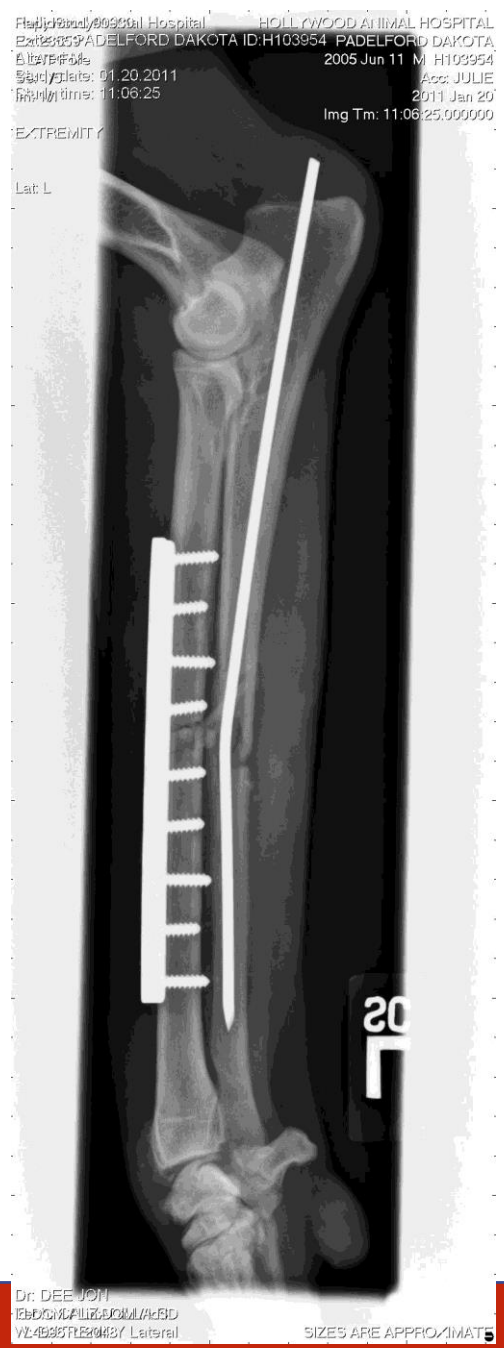
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2011 Jan 20
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Dr: DEE JON
AP
SIZES ARE APPROXIMATE

Wilderness SAR

- Air scent or tracking/ trailing dogs
  - Air scent
    - Work non-specific human scent
  - Tracking
    - On-lead
    - Scenting ground disturbance
  - Trailing
    - Work specific human scent
      - article

Wilderness SAR

- Injuries not well documented in literature
- Environmental
  - Lacerations / wounds
    - Foot pad
  - Heat injury
  - Sprains/strains/joint
    - Acute and chronic

Wilderness SAR

- Illness/Injury – 68%
- Injury
  - 43% wounds
- Illness
  - 10% lethargy
  - 10% weight loss
  - 10% fatigue

Gordon, L. E., & Ho, B. (2020). Injuries and illnesses among human remains detection–certified search-and-recovery dogs deployed to northern California in response to the Camp Fire wildfire of November 2018. *Journal of the American Veterinary Medical Association*, *256*(3), 322-332.

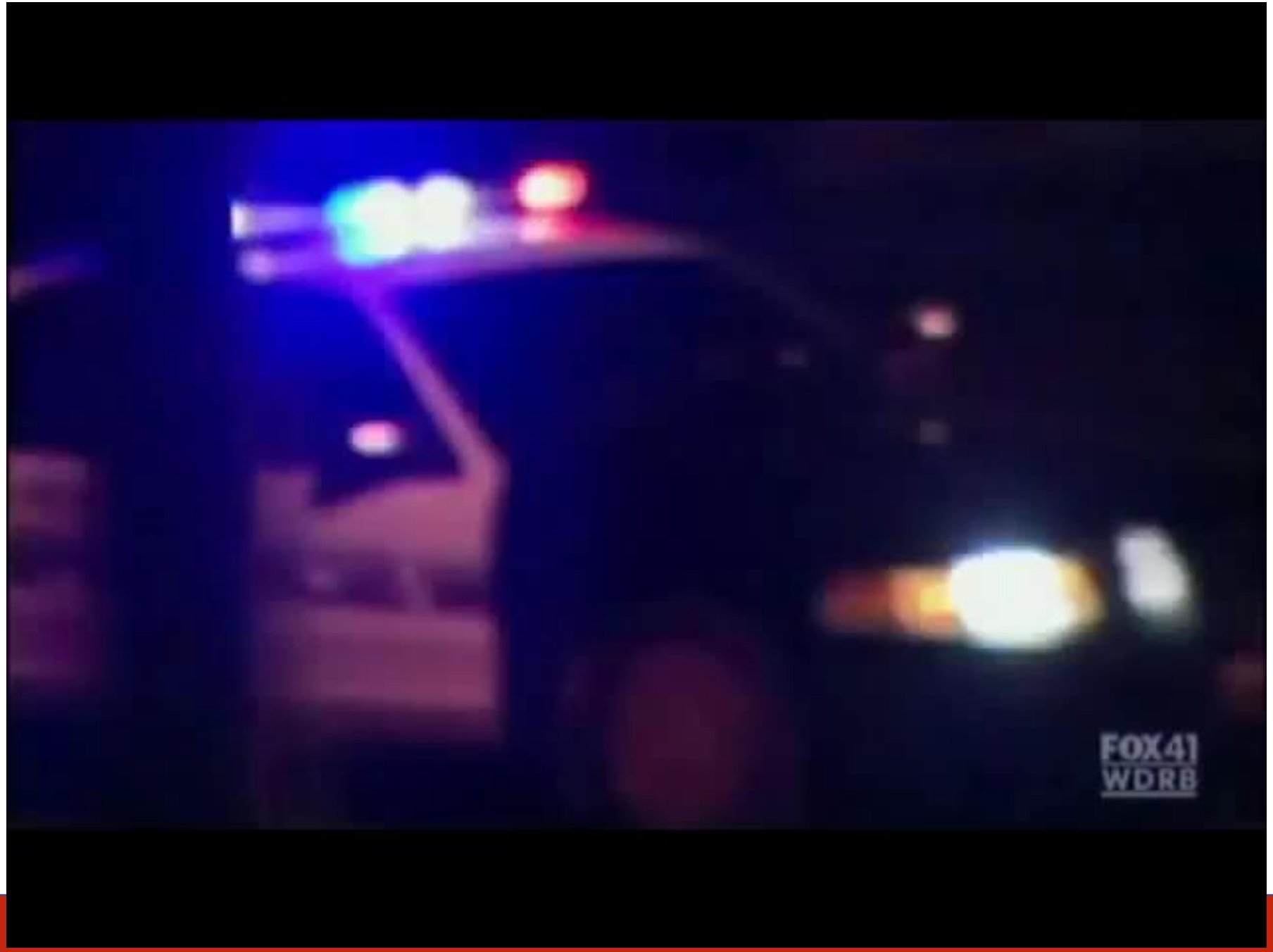
Avalanche SAR

- Air scent dogs
  - Works pool scent coming up from snowpack
  - Will stick head in snow and dig to pinpoint scent
  - Can locate victims 2-4 meters deep

Avalanche SAR

- Injury (Martinez et al 2019 VOS Abstract)
  - 36 dogs
  - Musculoskeletal
    - 25%
      - 8.3% forelimb; 8.3% hindlimb; 8.3% both
      - strains/sprains
      - Lacerations
      - Luxation, fracture

Law Enforcement


FOX41
WDRB

Law Enforcement

- LODD 2021 (ODMP-K-9)
  - 21
    - 1- Assault
    - 2 -Automobile crash
    - 2- Duty related illness
    - 1- Fall
    - 5 - Gunfire
    - 2 - Heart attack
      - During training
    - 6 – Heatstroke
      - 5 A/C failure/left in car
      - 1 Exertional
    - 1- Choking
    - 1- Vehicular assault

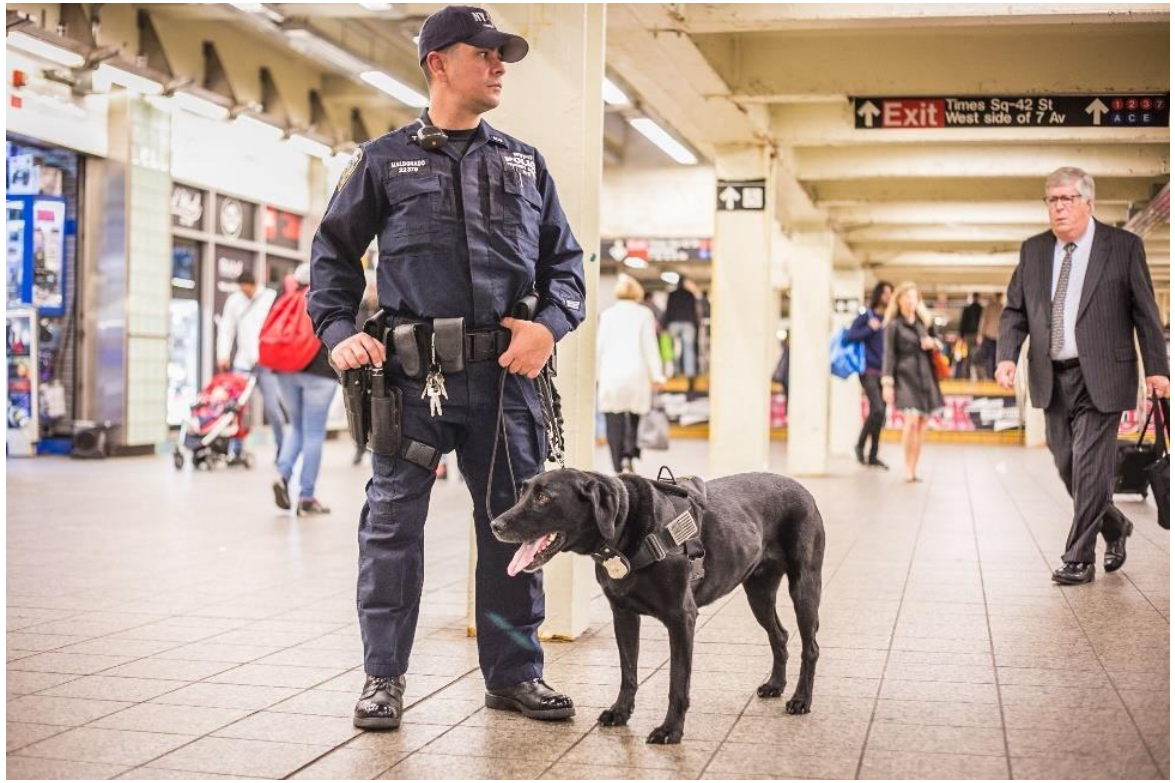
Police/Patrol Injuries

- 138 German Shepherd Police dogs (UPenn Emergency Service)
  - More likely to present for orthopedic issues than pet GSD
    - No history of musculoskeletal trauma
    - 25.4% (of visits)
  - Appendicular
    - 19.6%
  - Axial
    - 5.8%
  - Dental
    - 1.4%

Emergency visits and occupational hazards in German Shepherd police dogs (2008-2010). Parr JK, Otto CM. J Vet Emer Crit Care 23(6) p 591-597.

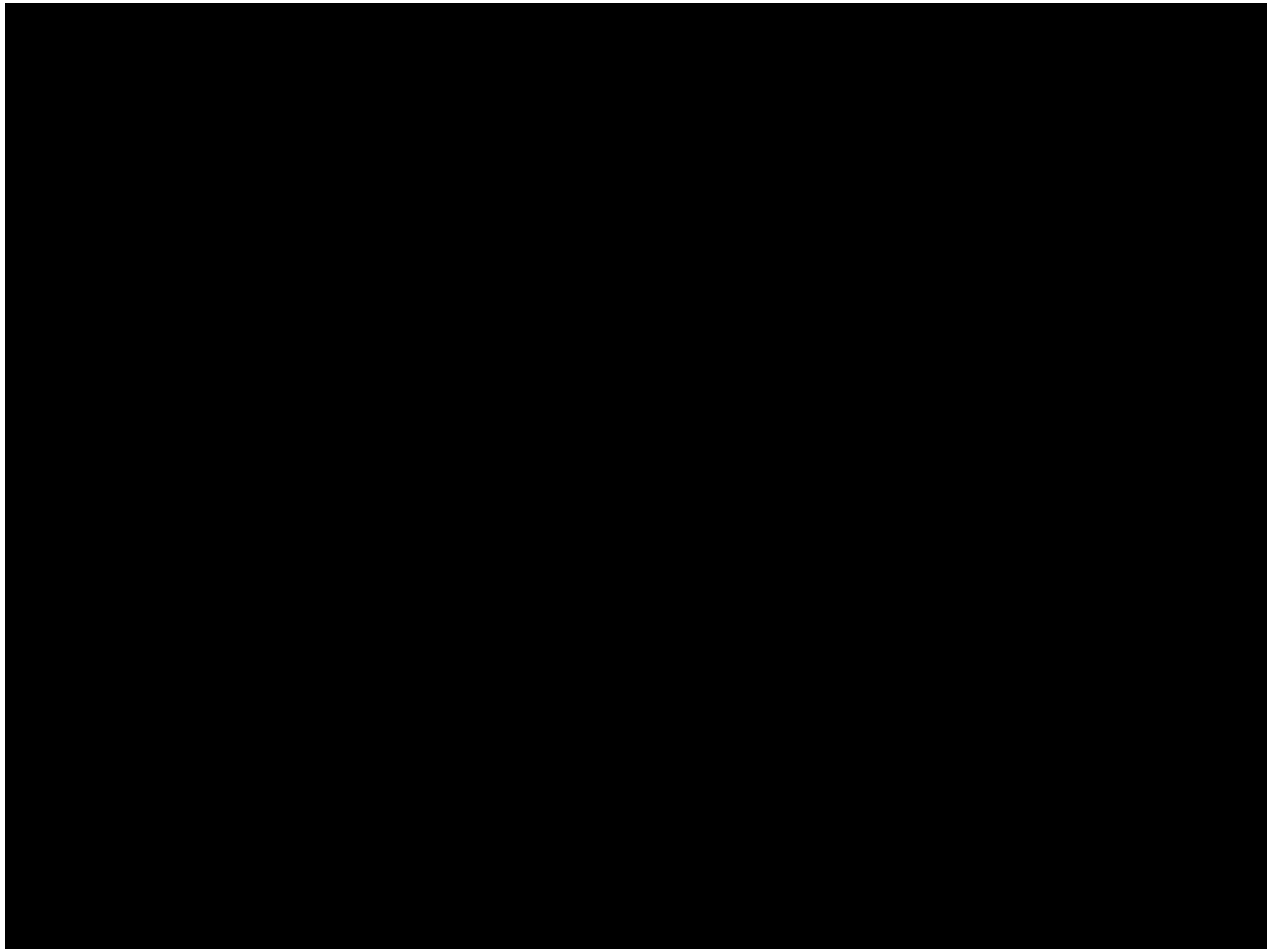
Law Enforcement – Detection Dogs

- Often Cross-trained
  - Narcotics (Drugs)
  - Explosives (Bombs)
  - Accelerants (Arson)
  - Firearms
  - Electronics
  - Forensic Evidence
- Multiple breeds used
  - GSD, Malinois, etc. - cross-trained
  - Labs – single purpose



Detection

- Environmental



Canine Physical Exam and Restraint

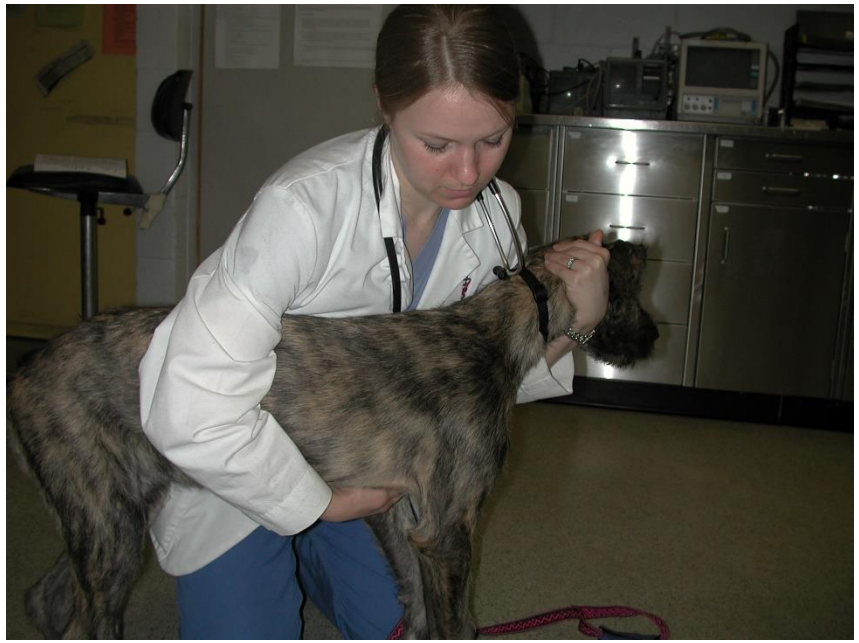
Restraint

Restraint

- Primary control of the dog will come from the handler
- Restraint method will depend on what you are trying to accomplish
- Sometimes less is more

Methods of Restraint

- Standing
  - Physical exam
  - SQ fluid administration
- Sitting
  - IV catheter placement
  - Bandaging front limb



Methods of Restraint

- Lateral
  - Bandaging and splinting
  - Exam of all 4 feet and abdomen
  - Laceration repair

Restraint

Of the dangerous part of the dog…….

Muzzling

- Protects handler and medical team from injury
- Even the nicest dog can be unpredictable when painful!
- It is critically important to understand that muzzles are NOT benign

Muzzles

- Commercial
  - Nylon
  - Basket
  - Leather
  - Etc.
- On-the-spot fabrication
  - Gauze
  - Tape
  - Leashes

Nylon Muzzles

- Mouth is completely closed
- Secured behind the ears
  - make sure it is tight

Basket Muzzles

- Basket muzzle recommended with facial trauma or to allow panting
- Mouth still cannot open fully

Leather Muzzles

On-The-Spot Fabrication - Gauze

Muzzling

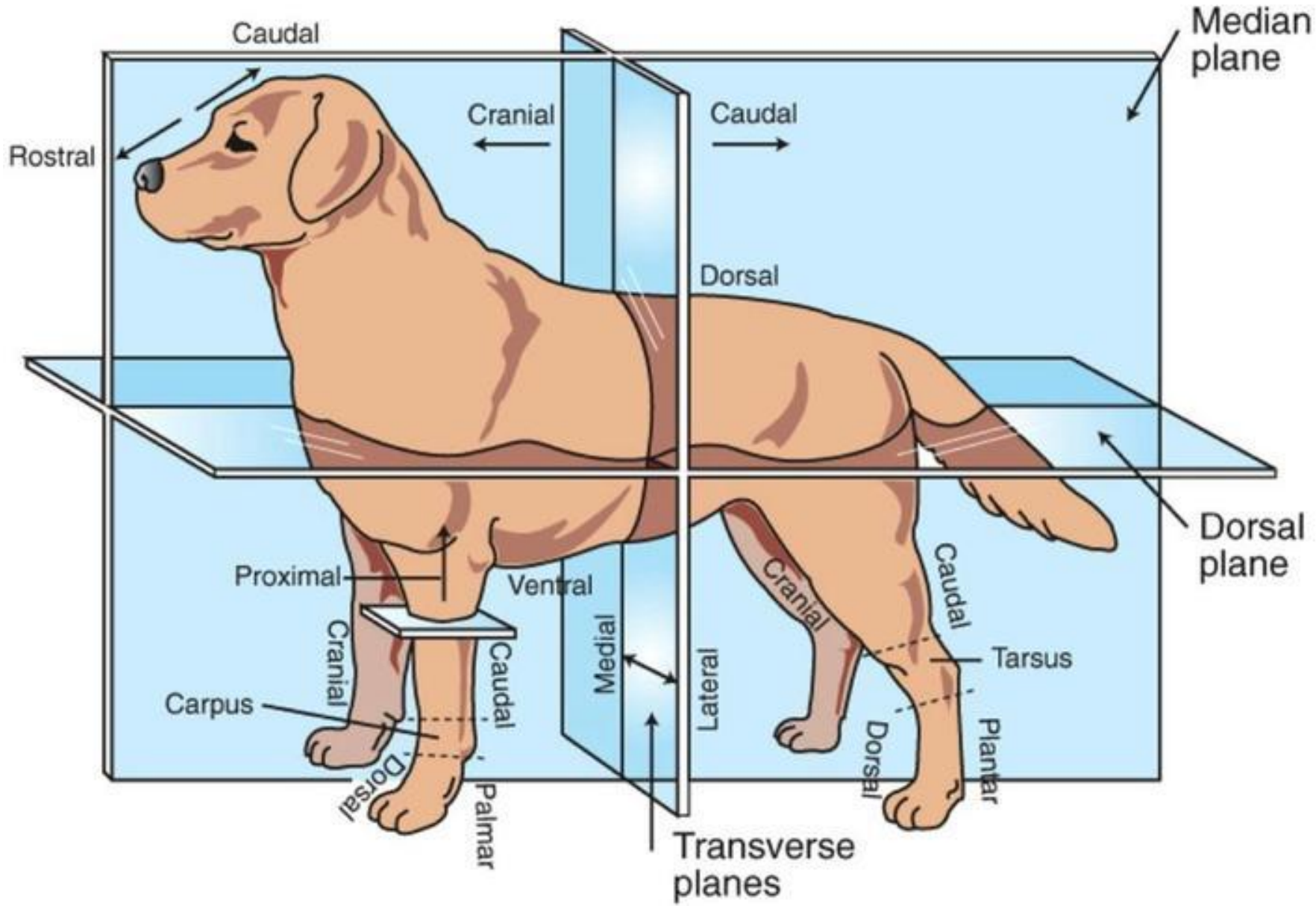
Tape Muzzles

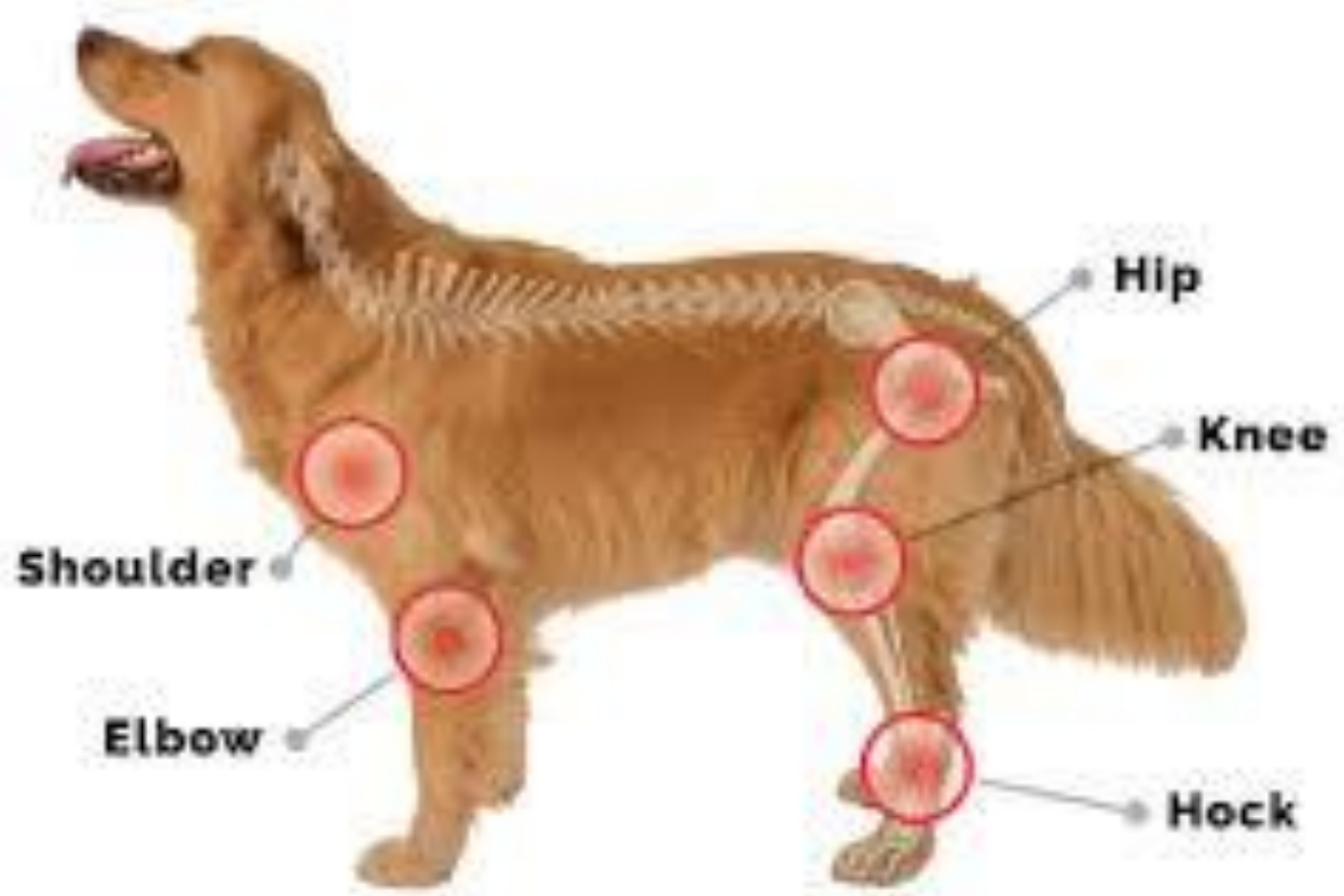
- White Tape
  - Make sure you can get it off quickly

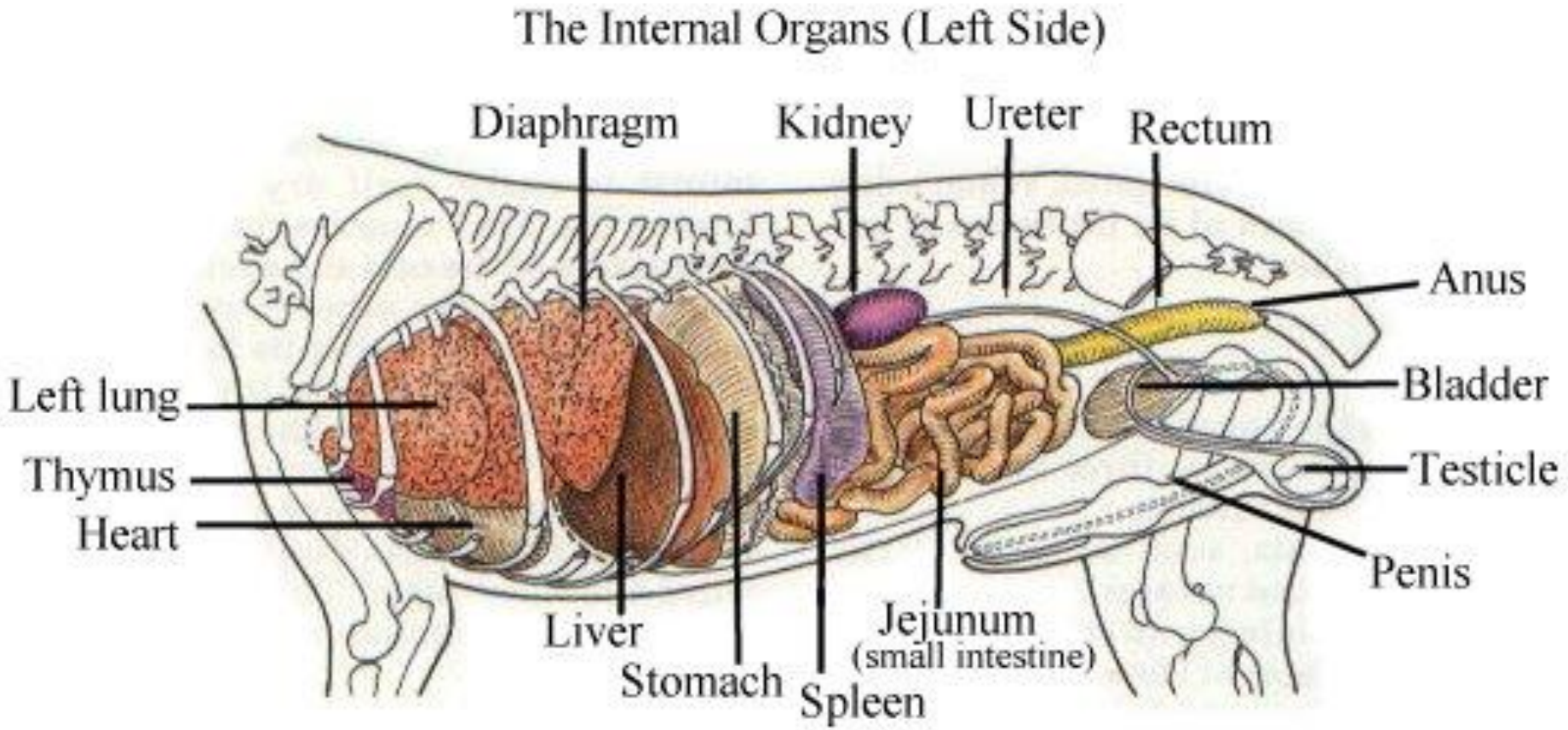
Leash Muzzles

- Depends on thickness and material of the leash
- Secure behind the ears
  - Grip or tie

Basic Anatomy


Caudal
Median plane
Cranial
Caudal
Rostral
Dorsal
Dorsal plane
Proximal
Ventral
Cranial
Caudal
Medial
Lateral
Cranial
Caudal
Tarsus
Carpus
Dorsal
Palmar
Dorsal
Plantar
Transverse planes


Hip
Knee
Shoulder
Elbow
Hock


The Internal Organs (Left Side)
Diaphragm
Kidney
Ureter
Rectum
Anus
Left lung
Bladder
Thymus
Testicle
Heart
Penis
Liver
Stomach
Spleen
Jejunum
(small intestine)

Physical Exam

Components of the Physical Exam

- Subjective and objective assessments
  - Subjective = mentation, hydration status
  - Objective = temperature, heart rate, respiration rte
- Systematic approach
  - By body system
  - Consistent approach to exam every time

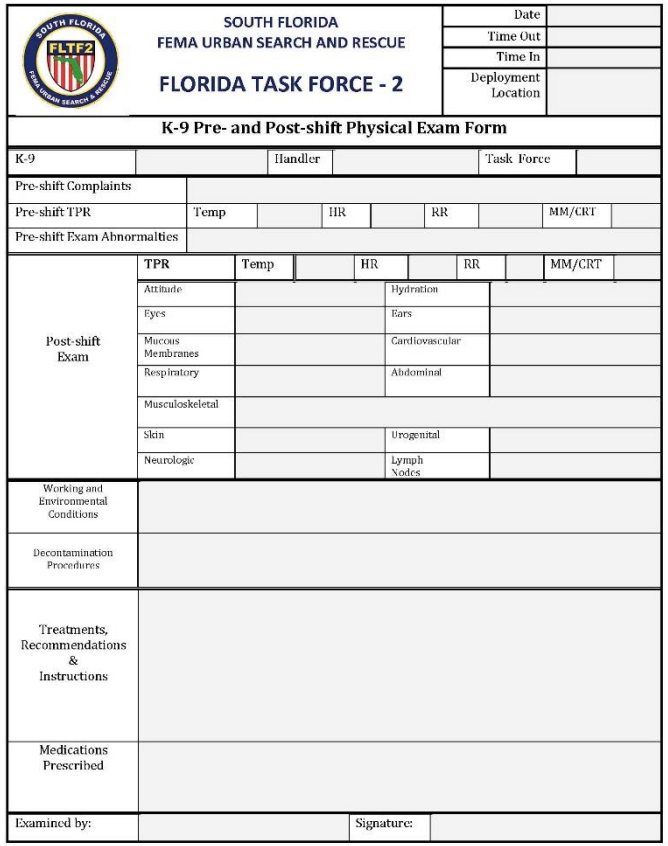
Physical Exam

Recommend having a standardized form for:

- Medical Check-in
- Pre/Post shift exam

Important for:

- Record keeping
- Consistency in exams
  - Check list



SOUTH FLORIDA
FEMA URBAN SEARCH AND RESCUE
FLORIDA TASK FORCE - 2

Date	
Time Out	
Time In	
Deployment Location	

K-9 Pre- and Post-shift Physical Exam Form

K-9		Handler		Task Force				
Pre-shift Complaints								
Pre-shift TPR	Temp		HR		RR		MM/CRT	
Pre-shift Exam Abnormalties								

Post-shift Exam				
TPR	Temp	HR	RR	MM/CRT
Attitude		Hydration		
Eyes		Ears		
Mucous Membranes		Cardiovascular		
Respiratory		Abdominal		
Musculoskeletal				
Skin		Urogenital		
Neurologic		Lymph Nodes		

Working and Environmental Conditions	
Decontamination Procedures	
Treatments, Recommendations & Instructions	
Medications Prescribed	

Examined by:		Signature:	

Behavior - normal

- BAR – bright, alert, responsive

Behavior - abnormal

- Depressed
- Non-responsive
- Lethargic

Eyes

- Symmetric
- Pupils equal size
- Clear cornea

Eyes

- Squinting
- Tearing
- Discharge
- Cloudy cornea
- Pupils unequal
- Eye size unequal
- Inflamed sclera or conjunctiva

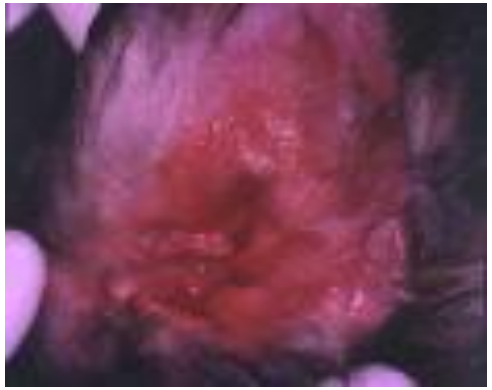
Ears

Normal

- Symmetric
- Smooth, pink , skin internally

Abnormal

- Hair Loss
- Swelling
- Redness
- Discharge
- Odor
- Pain
- Growths



Nose

Normal

- Symmetric
- Moist to dry

Abnormal

- Swelling
- Loss of skin
- Discoloration
- Discharge

Oral/Dental

Normal

- Moist mucous membranes
- Capillary Refill Time - < 2 sec
- Color
  - Pink pigmentation should be light pink

Abnormal

- Dry mucous membranes
- Abnormal color: jaundice, cyanotic, bright red
- Ulcerations
- Calculus or exudate around teeth
- Gingival reddening, swelling
- Fractured or missing teeth
- Excessive salivation
- Bad breath

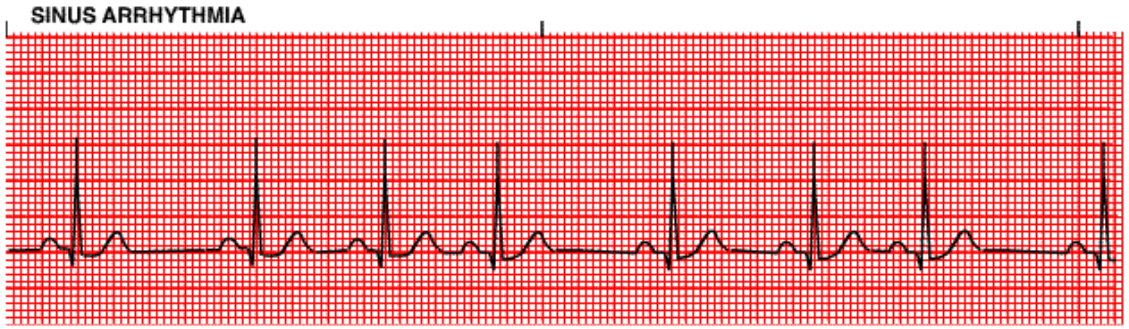
Heart

Exam

- Auscultation
- Heart
  - Performed standing
  - Best from left side
  - Just behind elbow
  - Dogs have normal sinus rhythm where HR increases and decreases with respiration

Abnormal

- Irregular rhythm
- Murmurs
- Muffled



Chest

Normal

- Sounds barely heard on auscultation
- Respiratory sounds same over entire lung field

Abnormal

- Irregular rate or rhythm
- Excessive effort
- Excessive respiratory noise
- Area in chest where sounds are dull or quiet
- Crackles and wheezes

Abdomen

Abnormalities:

- Abnormal posture
  - Hunched
  - Splinting
- Distention
- Palpation
  - Pain
  - Abnormal firmness
  - Masses

Musculoskeletal

Exam

- Observe at walk and trot
- Should have even, symmetric gait
- Manipulate all joints
  - Evaluate for pain and range of motion
- Look between all toes and pads

Abnormalities

- Lameness
- Pain on flexion or extension of joints
- Pain on palpation of muscles, bone, tendon/ligaments
- Swelling
- Instability

Skin

Exam

- Appearance of hair coat
- Be complete
  - Inspect all areas of the body
    - Abdomen, inguinal, paws/pads

Abnormalities

- Alopecia
- Exudate
- Moist/dry dermatitis
- Scaling
- Patches
- Masses
- Itching, pain
- Redness
- Lacerations/abrasions
- Parasites (ticks/fleas)

Urogenital

Exam

- Palpate reproductive organs (testes/mammaries/ prepuce/vulva) for asymmetry or masses
- Character of urine

Abnormalities

- Asymmetry
- Pain
- Swelling
- Masses
- Difficulty urinating
- Abnormal urine color

Neurologic

Exam

- Stance
- Head position
- Sensation
- Hearing
- Vision

Abnormalities

- Ataxia
- Cranial nerve deficits
- Proprioceptive deficits
- Abnormal stance
- Abnormal head position
- Loss of sensation, vision, hearing

Hydration Status

Components - subjective

- Mucous membranes
  - Dry
- Capillary refill time
  - Prolonged
- Skin tent

Objective Measurements

- Temperature
- Heart Rate
- Respiratory Rate

Temperature

- Normal
  - 100 – 102.5° F
- Hyperthermia
  - > 105 ° F
- Hypothermia
  - < 99.5 ° F

- Taken rectally

Heart Rate

- Normal
  - 60 – 120 beats per minute
  - Larger and fit dogs tend to have lower heart rates
  - Increases with activity
  - Will increase and decrease with respiration (sinus rhythm)

- Acquiring HR
  - Auscultation
  - Palpation of femoral pulse

Respiratory Rate

- Normal
  - Resting (not panting)
    - 18 – 34 breaths per minute
  - Panting
    - Can increase the respiratory rate 100 X
    - Method of cooling by passing air over moist membranes of upper respiratory tract, which increases evaporation.

Canine Physical Exam

- Be consistent in your approach
- Practice
- Know your normals

Skills Station

- Monitoring
- Restraint
- Physical Exam

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K-9 Illness and Injuries

Hyper/hypothermia

Hyperthermia – Heat Stroke

- Signs
  - Panting excessively
  - Elevated heart rate
  - Congested mucous membranes
  - Diarrhea (bloody)
  - Vomiting
  - Dehydration
  - Generalized organ dysfunction
  - Shock
  - Coma

- Fatality ≈ 50%
  - Fatality decreased when cooling started prior to referral
  - Prolonged referral >90min increases mortality

Bruchim, Y., Horowitz, M., & Aroch, I. (2017). Pathophysiology of heatstroke in dogs–revisited. *Temperature*, *4*(4), 356-370.

Bruchim, Y., Klement, E., Saragusty, J., Finkeilstein, E., Kass, P., & Aroch, I. (2006). Heat stroke in dogs: a retrospective study of 54 cases (1999–2004) and analysis of risk factors for death. *Journal of veterinary internal medicine*, *20*(1), 38-46.

Hyperthermia

- Body temperature > 105.8°
  - Inability to remove heat
    - Inability to pant
    - Remember dogs don’t sweat
  - Exposure to high temperatures
  - Increased heat production
    - Exertion
    - Seizures
    - Fever

Exertional Hyperthermia

- Elevation in body temperature is a normal physiologic response to exercise
  - Reported up to 108°F
- Normal elevation in core body temperature with exercise ≠ exertional heat stroke

- Differentiation:
  - Body temperature
    - Should return to normal within 30 minutes
  - Collapse
  - Weakness
  - Disorientation
  - Prolonged recovery

Hyperthermia

- Treatment
  - Immersion in cold water
  - Increase air circulation
  - Rubbing alcohol to feet and ventrum
  - Check temperature every 5 minutes
    - Stop actively cooling at 103 degrees
  - Provide water or electrolyte solution to drink
    - Dogs may not drink right away
  - IV fluids if shock present while transporting to definitive care

Hypothermia

- Classified to less than 95-97°
  - Can have Irreversible physiologic damage when less than 75°
- Signs
  - Shivering
  - Weakness
  - Changes in mentation
  - Depression
  - Comatose
  - Decreased respiratory and heart rates

Hypothermia

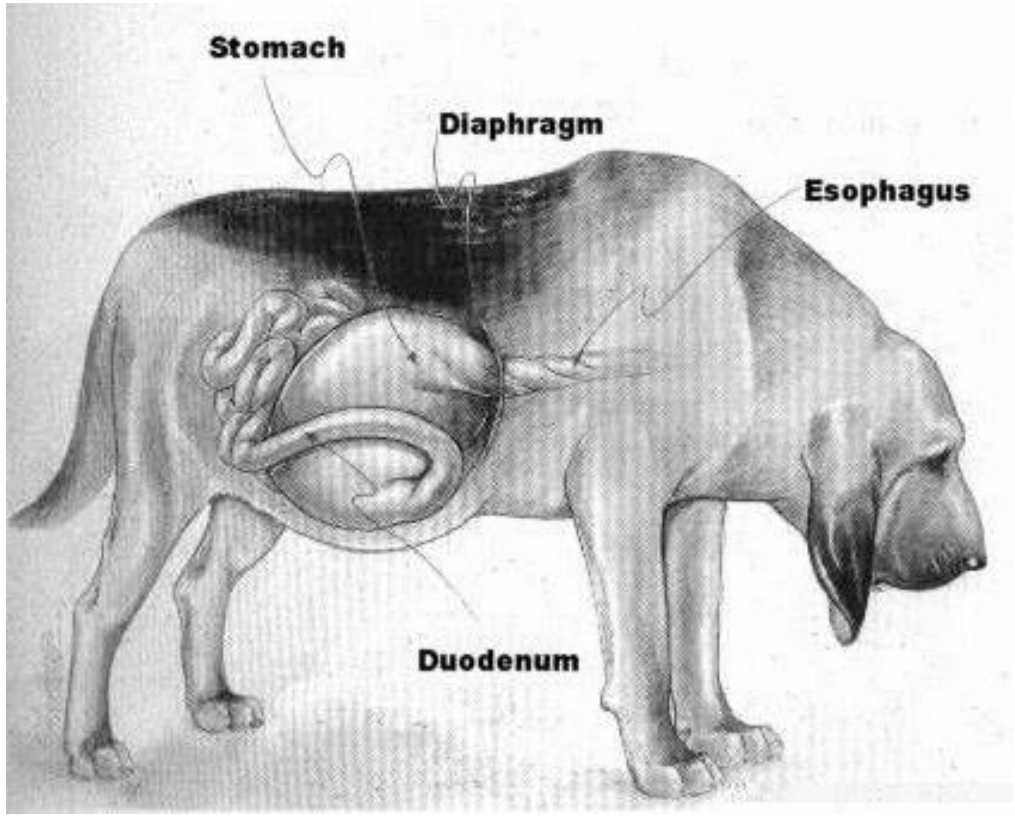
- Treatment
  - Careful re-warming
    - Warm water baths
    - Warm water bottles
    - Electric heating
      - Don’t place directly on pads
    - Blow dryers
    - Peritoneal dialysis when severe
  - Stop warming when body temperature returns to normal
  - Avoid massage and wrapping in blankets
    - Avoid stimulation of peripheral circulation
    - Shunts cold blood to core tissues and can cause rewarming shock

- Side-effects
  - Kidney problems
  - Cardiac arrhythmias

Gastrointestinal Issues

Gastric Dilatation-Volvulus Syndrome

- Stomach obstruction due to twisting of the stomach, FATAL if untreated

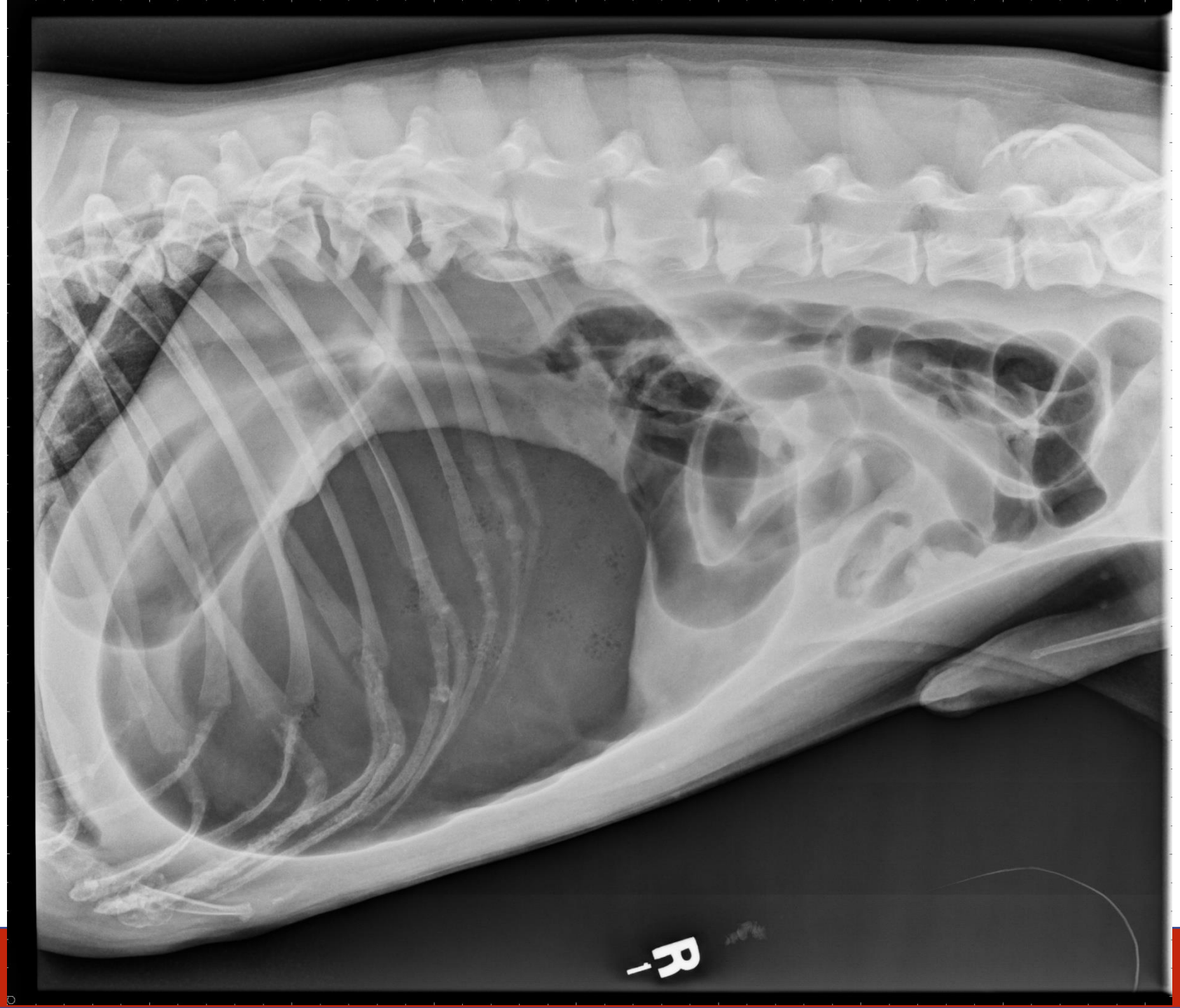


Clinical Signs

- Nonproductive attempts to vomit, salivation
- Distended, tympanic abdomen
- Shock
  - Heart rate > 160-180
  - Mucous membranes pale
  - Capillary refill time > 2 sec
- Increased respiratory rate
- Discomfort

Treatment

- **Emergency Medical Care**
- 100% surgical emergency
- IV fluids
- Oxygen therapy
- Gastric trocharization if prolonged pre-hospital time
    - Trocharization procedure:
        - Use large-bore catheter / needle
        - Percuss abdomen on right side
        - Seek resonant sound beyond last rib:
            - If no resonant sound, do not trocar here
        - Perform mini prep of site
        - Quickly insert needle to hub & hold against skin to stabilize while foul gas escapes
        - Gently push cranial abdomen for gas release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Definitive Treatment

- Surgery – ASAP!!
- 10% mortality
- Mortality most dependent on time from presentation to surgery
  - 6 hours

Vomiting

When to be concerned

- Unrelenting vomiting
- Persistent intermittent vomiting
- Vomiting blood
  - Fresh red blood
  - Digested blood (coffee ground appearance)
- Systemic signs of illness

Conservative Management

- Withhold food for 24 hours
- Hydration
  - Small amounts of water frequently if can have oral intake
- At cessation of vomiting
  - Offer rice flavored with boiled chicken
    - No fat
  - Small amounts frequently
  - After 24 hours gradually re-introduce regular food

Diarrhea

- Types
- Small Bowel
  - Large volumes
  - Watery
- Large Bowel
  - Small volumes frequently
  - Mucous, fresh blood
  - Pudding like

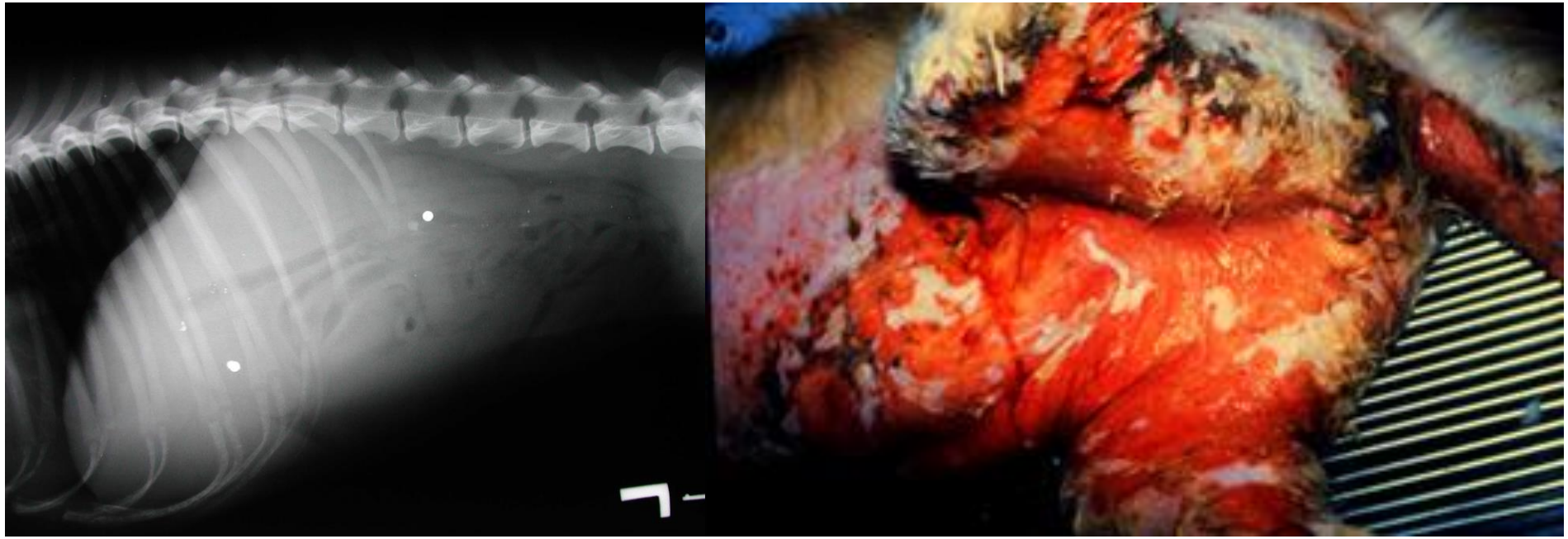
Diarrhea

- Common Causes
  - Small Bowel
    - Infectious diseases
    - Dietary
    - Stress
  - Large bowel
    - Stress
    - Infectious

Diarrhea

- Treatment
  - Withhold food for 24 hours
  - Bland, high fiber diet
  - Probiotics
    - Proviable KP
  - If persists, becomes bloody,
    - seek veterinary care/advice
  - Metronidazole +/-
    - Can affect olfaction

Abdominal Trauma



Evisceration/Open Wounds

- Rinse thoroughly with saline or clean water
- Cover to protect
  - Clean cloth/diaper
- Keep dog still
- Transport for surgery

Head and Spinal Trauma

Head Trauma

- Signs
  - Loss of consciousness
  - Pupil asymmetry
  - Blood/fluid from ears
  - Abnormal mentation
  - Slow heart rate

Head Trauma

- Treatment
  - Oxygen
  - Preserve airway
  - Elevate head
    - 15-30 degrees
    - Do not compress jugulars
  - Evacuate

Spinal Trauma

- Signs
  - Decrease or loss of ability to move limbs
  - Loss of coordination and/or control of the limbs
  - May have rigid front limbs
  - Pain
  - Anxiety

Spinal Trauma

- Treatment
  - Immobilize in lateral position on a board
  - Pain control

Seizures

- Transient disturbance in brain function
  - Primary brain disease
  - Secondary to other problems. e.g. toxins, low blood sugar
- Focal or generalized

Generalized Seizures

- Signs:
  - Loss of consciousness
  - Involuntary contractions of muscles
  - Loss of bowel/urinary control
  - Chewing / salivating
- Care
  - Keep quiet and calm
  - Prevent injury of dog and self
- Be careful as their behavioral response during and after seizure may be different

Ocular Injuries

Ocular Injuries

- Red eyes
  - Irrigate
  - Artificial tears, Genteal
- Ocular Discharge
  - Irrigate
  - Stain
  - Topical antibiotics
    - w/steroids if no stain uptake
- Ocular Pain (blepharospasm)
  - Irrigate
  - Stain
  - Topical antibiotics
    - NO steroids if corneal ulceration present
- Ocular trauma
  - Irrigate, lubricate (artificial tears or topical antibiotic)
  - Consider ‘E’ collar to prevent self-trauma

Exposure to Toxic Substances

- Animal Poison Control
  - www.aspca.org/pet-care/animal-poison-control
  - 1-888-426-4435
- Pet Poison Hotline
  - https://www.petpoisonhelpline.com/
  - 1-855-764-7661

Ingestion of Toxic Substances

- Poison Control will tell you whether to induce vomiting or not
- Never induce vomiting if:
  - suspect corrosives or petroleum-based products
  - dog is depressed, comatose or having seizures
- Methods of GI elimination
  - Induction of emesis
    - 60cc per dose Hydrogen Peroxide, repeat once
      - Will only empty 40% of stomach contents
    - Apomorphine
    - Clevor

Other Exposures

- Dermal, respiratory, and ocular are additional routes of exposure of toxic substances
  - Solids
  - Liquids
  - Gases
- Dilution is the solution to pollution
  - Utilize decontamination procedures for other exposures

Opioids

- Narcotics detection dogs at risk
- Inhalation/ingestion of the opioids
- Not as susceptible to respiratory depression
  - Except with pure mu agonists
  - O_2 administration
- Can be reversed with naloxone (Narcan)

Naloxone Administration

- Routes – IV, IM, IO
  - Intra-nasal no evidence but likely to be efficacious
- Dose
  - 0.04 mg/kg IV, IO, IN
    - 70# (32kg)
    - 1.6 mg
  - IN = 4mg (so ½)
  - Auto-injector = 2 mg
  - Vials = 0.4 or 1 mg/ml

Snake Bites

- Pit Vipers, Coral Snakes
  - Pit Vipers most common bite (Water Moccasin, Rattle Snakes, Copperhead)

- Signs
  - Bleeding at puncture sites
  - Immediate pain
  - Muscle fasciculation
  - Weakness
  - Swelling
  - Discoloration of tissue
  - Respiratory effects
  - Neurologic signs
  - Cardiovascular collapse

Snake Bites

- Treatment
  - Keep dog quiet for transport
  - Remove collar for bites to face/head
  - Identify snake if possible
  - Transport with bite wound below level of the heart
  - Veterinary treatment may include anti-venin
- DO NOT
  - Apply tourniquets
  - Apply Ice or heat
  - Incise and suck out wound

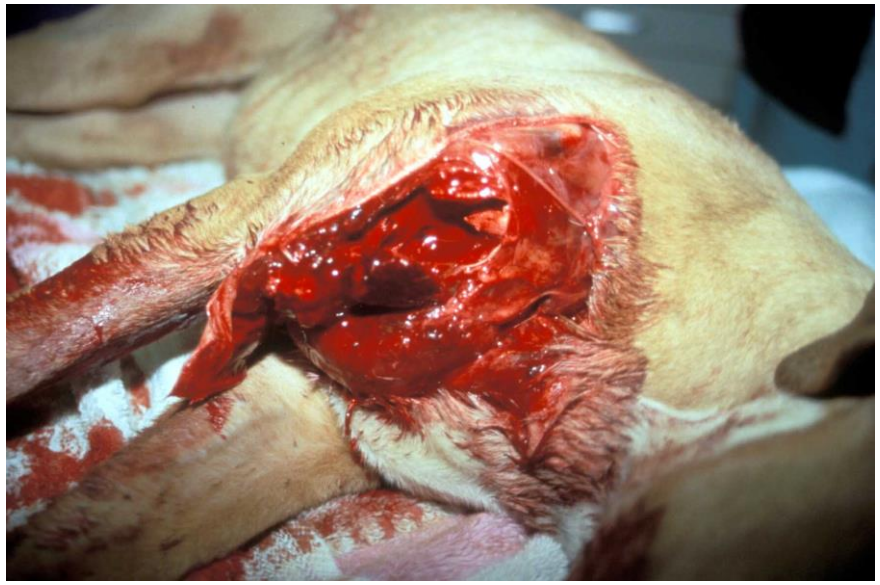
Stings

- Signs:
  - Swelling
  - Pain
  - Redness
  - Pawing at area
  - Snapping at air

- Treatment:
  - Remove stinger
  - Cold compresses
  - Benadryl (2 – 4 mg/kg) IM or Oral
  - See veterinarian if excessive swelling, especially around face or neck

Musculoskeletal Trauma

Trauma-Wounds



Wounds: Feet & Pad Injuries

- Most common injury in most working dogs

Wounds

- Clip
- Clean
- Cover with protective dressing
- Pain control
- +/- antibiotics

Burns

- Chemical
  - Copious lavage of the affected area
- Thermal
  - Apply cold water compresses for 20 minutes
  - Clip surrounding hair
  - Apply loose, moist dressing
  - If > 5% of body surface affected take to veterinarian

Bandaging

- Include limb distal to the wound down to and incorporating the foot
  - Tips of middle toes exposed
  - Morbidity from stopping bandage in proximal limb
    - Swelling of limb distal to bandage
    - Tourniquet effect
- Typically wrap from toes up to prevent tourniquet effect

Wrong

Bandaging - Layers

1. Cover wound
   - Non-stick pad
   - Secure with stretch conform
2. White tape stirrups
3. Padding
   - Cast padding
   - Roll gauze (thick)
4. Kling/Conform over padding
5. Stirrups to bandage
6. Coban

Fractures

- Treatment
  - Immobilize
    - Dog
    - +/- Fracture
      - IF distal to the stifle or elbow
  - Pain control and sedation may be necessary to stabilize fracture
  - Transport for definitive care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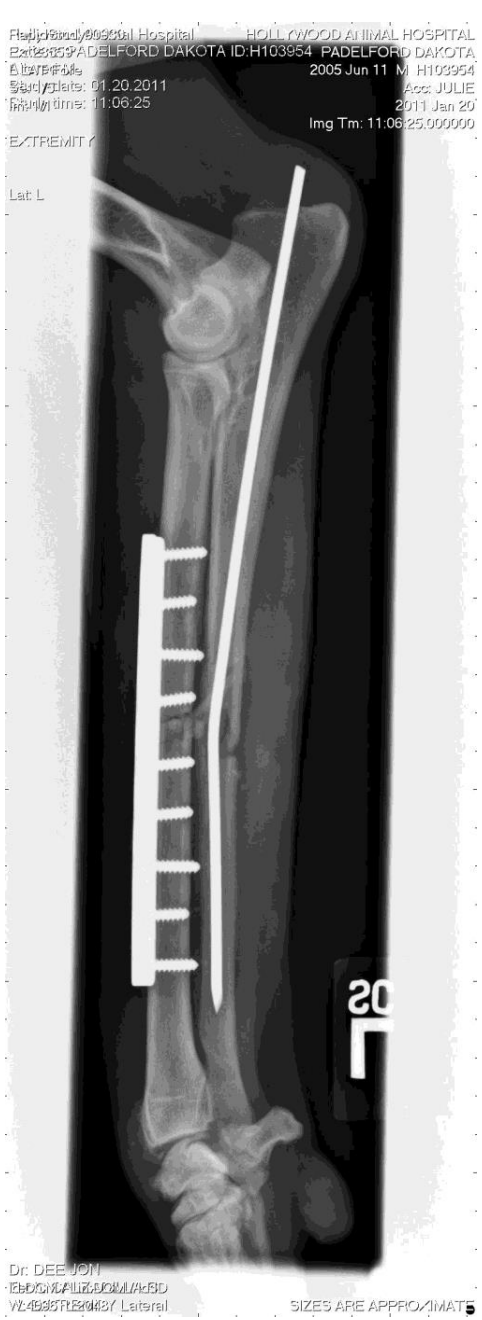
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Lat: L
Dr: DEE JON
SIZES ARE APPROXIMATE

Splinting

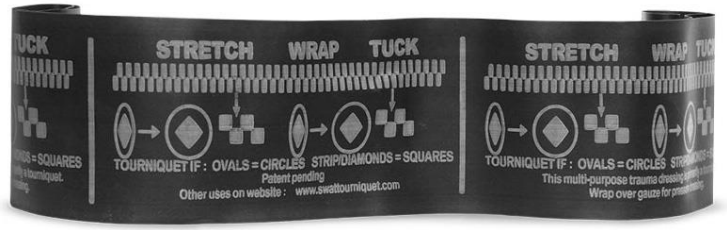
- Sedation and pain control likely will be needed
  - Or bruticaine
- Bandage first
  - thick padded preferred to stabilize and protect soft tissue and fracture
- Can use any rigid material for splinting
  - Commercial
  - On-hand
- Hasty splint when appropriate

Hemorrhage Control

- Tourniquet
- Pack
- Compression wrap

Tourniquet


RATS
Tourniquet
© Quinton D. Hapke Photography


STRETCH
WRAP
TUCK
TOURNIQUET IF : OVALS = CIRCLES STRIPDIAMONDS = SQUARES
Patent pending
Other uses on website : www.swattourniquet.com
STRETCH
WRAP
TOURNIQUET IF : OVALS = CIRCLES

Tourniquet

- 2” wide
- Placement
  - Above elbow or knee
  - 2-3” above wound

Packing

- Hemostatic gauze
- Gauze Roll

- Stuff it in there

- Apply circumferential wrap after packing (if applicable)

Circumferential Pressure Bandage

1. Pack or other absorbent material and apply firm pressure and hold 3-5 min
2. Gauze wrap over packing material snug
3. Observe for strikethrough

Circumferential Pressure Bandage

If strikethrough ----

DO NOT

----remove the bandage, apply another snug layer.

Skill Station

- Bandage and splinting
- Hemorrhage control
- Tourniquets

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Airway

Airway Assessment

- Can the dog breathe?
- Are they making unusual noises? Stridor? Stertor?
- Is dog able to move air?

Airway Assessment

- Breathing may be slow and deep
  - unless animal becomes panicked
- Stridor or noise with each breath
- Typically increased effort breathing in
- Agitated, stand with elbows out and neck extended
- Trauma or swelling near face or throat
- May paw at mouth or face

Physical Assessment

- Listen to the lungs
  - Increased sounds
  - Decreased sounds
- Percussion of the chest
  - Dull
  - Resonant or hollow sounding
- Gums
  - Pale or blue
- Mental status – depressed
- Upper Airway: extend neck, open jaws, pull tongue forward and depress posterior tongue (laryngoscope, tongue depressor

Airway Emergencies

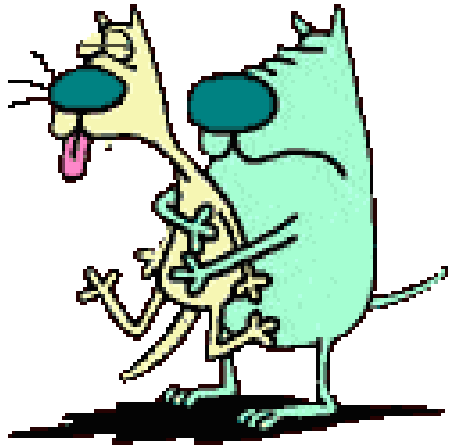
- Upper airway obstruction
  - Foreign body
    - Balls
    - Debris
  - Functional
    - Laryngeal paralysis
  - Trauma
  - Allergic Reactions

Airway obstruction – Allergic reactions

- Swelling can cause airway obstruction
  - Nasal passages
  - Pharynx
  - Larynx
  - Compression

Emergency Airway - Obstruction

- Clear the airway – CAREFULLY
- Consider Heimlich maneuver if known airway obstruction



Heimlich Maneuver

Picture courtesy of Cindy Otto

XXT – External Extraction Technique

- https://veterinarypartner.vin.com/default.aspx?pid=19239&id=8871225

Pulmonary/Chest Trauma

- Bruising of the lungs
- Rupture of a lung
- Penetrating chest wound
  - Gunshot
  - Stabbing
  - Impalements
  - Punctures
- Rib fractures
  - Falls

Other causes of abnormal breathing

- Tissue hypoxia
  - Shock
  - Anemia
- Acidosis
- Pain
- Drugs
- Neurologic disease

Oxygen Administration

- Face Mask
- Flow-by
- E-collar Canopy
- Nasal Catheter
- Intra-tracheal

Face Mask

- Tight-fitting
  - Dogs can be resistant when awake
  - O_2 flow rate:
    - 8 to 12 L/min
      - Dog may not tolerate
    - 50-60% inspired O_2
- Loose-fitting
  - O_2 flow rate:
    - 2-5 L/min
    - 25-40% inspired 0_2

Flow-by

- Options:
  - Human-use face mask
  - End of oxygen tubing
- Placement
  - 2 cm from end of noise
- Flow rate
  - 2-3 L/min
    - Can go up to 8-10 L/min
  - Provides 25-40% inspired oxygen

Nasal Oxygen

- 5 – 10 Fr soft rubber catheter
  - lubricate
- Local anesthetic into nasal passage
- Pass to level of the canine tooth
- Can also use nasal oxygen cannulas
- 80% oxygen concentration (bilateral)
- Flow rate
  - 3 to 5 L/min

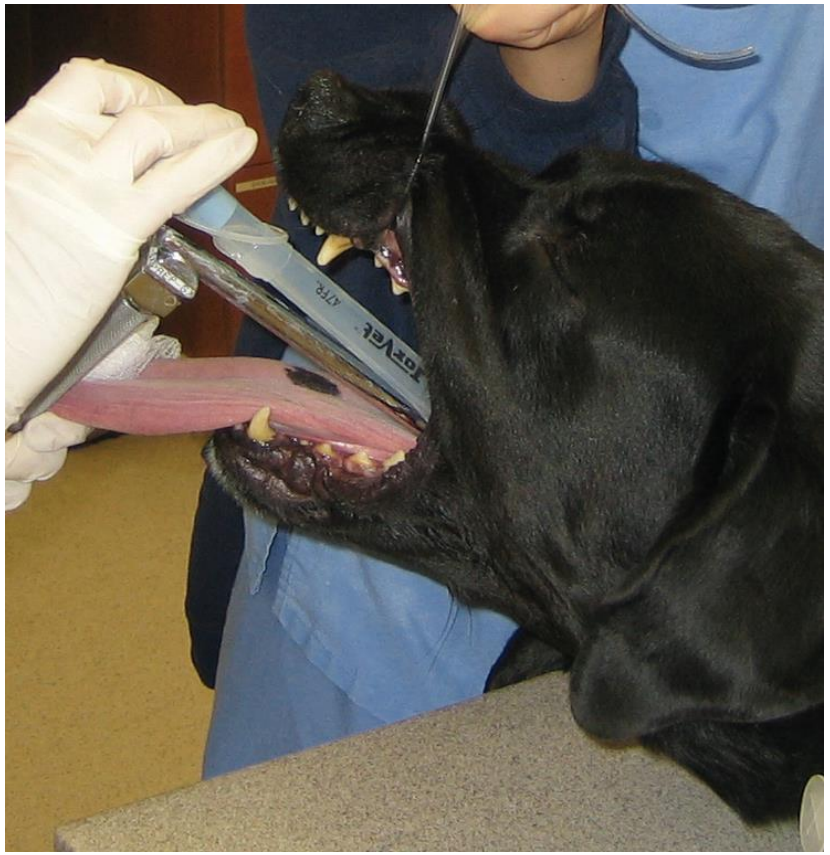
Intra-tracheal

- Needle tracheotomy is used when there is obstruction at the throat (larynx)
- 14-18 gauge IV catheter used
  - pass catheter between tracheal rings and down trachea
- Flow rate = 1-2 L/min

Endotracheal Intubation

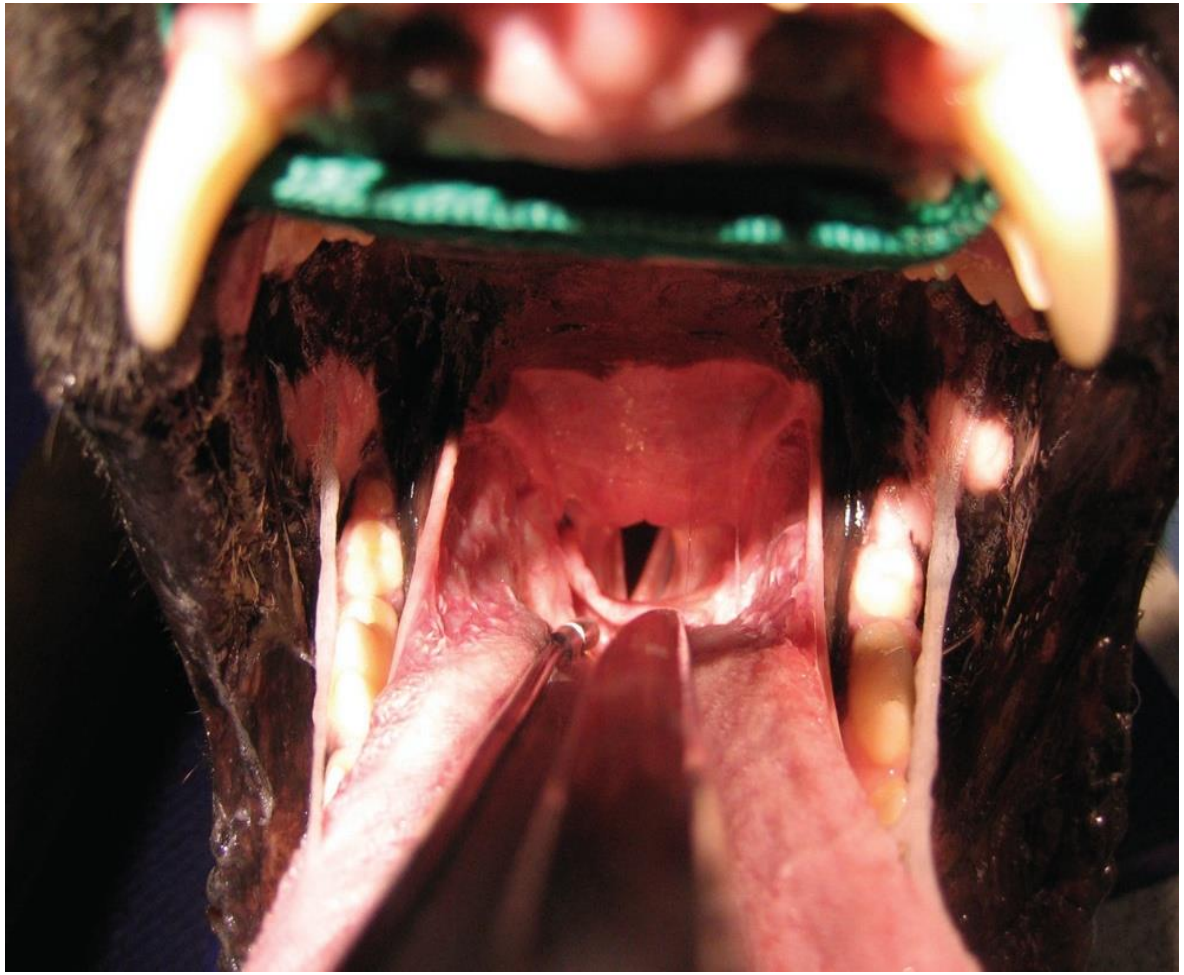
- Indicated when
  - Respiratory arrest
  - Respiratory fatigue
  - Comatose

Endotracheal Intubation



- Dog in sternal or lateral
  - Lateral when doing chest compressions for CPR
- Assistant to help position head
  - Head Extended
  - Grasp upper jaw
- Grasp tongue with gauze and pull out of mouth
- +/- laryngoscope to depress tongue

Endotracheal Intubation



- Tube size
  - 9 to 10 mm for average working dog (Labs & GSD)
- Pass tube against tongue, over epiglottis and down trachea

Mechanical Ventilation

- Ambu bag
- Ventilation rate
  - Rate 10 breaths/minute, visible chest rise
    - TV= 10 ml/kg
    - IT = 1 SEC

Objective Measures

- Pulse oximetry
  - SpO2 should be > 90%
  - Multi-site, ear lobe, or alligator probe best, but finger probe can be used
  - Probe placement
    - Lip and tongue
    - Ear, tail, toe
- $ETCO_2$ > 35-45mm Hg

Tension Pneumothorax

- Tension pneumothorax:
  - Physical exam findings:
    - Increased respiratory rate with shallow respirations
    - Increased inspiratory effort
    - Increased heart rate
    - Poor pulse quality (weak pulses)
    - Prolonged capillary refill time
    - Pale to cyanotic mucous membranes
    - Barrel chest

Tension Pneumothorax

- Needle decompression for tension pneumothorax:
  - Tension pneumothorax:
    - Needle placement for people:
      - Insert in third intercostal space, mid-clavicular placement
      - Insert in front (cranial aspect) of rib
    - Needle placement for canines:
      - Insert in intercostal (rib) space 7–9 & dorsal
      - Beginning with rib 13, count caudal to cranial (back to front)

Electrocution

- Sources
  - Lightening
  - Hot wires
- Signs
  - Loss of consciousness
  - Muscle spasms
  - Cardiac arrhythmias
  - Respiratory arrest
- ABCs
- TRANSPORT

CPR

Cardiac Arrest

- Dogs don’t arrest for same reasons as humans
- Typically
  - Traumatic
  - Shock states
- Asystole is the arrest rhythm
- Think about pediatric arrest when treating K-9 patient

CPR Emergency Drugs and Doses

		Weight (kg)	2.5	5	10	15	20	25	30	35	40	45	50
		Weight (lb)	5	10	20	30	40	50	60	70	80	90	100
	DRUG	DOSE	ml	ml	ml	ml	ml	ml	ml	ml	ml	ml	ml
Arrest	Epi Low (1:1000)	0.01 mg/kg	0.03	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
Arrest	Epi High (1:1000)	0.1 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Arrest	Vasopressin (20 U/ml)	0.8 U/kg	0.1	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
Arrest	Atropine (0.54 mg/ml)	0.05 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Anti-Arrhyth	Amiodarone (50 mg/ml)	5 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Anti-Arrhyth	Lidocaine (20 mg/ml)	2-8 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Reversal	Naloxone (0.4 mg/ml)	0.04 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Reversal	Flumazenil (0.1 mg/ml)	0.01 mg/kg	0.25	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
Reversal	Atipamezole (5 mg/ml)	50 µg/kg	0.03	0.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
Defib Monophasic	External Defib (J)	2-10 J/kg	20	30	50	100	200	200	200	300	300	300	360
Defib Monophasic	Internal Defib (J)	0.2-1 J/kg	2	3	5	10	20	20	20	30	30	30	50

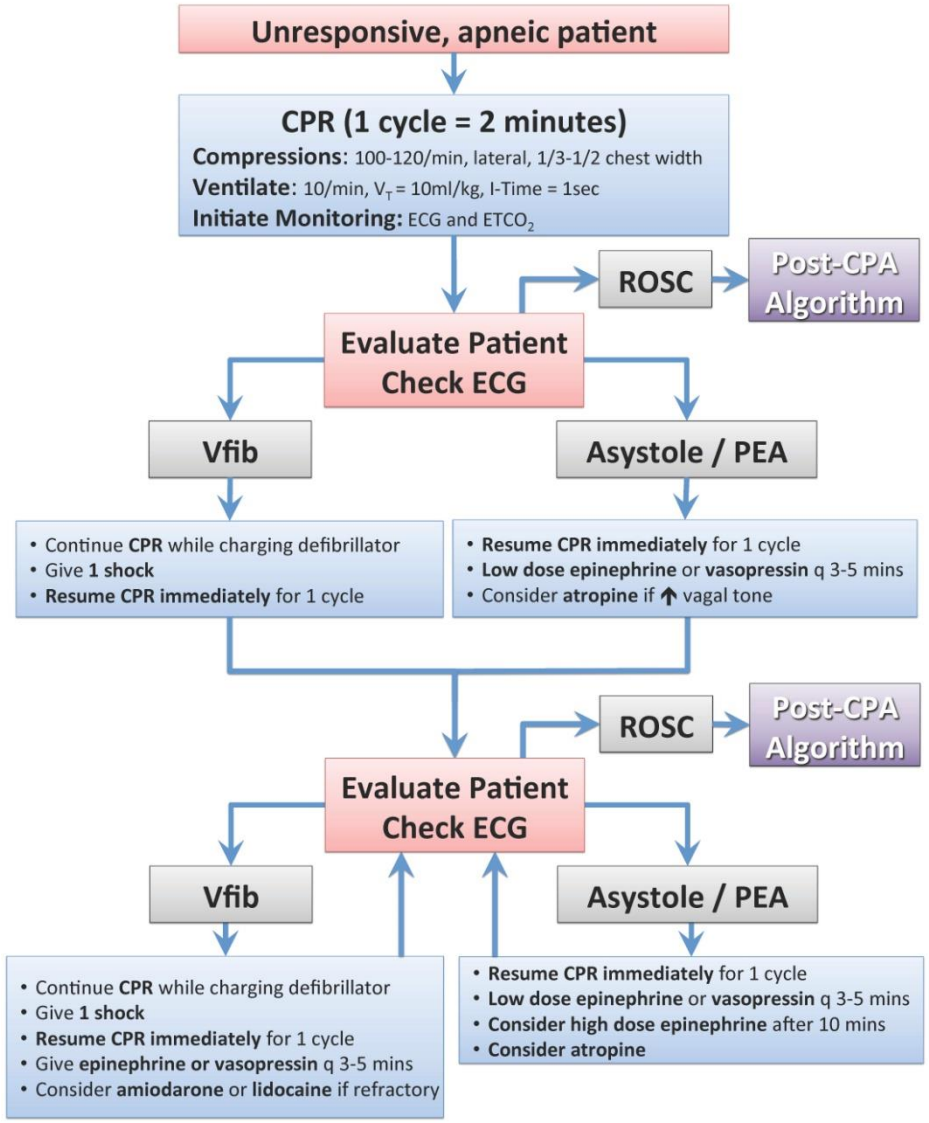
CPR

- About 5% success rate with canines:
  - Outcome depends on etiology
- If performing 2-person CPR, target 10–12 rescue breaths per minute
- If performing single-person CPR, target 2 breaths every 30 compressions

CPR - Compressions

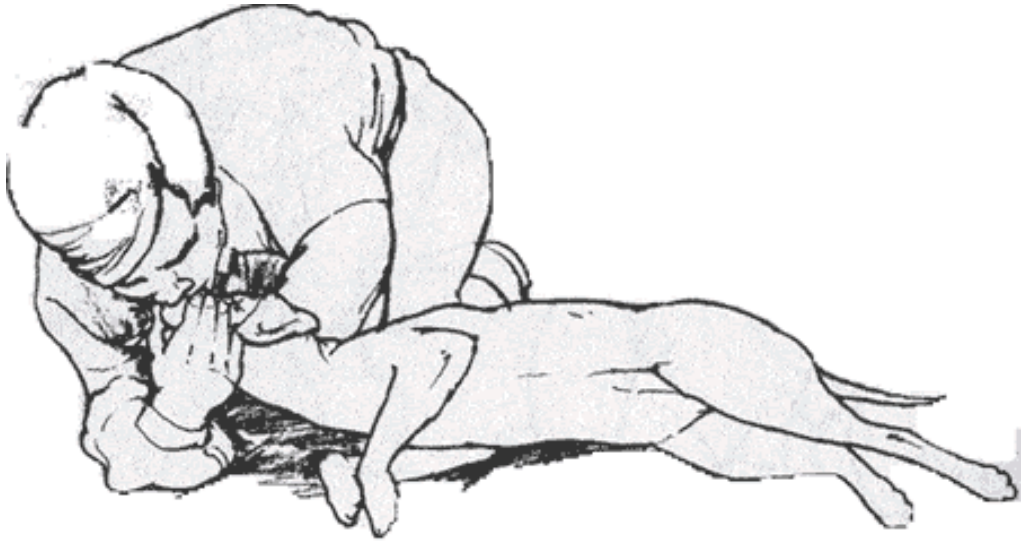
- If pulseless: place in lateral recumbency
- Compression- palm of hand over highest part of chest
  - 1/3 to ½ width of the thorax
  - Allow full chest recoil
- Rate
  - 100-120 per minute

CPR Algorithm



CPR - Ventilation

- Not intubated
  - Mouth-to-Nose (visible chest rise)
  - 30:2
- Intubated
  - Rate 10 breaths/minute, visible chest rise
    - TV= 10 ml/kg
    - IT = 1 SEC
  - 1:3 ratio with CPR, continuous chest compression
  - If alone give 2 ventilations to every 15 compressions
  - 100% oxygen if possible



Trauma planning and evacuation

Preplan Veterinary Emergency Evacuation and Care!

Trauma Planning and Evacuation

Who?

- Dog
- Handler
- Second K-9 Handler or LEO
- Medical Team Member

What?

- What supportive medical care will need to be maintained?

Where?

- Severity of the trauma will dictate what level of care you will need for the canine
  - General practitioners will be able to assist with mild to moderate illness and injury
  - Identify and seek specialists for advanced veterinary care for more severe illness and injury
- Time of day may have an impact on where you will go
  - General practice and some specialty facilities close at 5 p.m.
  - Some emergency clinics are only open overnight

How do you identify the “Where”?

Let’s Google!

How do you identify the “Where”?

- Veterinary

+

- Emergency

+

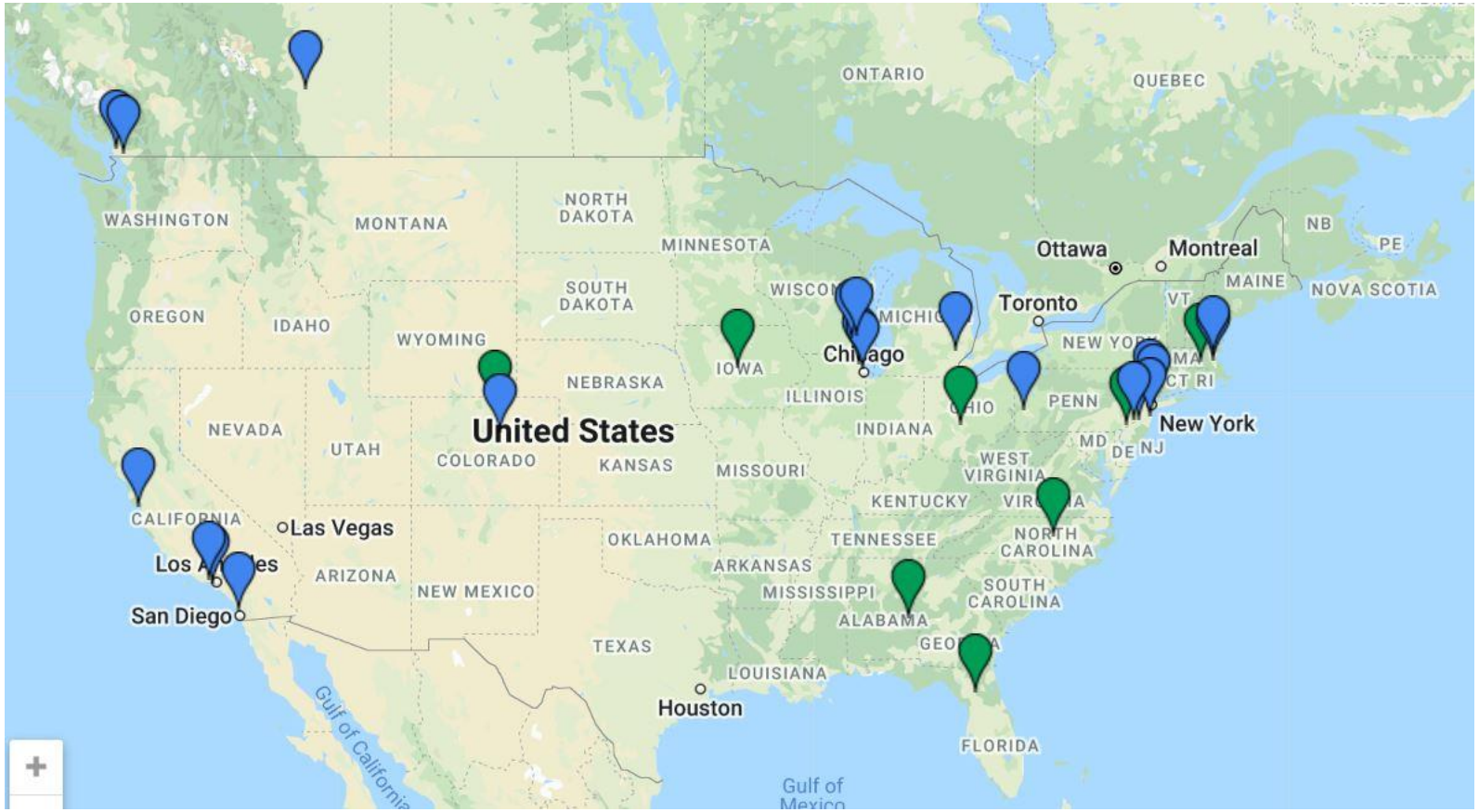
- 24 hour
- Other search words
  - Veterinary specialty
    - E.g. surgery, ophthamology

Emergency Veterinary Care

- **Veterinary Emergency and Critical Care Society** http://veccs.org
    - Membership > Facility Directory > Zip code

- **American College of Veterinary Emergency and Critical Care** http://acvecc.org
    - Public > How to Find a Specialist
    - Trauma Centers (VetCOT)
        - Veterinarians>Links of Interest>Trauma centers

Veterinary Committee on Trauma (www.VetCOT.org)



How?

- Methods of Transport
  - Police Vehicle
  - Ambulance
  - Helicopter
- Need to consider how canine will be restrained and secured in mode of transport

Patient Packaging and Transport

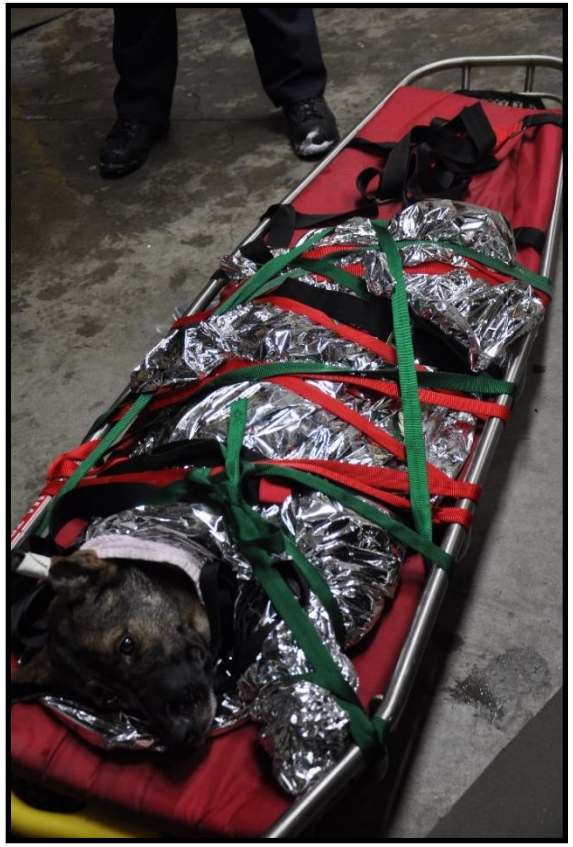
Preparing for Transportation

- Stabilization
- Minimize heat loss
  - Dry towels/blankets
- Restraint
- Cover/protect wounds and injuries

Patient Packaging

- Options
  - Similar as human patients

  But….
  - They are quadrupeds
- Long board
- Short board
- Stokes
- K.E.D./ Yates



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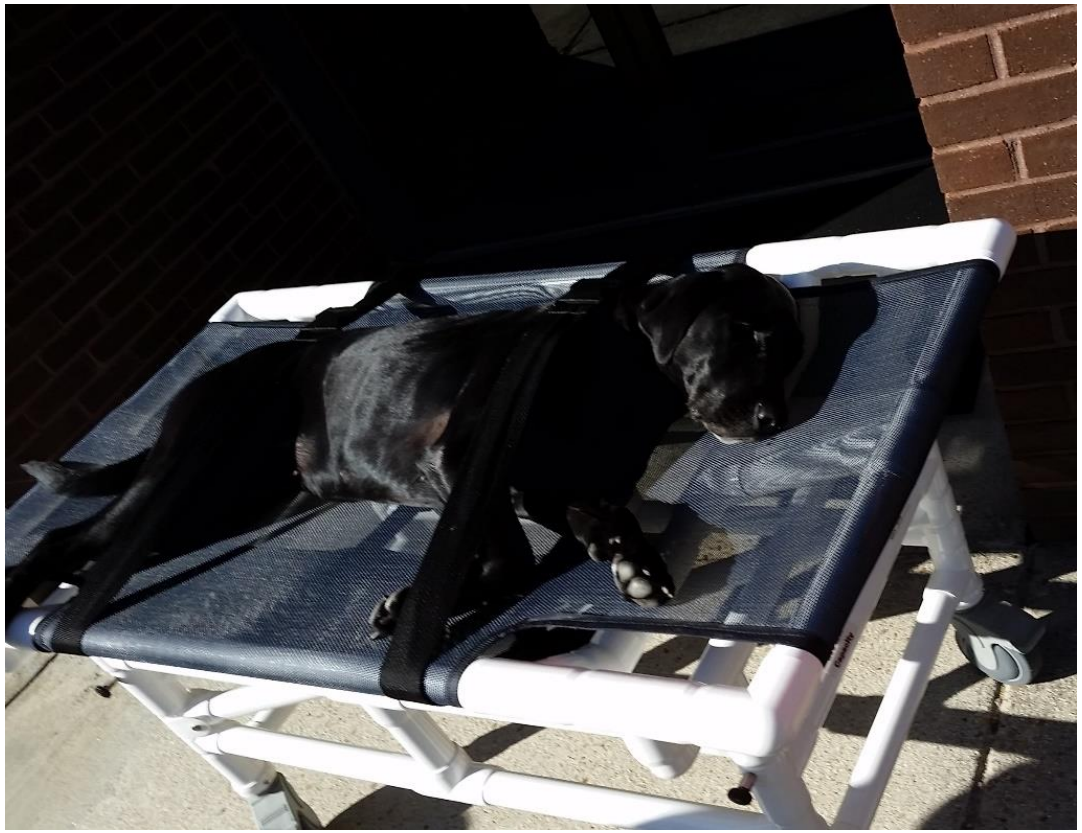
Patient Packaging



- Position
  - Lateral
    - Tuck legs in
  - Sternal
    - Especially with difficulty breathing
  - Let the dog pick

Secure Them Well

Dogs On Drugs

Using the Pharmacy Cache

Jennifer Brown DVM, DACVSMR

Florida TF-2 FEMA US&R

Team Veterinarian

Canine Search Specialist

Note

- Average search dog weight = 55-65# (25-30kg)
- Average large GSD – 75-80# (35-40kg)

Case #1

- 6 y.o. male Belgian Malinois
- Jumped down from the pile, got his leg caught in a pallet
- Non-weight bearing
- Leg was grossly unstable
- Handler quickly states that the dog may bite with painful stimuli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Se: 3/5
Im: 1/1
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PADELFORD DAKOTA
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PADELFORD DAKOTA
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SIZES ARE APPROXIMATE

What do you want to do?

- Restrain dog for evaluation

What do you want to do?

- Restrain dog for evaluation
- Evaluate dog
  - Evaluate fracture

What do you want to do?

- Restrain dog for evaluation
- Evaluate dog
  - Evaluate fracture
- Stabilize fracture for transport (+/-)

What do you want to do?

- Restrain dog for evaluation
- Evaluate dog
  - Evaluate fracture
- Stabilize fracture for transport (+/-)
- Evacuate K-9

What do you want to do?

- Restrain dog for evaluation
- Evaluate dog
  - Evaluate fracture
- Stabilize fracture for transport (+/-)
- Evacuate K-9

Pain control?

How do you accomplish this?

- Physical restraint
  - Muzzle

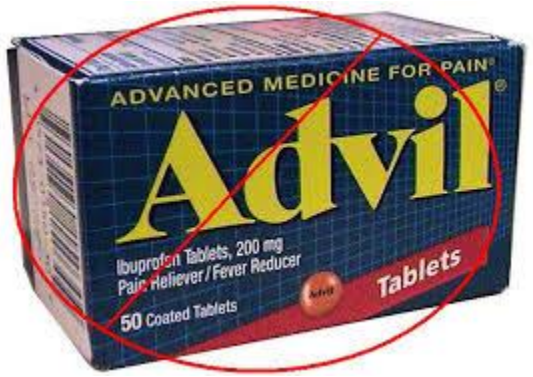
Physical restraint alone may be a challenge!

- Drugs
  - Analgesics
  - Sedatives
  - Anesthetics

Analgesics

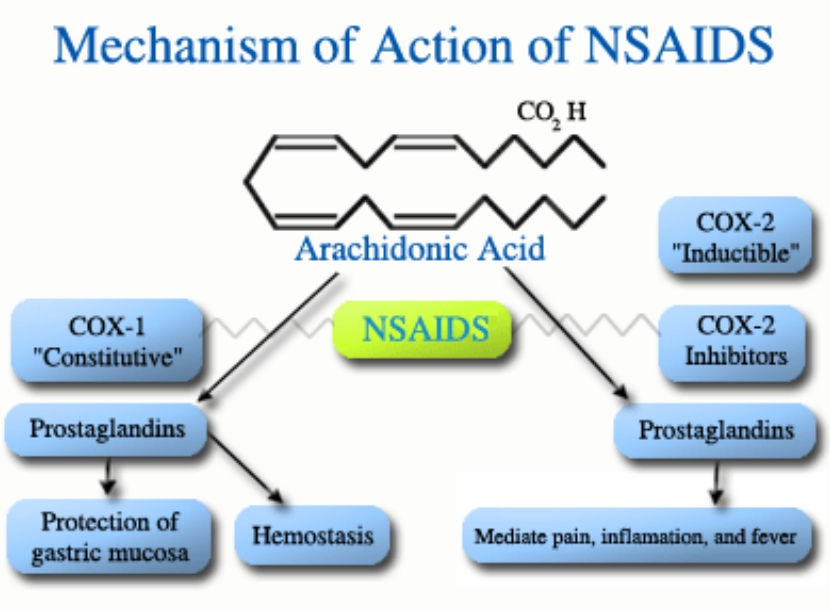
Non-steroidal Anti-inflammatories

- DO NOT use human NSAIDS on K-9's
  - E.g. ibuprofen, naproxen
  - Aspirin can be used as last resort but has more GI side-effects
- FEMA US&R Cache
  - K-9 Specific NSAIDS available for oral administration
  - Deramaxx, Rimadyl (carprofen), Previcoxx, etc
    - Dose dependent on which NSAID used



NSAIDS

- Provide analgesia through COX-1/2 inhibition
- Anti-inflammatory
- Mild to moderate analgesia
- Side-effects
  - GI
  - Renal
  - Liver
- Do not give if:
  - Shock
  - Hypotension
  - Poor perfusion
  - Significant dehydration
  - Active hemorrhage or coagulation issues



Opioids

- Morphine
  - 0.1-0.5 mg/kg IM
    - 60# dog - 2.7-13.5mg
  - 0.10-0.25 mg/kg IV, IO
    - 60# dog – 2.7-6.25mg
  - Will cause vomiting so monitor airway
  - Can cause excitement or dysphoria in some animals
  - Hypotension due to histamine release so give slowly

- Hydromorphone
  - 0.1 mg/kg IM, IV, IO (slowly)
  - May vomit
    - But less than morphine

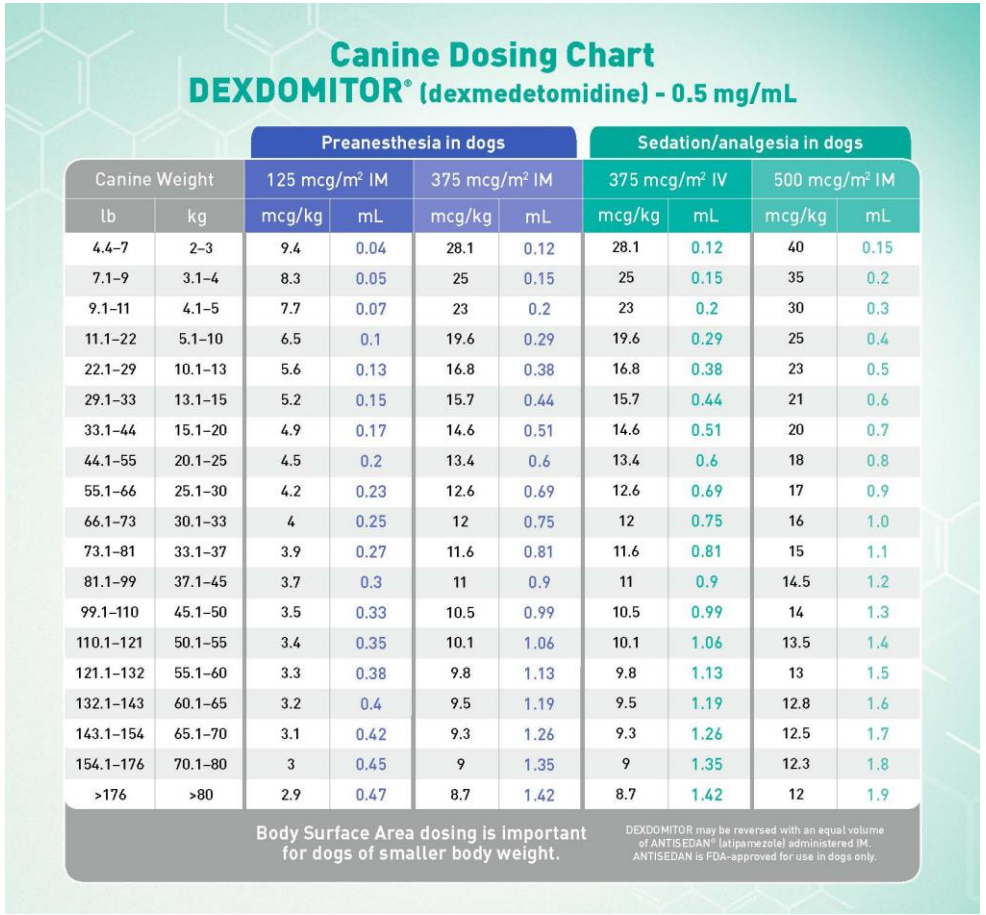
Opioids

- Fentanyl
  - Fentanyl lollipops don't work very well in dogs
  - Very short ½ life
    - Typically given as a loading slowly IV then on an infusion pump
  - Infusion = 2-5 µg/kg IV, IO, IM followed by 3-6 µg/kg/hr IV/IO
    - 60# dog - 54-135 ug
  - Sedation (about 15 minutes) 2-5 µg/kg IV/IO
  - No vomiting

Sedatives

Dexmedetomidine

- Dexmedetomidine
  - 5-10 µg/kg IV or 10-20 µg/kg IM
  - Handy chart comes with drug
    - Start with low-end of dose
  - Excellent sedation
  - Alpha-2 agonist
  - Some analgesia
  - Side effects
    - Bradycardia
    - Hypertension
    - Respiratory Depression
  - Quickly reversed with atipamezole
    - Dog can go back to work after reversal when used as sole agent



Canine Dosing Chart
DEXDOMITOR® (dexmedetomidine) - 0.5 mg/mL

		Preanesthesia in dogs				Sedation/analgesia in dogs			
Canine Weight		125 mcg/m² IM		375 mcg/m² IM		375 mcg/m² IV		500 mcg/m² IM	
lb	kg	mcg/kg	mL	mcg/kg	mL	mcg/kg	mL	mcg/kg	mL
4.4–7	2–3	9.4	0.04	28.1	0.12	28.1	0.12	40	0.15
7.1–9	3.1–4	8.3	0.05	25	0.15	25	0.15	35	0.2
9.1–11	4.1–5	7.7	0.07	23	0.2	23	0.2	30	0.3
11.1–22	5.1–10	6.5	0.1	19.6	0.29	19.6	0.29	25	0.4
22.1–29	10.1–13	5.6	0.13	16.8	0.38	16.8	0.38	23	0.5
29.1–33	13.1–15	5.2	0.15	15.7	0.44	15.7	0.44	21	0.6
33.1–44	15.1–20	4.9	0.17	14.6	0.51	14.6	0.51	20	0.7
44.1–55	20.1–25	4.5	0.2	13.4	0.6	13.4	0.6	18	0.8
55.1–66	25.1–30	4.2	0.23	12.6	0.69	12.6	0.69	17	0.9
66.1–73	30.1–33	4	0.25	12	0.75	12	0.75	16	1.0
73.1–81	33.1–37	3.9	0.27	11.6	0.81	11.6	0.81	15	1.1
81.1–99	37.1–45	3.7	0.3	11	0.9	11	0.9	14.5	1.2
99.1–110	45.1–50	3.5	0.33	10.5	0.99	10.5	0.99	14	1.3
110.1–121	50.1–55	3.4	0.35	10.1	1.06	10.1	1.06	13.5	1.4
121.1–132	55.1–60	3.3	0.38	9.8	1.13	9.8	1.13	13	1.5
132.1–143	60.1–65	3.2	0.4	9.5	1.19	9.5	1.19	12.8	1.6
143.1–154	65.1–70	3.1	0.42	9.3	1.26	9.3	1.26	12.5	1.7
154.1–176	70.1–80	3	0.45	9	1.35	9	1.35	12.3	1.8
>176	>80	2.9	0.47	8.7	1.42	8.7	1.42	12	1.9

Body Surface Area dosing is important for dogs of smaller body weight.

DEXDOMITOR may be reversed with an equal volume of ANTISEDAN® (atipamezole) administered IM. ANTISEDAN is FDA-approved for use in dogs only.

I ❤️ dexdomitor

Benzodiazepines

Drug	Dose	Route	55#	65#	75#
Diazepam 5 mg/ml	0.2-0.4 mg/kg	IV, IN	5-10 mg 1-2 ml	6-12 mg 1.2-2.4 ml	7-14 mg 1.4-2.8 ml
Diazepam 5 mg/ml	1 mg/kg	PR	25 mg 5 ml	30 mg 6 ml	35 mg 7 ml
Midazolam 5 mg/ml	0.2-0.4 mg/kg	IV, IM, IN	5-10 mg 1-2 ml	6-12 mg 1.2-2.4 ml	7-14 mg 1.4-2.8 ml
Lorazepam 4mg/ml	0.2-0.4 mg/kg	IV, IM, IN	5-10 mg 1.25- 2.5 ml	6-12 mg 1.5-3.0 ml	7-14 mg 1.75-3.5 ml

Benzodiazepines

- Anti-anxiety
- Can cause excitement and dysphoria in some dogs
- Can lower aggression threshold - disinhibition
- Good muscle relaxants
- Anti-convulsants
  - Diazepam and midazolam 0.5 mg/kg IV, IN or IM (midazolam only), 1 mg/kg PR (diazepam only)
  - Lorazepam 0.2 mg/kg IV, IM, IN

Anesthetics

Ketamine

- Analgesia
  - 0.25-1 mg/kg IV, IO
  - 2-4 mg/kg IM with 0.2-0.4mg/kg benzodiazepine
  - Best used in CRI with an opioid
  - 60# dog – 6.75-27mg IV
- Sedation
  - 1-3 mg/kg
- **<u>Give with benzodiazepine</u>**
  - Causes significant muscle rigidity
- Rapid induction and intubation
  - 5 mg/kg ketamine
  - 0.25 mg/kg benzodiazepine
  - 60# dog – 135mg ketamine/6.75mg benzodiazepine (equal volume)
- Emergence (rough recovery) common
- Do not use with head or eye injury

Propofol

- 5-8 mg/kg IV
  - Give slowly to effect over 30-60 seconds
  - Less will be needed if given other sedation/analgesia
- Short-acting
- Respiratory suppression / apnea
  - Intubate?
- Quick recovery
- Don’t give if cardiovascular instability

Back to Fracture

Fracture

What you know based on your exam:

- Dog is stable
- Very painful
- Closed fracture
- No other trauma
- Need to get off the pile and then transport over an hour away unless air evacuation is obtained

To do what you need to do – problems??????

- Dog may be aggressive
- Can you get venous access?

Fracture

- Analgesia – yes/no?

Fracture

- Analgesia – yes!
  - NSAID
  - Opioid
    - Morphine
    - Hydromorphone
    - Fentanyl

Fracture

- Analgesia
  - NSAID - no
  - Opioid - yes
    - Morphine
    - Hydromorphone
    - Fentanyl – probably not

Fracture

- Analgesia – yes
  - Opioid
    - Morphine
    - Hydromorphone
- Sedative – yes/no?

Fracture

- Analgesia – yes
  - Opioid
    - Morphine
    - Hydromorphone
- Sedative – yes!
  - Dexdomitor
  - Benzodiazepine

Fracture

- Analgesia – yes
  - Opioid
    - Morphine
    - Hydromorphone
- Sedative – yes
  - Dexdomitor
  - Benzodiazepine

Fracture

- Analgesia – yes
  - Opioid
    - Morphine
    - Hydromorphone
- Sedative – yes
  - Dexdomitor
  - Benzodiazepine

- Anesthesia – yes/no
  - Ketamine
  - Propofol

Fracture

- Analgesia – yes
  - Opioid
    - Morphine
    - Hydromorphone
- Sedative – yes
  - Dexdomitor
  - Acepromazine
  - Benzodiazepine

- Anesthesia – maybe
  - Ketamine
  - Propofol

Fracture

- Analgesia – yes
  - Opioid
    - Morphine
    - Hydromorphone
- Sedative – yes
  - Dexdomitor
  - Benzodiazepine

- Anesthesia – maybe
  - Ketamine
  - Propofol

Both these have their disadvantages if you choose to anesthetize

WWDBD?

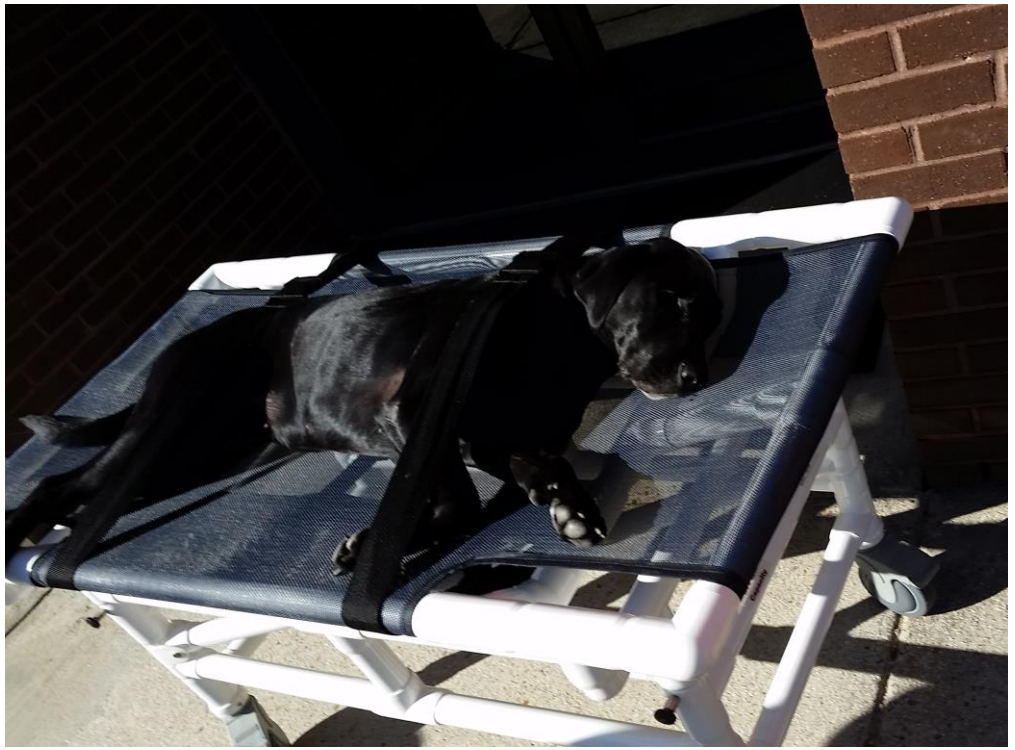
- Morphine (IM) / Hydromorphone (IV or IM)
- Dexmedetomidine (IV or IM)
- Once sedate
  - Splint fracture and transport
  - Monitor bradycardia
  - Reverse dexmedetomidine with atipamezole after he was secured in transport

Case #2

- 4 year old Labrador
- Laceration on limb from debris on pile
  - About 3” long

What do you want to do?

- Restrain dog for evaluation
- Evaluate dog
  - Evaluate wound



Assessment

- No lameness
- Superficial
- No hemorrhage
- Moderate contamination
- Little swelling

What do you want to do?

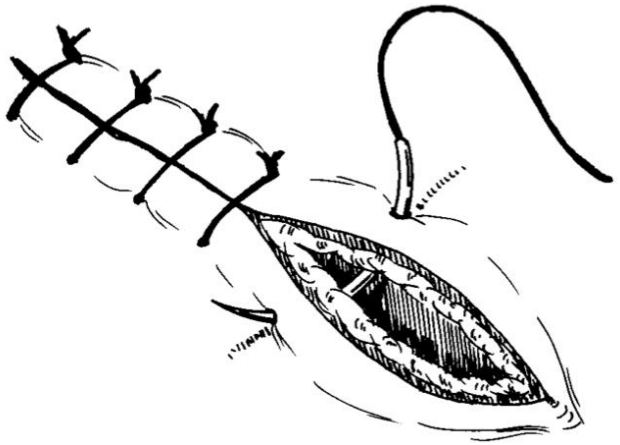
- Restrain dog for evaluation
- Evaluate dog
  - Evaluate wound
- Repair?
  - Onsite
  - Evacuate for repair

Assessment

- No lameness
- Superficial
- No hemorrhage
- Moderate contamination
- Little swelling

What do you want to do?

- Restrain dog for evaluation
- Evaluate dog
  - Evaluate wound
- Repair Onsite
  - So canine can return to work quickly



How do you accomplish this?

- Physical restraint
  - Muzzle

- Drugs
  - Analgesics
  - Sedatives
  - Anesthetics

Laceration

- Analgesia – yes/no?
  - NSAID
  - Opioid
    - Morphine
    - Hydromorphone
    - Fentanyl
- Sedative – yes/no?
  - Dexdomitor
  - Benzodiazepine
- Local Anesthesia -yes/no?
  - Lidocaine
  - Bupivicaine
- Anesthesia – yes/no?
  - Ketamine
  - Propofol

Laceration

- Analgesia – yes
  - NSAID - yes
  - Opioid – probably not
    - Morphine
    - Hydromorphone
    - Fentanyl
- Sedative – maybe
  - Dexdomitor
  - Benzodiazepine – probably not
- Local Anesthesia - yes
  - Lidocaine
  - Bupivicaine
- Anesthesia – no
  - Ketamine
  - Propofol

Local Anesthesia

- Lidocaine 2%
  - 2-5 mg/kg
    - 55#/25kg - 50-125mg / 2.5-6ml
    - 65#/30kg - 60-150mg / 3-7.5 ml
    - 75#/35kg - 70-175mg / 3.5-8.75ml
  - Typically will need 1-4 ml in wound that size
  - Onset of action < 5 minutes
  - Duration of anesthesia: 60-120 min
  - Convulsive dose = 11-20 mg/kg
  - Lethal Dose = 16-28 mg/kg

- Bupivicaine 0.5%
  - Stay less than 2 mg/kg total dose for infiltration
    - 55# - 50mg / 10 ml
    - 65# - 75mg / 12 ml
    - 75# - 70mg / 14ml
  - Onset of action 5-15 min
  - Duration of anesthesia: 4-6 hours
  - Toxic dose = 5-11 mg/kg

WWDBD?

Option #1

- Give NSAID
- Local anesthetic
- Repair
- Bandage
- Return to work
- +/- Antibiotics

Option #2

- Give NSAID
- Dexmedetomidine
- Local Anesthetic
- Repair
- Bandage
- Reverse
- Return to work
- +/- Antibiotics

Case #3

- 3 year old German Shepherd
- Acute diarrhea and 2 episodes of vomiting
  - Diarrhea has some blood
- Attitude and appetite is good
- No history of dietary indiscretion

What do you want to do?

- Restrain dog for evaluation
- Evaluate dog
  - TPR
  - Dehydration
  - Abdominal pain
- Evacuate K-9?

Assessment

- Vomiting not persistent
- Eating and drinking
- Attitude normal
- No abdominal pain on palpation
- TPR normal
- MM p/m, CRT <2
- No dehydration

What do you want to do?

- Restrain dog for evaluation
- Evaluate dog
  - TPR
  - Dehydration
  - Abdominal pain
- Evacuate K-9?
- Treat at BOO

Assessment

Your Dog

- Vomiting not persistent
- Eating and drinking
- Attitude normal
- No abdominal pain on palpation
- TPR normal
- MM p/m, CRT <2
- No dehydration

What would indicate evac?

Assessment

Your Dog

- Vomiting not persistent
- Eating and drinking
- Attitude normal
- No abdominal pain on palpation
- TPR normal
- MM p/m, CRT <2
- No dehydration

What would indicate evac?

- Persistent, non-productive vomiting
- Anorexia
- Depressed, ADR
- Abdominal pain or distention
- Abnormal TPR, MM
- Dehydration
  - Profuse diarrhea

Anti-emetics

- Ondansetron (Zofran)
  - 0.5 mg/kg i.v. loading dose followed by 0.5 mg/kg/h infusion for 6 hours
  - 0.5-1 mg/kg PO q12-24h
  - Anti-emetic
- Maropitant (Cerenia)
  - 1 mg/kg SQ

GI Protectants

- Famotidine (Pepcid)
  - 0.5 mg/kg SQ, IV, PO SID
- Omeprazole
  - 0.5-1 mg/kg PO SID

"Eat some grass, and
call me in the morning."

Anti-diarrheal

- Metronidazole (Flagyl)
  - 15 mg/kg PO BID for 5 days
  - In general good against organisms that cause bloody diarrhea
  - Can affect olfactory system!!!!!!

Fluids?

- No clinical evidence of dehydration
- Could have some mild ongoing losses from diarrhea and vomiting (+/-)
- With GI issues they may drink less than normal

Subcutaneous Fluids

- Easily performed
- Not to be used for severe dehydration or shock
  - SQ does not provide rapid administration or absorption
- Absorbed in 2 - 6 hours
- 5 - 10 mls per pound
  - Average 50 – 70 pound dog
    - 250 – 700 ml
  - Average 70 – 100 pound dog
    - 350 – 1000 ml
- 500 ml is a good average

IV/IO Fluids

Fluid resuscitation:

- Hypovolemia
- Dehydration
- Mild to moderate (SQ)
  - 25-50 ml/kg
  - Phierce = 625-1250ml

Average bolus in dogs for any method is 500ml 25-35 kg

- Moderate (IV/IO)
  - Max volume 80ml/kg
  - Phierce 2000ml

Fluid Volume - shock/hypovolemia

- Bolus in increments of 20 ml/kg
- Continued based on response
- Give remainder over next 6 hours

Uncontrolled hemorrhage

- Bolus in increments of 40ml/kg
- Monitor for response
- Needs blood prducts

SUSAR MSOC 2022

TXA

- 20mg/kg over 20 min
- Vomiting most common side effect

SUSAR MSOC 2022

WWDBD?

- Probiotics
- Famotidine/omeprazole
- Metronidazole if bloody diarrhea
- SQ Fluids +/-
- Cerenia (or Zofran)
  - If any further episodes of vomiting
- Rest dog until improvement in signs
- Evacuate if vomiting persists, diarrhea persists/worsens, or he stops eating/drinking

Other Drugs

Antibiotics

Indications for Antibiotics

- IV
  - Polytrauma
  - Shock
- Ceftriaxone
  - 50 mg/kg IV
  - Can add cefazolin to increase spectrum
    - 22 mg/kg IV

Indications for Antibiotics

- Oral
  - Dermatitis
  - Wounds
- Cephalexin
  - 30 mg/kg
- Ciprofloxacin
  - 5 mg/kg

Steroids

Indications for steroids

- Pruitus
  - Dermatitis
  - Prednisone on a decreasing dose and frequency (0.5 mg/kg)
  - Dexamethasone SQ or IV (0.5 mg/kg)
  - Would only give after consult with veterinarian

Allergic Reactions / Anaphylaxis

Allergic Reactions

- Diphenhydramine
  - 1-2 mg/kg IM, SQ
  - 2-4 mg/kg PO
- Primarily for cutaneous signs
  - Redness, erythema
  - Facial swelling without respiratory compromise
  - Pruitus

Anaphylaxis

- Epinephrine
  - 0.01 mg/kg IM (0.01 ml/kg of 1:1000)
- 1 epi-pen junior for average working dog
- Additional signs
  - CV
  - Respiratory
    - Also albuterol – 1-2 puffs
  - Gastrointestinal

Naloxone

- Routes – IV, IM, IO, IN
- Dose
  - 0.04 mg/kg
    - 60# (27 kg) = 1.0mg
    - 70# (32kg) = 1.6 mg

Dogs on Drugs

- With some (notable) exceptions many of the drugs should be familiar
- Dosages can be very different

Dogs on Drugs

- Decision making on using your pharmacy cache
  - What is the goal of using the medication?
    - Patient and situational assessment
  - Understand the effects (and side-effects) of the medication
  - Know dosages
    - In general start low and titrate up to desired effect
  - Be prepared to support your decision

Goals

- Decrease morbidity / mortality
- Return dog to service

Take care of your valuable team member!

Recommendations

- Plumb's Veterinary Drug Handbook (or the like)
- Laminated spreadsheet / card with drugs you have and plan to use
  - And dosages
- Drug cards for each dog on team/in unit
  - Customized to dog by weight
- Emergency Drugs (laminated pocket card)

Thank you!