WHEN ANIMALS ATTACK

7th Annual Flagstaff Osteopathic Medical Conference
August 14 & 15, 2021
Robert Berger, MD

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Disclosures:

- None to speak of.

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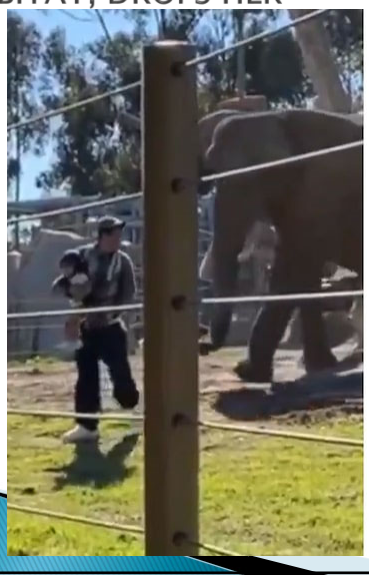
BUFFOONERY AT SAN DIEGO ZOO
Dad Brings His 2-Year-OldINTO AN ELEPHANT HABITAT, DROPS HER



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FMC CASE

- Pt reports she was walking home at the Grand Canyon after having a few drinks when **she was attacked by an elk**.
- Gored in the back with antlers and knocked to the ground.

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Objectives:

- List the various mechanisms of injury that occur involving large animals.
- Discuss the pitfalls of underestimating or under triaging injury.
- Review ways to prevent or minimize potential injuries.

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Wildlife Encounters

- > 47,000 annual visits for encounters for attack or bites
  - 8 fatalities on average
- >59,000 injuries Animal Vehicle Collision
  - >440 Human fatalities
- Wildlife – Aircraft Collisions
  - 16 injuries with 10 fatalities

Human-Wildlife Interactions 13(2):264–276, Fall 2019
Department of Wildland Resources – Utah State Univ.

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Large Animals

- Equine
- Bovine
  - Rodeos
- Elk/Deer
  - Motor Vehicle Crashes
- Wild
  - Cougars
  - Bears

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Mechanisms of Injury

- Blunt
  - Closed Head Injury (CHI)
  - Torso
  - Abdominal/Small bowel perforation
  - Extremity
- Penetrating
  - Teeth
  - Claws
  - Antlers/Horns
- Crush
  - “Large” animals

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Mechanisms of Injury

- Bites
- Secondary
  - Auto vs. Animal vs. Auto
- Infection/Rabies
- Psychological

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Treatment

- ATLS
  - Don't forget your ABC's
  - Don't get caught up in the story
  - Don't get distracted by the injuries
- Thorough Secondary & Tertiary Survey
- Secondary Sources of Injury

Published: 20 August 2019
Fatal rooster attack
Judith Fronczek & Roger W. Byard
Forensic Science, Medicine and Pathology **volume 16**, pages191–194(2020)

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Pitfalls

- Missed Injuries
- Acute Blood Loss
- Delayed Bowel Injuries
- Wound Infections
- Renal Failure from Rhabdomyolysis
- Rabies
- Post Traumatic Stress Disorder

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Equine

- Arab Proverb: “The grave yawns for the horseman.”
- 30 Million Americans participate in horse activities
- 50,000 riders treated in ER annually
- 2,300 Admissions annually
- Horses- Weigh up to 1500 lbs
- Speeds of 40 mph

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Equine

- Head Injuries are most common cause of hospitalization and/or death
  - Secondary injuries of upper extremities
- Most serious injuries are when thrown
  - 63% at FMC
- Rider elevated 9 ft above ground
- 80g of acceleration are required to shear or disrupt cerebral parenchyma at a cellular level – a fall from a galloping horse can deliver 100-300g of acceleration to the rider's cranium or spine

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Equine

- Being kicked accounts for about 30% of injuries
- Can deliver 1 Ton of force
- Occurs when handling/cleaning/feeding
- Usually in Head or Upper Body
- Trampled / Dragged / Crushed
  - After fall
- Bites
  - 3-4.5%
- Experience is not necessarily protective

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Equine

- Mexican Proverb : “It is not enough for a man to know how to ride; (s)he must know how to fall.”

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Horse Jumping Accident

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Pelvis of Horse Jumping Accident

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Pelvis of Horse Jumping Accident

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Pelvis of Horse Jumping Accident

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Prevention

- Head Gear
  - 5% if helmeted, 60% if unhelmeted
  - Even when not mounted
  - Wearing a helmet, decreases the risk of CHI
- Appropriate Footwear / Safety Stirrups
  - Decreased risk of being dragged
- Proper Training
- Don't Drink and Ride

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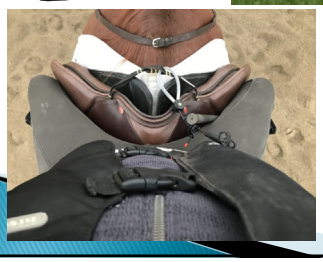
New Strategies for Safety



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Rodeo

- Started 1700's by Spanish vaqueros
- Officially organized in 1929
- First Championships in the 1930's
- Despite popularity – few scientific investigations
- Athletes are at same conditioning level as mainstream athletes
- Newly formed "Rodeo Catastrophic Injury Registry (RCIR)" at University of Calgary

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Rodeo

- Self-reported Injury History in Native American Professional Rodeo Competitors
  - 180 comp. at Indian National Finals Rodeo 2004
  - 100% of Bull Riders vs. 24% tie-down ropers
  - 40% reported using protective gear
  - 32% wear vests
  - 26% injured to prevent working an avg 3.2 months
  - 13.5% head injury in last 10 rides – Only 1 rider reported wearing helmet

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Rodeo

- Rodeo Injuries and Preventions
  - 1981 – 2005: 1939 rodeos
  - 49.8% Bull riding, 22.8% Bareback, 15.6% Saddle bronc, 8.0% Steer wrestling, 2.7% calf roping
  - Bull Riding injury 32.2 per 1000 exposures
  - Reports of Aortic Transection and Ventricular Septal Rupture have been reported
  - Wild Horse Race – 3 men halter, saddle, ride wild horse. 10 teams at a time.
    - Up to 53.0 injuries per 1000 exposures

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Rodeo

- First International Rodeo Research and Clinical Care Conference 2004
  - 8.6% of bull riding injuries were concusions
  - Recommend helmet if > 18 yo
  - Mandatory helmet if < 18 yo
  - Physicians available to assess for concussions and if not available – produce letter of medical release if prior concussion
  - Only followed in High School Rodeos

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Rodeo

- Roping Injuries
  - Digit Amputation – especially thumb
    - Caught between rope & saddle horn during "dallying"
  - Force = 500lb steer running 30 mph
    - 16,544 N for "heading", 13,297 N for "heeling"
  - 30 – 59% Re-implantation rate

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Bovine

- Sports Writers of America
  - Bull riding as the most dangerous sport in America
- 12,000 Professional Cowboys, 850 annual events
  - Injury rate is 2.3 – 19.7 per 100 animal events.
- 21 Deaths Professional Bull riders since 1989
- Weigh 2,000 to 2,500 lbs
- Trampled
- Gored

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Bovine

- Pamplona, Spain – Running of the Bulls, 16 deaths since 1922


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Bovine

- 1992-1999 East Texas Univ.- 145 Admissions
  - Horse 79 (55%), Bull 47 (32%), Cows 16 (11%), Wild 3 (2%)
  - Horses – Falls 57%, Bull 30%
  - Stepped on or Trampled – Bull 45%, Horse 4%
  - Area – Horse – head 32%,
    - Bull – Torso 49%,
    - Gored – 9 of 47
  - Risk of multiple injuries
    - Upper body – 52%,
    - Lower body –19%

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Large Animal Abdominal Injuries

- 113 Patients/10 years/33 with Abdominal Injury – Agricultural Area (Turkey)
- Blunt 31 (93.9%)
- Penetrating 2 (6.1%)
- Isolated abdominal injuries 27 (82%)
- Combined injuries 6 (18%)
- Bovine-related 25 (75.8%)
- Equine-related 8 (24.2%)
- To Surgery 21 (63.6%)

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Large Animal Abdominal Injuries

- Used Physical Exam and Ultrasound to assess
- CT scan for Only 6 patients
- DPL for Gored Patient
- CT showed solid organ injury
  - Not useful for identifying degree of bowel injury

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Large Animal Abdominal Injuries

- **Injured Organs at Laparotomy**
- Ileum 13 (39.4%)
- Jejunum 3 (9.1%)
- Mesenteric Injury 1 (3.0%)
- Liver 4 (12.1%)
- Spleen 2 (6.1%)
- Negative exploration 2 (6.1%)

- High Suspicion for traumatic bowel injury

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Bull Rider/Flak Jacket

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Bovine – Prevention

Helmets!
Flak Jackets!
Just Say No!

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ELK/DEER

- Attacked!
  - Unusual but not isolated incident
- More commonly Auto Accident
  - Elk most common, ISS = 4.9
  - Except when hit by other car ISS = 30
- Worse injuries if secondary accident occurs with collision into other autos/fixtures

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2019 AZ DOT Crash Facts

- MVC Total 129,750 – 2,007 involved animal
  - 911 Fatal with 3 involving animal
  - 982 people killed – 53,809 injured statewide
  - 4 people killed – 264 injured involving animals
- MCC Total 2,676 – 171 fatal, 2105 injuries
  - 28 crashes involved animal, 2 fatal, 21 injuries

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Horse vs Car

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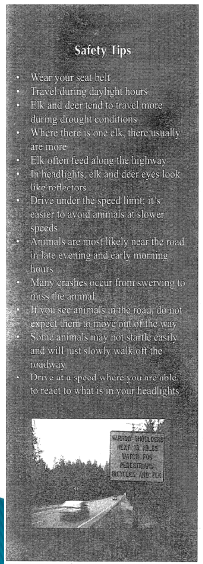
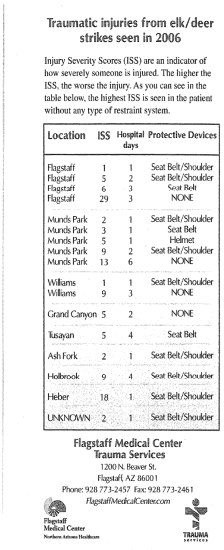
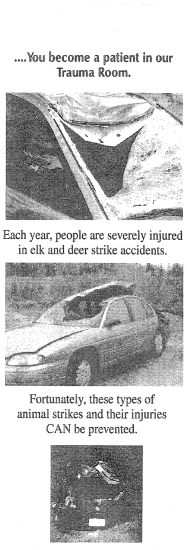
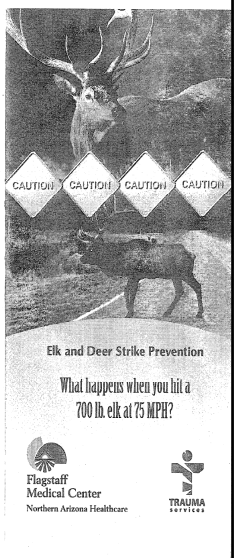
Prevention









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Cougars

- Most widely distributed large mammal on the American continents
- 130-225 lbs, 8 feet long for males
- Can kill full grown deer or elk
- Can leap up 15 feet, spring forward 45 feet
- Overlapping habitats
- More Urban Growth
- Less Forest
- Less Food Available

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Cougar Attacks in US

- 74 Reported Attacks 1924 to 2018
- 48% < 18yo, 35% < 10yo
- Common in Summer and Fall months
- Most during daylight hours
- 11 Fatal Attacks

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Cougars in Canada

- Children at risk due to smaller size – B.C. 50 attacks and 25% mortality
- Common injuries are neck lacerations, ICA injury, fatal cervical spine injury, phrenic nerve injury
- Proprioceptors in the cougar's jaw enable it to determine when teeth encounter bone. Causes a forcible hyperextension of the neck for a cervical fracture.
- Then open sternum and ribs and evisceration of heart and lungs and abdominal organs.

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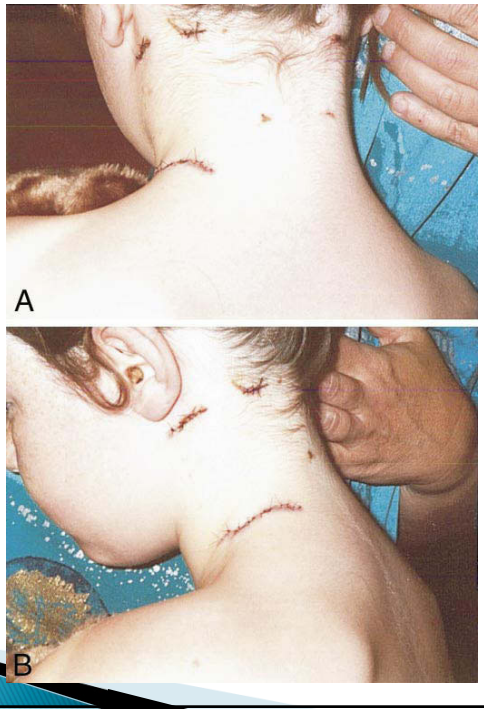

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Treatment/Prevention

- C-spine films/ PTX
- Prophylactic Antibiotics
  - *Pasteurella, Moraxella, Corynebacterioum, Neisseria* – common isolates in cat bites
  - PCN & 1st Gen Cephalosporin or Clindamycin and Floroquinolone
  - Irrigate, Debridement, Explore
  - 6% infection rate for mammalian bite wounds if closed
    - 20% –dog, 30% – cat
  - Weigh risk of infection with cosmetics/function

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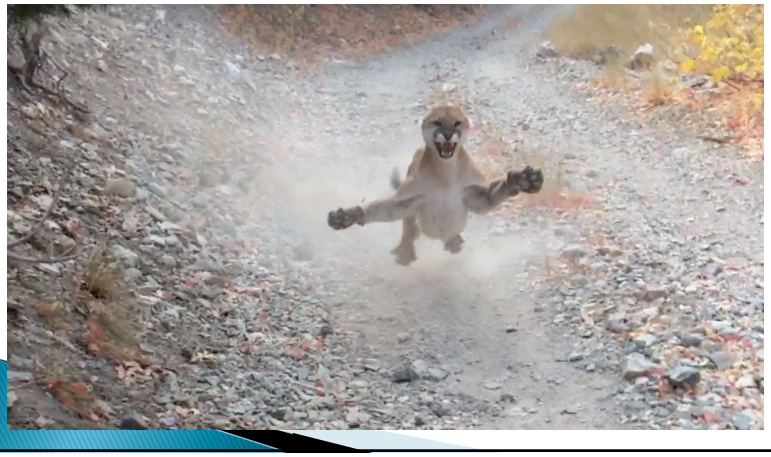
Prevention

- Agreessive movements deter attacks
- Never turn your back!



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Rabies

- *Rhabdoviridae*
  - In saliva, transmitted by bite
  - Causes acute progressive encephalomyelitis that is almost always fatal
  - Incubation period in humans is usually weeks to months, but ranges days to years
- After WWII Dog vaccinations started
  - 1946
    - 8,384 dog cases
    - 33 human cases
  - 2018
    - 63 dog cases
    - 1 to 3 human cases
- 2004 One death and organs transplanted into 4 patients, all 4 recipients also died

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Rabies

- Rabies Post-Exposure Prophylaxis
- Wound Irrigation
- Consider risks:
  - Type of exposure
  - Epidemiology of Animal Rabies in the area and Species of Animal
  - Circumstances of Exposure
  - Ability to capture/study the animal
  - Attempt to obtain animal for necropsy and brain testing.
- About 16,000 to 39,000 persons come in contact with potentially rabid animals per year.
- Medical Urgency – not an Emergency

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Bears

- Significant soft tissue injury and fractures
- Wrestling on the ground – contamination
- Types of Attacks
  - Defensive – Startled abruptly
  - Predacious – Humans thought of as food, most fatal outcomes.
- Psychological – Depression, Anxiety, Cognitive Difficulties
  - Lasts < 1 month is Acute Stress Disorder
  - Lasts > 1 month is Post Traumatic Stress Disorder
- Average10 Attacks per year, 1 fatality per year on average

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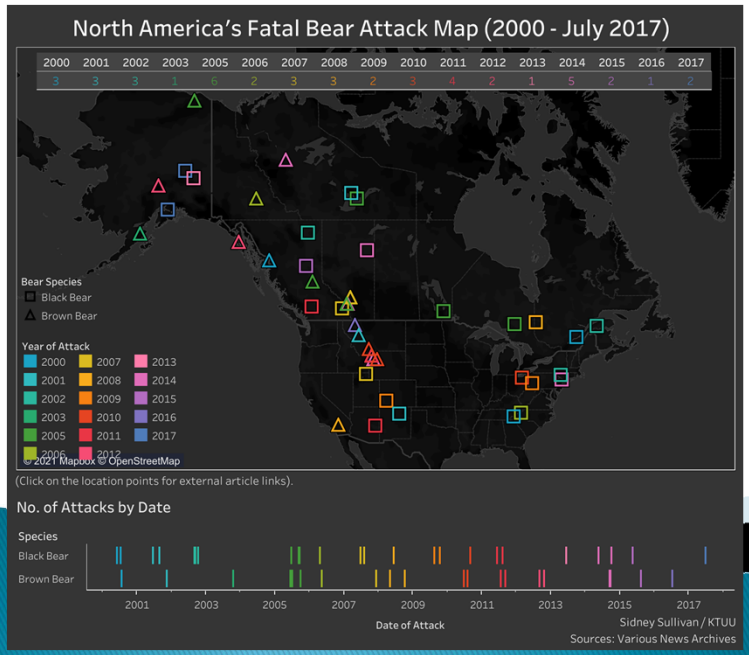

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Arizona Bear Attacks

- Lana Hollingsworth, 61, female July 25, 2011 Black Pinetop-Lakeside, Arizona Hollingsworth was attacked by a 250 lb (113.4 kg) black bear while walking her dog at a country club. Nearly a month later and after eleven surgeries, she died from a massive brain hemorrhage, which doctors believe was a result of the attack. The bear was tracked, shot and killed.

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Bear Attack

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Comparison – Annual Fatalities

- Homicides – 19,000
- Lightning Strikes – 82
- Tornadoes – 80
- Dog Attacks– 35
- Bear Attacks – 1

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Conclusion

- Consider all possible sources of injury
  - Blunt
  - Penetrating
  - Crush
  - Infectious
  - Psychological
- Injury Patterns do exist based on mechanisms
  - Check for associated injuries
- Treat with prophylaxis when appropriate

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