Triage & Critical Care

Bandaging, Fluid Therapy & Wound Management



Dave McRuer, MSc, DVM, Dipl. ACVPM

Wildlife Center of Virginia

Florida Wildlife Rehabilitators Association Symposium

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Outline

- Triage
- Critical Care
- Bandaging
- Fluid Therapy
- Wound Management

Notes

- www.hotmail.com
- Username: floridawildlfierehab@hotmail.com
- Password: sandhill2012

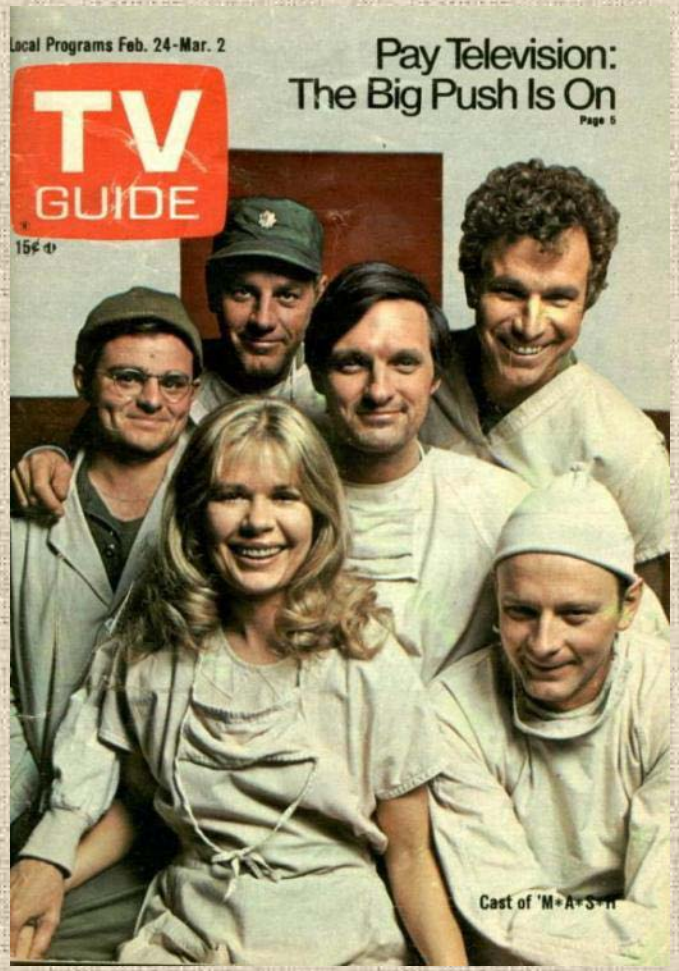
- Open the email invitation from Ed Clark
- Follow the link to download the lectures

Outline

- Triage
- Critical Care
- Fluid Therapy
- Bandaging
- Wound Management

What is Wildlife Triage?

- Injuries are prioritized and treated according to severity (life-threatening first)
- Usually considered for the first 24 hours
- Think M*A*S*H



What is the most common category of injury at admission for wildlife patients?

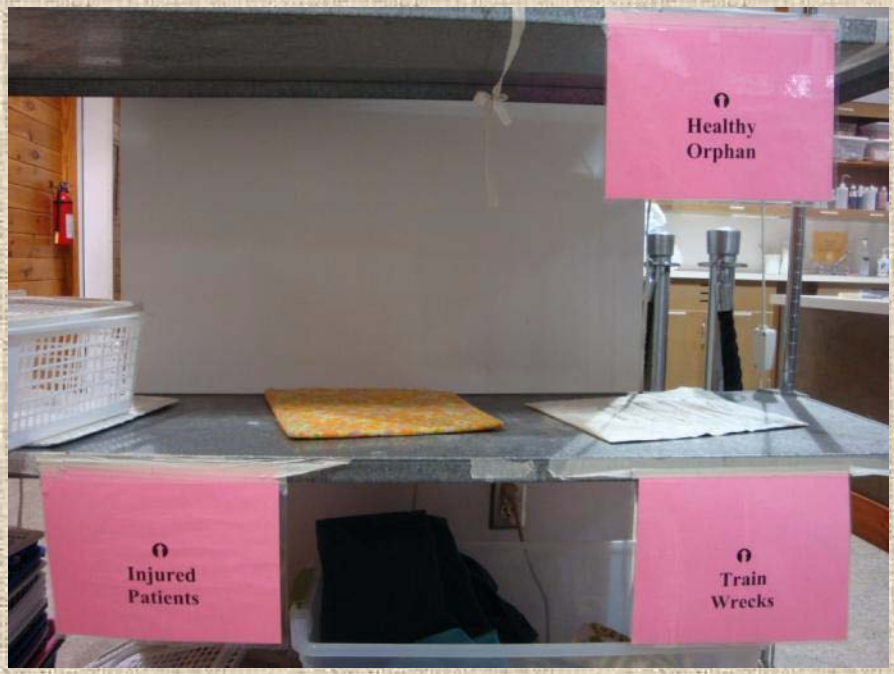



TRAUMA




Categorize

1. No life-threatening condition, only requiring routine treatment. (Healthy orphans)
2. Injured, but no life-threatening condition; requires stabilization and additional diagnostics. (Most wildlife cases)
3. Life-threatening condition, requiring immediate emergency treatment. (hemorrhage, respiratory distress, seizures)



Triage – Practice Makes Perfect

- As accurate an assessment as possible of the nature and severity of the injury is essential to determine prognosis and treatment.
- Accurate triage can save months of work, emotional energy and finite resources.

What do you see in this photo?

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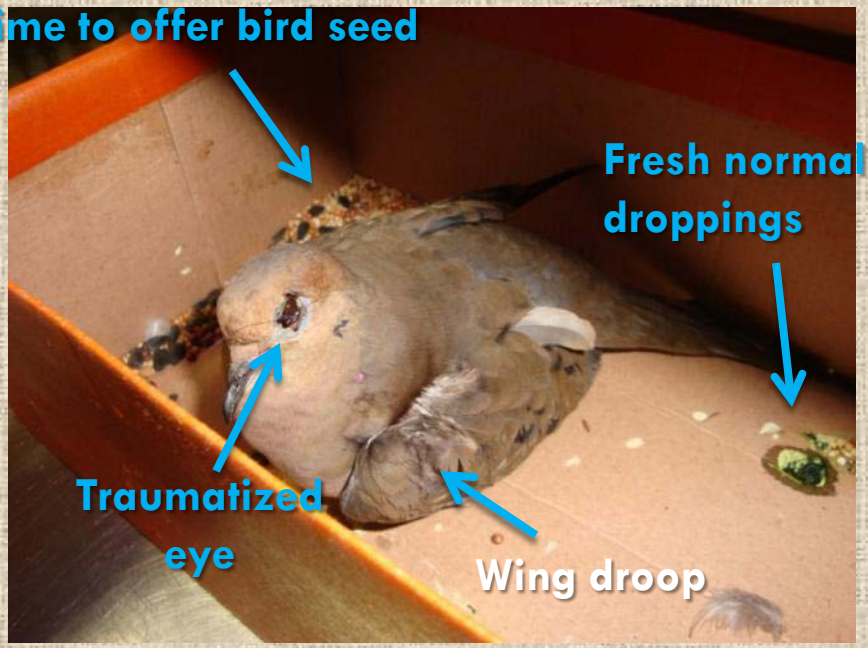
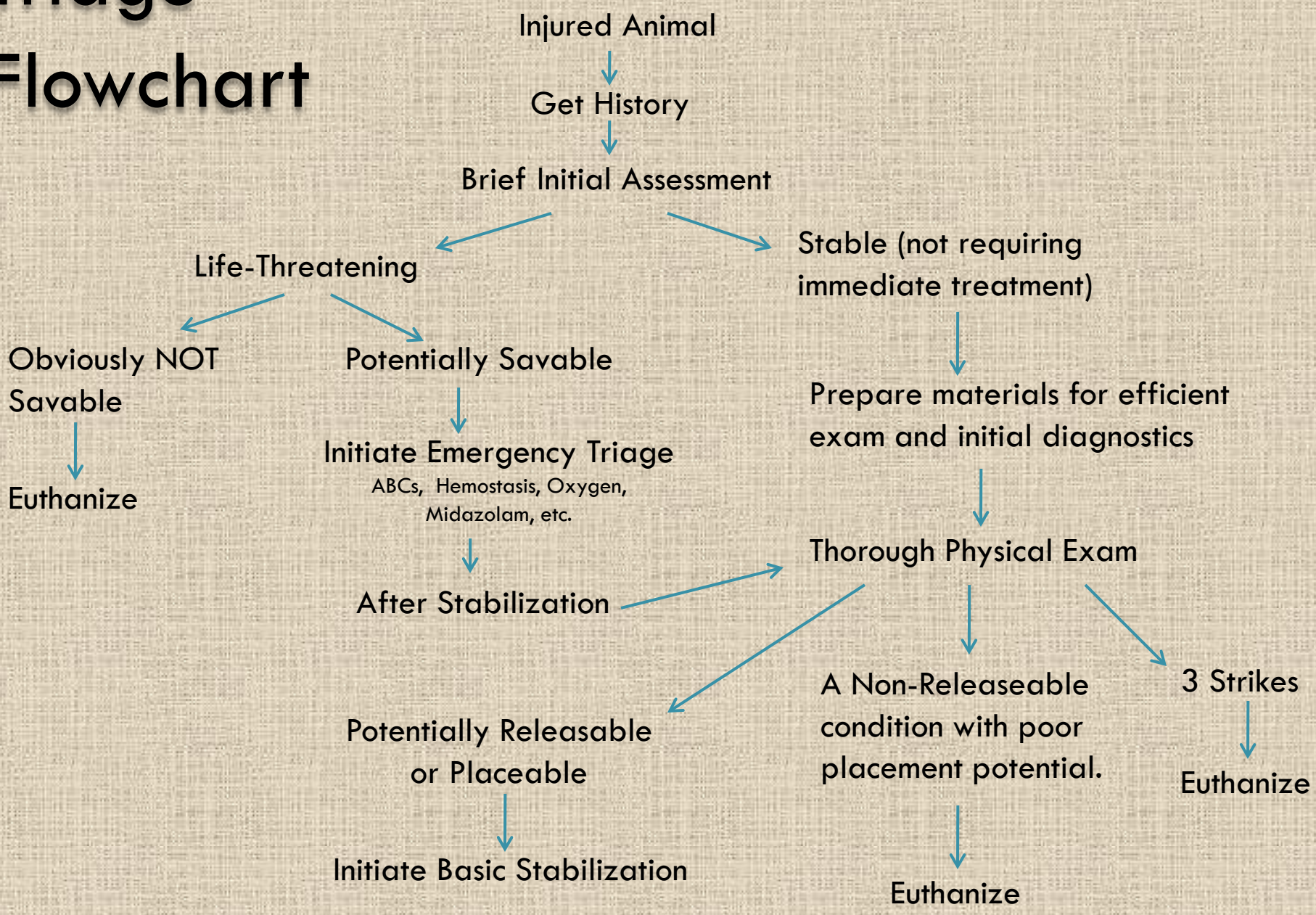


What do you see in this photo?

Triage Flowchart



Goal of Treating Wildlife

Release back to wild

Wildlife Presentations

- Hemorrhage
- Respiratory Distress
- Hypoglycemia/Hypothermia
- Emaciation (metabolic collapse)
- Seizure
  - Hypoglycemia, head trauma, infectious dz, toxicoses
- Toxicities
  - Organophosphates
  - Lead
  - Mercury
  - Petroleum

Always must be thinking…

This is a wild animal and it must be able to survive in the wild.

What's the difference?

- The dog most likely will be taken to a veterinarian soon after the injury.
- Dedicated owners will provide long-term medical care and monitoring.

- The fox may not be found and captured until it is very weak, long after the injury, (secondary health problems.)
- Long-term monitoring is not feasible.

Release Criteria

- Has recovered from its initial problem and it will not reoccur,
- Is able to avoid predators,
- Is able to find food in the wild,
- Has been cured of any secondary problems,
- Is expected to function reasonably within a population,
- Displays normal behavior and is not habituated to humans,
- Does not pose a risk to the wild population or the environment, nor is it likely to spread pathogens or contribute to disease processes,
- Is not carrying a potentially zoonotic infection.

Other Options

Permanent placement

Euthanize

Patient History

- **Who?** (brought the animal in, touched the animal)
- **What?** (species, age, sex)
- **Where?** (as much detail as possible; town, road, etc.)
- **When?** (found, time in captivity, season)
- **How?** (injured, captured, handled, any treatment)

Details of circumstance as to why animal came into captivity.

Brief Observational Exam First

- **Importance cannot be overstated.**
- Quietly peek at the animal to:
  - Confirm species,
  - Note any obvious wounds, posture (wing droop?), ability to ambulate or perch (hock sitting?),
  - Assess mentation, respiratory status (tail bobbing or open-mouthed breathing?),
  - Evaluate aggressiveness,
  - *Recall that prey species try to hide clinical signs.*
- With this information, gather everything you will need to perform a PE and initial diagnostics.

Equipment Ready

- All equipment and materials for a PE should be ready before restraint.
- Preparedness will minimize handling, exam time and thus, patient stress.
- May need to examine animal in stepwise fashion – breaks between exam, diagnostics and treatment.

Anticipate

- Seasonal effects
  - Opossum with neonates in pouch
  - Migrating raptors
    - Juveniles – thin
    - Adults - obese
  - Turtles with eggs
  - Breeding season aggression (eagles)

Personal Safety

- Common zoonoses?
  - Rabies
  - Tularemia
  - Lyme Dz
  - Psittacosis
  - WNV
  - Baylisascaris

If you peek in and see…

- Life-Threatening Condition:
  - Significant Hemorrhage
  - Extreme respiratory distress
  - Seizure
  - Severe shock
- You should act quickly
- Otherwise, it's okay to let the animal rest in a dark, quite, warm, area

Hemorrhage

- How much blood can lose?
  - In general, no more than 1% of body weight
- Hemostasis is top priority (particularly in small patients)
  - Apply direct pressure to hemorrhage site until bleeding stops
  - May apply pressure bandage
  - Hemostatic powder may be used on broken nails and beaks

Acute Blood Loss

- Birds tolerate acute blood loss better than mammals
- Consider transfusion if PCV is <15%
  - (<25% in mammals)
- Homologous transfers are ideal (raptor to raptor)
- Oxyglobin is a very effective substitute

Broken Blood feathers

- Apply pressure to promote hemostasis
- Silver nitrate and other hemostatic agents should not be applied to feather follicle
- Only pull feathers to stop the bleeding if the bird is small and blood loss is large

Respiratory Distress

- Trauma
- Ruptured air sac
- Tracheal obstruction
- Infectious

Plan:

- Minimize handling
- Get into O2
  - Face mask or oxygen chamber
- Mild sedation
  - Butorphanol (1mg/kg) with Midazolam (0.25 mg/kg)

Electrocution

- Can see acute respiratory distress from pulmonary edema
  - Also can see cardiac arrest, pericardial effusion, thermal burns
  - Thermal burns may not show for several days.
  - Treat symptoms
    - O2 therapy
    - Furosemide 2mg/kg – ONE dose
    - +/- sedation
    - Abs, NSAIDS, topical wound care

Seizure

- Causes?
  - Trauma
  - Hypoglycemia
  - Infectious
  - Toxicities
  - Parasites (CNS larval migrans)
- Can treat with Midazolam or diazapam
- Monitor body temperature - prolonged seizures can cause dramatic increases

Shock

- Defined as poor tissue perfusion from either low blood flow or unevenly distributed flow
- Results in inadequate delivery of oxygen to tissues
- Many types of shock and many causes
- Hypovolemic shock (most common)
  - Loss of blood volume in the body from burns, bleeding or dehydration
- Fluid therapy is critical for successful treatment of shock

How to recognize shock?

- Rapid heart rate
- Weak pulses
- Collapse of peripheral veins
- Prolonged CRT
- Lethargy
- Cold extremities (low body temperature)
- Increased rate and depth of breathing
- Mental depression
- Dry tongue
- Dilated pupils
- Decreased urine production (or none)
- Glazed sunken eyes

ABC Principles

- Airway
  - Crusts over nares, foreign body, parasites, blood clots, masses, abdominal distention, crop swelling, other cause that may interfere with oxygen delivery. (endotracheal tube or air sac cannula)
- Breathing
  - Rate, pattern, abnormal sounds. (100% O2, positive pressure ventilation)
- Circulation
  - Coloration of mucous membranes, degree of hydration, body temperature (cold extremities?), CRT, pulse. (external chest compressions or internal cardiac massage)

Cardiopulmonary Arrest

- Patient should be intubated and positive pressure ventilation every 4-5 seconds
- Compressions over the sternum (60-80/min)
- ECG and Doppler to monitor heartbeat
- Epinephrine 0.5-1.0ml/kg IV,IO,IT
- Atropine 0.5 mg/kg IV, IO, IT

3-Strikes-You're-Out Rule

- At the WCV, we use this rule to help guide our triage…
- 3 major problems such as:
  - Wing fracture
  - Leg fracture
  - Severe ocular trauma
- Patient would be euthanized because the likelihood of returning to normal function is very low.

3-Day-Decide-Fate Rule

- As long as a critical patient continues to improve on a 3-day interval, we will continue to treat.
- At the WCV we use this rule to help us continually evaluate the progress of our patients which may not be as obvious on a daily basis.
- Turtles (reptiles) and neurologic patients may have longer intervals.

Poor Prognostic Indicators & Presentations

- Emaciated
- Very low TP
- Heavy ectoparasite burden
- Old open fxs
- Joint Luxations
- Spinal fxs
- Fawn with broken leg
- Damaged hallux or power talon
- Severe patagial wounds
- Bilateral ocular trauma

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Prioritize Treatment

- List health problems
- Prioritize and treat the life-threatening or most important problems first
- Treatment may be determined by what materials and equipment you have available

Initial Treatment - Stabilization

- Stabilization (fx)
- Fluids
- Wound Management
- Analgesia
- Thermal
- Nutritional
- Antibiotics

What does this mourning dove need?

Thermal Therapy

- Hyperthermia
  - Can see with severe exertion, excitement, environmental factor
  - Animal panting, red mucous membranes
  - Minimize stress, place in cool environment
- Hypothermia
  - Very common with orphaned animals
  - Wet animals lose heat rapidly
  - Warm slowly – incubator, warm water bottles, rice bags, warm fluids

Nutritional Support

Only after replacement fluid therapy has begun and animal is more stable. Start with elemental diet if TP < 2g/dl.

Hypoglycemia

- Very common in orphaned wildlife
- Frequently show neurologic signs such as: ataxia, seizures, loss of consciousness
- Can apply Karo syrup to gums along with fluids

Antibiotics

- Many wounds will be old and contaminated
  - See any pus, maggots, necrotic tissue, exposed bone?
- Cat (and dog) bites are notoriously infected
  - Wild animals are often susceptible to *P. multocida* and sepsis from other gram – bacteria
- Broad-spectrum antibiotics are indicated

Other Medications to Consider

- Atropine (OP toxicity)
- CaEDTA (lead toxicity)
- Vit K (rodenticide toxicity)
- Iron Dextran (anemia)
- Potassium (cachexia)
- Vit B (cachexia)
- Vit A/D (cachexia)
- Parasiticides

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Assume

In most cases with wild animals, particularly if there is trauma or disease, it is safe to assume there is at least 5% dehydration.

Calculate Fluid Requirements

- Need:
  - % dehydration (based on PE and lab)
  - Body weight (gm and kg)
  - Maintenance fluid rate for the species, See Table
  - Estimation of ongoing losses – such as prolonged gastrointestinal loss (vomit/diarrhea)

Species	Maintenance Fluid Rate
Birds	60-90ml/kg/day
Mammals	50-60 ml/kg/day
Reptiles	10-30 ml/kg/day

Conversion from	to ml
1 ounce	30 ml
8 oz (1 cup)	250 ml
1 pint	250 ml
1 teaspoon	5 ml
1 tablespoon	15 ml

Fluids Formula

1. **Maintenance** Fluid Requirement
   - Weight (kg) x Maintenance Rate for the species (ml/kg)
   - = Volume in ml or cc
2. **Fluid Deficit** (Rehydration)
   - % Dehydration x Body Weight (gms)
   - = Volume in ml or cc
3. **Ongoing Losses**
   - Volume in ml (estimation of loss)
4. **Daily Fluid Requirement**
   - 1 + 2 + 3 = volume of fluids in ml to be given

Fluid Protocol

- Total daily fluid requirement shouldn't be given all at once
- The maintenance fluids and ongoing losses are given daily, BUT it is best to treat the Fluid Deficit over several days
- Half of the Fluid Deficit should be given within the first 24 hours
- The remaining half of the Fluid Deficit is divided over the following 24-48 hours

Which Fluid to Give

- **Crystalloids**
  - Solutions that contain electrolyte and non-electrolyte solutes
  - Can enter cells and all body fluid compartments
  - Stay in the bloodstream for shorter period of time than colloids
  - Exert their effects primarily on the interstitial and intracellular compartments
  - Used for replacement or maintenance of blood volume
  - Can be given PO, SQ, IV
  - Examples
    - Lactated Ringers Solution
    - 0.9% Sodium Chloride
    - Normosol –R
    - 2.5% Dextrose with 0.45% NaCl
- **Colloids**
  - Large molecular weight substances that are restricted to bloodstream
  - Exert their effects primarily on the intravascular compartment
  - More of this fluid remains in the bloodstream
  - Ideal for animals in shock
  - Must be given IV or IO
  - Examples:
    - Hetastarch
    - Oxyglobin
    - Whole blood or plasma

How to Administer Fluids

- In mammals, reptiles and birds fluids can be replaced…
  - Orally (PO)
  - Subcutaneously (SQ)
  - Intravenously (IV)
  - Intraosseously (IO)
- In mammals and reptiles, fluids can also be administered …
  - Intraperitoneally (IP – mammals)
  - Intracoelomically (Ico – reptiles)

Which Route of Administration is Best?

- In mildly dehydrated patients (<5%), with a functional GIT, PO fluids are best
- SQ fluids can be used for mildly-dehydrated patients that have diminished GIT function (diarrhea, vomiting)
- When replacing large fluid deficits (critical/shocky patients), IV or IO routes are best

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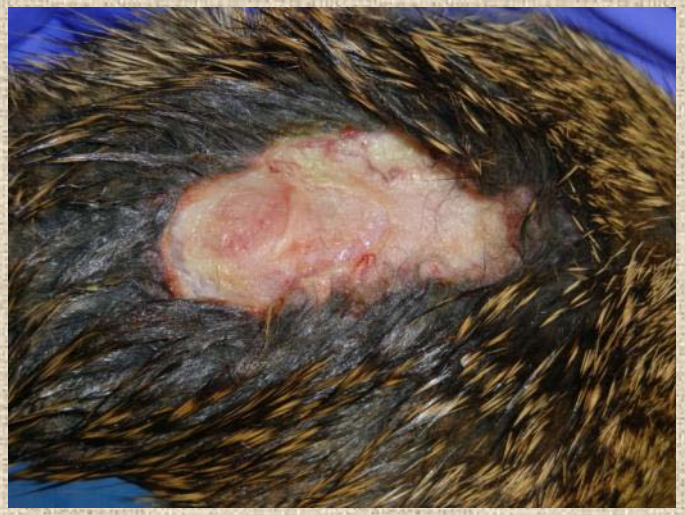
Wound Considerations

- How old?
- How contaminated?
- Cleaning options?
- Can it be closed? Now or later?
- Should it be dressed or bandaged?



Aging a Wound

- Knowing the stages of wound healing helps to age a wound and determine the appropriate treatment
  - Inflammatory stage – onset to 4 days
  - Granulation stage – 4 days to 2-4 weeks
  - Re-epithelialization stage – size dependent
  - Maturation stage – occurs over weeks to months

Inflammatory Stage

- Vasodilation is occurring to bring new cells to the wound area such as white blood cells to remove debris and fight infection

Granulation Stage

- Fibroblasts migrate into wound to lay down collagen matrix and formation of new blood capillaries occurs

Re-epithelialization Stage

- Migration of epithelial cells from the edge of the wound onto granulation tissue

Maturation Stage

- Tissue contracture – averages 10%

Options for Wound Closure

- Primary closure – within 12 hours
- Delayed primary closure – within first 4 days
- Secondary closure – after the first 4 to 5 days (lots of debridement is usually necessary)

Options for Wound Closure

- Second intention healing – allowing the wound to granulate in with no assisted closure

Flush, Flush, Flush!

The solution to pollution is dilution!

Topical Treatment Options

Ointments

- Triple Antibiotic Ointment
- Vitamin A&D ointment

Creams

- Dermisol cream
- SSD cream
- Nystatin cream

Gels

- Medihoney gel
- Solosite gel

Bandage Changes

- If drainage/seeping is occurring, change at least every 24 hours
- If topical medications are needed, change every 24 hours
- If wound is dry, can change every 3 days but monitor closely
- Wet-to-Dry bandage will help keep wound moist, but still absorb discharge
- Avian skin tends to desiccate easily… pack wound with water-based ointment and keep covered

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Bandages


Ball Bandage


Interdigitating Bandage


Body Wrap


Robert Jones Bandage


Figure 8 Bandage

Fx Stabilization/ Wound Dressing

- Immobilize fractures with appropriate bandage.
  - Don't rush to surgery,
  - Stabilize patient first,
  - Remember fractures usually are NOT fresh.
- Open wounds should be cleaned and bandaged until the patient is stable and can tolerate more extensive wound debridement or surgery.
- Avian skin tends to desiccate quickly… pack wound with water-based ointment and cover immediately.


Questions?

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