Small Mammal Emergencies: Foundations and Updates

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Board-Certified Specialist in Zoological Medicine™
Cape Cod Veterinary Specialists

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Who am I?

- University of Illinois Urbana-Champaign - Vet school
- Milwaukee Emergency Center for Animals – ER-only internship
- Louisiana State University CVM – zoological medicine internship
- University of California-Davis – ACZM-approved residency (zoological companion animal focus)
- VCA South Shore (Weymouth) Animal Hospital

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Outline

- Assessing Our Patients
  - Triage
  - Shock
- Managing Our Patients
  - Supportive care
  - Monitoring
  - CPR
- Preparing For Emergencies

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Assessing Our Patients: Triage and Shock

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TRIAGE

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Introduction

- Definition – Process of sorting patients to determine order of treatment
- Done for emergent and routine appointments
- Quick look at major systems
  - Hands off assessment first

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Introduction

- Very few carnivores in exotics
  - *Which species of exotic pet mammal is a predator?*
  - Understand the nature of prey species
- HIGHLY stress sensitive – consider sedatives
- Balance critical care with what can be tolerated
- Efficient examinations

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History

- Signalment
  - Age
  - Sex – **reproductive status**
  - Species
  - Breed/morph

Species	Lifespan
Rabbit	8-12 y
Chinchilla	15-20 y
Guinea Pig	4-8 y
Ferret	5-8 y
Gerbil	3-4 y
Hamster	1.5-3 y
Rat	1.5-3 y
Mice	1.5-3 y

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History (con’t.)

- Presenting complaint
- Systems check
- Medical history
- Husbandry – *what does this include??*
  - Diet
  - Housing

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Initial PE – Respiratory System

- Respiratory rate and effort
- Auscultation
  - Crackles, wheezes, harsh lung sound
  - Upper airway sounds
  - Lack of sounds
  - Auscultate trachea, larynx, nasal passages

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- *What are some abnormalities noted in this rabbit?*

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Initial PE – Nervous System

- Mentation
- Motor function
- Reflexes
- Seizures?
- *How would you describe the nervous system of this patient?*

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- *How would you describe the nervous system of this patient?*
  - *No sedatives were provided*

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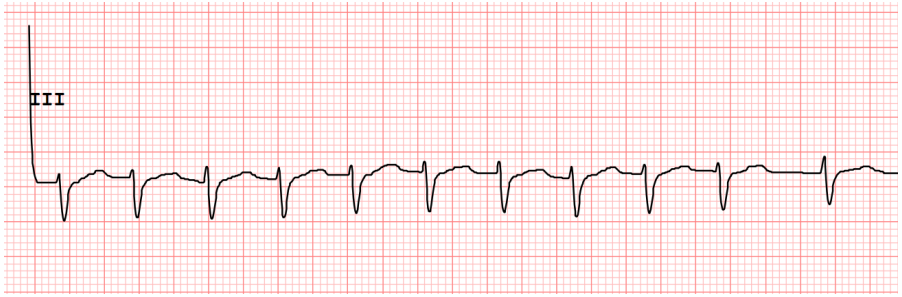
Initial PE – Circulatory System

- Heart rate and rhythm
- Murmur?
- Perfusion
  - Pulse
  - Mucous membranes



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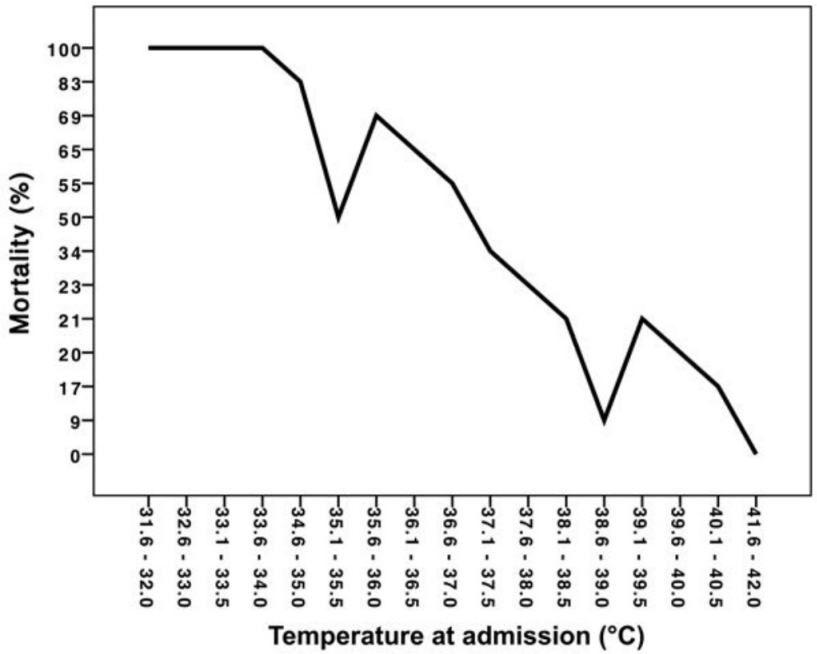
Initial PE – Temperature

- Hyperthermia
  - Heat stroke
  - *Which species is especially at risk?*
- Hypothermia
  - Prognosis
  - *Prognostic indicator in which species?*



Di Girolamo et al 2016 JAVMA

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Initial PE – Hydration Status

- Skin tent
- Mucous membranes
- Corneal appearance
- Presence of enophthalmia

Percent dehydration	Clinical signs
<5	No detectable abnormalities
5-8	Decreased skin turgor, dry mm
8-10	Decreased skin turgor, dry mm, eyes sunken, slightly prolonged CRT
10-12	Severe skin tenting, prolonged CRT, dry mm, eyes sunken, possible signs of shock
>12	Above plus signs of shock, life threatening

Initial PE – Weight

- Drug calculations
- Body condition score
- Dehydration
- Fluid therapy monitoring

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Latter Portions of PE – Abdomen

- Palpation
  - Pain
  - GI tract, liver
  - Urinary tract (kidneys, bladder)
  - Reproductive tract
- Auscultation
  - *What is the medical term for the sounds of the GI tract?*

Joanne Paul-Murphy

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Latter Portions of PE – Pain

- Reluctance to move
- Lying stretched out
- Sitting hunched
- Tucked abdominal appearance
- Self-mutilation
- Bruxism and/or vocalization
- Grimace scales available
- Bristol rabbit pain scale

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Grimace scales

- *Why is a grimace scale assessment alone insufficient to determine pain?*

J Am Assoc Lab Anim Sci. 2017 Jul; 56(4): 425–435.
Published online 2017 Jul.
PMCID: PMC5517332
PMID: 28724492

Evaluation of Pain Assessment Techniques and Analgesia Efficacy in a Female Guinea Pig (*Cavia porcellus*) Model of Surgical Pain

Vanessa L Oliver,[1] Stephanie Athavale,[1] Katherine E Simon,[1] Lon V Kendall,[2] Jean A Nemzek,[1] and Jennifer L Lofgren[1,*]

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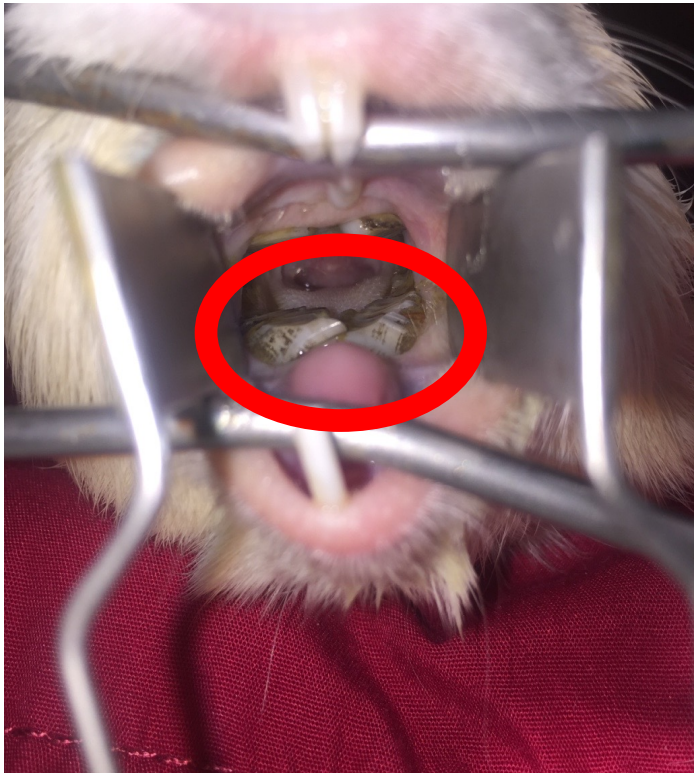
Latter Portions of PE – Oral Exam

- Limited in awake animals
- Malocclusion
- Oral abscesses, ulcerations
- Impacted cheek pouches
- *What is the term describing a particular component of this guinea pig's dental disease?*



THIS ANIMAL WAS ANESTHETIZED DURING THIS PICTURE

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Shock

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Introduction

- Definition: Poor tissue perfusion
- Dehydration vs shock
- Types of shock
  - Hypovolemic
    - Absolute → hemorrhage
    - Relative → GI loss, urinary loss, third spacing
  - Obstructive → tamponade, PTE, bloat
  - Cardiogenic
  - Distributive → sepsis, heats stroke, anaphylaxis

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Stages of Shock

Stage	Blood loss	Physiology	Signs	Comments
Compensatory	<20%	SNS→ BP increases/ SVR	↑HR, N to ↑BP, bounding pulses, rapid CRT	Not commonly seen
Early Decompensatory	30-40%	Reduced blood flow to non-vital organs	↓ Temp, BP, ↓ or ↑ HR, ↑CRT	MOST COMMON
Decompensatory	>40%	Irreversible organ failure, neuroendocrine response ineffective	↓ Temp, BP, HR, pale/cyanotic mm, renal failure, comatose, arrest	

Managing Our Patients: Supportive Care, Monitoring, CPR

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Supportive Care

Oxygen, Heat, Fluids, Pain, Food

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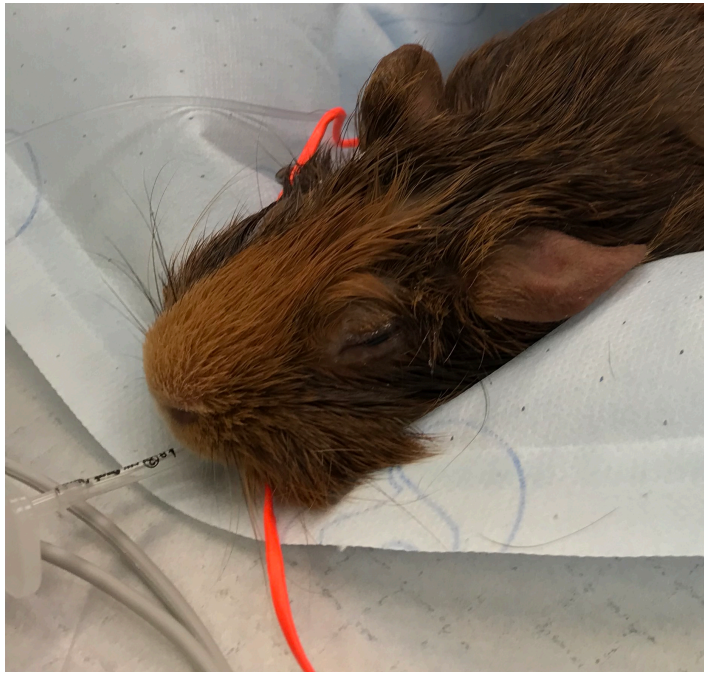
1. Oxygen Supplementation

- Indications
  - Primary respiratory disease
  - Stress
  - Cardiovascular disease
- Methods
  - Oxygen cage
  - Face mask
  - Nasal oxygen
  - Intubation and ventilation



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2. Thermal Support

- Monitor closely
- Methods
  - Bair Hugger, incubator
  - Fluids
  - Warm water blankets
  - Water bottles/gloves
- Considerations
  - Burn injuries, overheating
  - “Rewarming shock”

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3. Fluid Therapy

- Most effective when normothermic
- Risk of fluid overload
- Shock rates
  - Goal = BP > 90 mmHg (systolic)
  - Subtract boluses from daily maintenance and replacement

Species	Maintenance
Rabbits	100-120 ml/kg/d
Ferrets	75-100 ml/kg/d
Guinea pigs	100 ml/kg/d
Other mammals	80-100 ml/kg/d

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3. Fluid Therapy – Rehydration

- Rabbit of 3 kg that is 6% dehydrated using 100 ml/kg/d
  - Maintenance = (x ml/kg/d)(BW in kg)
    - (100 ml)(3 kg) = 300 ml/d
  - Deficit = (% dehydration)(BW in g)
    - (0.06)(3000 g) = 180 ml
- Replacement therapy for this example
  - 300 ml + 180 ml = 480 ml
  - Replace over 24 hours = 240 ml SQ q12hr x 2 doses
  - Replace over 24 hours = 20 ml/hr IV
    - Routine pulmonary auscultation

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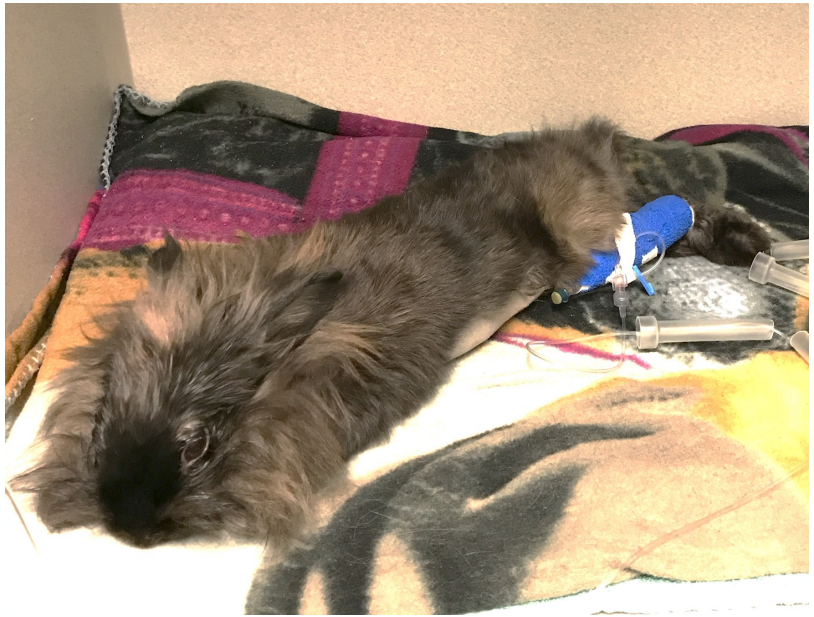
3. Fluid Therapy – Routes

- Intravenous (IV)/intraosseous (IO)
  - Shock, severe dehydration
- Subcutaneous fluids
  - Mild dehydration, stable patients
- Oral fluids
  - Hypernatremia, burns, cardiac disease



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3. Fluid Therapy – Isotonic Crystalloids

- Volume replacement, dehydration, maintenance
- 20-40% remains in intravascular space after 30-60 minutes
- Shock rate – 5-10 ml/kg over 15 minutes
  - Repeat up to 4 times total
- LRS, 0.9% NaCl, Normosol-R, Plasmalyte

3. Fluid Therapy – Hypertonic Crystalloids

- Hyperosmolarity → rapid intravascular volume expansion
- Cerebral edema, volume expansion
- Risks
  - Caution in dehydrated animals
  - Hypernatremia
- Shock rate – 3-5 ml/kg over 15 minutes
- 7.5-10% NaCl

3. Fluid Therapy – Colloids

- High oncotic pressure holds fluid in the vascular space
- Risks
  - Coagulopathies
  - Renal failure in septic patients
- Dose
  - 10-20 ml/kg/d
  - Shock rate – 3-5 ml/kg over 15 minutes
- *What are some examples?*

3. Fluid Therapy – Blood Transfusion

- Suboptimal first resuscitation fluid
- Indications
  - >20-30% blood volume loss
  - Ongoing hemorrhage
  - PCV < 20%
  - Poor response to other fluids
  - Coagulopathies
- Rate – 0.5 ml/kg for the first 20 minutes, then 10-20 ml/kg IV up to 4 hours

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3. Fluid Therapy – Blood Transfusion

- Perform cross match
  - *Which species can forego an initial cross-match in truly emergent situations?*
- Collect blood, replace fluid, use anti-coagulant preservative
- Monitor for reactions
  - Acute hemolytic
  - Febrile non-hemolytic
- Recheck PCV/TS

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3. Blood Transfusion QUIZ!

- *What drug causes a time-dependent decrease in PCV/TS in ferrets, and therefore should be avoided for donor blood collection?*
  - Isoflurane
- *What is the amount of blood that can be safely collected from the donor?*
  - 1% of the body weight in grams (1 ml per 100 grams)
- *What is the most common anti-coagulant used in dog and cat blood transfusion medicine (abbreviation is ok)?*
  - CPDA (citrate-phosphate-dextrose-adenine)
- *What are some clinical signs of a transfusion reaction?*
  - Injected or pale mucous membranes, ↑ TPR, CRT < 1 sec, red/brown urine, agitated/comatose/lethargic mentation

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4. Analgesia – Intro and Sedation

- Benzodiazepines
  - Reversible, NOT analgesic
  - Sedative, anxiolytic, amnesic
- Opioids
  - Reversible, analgesic
- Other analgesics
  - Lidocaine
  - NSAIDs?

JAVMA

AVMA

Lidocaine constant rate infusion improves the probability of survival in rabbits with gastrointestinal obstructions: 64 cases (2012–2021)

Gail L. Huckins, DVM, DACZM[1,2*]; Chelsey Tournade, DVM[1]; Courtney Patson, DVM[1,3]; Kurt K. Sladky, MS, DVM, DACZM, DECZM[1]

4. Analgesia – Maropitant?

> Am J Vet Res. 2019 Oct;80(10):963-968. doi: 10.2460/ajvr.80.10.963.

Pharmacokinetics of maropitant citrate in New Zealand White rabbits (*Oryctolagus cuniculus*)

Sarah M Ozawa, Michelle G Hawkins, Tracy L Drazenovich, Philip H Kass, Heather K Knych

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Journal of Exotic Pet Medicine

Volume 47, October 2023, Pages 14-20

Research

Use of maropitant for pain management in domestic rabbits (*Oryctolagus cuniculus*) undergoing elective orchiectomy or ovariohysterectomy

Megan Roeder [a 1], Pedro Boscan [b], Sangeeta Rao [b], Laila Proença [c 2], William Guerrera [d 3], Maya Grayck [e], Megan Gish [e], Michelle N. Sullivan [f], Miranda J. Sadar [b]

ELSEVIER

Veterinary Anaesthesia and Analgesia

Volume 46, Issue 4, July 2019, Pages 476-482

RESEARCH PAPER

Evaluation of analgesic interaction between morphine, dexmedetomidine and maropitant using hot-plate and tail-flick tests in rats

Sandeep Raj Karna, Kavitha Kongara, Preet Mohinder Singh, Paul Chambers, Nicolas Lopez-Villalobos

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5. Nutrition – Basics

- Negative effects of anorexia
  - Compromise of gastric mucosa
  - Hepatic lipidosis as soon as 48 hours in chinchillas
  - Leads to GI ileus
- Euhydrated, euthermic
- Slow return to diet with anorexia
  - Refeeding syndrome?
  - Divided feedings

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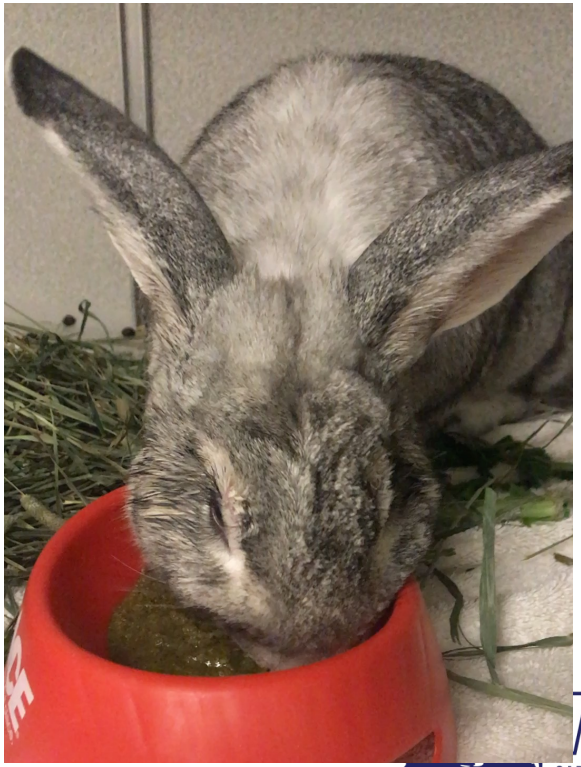
5. Nutrition – Metabolic Requirements

- RER = 70 x (body weight in kg)$^{0.75}$
- MER = Energy factor X RER
- Energy factor
  - Starvation: 0.5-0.8
  - Trauma: 1-2
  - Sepsis: 1.2-1.5
  - Growth: 1.5-3



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5. Nutrition – Diets

- Commercial powdered diets
- Herbivores – indigestible long fibers
- Ferrets (carnivore) – high protein and calorie-dense foods

Table 2
Nutritional requirement for adult rabbits and comparison between analytical constituents of rabbit prescription diets

Diet/Requirement	Protein (%)	Fat (%)	Crude Fiber (%)	Indigestible Fiber (%)	Energy	Crude Ash (%)
Requirement for adult rabbit	12–16	2.5–4	13–20	>12.5	NP	NP
Emeraid Herbivore	19	9.5	32	NP	1.2 kcal/g dry weight	—
Critical Care	16	3	21–26	NP	24 kcal/tbsp (9 g)	10
Critical Care Fine Grind	16	3	21–26	NP	24 kcal/tbsp	10

Proenca and Mayer, VCNA Exot Anim Pract, 2014. **17**(3):485-502

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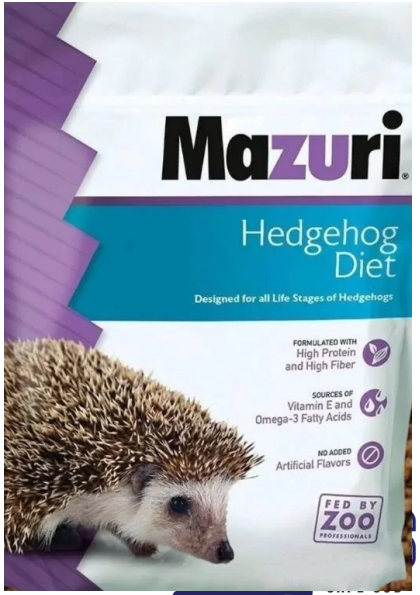
5. Nutrition – Diets

- *What about hedgehogs, rats, and sugar gliders?*



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- *What is this sugar glider eating?*

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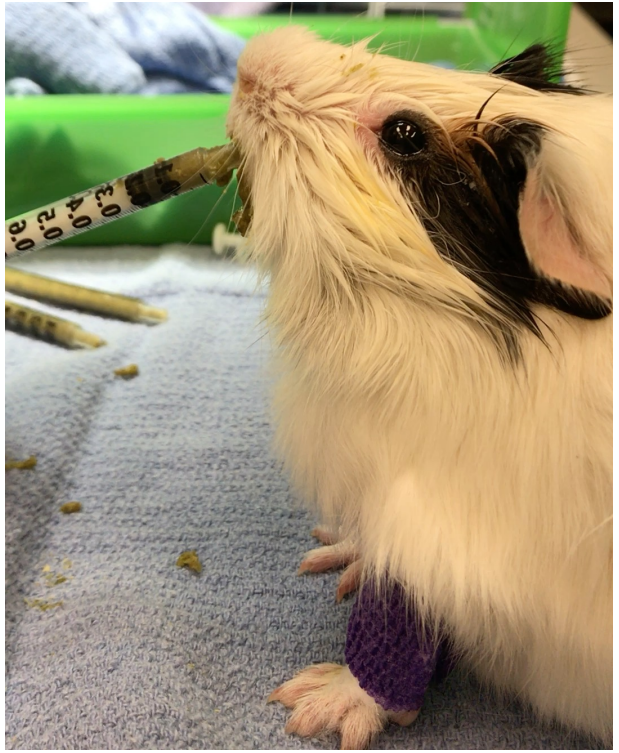
5. Nutrition – Routes

- Syringe feeding
  - 1 ml syringe in the interdental space
    - *Which animals have this space?*
  - Divided into 2-4 feedings
- Nasogastric tube
  - Short durations
  - Liquid diet, CRI or bolus feeding
- Esophagostomy tube
  - Weeks to months
  - Thicker diets, complications



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Additional Supportive Care

Antibiotics

- Septic shock or translocation
- **Stop using enrofloxacin**
- Routes – IV, PO, SQ
- *What antibiotics should be avoided in rabbits, guinea pigs, and chinchillas?*

Steroids?

- Immunosuppression
- Not recommended
- **EXCEPTION**
  - *Ferrets → what disease that is a common reason for emergency presentation? Most common clinical sign?*

Monitoring

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Lactate and Glucose

- Lactate
  - Increases with poor tissue perfusion
  - D- and L-lactate
  - Rabbits – prognosis (hypolactatemia)
- Glucose
  - Rabbits – prognosis, GI obstruction (hyperglycemia)
  - Ferrets – hypoglycemia
  - Laboratory analyzer more accurate
  - Portable devices → AlphaTrak Canine (ferret), AccuCheck Aviva for humans (rabbit)

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Blood Gas Analysis and Pulse Oximetry

- Blood gas analysis
  - Acidemia common
  - Electrolyte disturbances
    - Hyponatremia, ↑ BUN in rabbits
    - *Which species can vomit?*

- Pulse oximeter
  - Goal >96%
  - Vetcorder
  - Locations same as cats/dogs

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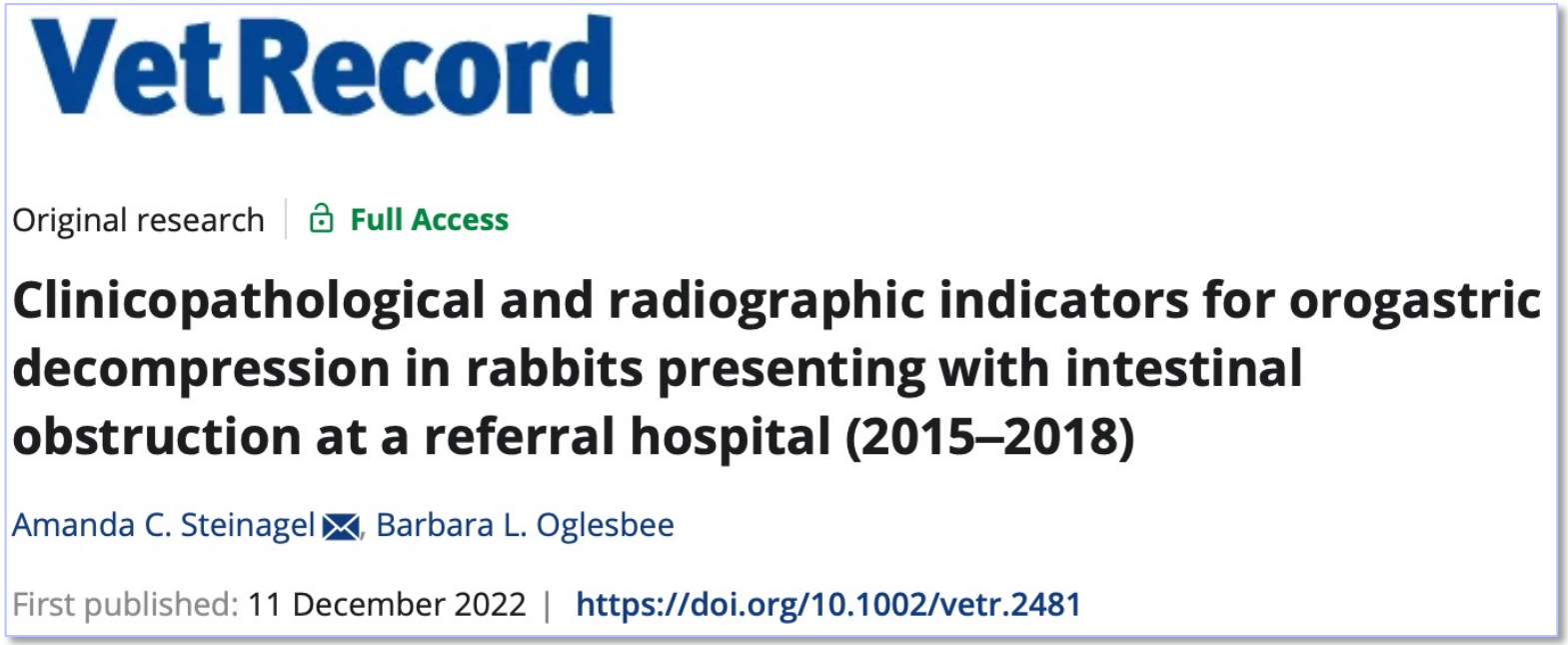
Hyperglycemia and Hyponatremia



Vet Record

Original research | Full Access

Clinicopathological and radiographic indicators for orogastric decompression in rabbits presenting with intestinal obstruction at a referral hospital (2015–2018)

Amanda C. Steinagel, Barbara L. Oglesbee

First published: 11 December 2022 | https://doi.org/10.1002/vetr.2481

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Blood Pressure and Urinalysis

- Blood pressure
  - Arterial > indirect
  - Doppler and oscillometric
    - Front limb > hindlimb
  - Monitor TRENDS
- Urinalysis
  - pH, ketones

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CPR

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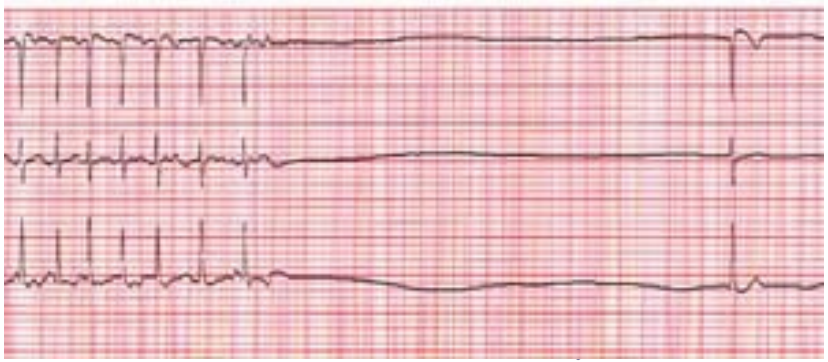
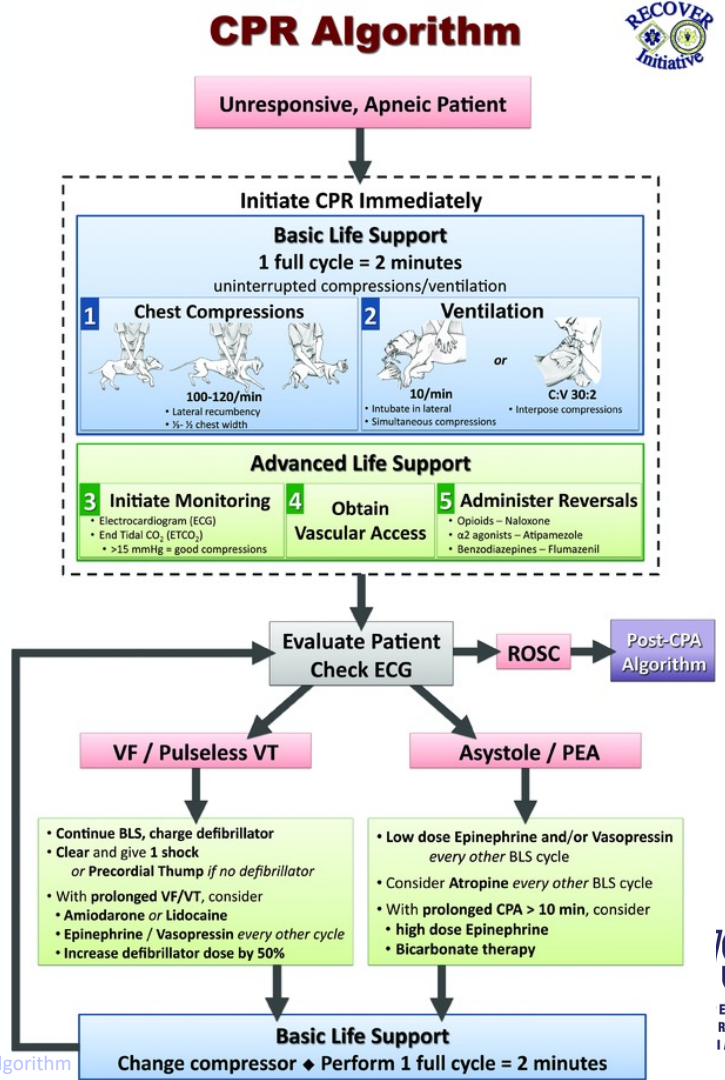
Recognition of Arrest

- Cardiac vs respiratory arrest
  - Respiratory arrest generally occurs first
  - *What if they're anesthetized?*
- Signs
  - Apnea
  - Unconsciousness or shift in mentation
  - Poor or dropped pulses
  - Pale to cyanotic mm



Basic Principles

- Communication is CRITICAL
- Identify a leader
- Roles
  - Obtain airway and ventilate
  - Catheter
  - Chest compressions
  - Attach monitoring
  - Record and time
  - Draw up medications
  - Inform owner



RECOVER CPR algorithm

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Use RECOVER to Record CPR Efforts

Standard Reporting of Small Animal Cardiopulmonary Resuscitation

RECOVER		
	Date: **Time:**	**Patient Name:** **MRN:**
	Doctor:	**Client Name:**
	Canine ☐ **Feline** ☐ **Chest Conformation:**	**Sex: FI** ☐ **MI** ☐ **FS** ☐ **MN** ☐
Time **HR MIN SEC**	**Round** ☐ **Keel** ☐ **Flat** ☐	**DOB (DD-MM-YYYY):** __-__-____ **Wt:** ___ **kg/lbs (circle one) Breed:** ___________

HR	MIN	SEC	
			Compressions started ☐ Not started because: DNR ☐ Futile ☐ Respiratory Arrest Only ☐ Arrest Witnessed (Y/N):
			Ventilation started ☐ ET Tube ☐ Size:__ Tracheostomy (Y/N):__ Mouth-to-snout (Y/N):__ Bag mask (Y/N):__ Laryngeal mask (Y/N):___
			Vascular Access ☐ IVC size:________ Location:___________ Peripheral ☐ Jugular ☐ Central ☐ IO ☐ Open chest (Y/N):
			CPR Stopped ☐ Reason: ROSC ☐ (Time:_____) Unresponsive to ALS ☐ Owner Decision ☐ Clinician decision ☐

Time HR	MIN	SEC	Monitoring	mmHg	EPI mL	ATRO mL	VASO mL	_____ mL	_____ mL	Route IV/IT/IO	DEFIB J	Open	Re-Arrest	Fluids Type/Rate/Dose
			PEA ☐ **Asystole** ☐ **VF** ☐ **VT** ☐ **Brady** ☐ **ROSC** ☐	CO2:								☐	☐	
			PEA ☐ **Asystole** ☐ **VF** ☐ **VT** ☐ **Brady** ☐ **ROSC** ☐	CO2:								☐	☐	
			PEA ☐ **Asystole** ☐ **VF** ☐ **VT** ☐ **Brady** ☐ **ROSC** ☐	CO2:								☐	☐	
			PEA ☐ **Asystole** ☐ **VF** ☐ **VT** ☐ **Brady** ☐ **ROSC** ☐	CO2:								☐	☐	
			PEA ☐ **Asystole** ☐ **VF** ☐ **VT** ☐ **Brady** ☐ **ROSC** ☐	CO2:								☐	☐	
			PEA ☐ **Asystole** ☐ **VF** ☐ **VT** ☐ **Brady** ☐ **ROSC** ☐	CO2:								☐	☐	
			PEA ☐ **Asystole** ☐ **VF** ☐ **VT** ☐ **Brady** ☐ **ROSC** ☐	CO2:								☐	☐	
			PEA ☐ **Asystole** ☐ **VF** ☐ **VT** ☐ **Brady** ☐ **ROSC** ☐	CO2:								☐	☐	

Time HR	MIN	SEC	Additional Notes (Drugs, lab tests, AFAST, TFAST)	Time HR	MIN	SEC	Additional Notes (Drugs, lab tests, AFAST, TFAST)

CPR Team	**Drug Concentrations:**	**Add'l Conc.**	**Fluids Used:**
Lead:	Epinephrine	____________:	Crystalloid:
Recorder/Drugs:	Atropine	____________:	Colloid:
Rotators (Airway/Vent, Compressions, Runner):	Vasopressin	____________:	Blood Prod:
ROSC >20min **Yes** ☐ **No** ☐ **Euthanized** ☐	Dextrose	____________:	________:

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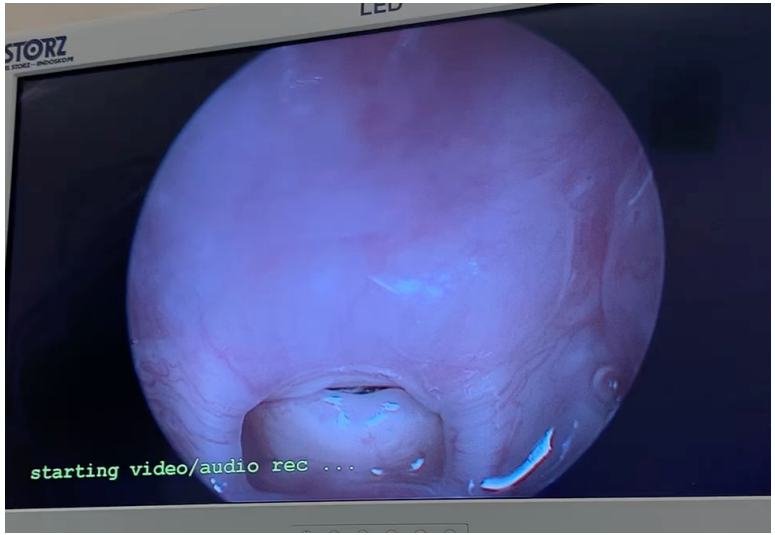
A = Airway

- Often difficult in small mammals
- Ferrets, hedgehogs = small cats
- Rabbits/guinea pig/chinchilla
  - Lidocaine
  - Laryngoscope to visualize
  - Stylet
  - Endoscope
  - Blind?



- *What is name of the structure in the mouth of this guinea pig? What other species also has this?*

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Can’t Intubate?

- Tight fitting mask
  - Can be effective → gastric tympany
- Supraglottic airway tube
- Tracheostomy

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Veterinary Anaesthesia and Analgesia

Volume 48, Issue 4, July 2021, Pages 517-523

RESEARCH PAPER

Evaluation of supraglottic airway device use during inhalation anesthesia in healthy African pygmy hedgehogs (*Atelerix albiventris*)

Gail L. Huckins, Grayson A. Doss, Tatiana H. Ferreira

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B = Breathing

- 20-30 breaths/min
- Hyperventilation
  - Decreases preload, cardiac output, coronary artery perfusion pressure
- Positive pressure ventilation
  - Lower pressure tolerated (<15 cm H2O)
- ETCO2
  - <10 mmHg associated with poor prognosis
  - >15-20 mmHg = goal

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C = Circulation/Compression

- Cardiac pump theory
- Dorsal or lateral recumbency
- Chest compressions
  - 100-130/min
  - 25-33% compression
  - 1:1 compression/relaxation
  - Location of the heart may be species-dependent
    - *Which species has a very caudally located heart?*

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D = Drugs

- Epinephrine
- Reversals
- Anticholinergics
  - Atropine
    - *Questionable in which species? Why?*
  - Glycopyrrolate
- Vasopressors
  - Vasopressin
  - Norepinephrine CRI

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Vascular Access

- Intravenous
  - Cephalic vein
  - Lateral saphenous vein
  - Rabbits – marginal ear vein
  - Rats – lateral or ventral tail
- Intraosseous
  - Tibial crest
  - Femoral trochanteric fossa
- Intratracheal if no vascular access

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Efficacy of CPR

- Monitor ETCO2
- Blood gas
  - Venous blood = oxygenation of peripheral tissues
- Regaining consciousness
  - Lack of immediate return ≠ neurologic impairment
  - Coma > 4 hours = grave prognosis
- Brainstem reflexes important
  - PLR absent > 1 day = grave prognosis
- Training and practice is crucial

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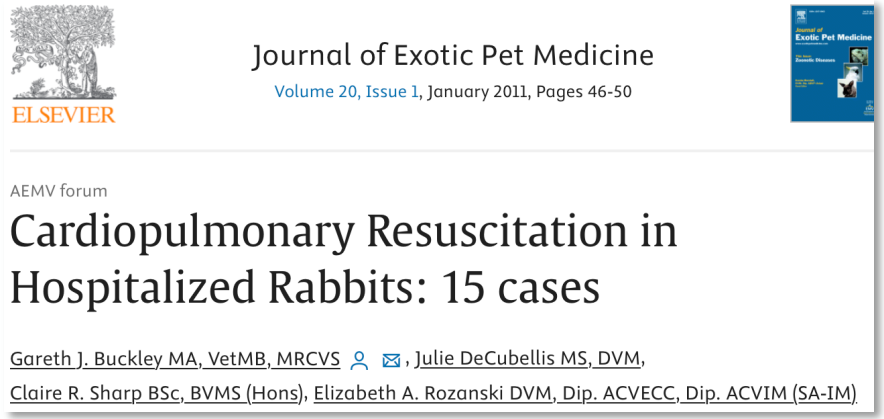
Prognosis of CPR in Exotic Mammals



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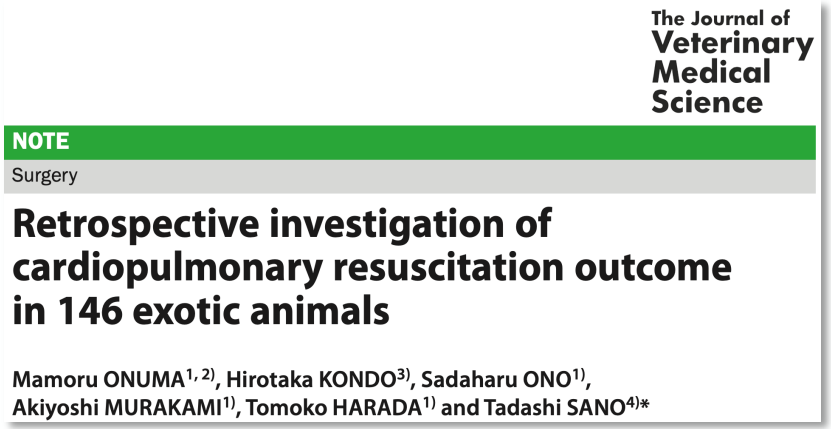
AEMV forum

Cardiopulmonary Resuscitation in Hospitalized Rabbits: 15 cases

Gareth J. Buckley MA, VetMB, MRCVS, Julie DeCubellis MS, DVM, Claire R. Sharp BSc, BVMS (Hons), Elizabeth A. Rozanski DVM, Dip. ACVECC, Dip. ACVIM (SA-IM)



The Journal of Veterinary Medical Science

NOTE

Surgery

Retrospective investigation of cardiopulmonary resuscitation outcome in 146 exotic animals

Mamoru ONUMA[1, 2], Hirotaka KONDO[3], Sadaharu ONO[1], Akiyoshi MURAKAMI[1], Tomoko HARADA[1] and Tadashi SANO[4]*

- ROSC 7/15
  - 5 with face-mask
  - 5 long-medium term survival
- Prognosis similar to cats/dogs

- Rabbit 15%
- Hamster, ferret 0%
- Other mammals 14.3%
- Discharge rate 1.2%

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Important Exotic Note

- You can be doing everything correctly for CPR in an exotic
- The odds are good they are going to die anyways
- HOWEVER …
    - **Our CPR efforts will be in vain if we do not provide thermal support during CPR**

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Preparing for Emergencies

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Equipment

- Crash cart
  - Syringes, needles, emergency drugs
  - Laryngoscope, ties
  - Ambu bag
  - ET tubes, v-gel
- Oxygen source
- IV catheter supplies, flush (**NO HEPARIN**)
- ECG, ETCO2, SPO2, Doppler
- Heat support
- Fluids, syringe pumps
- Red rubber catheters, polypropylene catheters

Cheat Sheets

- Have drug sheets available
  - Common calculations
  - Reversals
- Code status of the patient – get from owner immediately

- Sheets with normal parameters
  - Average weight
  - Heart rate
  - Respiratory rate
  - Rectal temperature
  - Shock fluid volumes

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Species	Avg Wt	Temp	HR	RR
Chinchilla	500-800g	94.8-100.2	200-240	40-80
Guinea pig	700-1000g	99.5-103.1	230-380	40-120
Hamster (golden)	80-150g	98.6-102.2	200-500	90-120
Rat	350-500g	98.6-103.1	250-450	70-120
Rabbit	1.5-6kg	100-104	130-325	30-60

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Species	LAGO	Animal Name		Scoopers		2.000	kg
		VMTH#					
	Atropine	0.1-0.5mg/kg					
Concentration	0.4	mg/ml		0.4000	mg	**1.000**	ml
Dose	0.2	mg/kg	SC				
	Epinephrine	0.01-0.02mg/kg IV, IT					
Concentration	1	mg/ml		0.0200	mg	**0.020**	ml
Dose	0.01	mg/kg	SC,IM,IV				
	Dopram	2-5 mg/kg SC, IV					
Concentration	20	mg/ml		10.0000	mg	**0.500**	ml
Dose	5	mg/kg	SC,IM				
	Glycopyrolate	0.01-0.02mg/kg				**PREMED**	
Concentration	0.2	mg/ml		0.0200	mg	**0.100**	ml
Dose	0.01	mg/kg	SC				
	Midazolam	0.5-2.0 mg/kg IM, IV, IP				**PREMED**	
Concentration	5	mg/ml		1.6000	mg	**0.320**	ml
Dose	0.8	mg/kg					
	Butorphanol	0.1-0.5 mg/kg SC, IM, IV					
Concentration	10	mg/ml		1.6000	mg	**0.160**	ml
Dose	0.8	mg/kg					
	Buprenorphine	0.01-0.05 mg/kg SC, IP, IV					
Concentration	0.3	mg/ml		0.0600	mg	**0.200**	ml
Dose	0.03	mg/kg					
	Oxymorphone						
Concentration	1	mg/ml		0.2000	mg	**0.200**	ml
Dose	0.1	mg/kg					

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QUESTIONS?

kyraberg@capecodvetspecialists.com

Dr. Berg's babies :)

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NOTICE

CE credit certificates & presentation slides will be emailed to you. If you do not receive an email with this information within a week, contact Nichole - *nicholemanfredi@capecodvetspecialists.com*

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