

Caring for the Neonatal Kitten

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Objectives

- Brief review of the “normal” neonatal kitten
- Brief review of common disease in neonates
- Care for the sick neonate
 - Thermoregulation
 - Fluid support/catheterization
 - Medication administration
 - Feeding
 - Blood transfusion
- Serial monitoring

Normal neonatal kitten

- Birth – 2 weeks = neonatal period
- 2-4 weeks = transition period
- >4 weeks = socialization/juvenile period
- Birth weight: 100 g +/- 10g
 - Best predictor of survival
 - Underweight if endocrinopathy, poor maternal nutrition, uterine crowding, congenital anomalies
 - Double weight in 10d (10-15g/day) if nursing



Normal neonate - Behaviors

- Sleep 90% of day (deep sleep only for 4 weeks)
- Standing by 10 days
- Able to learn by 3 weeks
- Eyes open at 10-14 days (cloudy cornea clears 24 hrs)
 - Corneal reflex present at birth
 - Menace--- learned after 3 weeks age+
 - PLRs difficult to assess until 21d old
 - Reflex lacrimation from time eyes open
- Reflexes
 - Born with righting, withdrawal, anal/urinary reflex
 - Suckling until 3 weeks age
 - Rooting reflex present at birth
 - Crossed extensors at birth → gone by week 2
 - Voluntary urination/defecation after 18-21 days

Normal neonate - thermoregulation

96-98°F week 1
99°F week 2
100.5°F week 3+

- Unable to shiver
- Impaired peripheral vasoconstriction
- Large body surface non-cornified skin
- Lack insulating fat
- Maintain 12°F greater than environment

Normal neonate - fluid balance

- 75% water with large body surface area non-cornified skin
- Nephrogenesis first 3 weeks life
 - Unable to concentrate urine
 - Highly susceptible to dehydration
 - Water turnover 2-3x of an adult
 - High normal BUN × 7d
 - spG 1.006-1.017
 - Mild glucosuria/proteinuria × 6 weeks



Normal neonate - development

- Decreased cytochrome P450 enzymes (liver) first 4 weeks
 - Abnormal bile acids
 - ALP elevation
 - Normal ALT
- GI tract sterile at birth
 - Colonized by bacterium from mother (E. coli, Proteus, Enterococcus, Lactobacillus, Clostridium, Bacterioides)
 - Stool yellowish-tan, soft
- Maternal immunity from colostrum within first 24 hours



Normal neonate - vitals

- Umbilicus fallen off by 3d post-birth
- RR= 30 by 3 hrs post-birth
- Mucous membranes
 - Dark pink/red for one week
 - Later pale pink (along with extremities)
- Heart rate/cardiac output/central venous pressure higher than adults
 - HR>250 bpm until at least 4 weeks age (No PNS tone)
 - No sinus arrhythmias
 - Heart murmurs innocent until 12 weeks age
- Blood pressure/stroke volume lower than adults



Normal neonate - diagnostics

- Blood sampling
 - Jugular venipuncture (hemolysis)
 - No alcohol (cooling)
 - 100 gm kitten blood volume= 6mL!
 - Hematoma formation
 - Significant loss blood
 - Obstruction airway
 - Less than 10% blood volume/24 hrs
 - 68-75ml/kg= blood volume



www.happycat.com

Normal neonate - diagnostics

- CBC
 - High red cell mass (MCV) and PCV (42%) at birth
 - PCV decrease to 24% by 8 wks (dilution by increased ECF)
- Serum chemistry
 - BUN high \times 7d \rightarrow then normal
 - Creatinine lower than adults
 - ALP elevated, ALT normal range
 - Phosphorus elevated
 - Normal electrolytes
- Urinalysis
 - Low spG \times 3 weeks
 - Proteinuria \times 6 weeks
 - Glucosuria \times 6 weeks



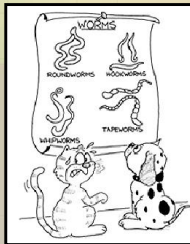
Normal neonate - diagnostics

- Radiographs hard to interpret
 - Size patient
 - Lack abdominal fat
 - Poor mineralization bones
 - Reduce KVP by 50% and detailed film/screens
- ECG
 - Lead II diagnose arrhythmias



Common illness of neonatal kitten

- Parasitism
 - Fecal-oral parasites (environment)
 - Transplacental transmission
 - Cause
 - Dehydration
 - Anemia
 - Diarrhea
 - Impaction
 - Neurologic disease (aberrant migration)



www.vchospitals.com

Common illness

- Septicemia
 - Bacteria enter from GI tract, respiratory tract, urinary tract, skin, umbilical cord
 - Predisposed by:
 - Inadequate colostrum
 - Hypothermia
 - Hypoglycemia
 - Poor nutrition
 - Viral infection
 - Endoparasitism
 - Mastitis/metritis in dam



Common illness

- Clinical signs septicemia
 - Prolonged crying
 - Restlessness
 - Weakness
 - Cyanosis or mucous membrane hyperemia
 - Discoloration/sloughing extremities



Common illness

- Fading kitten syndrome
 - Fail to gain weight, weak, die
 - No apparent reason
 - Look for underlying infection, congenital abnormalities, etc.



Common illness

- Neonatal isoerythrolysis
 - Type B dam with type A tomcat
 - Type A or AB kittens at risk (maternal anti-A antibodies)
 - Hemolysis from maternal antibodies
 - Anemia, icterus, nephropathy (secondary to pigmenturia), DIC
 - First signs hours to days after initial nursing



www.dr-saddle.com

Common illness

- Hypoglycemia
 - Inadequate nursing
 - Infrequent feeding
- Hypothermia
 - Lack of fat and thermoregulation
 - Temperature <93°F likely to die
- Dehydration
 - Diarrhea
 - Anorexia
 - Inadequate food intake



<http://cat-chitchat.pictures-of-cats.org>

Treatments for the neonate

1. Thermoregulation
2. Fluid support
3. Glucose supplementation
4. Antibiotics
5. Feeding
6. Blood products

Thermoregulation

- Hypothermia can be deadly
 - Below 94° F: weak suckling, hypomotile intestines, tachycardia
 - Below 85° F: GI stasis, chance bacterial translocation, decrease in heart rate, hypoglycemia
 - Below 70° F: motionless and appears dead, bradycardic, no pulse



Thermoregulation

- Rewarm slowly
 - Over 1-4 hrs (to 98-99°F)
 - Too quickly → increase metabolism and oxygen demand → excess water loss → hypovolemia and shock
- Increase body temperature
 - Heating blankets, hot water bottles, etc
 - Allow for neonate to move away from heat
 - Rotate every 10-20 minutes
 - Increase room temperature/remove drafts
 - Warmed fluids (95-98°F) IV or IO

Fluid support - crystalloids

Isotonic crystalloids (plasmalyte, LRS, or 0.9% saline)

- Give for resuscitation OR for dehydration
- Hypotension/hypovolemia
 - Bolus in 10 mL/kg aliquots → reassess after each bolus
 - Fluids warmed prior to administration
 - Up to a total of 60ml/kg (1 blood volume)

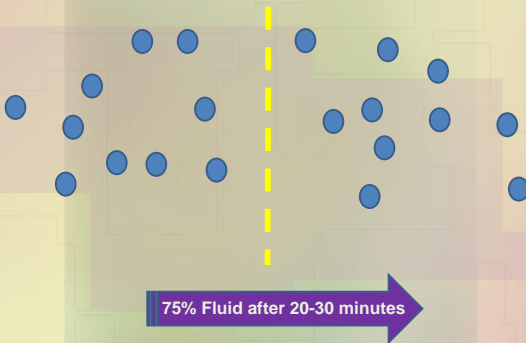
Fluid support - crystalloids

- If dehydrated, replace dehydration AND provide for daily maintenance fluid
 - Dehydration
 - Estimate percent dehydration \times body weight (kg) = deficit (L)
 - Maintenance fluids
 - $70(\text{wt in kg})^{0.75} + 20\text{ml/kg/day}$ = daily fluid requirement
 - Estimate 60-100mL/lb/day

Isotonic crystalloids

IV

ISF



Fluid support crystalloids

Example calculation 100g kitten 7% dehydrated:

100g = 0.1kg (1kg = 1000g)

Dehydration:

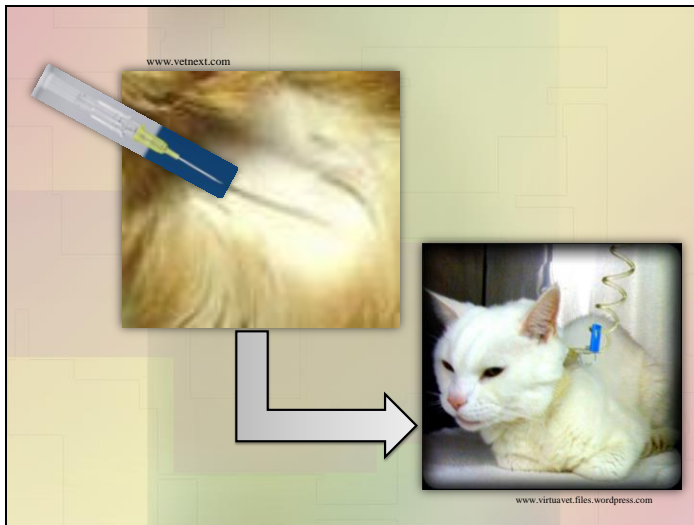
$$0.07 \times (0.1) = 0.007 \text{ L} = 7 \text{ mL}$$

Maintenance:

$$70(0.1)^{0.75} = 70 \times (0.18) = 12.4 \text{ mL/day}$$
$$20 \text{ ml/kg/day} = 20(0.1) = 2 \text{ ml/day}$$

} 14.4 ml/day or 0.6ml/hr

Total fluids = 21.4ml/day = 0.9 mL/hr for first 24 hours



Fluid support - routes

- Intraosseous catheter



Advantages of IO catheter

- Can place in ANY sized kitten
- Use hypodermic needles (22 or 25 ga.)
- Administer
 - Fluids
 - Blood products
 - Dextrose (diluted to at least 12.5%)
 - Antibiotics

Dextrose administration



- Give PO, IV or IO (not SQ!!)
- Orally
 - Via syringe
 - Via feeding tube
 - 0.25-0.5mL/100g of 5-10% solution dextrose
- IV or IO
 - Dilute to 12.5% solution (1:4 solution of 50% dextrose)
 - 0.1-0.2 ml/100g of 12.5% solution

Antibiotics

- Often for upper respiratory disease, neonatal septicemia
- Not for diarrhea (disrupt flora → worse diarrhea)
- Prefer parenteral administration if possible
- Penicillins, cephalosporins
- Avoid:
 - Aminoglycosides -- renal damage and ototoxicity
 - Tetracyclines – enamel hypoplasia
 - Chloramphenicol – bone marrow suppression
 - Fluoroquinolones -- damage to growing cartilage (moreso pregnant dams)



www.ppdugs.com

Antibiotics



www.safefetus.com

- Dosing:
 - Use 30-50% of adult dosage
 - Increased absorption (low serum albumin)
 - Altered drug re-distribution (water, fat percentages)
 - Few to no drugs evaluated for neonates
 - Limited to liquid formulations

Feeding

- Oral only if normothermic, suckling
 - Bottle feeding with commercial milk replacer
 - Use at manufacturer's suggested proportions

http://www.maddiesfund.org/Maddies_Institute/Videos/Orphaned_Kitten_Care_How_to.html



www.raising-happy-kittens.com

Feeding

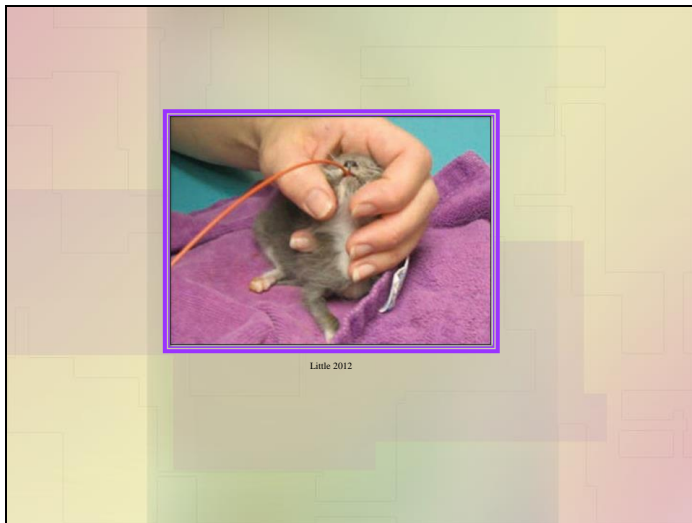
- Tube feeding
 - Risk of over-feeding
 - Oro-gastric
 - Nasogastric

Orogastric tube

- 5 Fr red rubber tube
- Measure from rostral aspect mouth to last rib
- Flex head forward and advance tube along roof of mouth
 - Small amount water to test tube placement
 - Often meow while feeding
 - No coughing while feeding
- Kink tube when remove (aspiration)
- Stomach capacity 4-5mL/100g




Lowchensustralia.com



Nasogastric tube

- More permanent feeding tube
- Continuous feeding
- No risk aspiration
- 3.5 Fr red rubber tube must fit into kitten's nose

Nasogastric tube



- Placement
 - Measure tip of nose to last rib – mark tube
 - Lidocaine into nostril
 - Feed tube through nostril to mark on tube
 - Initially tip nose downward
 - Raise head once tube into oropharynx
 - Suture into place
- Radiograph to test placement

How much to feed?

- Caloric requirements vary
 - 1-3 days old: 15 kcal ME/100 g body weight at 1–3 days old
 - > 6d age: 20–25 kcal ME/100 g body weight
- Water 13–22 ml/100 g wt per day
- In general feed
 - 10-15% of body weight as milk replacer day 0-7
 - 20-25% of body weight as milk replacer day 7-28
 - Less volume/day
 - Monitor body weight
 - Gain 10-15 g/day
 - Divide into feedings every 2-4 hours or feed continuously through NG tube
 - Stomach 4-5ml/100g capacity

Anemia



- Neonatal isoerythrolysis
 - Remove kitten from dam ASAP (<24 hrs)
 - Watch for developing anemia
- Parasitism (hookworms, fleas, etc)
- Blood transfusion
 - Weakness, tachycardia, PCV<15%
 - $$\frac{\text{Desired PCV} - \text{current PCV}}{\text{Donor PCV}} \times 100 \times \text{Wt (kg)}$$

Anemia

- Blood type kitten if >3d old (3 drops blood)
- Neonatal isoerythrolysis
 - First 3d life: use blood from dam
 - After 3d: use kitten type blood
- Give transfusion over 1-4 hours
 - Monitor kitten for transfusion reaction
 - Give IV, IO



Failure passive transfer

- Should receive colostrum within 18 hrs birth
- Problem in orphaned kittens

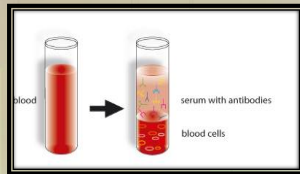


www.cattipper.com

- Kittens at risk for infection until >4 wks old

Failure passive transfer

- Give serum SQ from adult with compatible blood type
 - 15 mL/100g weight serum
 - Give SQ
 - Divide total into three injections (q 8 hrs)




http://212.227.241.121/images-international/media/ENG_090511/03_Blood.jpg

Monitoring

- PCV can be positively affected by treatments (deworming, transfusion)
 - Recheck PCV 2-4 hours after transfusion
 - No more often than q24 hrs
- Dehydration
 - Physical exam limited useful-ness
 - SpG <1.017

Monitoring

- Serial body weights critical!
 - Measure every 12 hours
 - 10-15g/day expected weight gain
- Stool color/consistency
 - Normal= pasty yellow/tan
 - Overfeeding= green/yellow/watery
 - White stools= liver disease, enzyme deficiency
 - Bloody stool= coccidia, sepsis
- Exhibit normal behavior





Thank you for your attention!!!

For Animal Care Staff and Volunteers:
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