



Critical Care of the Neonatal Kitten
Live Webcast Audience Questions and Answers
By Dr. Elizabeth Thomovsky
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Feeding/Nursing/Colostrum

- 1) **Q: Should you wake neonatal kittens to keep them on a feeding/hydration schedule?**

A: Yes. Normally they are awakened by other kittens or their mother and this stimulates them to suckle. We need to awaken them otherwise.

- 2) **Q: What is a good source of colostrum/bacterium for orphaned kittens? Are formulas that say they contain colostrum worth using for the first 24 hours? After 24 hours?**

A: The only reason to give colostrum is for the antibodies. When kittens don't ingest colostrum it is termed failure of passive transfer. The best source to replace the antibodies found in colostrum is using the serum injection that I talked about during the lecture: 15 mL of serum/100g of weight divided into 3 injections given every 8 hours.

- 3) **Q: How do you address normal bacteria colonization of the gut in neonatal kittens that are bottle raised?**

A: The kittens should pick up all the bacteria they require in their gut from the environment. If they are housed with other cats (it doesn't have to be their mother), they will pick up bacteria from the other cats and the feces of the other cats.

- 4) **Q: If we know they have had mother's milk for at least 24 hours, have they gotten enough for their immune system's viability?**

A: If they suckled what you believe is a normal amount for the first 24 hours, they do NOT have failure of passive transfer and do not require colostrum.

Thermoregulation/Heating

- 5) **Q: If a kitten comes in too cold and you want to increase their body temperature, is there a concern of raising the body temp too quickly?**

A: As I discussed on slide #22, you should raise their temperature slowly over 1-4 hours. Increasing temperature too quickly will increase their metabolic rate and energy demand and risk excessive water loss. All of these things can be detrimental.

- 6) **Q: Do you have any suggestions for a safe way of providing consistent heat without an actual incubator?**

A: Putting in warm or hot water bottles under blankets, covering the kittens, and raising the ambient room temperature into the mid-80s are all ways to increase the temperature of the kitten. Also, the warm water blankets – where water is heated in an attached unit and pumped into a rubber or plastic blanket/mat – provide consistent temperatures.

- 7) **Q: Since kittens lack significant cornified cells does this make them more prone to injury from warming methods? What is best?**

A: Kittens might be more at risk from burns from electric heating units. They are definitely more at risk from dehydration when heated too much. Always provide a way for the kitten to get away from the heat source. See #6 question above and slide #22 below for ways to heat kittens.

Slide 22

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

Respiratory Infection/Eye Infection

- 8) **Q: How do you prevent corneal adhesions during severe respiratory infections with severe ocular inflammation?**

A: If you are referring to a corneal ulcer, applying eye lubrication every 2-4 hours is required to treat ulcers. Your veterinarian can recommend a good eye lubricant and give guidance as to whether they would recommend antibiotic eye lubricants or just regular eye lubricants. Avoid any eye lubricant containing steroids, as this makes infections worse and retards corneal healing.

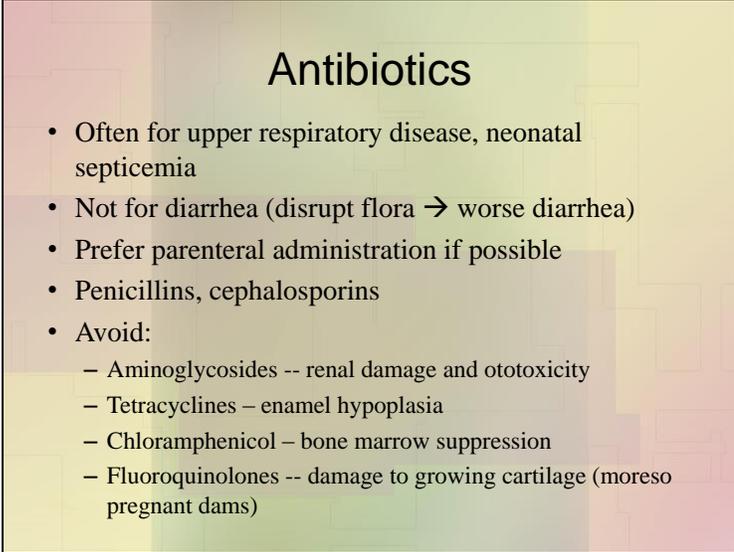
- 9) **Q: Are anti-virals a good idea in young kittens who may develop secondary infections from URI's? What about side effects?**

A: Most anti-virals are not tested and have no evidence that they work. They will not work in neonates who do not have a fully formed immune system and can only be considered in kittens greater than 16-20 weeks who have a fully functional immune system and are fully vaccinated. They could be detrimental in unvaccinated or very young kittens. I personally do not recommend them. Talk to your regular veterinarian to see if they have a different opinion. Most anti-virals have no side effects except not working.

10) Q: What are the appropriate medications/protocols for neonatal kittens that look like they have URI? What is the earliest age that oral antibiotic can be safely given to a neonatal kitten with severe URI?

A: Antibiotics can be given as young as 2 weeks of age, if necessary. See slide #35, 36 below for antibiotics to avoid and dosing suggestions. Using oral antibiotics at very young ages will risk diarrhea or destroying gut flora, so use them judiciously. Upper respiratory infections are viral first and only have secondary bacterial components; thus, in many cases, supporting the kittens with nutrition, heat support, and fluids will allow them to get over the infection without the need for antibiotics or with only short courses of antibiotics.

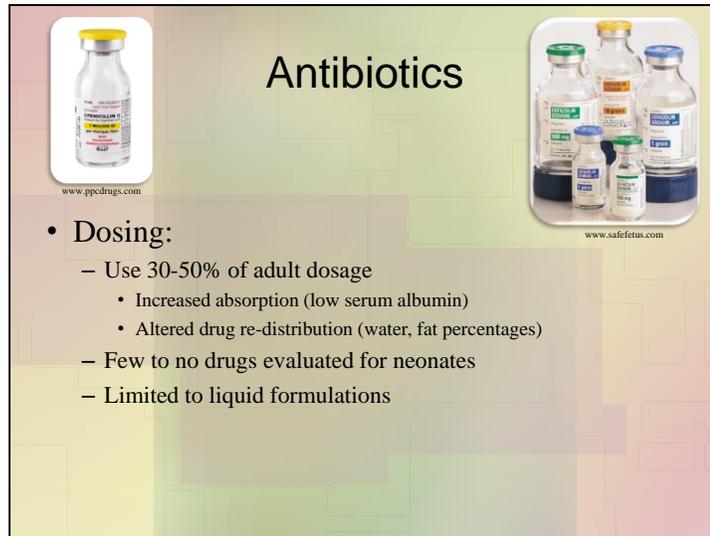
Slide 35



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)

Slide 36

The slide features a central title 'Antibiotics' in a large, bold, black font. To the left of the title is a single vial of antibiotic with a yellow cap and a white label, with the URL 'www.ppcdrugs.com' below it. To the right of the title is a group of several different antibiotic vials in various sizes and colors (green, blue, white), with the URL 'www.safefetus.com' below them. Below the images and title is a bulleted list under the heading 'Dosing:'.

Antibiotics

- **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

Antibiotics

11) **Q: Would you recommend nebulizing antibiotics? If so, which antibiotics are acceptable?**

A: Gentamicin is the only recommended antibiotic for nebulization. I do not have any experience with doing this and cannot recommend a dose or frequency; however, you can discuss this with your regular veterinarian.

12) **Q: What antibiotic protocols do you recommend when using IO catheters?**

A: The same antibiotics using IV can be used IO. Same dosing and frequency of dosing.

13) **Q: What about azithromycin for neonates? (Thinking about URI).**

A: Save this drug for adult cats or don't use it at all. Not evaluated in neonates.

14) **Q: What about sulfa drugs orally in neonates?**

A: Not evaluated in neonates. Avoid oral drugs as much as possible due to the effects on the gut bacteria.

15) **Q: Can't the fluorquinolones cause blindness in kittens?**

A: Blindness has only been noted in adult cats. Fluoroquinolones are not recommended in neonates due to cartilage defects.

- 16) **Q: You advise against tetracycline. I have heard many speakers state that doxycycline does not have the calcium chelation properties of tetracycline, and are not contraindicated in young animals. Any comments on that?**

A: Any tetracycline, including doxycycline, can have effects on the enamel and can cause enamel hypoplasia. I would avoid tetracyclines in any form in neonates until the teeth are fully formed and erupted.

- 17) **Q: What dose would you use of Covenia?**

A: This drug has not been evaluated in neonates, so I would not use it.

Probiotics

- 18) **Q: When do you recommend the use of probiotics such as FortiFlora or Benebac? Should they be used to prevent or combat diarrhea?**

A: Probiotics can be used either as a preventative or treatment for diarrhea. However, they have not been evaluated in neonates, so I can't comment on the efficacy. In neonates, it is much more important to ensure proper deworming for parasites first before trying a probiotic since most diarrhea is due to parasites until proven otherwise in neonates.

Parasites

- 19) **Q: What do you recommend as a deworming protocol for neonates? How early is it acceptable/recommended to deworm neonates? What medications? And how much?**

A: Deworming can start as soon as 2-4 weeks of age. Typically Strongid is used first and is given at a dose of 1 ml per 5 lbs. of weight. Repeat every 2 weeks until the kitten is 6-10 weeks of age. Do not deworm a severely debilitated kitten. Make sure that they are getting appropriate nutrition and not dehydrated before you deworm them.

- 20) **Q: Is ponazuril safe for use in severe cases of coccidiosis? Dosing?**

A: I have never used this drug, so I cannot comment on it personally. It appears that some practitioners have tried it and find it useful. Talk to your regular veterinarian to see if this is a drug that they would recommend and for dosing recommendations.

- 21) **Q: How do you address fleas in neonatal kittens, particularly a bad infestation? At what age can we use flea treatments like Frontline on kittens?**

A: Frontline is only labeled for cats 8 weeks and older. Capstar can be used on kittens 4 weeks of age (and 2 lbs.+). Capstar will only kill fleas on the cat at that time and has no residual activity; therefore, it must be given repeatedly.

I would also recommend environmental cleanup including: vacuuming and throwing out the bag immediately after vacuuming, washing bedding with bleach and area treatments in between periods where cats are housed in the area.

- 22) **Q: Mom has tapeworms and is due to deliver in one week. Can she be treated? What about the kittens when they are born? Also, generally, what is the youngest age you can treat for tapeworm?**

A: I would speak to your veterinarian to see what they typically use for deworming for tapeworms and have your veterinarian look at the product insert to see if there are any specific comments about deworming a pregnant animal. Dewormers are usually safe for animals greater than 4 weeks of age, but again, read the product insert for your particular dewormer of choice to see.

- 23) **Q: I was under the impression that on the contrary to dogs, ascarids (roundworms) do not cross the placental barrier during gestation in cats. Could you confirm?**

A: I believe that kittens typically get ascarids while suckling from their dam or interacting otherwise with fecal contamination (fecal-oral) rather than transplacentally.

Aspiration Pneumonia

- 24) **Q: What is the treatment for aspiration pneumonia in a nursing neonatal kitten?**

A: If that occurs (which is almost unheard of in a kitten suckling on its own), it is treated like any pneumonia with antibiotics IV or IO initially, IV fluids and nebulization. Some cats also need oxygen support.

Fading Kitten Syndrome

- 25) **Q: Are there early signs to look for in a kitten that suddenly begins to fade?**

A: Not gaining weight like the remainder of the litter, not suckling on its own or not suckling enough volume.

- 26) **Q: If the kitten is doing fine and playing, eating and voiding then suddenly is thin, weak and gone - is that fading kitten or is that something else?**

A: It is impossible to tell fading kitten syndrome in many cases from sepsis, severe parasitism, another infection, or whatever in many cases. Necropsy might help you to know for sure.

- 27) **Q: How old of a kitten can “fading kitten syndrome” affect? Is this only a neonate issue?**

A: Neonates up to 3-4 weeks of age are usually referred to as ‘fading kittens’ but there are so many diseases that are called fading kitten syndrome (perhaps mistakenly) that it is impossible to know in many cases why these cats die.

Defecation /Diarrhea/GI Tract

28) Q: How do you treat rectal prolapse in a neonatal kitten?

A: The rectum can be gently replaced using a blunt instrument such as the cap of a syringe. In some cases the kitten needs a purse-string suture to keep the tissue from prolapsing again for at least a few hours. All kittens with prolapse should be dewormed.

29) Q: Round, over-extended bellies in neonatal kittens with diarrhea: what are your first thoughts? Parasites? If you were to pull a chylous (white) type fluid from the belly what could this be?

A: I always think of parasites first. Any fluid in the abdomen makes me think of FIP second. I would always do a fluid analysis on any free fluid to help confirm the diagnosis since peritonitis, chylous effusions, heart failure, etc. can possibly occur in kittens too.

30) Q: Which therapeutic approach do you recommend when a kitten presents white feces?

A: I would perform diagnostics looking at liver function (chemistry panel, bile acids) to rule out liver disease. (This is after making sure that the kitten is receiving appropriate nutrition.)

31) Q: Last year we saw a couple of neonates who were doing well but suddenly presented with foul-smelling cloudy liquid diarrhea. One died within 24 hours of presentation. No diagnosis. Any insights?

A: I would always think of parasitism first when there is diarrhea. Viral diseases such as panleukopenia will also present with diarrhea and sudden death as well. Necropsies can help future kittens coming from the same source.

32) Q: Any advice for diet if there is diarrhea?

A: With neonates, they require mother’s milk or formula. There is not a lot that can be changed in the diet until they are eating solid food.

Urination

33) Q: Why do some healthy-seeming kittens under the age of 3 weeks have very dark or very yellow urine? Is this a sign of dehydration?

A: I would check the urine specific gravity (which should be very dilute) to see if there is indication of dehydration and a urine dipstick to see if there is a reason for the color change. I expect pale yellow urine in neonates and young kittens.

SQ Fluids/IV Fluids/ IO Catheter/Dehydration

34) Q: What is recommended protocol for SQ fluid therapy for dehydrated kittens, including volume, duration, type of fluids, needle size, etc.?

A: SQ fluids do not have a specific dose but I would expect 5-10 mL per day is all that most small neonates can tolerate. SQ fluids are absorbed very slowly in most cases so giving them more than once a day is not efficacious. I use any crystalloid fluid but LRS has the least tendency to sting. Use whatever needle size allows you to give the fluids efficiently (probably 22 ga). Give in several locations if necessary to reduce significant skin stretching.

35) Q: What is your preferred venous access for fluids in neonates? And, what do you think of the intra-rectal route for rehydration?

A: I will use cephalic or jugular, whichever my technicians can get for me. If they cannot get a vein, I use an IO catheter. I have not used intra-rectal for rehydration, so I cannot comment.

36) Q: Is skin turgor a reliable indicator of dehydration in a neonatal kitten? How do you calculate the percent that the kitten is dehydrated?

A: Skin turgor is not reliable, because kittens have much more skin elasticity than adults. You have to take an educated guess to come up with your dehydration percent. It is hard to over-hydrate, so I would err on the side of over-estimating rather than underestimating. If you think on a PE that a kitten is dehydrated, it is probably at least 7% dehydrated.

37) Q: Can you put TPN or PPN thru an IO catheter?

A: No. The osmolarity will lyse bone marrow precursor cells.

Tube Feeding

38) Q: Do you have any opinion on nasogastric vs. nasoesophageal tubes? Pros and cons?

A: NG tubes are good if you want to suction out the stomach and have a decreased chance to induce vomiting/regurgitation (the stomach is a better food depot than the esophagus). However, NG tubes might lead to a greater chance of esophagitis due to keeping the lower esophageal sphincter open. NE tubes do not risk esophagitis due to opening of the LES. There is a greater chance of regurgitation with NE tubes, especially if too much food is fed too fast.

I personally use NG tubes unless my tube is too short to reach the stomach, at which point I use NE tubes.

39) Q: Is this proportion for stomach capacity the same for cats? 4-5ml/100g

A: Yes.

Hypoglycemia/Sugar Levels

40) Q: Where are you sticking the kittens for small things such as PCV's and TP's, glucose tests, etc., if you want to preserve veins?

A: We use the jugular vein or draw back from a catheter placed in a jugular vein. If you draw back from a jugular catheter, take out approximately 0.5 mL, hold that in a syringe, and draw your sample. Then give the 0.5 mL back to the kitten and flush the catheter. You can also use ear veins for the glucose testing if you see vessels in the ears.

41) Q: Is karo syrup on the gums at all useful for increasing blood glucose?

A: Yes. It is just difficult to predict how much sugar will be absorbed if the kitten is hypovolemic or vasoconstricted (i.e., there is decreased blood flow to the gums). I use karo syrup while waiting to get my catheter placed.

42) Q: Can you give dextrose IP if you can't get into a vein or bone?

A: No, it is too caustic and will cause peritonitis. You can coat the mucous membranes with karo syrup or dextrose (undiluted) in a pinch.

Blood Sampling/Diagnostics

43) Q: Given dangers of blood sampling, at what age should we do routine screens e.g., for FIV/FelV?

A: The timing of this testing has more to do with when the test can diagnose these diseases than the age of the kitten. FeLV is an antigen test so it can be performed any time after 4 weeks and will directly identify the viral antigen. FIV is an antibody test and can cross-react with maternal antibodies. To be sure that a positive FIV test is for real, it should not be performed until 16-20 weeks when you are sure maternal immunity has gone. That is why any positive FIV test performed sooner than 16 weeks should be rechecked when the cat is greater than 16 weeks.

44) Q: Has the use of washed RBCs been attempted in kittens with neonatal isoerythrolysis?

A: I have not seen this in the literature, so I don't think so.

Blood Transfusion/Serum

- 45) **Q: How do you do a blood transfusion without blood typing or products? (From one cat to another.)**

A: You should always know the blood type of the donor and recipient so you don't kill a type B cat by giving it type A blood. It takes 3 drops of blood to do a typing card. You should also at least know that the donor does not have FeLV/FIV or a blood-borne parasite, such as mycoplasma hemofelis.

You can draw blood directly from the donor into a syringe with anticoagulant and give it to the kitten.

- 46) **Q: Can we store serum?**

A: I have not seen a study proving that serum retains its antibody function after being frozen or refrigerated, so I do not know. To be safe, it is best to draw the serum from a healthy cat the day you want to administer it. It is ok to refrigerate the 2nd and 3rd aliquot of serum to give to the kitten later that day but do not store the serum longer than 24 hours.

- 47) **Q: How would you know to give serum to FPPT? How do you surmise that clinically?**

A: By definition, if there is failure of passive transfer, the kittens have not gotten colostrum (and antibodies) and need the serum to provide the antibodies they did not ingest in the first 24 hours after birth.

- 48) **Q: Which precautions should we take when selecting a cat as a serum donor for kittens that haven't received colostrum?**

A: The donor should be healthy, fully vaccinated, and free of any blood-borne diseases such as mycoplasma felis or FeLV/FIV.

Miscellaneous

- 49) **Q: Do you see cleft palate very often and how would you recommend caring for this kitten?**

A: I have not seen cleft palate for years but it does still exist and should be checked for. Soft palate kittens will require surgery to close the defect (sometimes multiple surgeries) when they are older and can tolerate anesthesia. They require orogastric feeding initially to bypass the defect and will eventually need a feeding tube to bypass the defect until it can be surgically addressed. They should not be allowed to eat orally (or suckle), because the defect will lead to milk aspiration into the nasal passages and irritation and infection in the nasal passages. They can also aspirate the milk into the lungs.

50) Q: I have had 1 week old kittens that pant, but the room is not too hot. What does panting mean?

A: I have not seen this before, so I do not know. I would suspect they are breathing with an open mouth because they require oxygen therapy (i.e., have lung or thoracic cavity disease) or are in shock and need fluids and dextrose.

51) Q: How old do the kittens need to be before we can use normal drug calculations?

A: Normal drug calculations are usually after 12-16 weeks of age.

52) Q: Can you use any systemic antiviral medicine such as Famvir?

A: I have never used this medication and cannot comment on it. I would talk to your regular veterinarian and see if they can shed any light on the use of this medication.

53) Q: Is there a difference in the size of the molecules between hetastarch and Vetstarch?

A: VetStarch has a smaller average molecular size than hetastarch. It also has a more uniform particle size than hetastarch. As a result, it is a stronger colloid than hetastarch but has a shorter half-life.

54) Q: What specifically causes the sloughing of the extremities, septicemia?

A: The skin and extremities slough due to decreased perfusion and oxygen delivery to those tissues. When the animal is septic, they are vasodilated and blood does not perfuse those tissues adequately. The tissues become necrotic and eventually will slough if the animal doesn't die from the septicemia first.