

UNDERGRADUATE C.A.T END OF LECTURE SERIES ESSAYS – 9TH MAY 2013 - ANSWER GUIDE

QUESTION ONE – 20 MARKS

1. You are the doctor in the newborn unit and you are called to receive a baby in the maternity theatre.

A. What is the single most important ingredient for this resuscitation to be successful? (2marks)

Preparedness

B. You are alone. List what you will require for this resuscitation. (8-marks)

1. Warmth – close the windows, source of heat e.g. heater or a resuscitaire with a radiant warmer
2. Adequate lighting
3. Surface to resuscitate – resuscitaire or firm surface
4. Gloves
5. 2 warm towels
6. Suction tube with a working suction machine
7. Working 500ml ambubag (bag valve device)
8. Varying sizes of masks (for preterm and term babies)

C. You have set up and are ready to receive the baby. A term baby is delivered through thick meconium. As the cord is being cut, the baby makes no cry. Outline the sequence of resuscitation in this neonate. Note that throughout this resuscitation you are alone and the baby does not breathe. (9 marks)

Full marks are awarded if well done and half marks if attempted. Sequence should be followed (in this scenario – it is imperative that the meconium is cleared from the airway before drying the baby)

- i. In a warm, adequately lit safe setting, glove and receive the baby using one of the dry towels and place the baby on the resuscitaire. [1 mark]
- ii. BEFORE THE FIRST BREATH AND BEFORE DRYING OR STIMULATING - Look into the mouth and suction any meconium in the airway under direct visualization. [1 mark]
- iii. Dry and Stimulate the baby as you observe color, tone, activity and cry. Change the towel and wrap the baby in a dry warm towel leaving the chest exposed. [1 mark]
- iv. Airway - Look into the mouth and clear the airway if secretions are present. Open the airway to the neutral position using the head tilt chin lift maneuver [1 mark]
- v. Breathing - Look, listen and feel for breathing for 5 seconds [1 mark]

This neonate is not breathing.

1. CALL for HELP [1 mark]

2. Size mask appropriately and use 500ml BAG VALVE MASK (AMBUBAG) to give 5 INFLATION BREATHES [1 mark]
3. then proceed to give 30-50 ventilations in one minute [1 mark]
4. RE-ASSESS the airway and breathing. Continue with 30-50 ventilations every 1-2 minutes and then reassessment until help arrives. [1 mark]

D. Help finally arrives. You manage to resuscitate this neonate successfully and the baby is transferred to the new born unit for further management. The main issue the baby has is respiratory distress. What is the most likely diagnosis? (1 mark)

- Meconium aspiration syndrome.

QUESTION TWO – 20 MARKS

2. Fatma, a 4 month old girl (5kg) is brought to the pediatric outpatient clinic by her mother with complaints of cough, hotness of body and difficulty in breathing for 3 days. You observe that she is alert, sitting on her mother's lap breastfeeding. On rapid assessment you note that she has no noisy breathing. She is breathing at a rate of 63/minute, has no grunting, head nodding or central cyanosis. Lower chest wall indrawing is present however there is no deep acidotic breathing. Crepitations are heard bilaterally on auscultation. Rhonchi (wheeze) are absent.

A. What would you do at this point? (2 marks)

- i. Give oxygen via a nasal catheter/nasal prongs at 0.5-1L/min which delivers about 30-35% of oxygen. [1 marks]
- ii. Proceed to assess circulation. [1 mark]

B. No other issues are identified in your rapid assessment. What would your working diagnosis be at this point and why? Give the appropriate classification. (4 marks)

i. Severe pneumonia. [2 marks]

Reason: The child has hotness of body, cough and difficulty in breathing for 3 days with tachypnea and lower chest wall indrawing but is alert, able to breastfeed and has no grunting, head nodding or central cyanosis. [2 marks]

C. List the interventions/key strategies for protecting, preventing and treating children under 5 years with this condition in order to improve child survival. (12 marks)

* Global action plan for prevention and control of pneumonia (GAPP)

i. Protect (5 marks)

1. Promote exclusive breastfeeding for 6 months. [1 mark]

C.P

P/D

2. Adequate nutrition throughout the first five years of life, including adequate micronutrient intake. [1 mark]
3. Reduce incidence of low birth weight. [1 mark]
4. Reduce indoor air pollution. [1 mark]
5. Hand washing. [1 mark]

ii. Prevent (4 marks)

1. Vaccination against measles, pertussis, *Streptococcus pneumoniae* and *Haemophilus influenzae* type B. [1 mark]
2. Prevention of HIV in children. [1 mark]
3. Cotrimoxazole prophylaxis for HIV -infected children. [1 mark]
4. Zinc supplementation in children with diarrhea. [1 mark]

iii. Treat (3 marks)

1. Improved care seeking and demand generation within communities. [1 mark]
2. Health facility case management for very severe cases and vulnerable groups such as newborns, HIV -infected and malnourished children. [1 mark]
3. Increasing access to appropriate care through community-based case management. [1 mark]

D. Write out the definitive treatment plan for Fatma. (2 marks)

- i. Oxygen via a nasal catheter/nasal prongs at 0.5-1L/min [1 mark]
- ii. IV Crystalline penicillin 250,000 IU q6h [1 mark]

QUESTION THREE – 20 MARKS

3. Njoroge, a 2 and a half year old boy, (now 16kg), presents with generalized body swelling.

A. What are the 3 main systems that could be affected? Give one example in each system listed. (6 marks)

- i. Cardiovascular – congestive cardiac failure [2 marks]
- ii. Renal – nephrotic syndrome, acute glomerulonephritis, acute kidney injury, chronic renal failure [2 marks]
- iii. GIT – liver failure, protein losing enteropathy, severe acute malnutrition (kwashiakor) [2 marks]

B. On taking history, Njoroge had been previously well with normal growth. The body swelling began 1 month ago and has been progressive. Systemic complaints are minimal

and on examination, he is alert, has no pallor, jaundice, cyanosis or dehydration. His vital signs are within normal. Serum albumin is 15g/l. What one additional investigation would you do to clinch your diagnosis? Indicate the cut-off. (2marks)

- i. Spot urine protein: creatinine ratio $>200\text{mg}/\text{mmol}$ OR proteinuria $>50\text{mg}/\text{kg}/24\text{hrs}$ or $>1\text{g}/\text{m}^2/24\text{hrs}$ or $>40\text{mg}/\text{m}^2/\text{hr}$.
[No mark for protein 3+/4+ on dipstick]

C. Njoroge has no blood in his urine macroscopically, RBC casts and blood are absent on microscopy, and 900mg of protein are reported from his 24 hour urine sample. What are the possible causes for his condition? Give one example for each cause listed. (8marks)

- i. Idiopathic - unknown [2 marks]
- ii. Infections – Group A beta hemolytic Streptococcus, Hepatitis B,C, HIV, CMV, EBV [2 marks]
- iii. Systemic diseases – connective tissue disorders e.g. SLE, malignancies e.g. Hodgkin's lymphoma [2 marks]
- iv. Drugs/ Heavy metal poisoning – mercury [2 marks]

D. What is the most likely histological diagnosis for Njoroge's condition? (2 marks)

- i. Minimal change nephrotic syndrome.

E. How would you know if Njoroge was responding well to the appropriate treatment? (2marks)

- i. Remission is achieved when urine protein is 0/trace for 3 consecutive days within the first 4 weeks of appropriate treatment (prednisolone at $2\text{mg}/\text{kg}/\text{day}$).

QUESTION FOUR – 20 MARKS

4. Onyango, a 3 year old boy who recently traveled from Kisumu is brought to the pediatric outpatient clinic by his father with complaints of fever and respiratory distress for 2 days. You observe that he is drowsy and does not respond to your stimulation so you quickly transfer him to an emergency setting. On rapid assessment, his airway clear and you open it into the sniffing position. He is breathing at a rate of 52/minute, has no grunting, head nodding, central cyanosis or lower chest wall indrawing. Deep acidotic breathing is present but there are no crepitations or rhonchi (wheeze) heard on auscultation. You give oxygen via a face mask at 5-6L/min.

A. On assessing his circulation, his peripheries are warm, radial pulse is easy to feel, capillary refill time is 1 second and he has severe palmar pallor. What would you do at this point? Give reasons why (3 marks)

- i. Fix an IV line and take a blood sample for urgent group and cross match for blood transfusion. [1 mark]

Reason: The child has features of respiratory distress which are probably due to the severe anemia and thus this child would require the blood transfusion as an emergency. [2 marks]

- B. On assessing disability, the child is noted not to respond to pain appropriately, is unable to sit up or drink. Blood glucose is 1.8mmol/l. What would you do at this point? The child weighs 15kg. (3 marks)

- i. Give 75ml of 10% Dextrose over 5 minutes [2 marks]
- ii. Re-assess Airway together with Breathing and then Circulation [1 mark]

- C. Once you have stabilized the child, you proceed to take a history and examination and follow up investigations done. A blood slide done for malaria parasites comes back positive. ^{What would be the diagnosis be at this point} Classify and give reasons why. (4 marks)

- i. Severe malaria [1 mark]

Reason: The child has features of hotness of body with a history of recent travel to a malaria endemic area on examination respiratory distress, severe anemia, inability to drink /sit and AVPU at U. [3 marks]

- D. Draw and describe the life cycle of Plasmodium falciparum. Indicate where the drug used in Onyango's treatment as per our current protocol works. (10 marks)

1. Plasmodium-infected Anopheles mosquito bites a human and transmits sporozoites into the bloodstream. [2 marks]

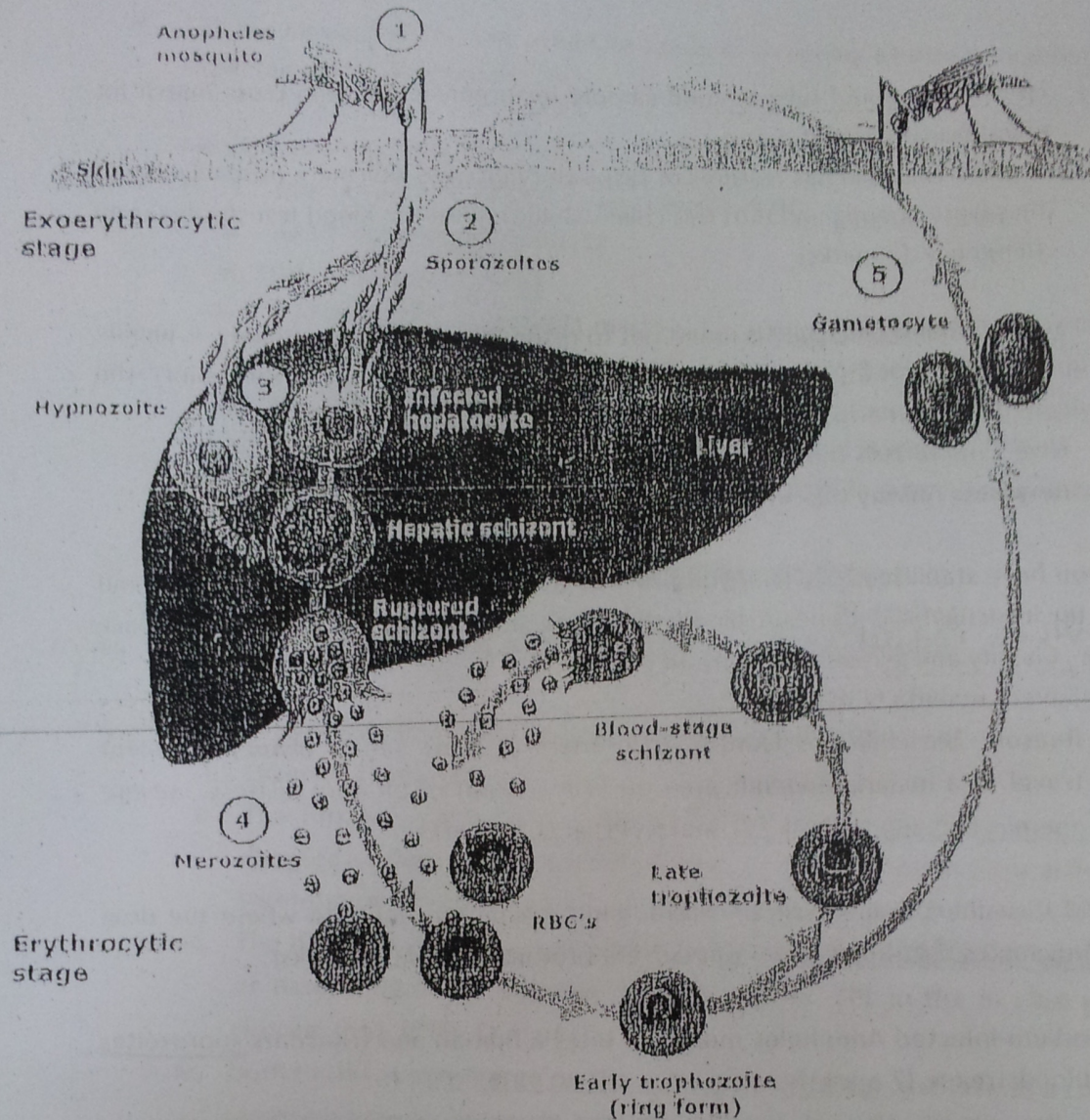
2. Sporozoites migrate through the blood to the liver where they invade hepatocytes and divide to form multinucleated schizonts (pre-erythrocytic stage). [2 marks]

3. The schizonts rupture and release merozoites into the circulation where they invade red blood cells. Within red cells, merozoites mature from ring forms to trophozoites to multinucleated schizonts (erythrocytic stage). [2 marks]

- Correctly notes that Quinine works at this stage (erythrocytic stage) [1 mark]

4. Some merozoites differentiate into male or female gametocytes. These cells are ingested by the Anopheles mosquito and mature in the midgut, where sporozoites develop and migrate to the salivary glands of the mosquito. The mosquito completes the cycle of transmission by biting another host. [2 marks]

Diagram [1 mark]



QUESTION FIVE -- 20 MARKS

5. Mutiso is a 6-year-old boy who presents with painful swelling and bleeding into the ankle joint after being hit by one of his friends as they were playing football. He is unable to bear weight on this limb. This is his second episode of bleeding into this joint. There is no history of bleeding into the skin or mucosae (no epistaxis or gingival/buccal bleeding). Family history reveals that his maternal uncle experienced severe bleeding when he underwent circumcision.

A. What is the most likely diagnosis? (1 mark)

i. Hemophilia (1 mark)

B. How is this condition inherited? (1 mark)

i. X linked recessive [1 mark]

C. List the investigations that would be useful in screening Mutiso's condition. Include the expected findings. (6marks)

Award 1 mark for any 6.

- i. Hemogram – normal platelet count [1 mark]
- ii. APTT – prolonged [1 mark]
- iii. INR – normal [1 mark]
- iv. Bleeding time – normal [1 mark]
- v. Thrombin time – normal [1 mark]
- vi. Von Willebrand Factor – normal [1 mark]
- vii. Risocetin-induced platelet aggregation – normal [1 mark]
- viii. Factor VIII or Factor IX assay – low in Hemophilia A and B respectively [1 mark]

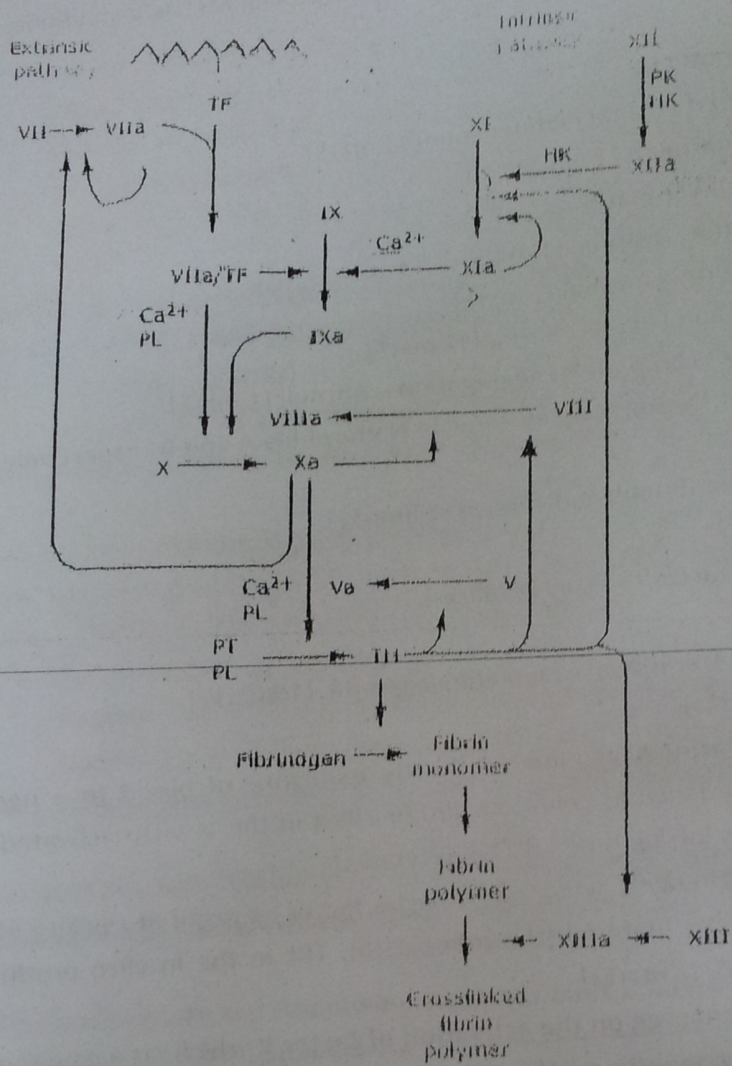
D. What test would give a definitive diagnosis? (2marks)

i. Factor VIII or Factor IX assay [2 marks]

E. Draw and describe the traditional coagulation cascade. [10marks]

- i. Diagram [2 marks]
- ii. The intrinsic pathway is initiated by the exposure of blood to a negatively charged surface (such as celite, kaolin, or silica in the in vitro activated partial thromboplastin clotting time [aPTT]). [2 marks]
- iii. The extrinsic pathway is activated by tissue factor exposed at the site of injury or tissue factor-like material (thromboplastin, TPL in the in vitro prothrombin clotting time [PT]). [2 marks]
- iv. Both pathways converge on the activation of factor X which, as a component of prothrombinase, converts prothrombin to thrombin, the final enzyme of the clotting cascade. [2 marks]
- v. Thrombin converts fibrinogen from a soluble plasma protein into an insoluble fibrin clot. [2 marks]

P.T.O



HK: high-molecular-weight kininogen

PK: prekallikrein

PL: phospholipid

PT: prothrombin

TH: thrombin.