Neonatology – DCH Teaching

Dr Shukri Raban
Outline

- Learning objectives
- Core material references
- Core topics
- Case presentations
- Questions
Learning objectives

- To be proficient in neonatal resuscitation
- To be able to manage and discharge a normal TERM infant
- To have the theoretical and practical knowledge of the common neonatal problems as discussed in core material
- To be proficient in the management of neonatal emergencies and routine neonatal care
Core Material References

- PEP Newborn Care manual
- Tygerberg neonatal handbook
- Red Oxford book
- Internet resources
Core Topics

- Examination of newborn and gestational age scoring of the newborn
- Resuscitation of the newborn
- Feeding term and preterm infants
- Fluid management
- Thermoregulation
- Sepsis – diagnosis and management
- Approach to a baby that has ‘collapsed’
- Congenital infections (TORCH – prevention, recognition and management)
- Respiratory Distress – differential diagnosis MAS, PPHN, HMD (pathophysiology, natural history, management), pneumothorax and Wet lung Syndrome
- Jaundice (pathophysiology and management)
- HIE
- Glucose control
- PDA
- Apnoea
- KMC
Examination of the newborn

- History
  - maternal background
  - pregnancy
  - labour and delivery
  - infant at delivery
  - infant since delivery
Examination of the newborn

- Examination
  - measurements
  - general inspection
  - regional examination
  - neurological status
  - examination of the hips
  - examination of the placenta (if available)
  - assessment
Examination of the newborn

### Maturation Assessment of Gestational Age (New Ballard Score)

<table>
<thead>
<tr>
<th>NAME</th>
<th>SEX</th>
<th>HOSPITAL NO.</th>
<th>BIRTH WEIGHT</th>
<th>RACE</th>
<th>LENGTH</th>
<th>DATE/TIME OF BIRTH</th>
<th>DATE/TIME OF EXAM</th>
<th>AGE WHEN EXAMINED</th>
<th>EXAMINE</th>
<th>APGR SCORE: 1 MINUTE</th>
<th>5 MINUTES</th>
<th>10 MINUTES</th>
</tr>
</thead>
</table>

#### Neuromuscular Maturity

<table>
<thead>
<tr>
<th>NEUROMUSCULAR MATURITY SIGN</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>RECORD SCORE HERE</th>
<th>RECORD SCORE HERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTURE</td>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /></td>
<td><img src="image3" alt="Image" /></td>
<td><img src="image4" alt="Image" /></td>
<td><img src="image5" alt="Image" /></td>
<td><img src="image6" alt="Image" /></td>
<td><img src="image7" alt="Image" /></td>
<td><img src="image8" alt="Image" /></td>
<td><img src="image9" alt="Image" /></td>
</tr>
<tr>
<td>SQUARE WINDOW (Wrist)</td>
<td><img src="image10" alt="Image" /></td>
<td><img src="image11" alt="Image" /></td>
<td><img src="image12" alt="Image" /></td>
<td><img src="image13" alt="Image" /></td>
<td><img src="image14" alt="Image" /></td>
<td><img src="image15" alt="Image" /></td>
<td><img src="image16" alt="Image" /></td>
<td><img src="image17" alt="Image" /></td>
<td><img src="image18" alt="Image" /></td>
</tr>
<tr>
<td>ARM RECOIL</td>
<td><img src="image19" alt="Image" /></td>
<td><img src="image20" alt="Image" /></td>
<td><img src="image21" alt="Image" /></td>
<td><img src="image22" alt="Image" /></td>
<td><img src="image23" alt="Image" /></td>
<td><img src="image24" alt="Image" /></td>
<td><img src="image25" alt="Image" /></td>
<td><img src="image26" alt="Image" /></td>
<td><img src="image27" alt="Image" /></td>
</tr>
<tr>
<td>POPITEAL ANGLE</td>
<td><img src="image28" alt="Image" /></td>
<td><img src="image29" alt="Image" /></td>
<td><img src="image30" alt="Image" /></td>
<td><img src="image31" alt="Image" /></td>
<td><img src="image32" alt="Image" /></td>
<td><img src="image33" alt="Image" /></td>
<td><img src="image34" alt="Image" /></td>
<td><img src="image35" alt="Image" /></td>
<td><img src="image36" alt="Image" /></td>
</tr>
<tr>
<td>SCARF SIGN</td>
<td><img src="image37" alt="Image" /></td>
<td><img src="image38" alt="Image" /></td>
<td><img src="image39" alt="Image" /></td>
<td><img src="image40" alt="Image" /></td>
<td><img src="image41" alt="Image" /></td>
<td><img src="image42" alt="Image" /></td>
<td><img src="image43" alt="Image" /></td>
<td><img src="image44" alt="Image" /></td>
<td><img src="image45" alt="Image" /></td>
</tr>
<tr>
<td>HEEL TO EAR</td>
<td><img src="image46" alt="Image" /></td>
<td><img src="image47" alt="Image" /></td>
<td><img src="image48" alt="Image" /></td>
<td><img src="image49" alt="Image" /></td>
<td><img src="image50" alt="Image" /></td>
<td><img src="image51" alt="Image" /></td>
<td><img src="image52" alt="Image" /></td>
<td><img src="image53" alt="Image" /></td>
<td><img src="image54" alt="Image" /></td>
</tr>
</tbody>
</table>

#### Physical Maturity

<table>
<thead>
<tr>
<th>PHYSICAL MATURITY SIGN</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>RECORD SCORE HERE</th>
<th>RECORD SCORE HERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKIN</td>
<td>sticky, friable, transparent</td>
<td>gelatinous</td>
<td>translucent</td>
<td>smooth, pink</td>
<td>visible veins</td>
<td>superficial</td>
<td>cracking</td>
<td>parched</td>
<td>deep cracking</td>
</tr>
<tr>
<td>LANTUGO</td>
<td>none</td>
<td>sparse</td>
<td>abundant</td>
<td>thinning</td>
<td>bald areas</td>
<td>mostly bald</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLANTAR SURFACE</td>
<td>heel toe 40-50 mm: 1 no crease</td>
<td>&gt;50 mm no crease</td>
<td>faint red marks</td>
<td>anterior creases</td>
<td>only</td>
<td>creases, ant. 1/3</td>
<td>creases over entire sole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BREATH</td>
<td>imperceptible</td>
<td>barely perceptible</td>
<td>flat areola</td>
<td>no bud</td>
<td>stopped areas</td>
<td>1-2 mm bud</td>
<td>3-4 mm bud</td>
<td>5-10 mm bud</td>
<td>full areola</td>
</tr>
<tr>
<td>EYE/EAR</td>
<td>lid's fused loosely</td>
<td>lid's open</td>
<td>pinna flat</td>
<td>shiny</td>
<td>pinna flat</td>
<td>soft</td>
<td>slow roll</td>
<td>well-curved</td>
<td>pink</td>
</tr>
<tr>
<td>GENITALS (Male)</td>
<td>scrotum flat, smooth</td>
<td>scrotum empty</td>
<td>taint</td>
<td>rugae</td>
<td>testes</td>
<td>few rugae</td>
<td>testes</td>
<td>down</td>
<td>good rugae</td>
</tr>
<tr>
<td>GENITALS (Female)</td>
<td>clitoris prominent</td>
<td>clitoris small</td>
<td>labia</td>
<td>pinna</td>
<td>labia majora</td>
<td>prominent</td>
<td>clitoris &amp; minora</td>
<td>clitoris &amp; minora</td>
<td>prominent</td>
</tr>
</tbody>
</table>

### Total Neuromuscular Maturity Score

**Total Neuramuscualr Maturity Score**

### Total Physical Maturity Score

**Total Physical Maturity Score**

### Gestational Age

- Score: Neuromuscular
- Score: Physical
- Total Score: Physical

### Maturity Rating

<table>
<thead>
<tr>
<th>SCORE</th>
<th>WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>40</td>
<td>42</td>
</tr>
<tr>
<td>50</td>
<td>49</td>
</tr>
</tbody>
</table>
Resuscitation of a newborn

Birth

Term gestation? Breathing or crying? Good tone?

Yes, stay with mother

Warm, clear airway if necessary, dry, stimulate

HR below 100, gasping, or apnea?

No

Labored breathing or persistent cyanosis?

No

Clear airway SpO₂ monitoring Consider CPAP

Targeted Preadult SpO₂ After Birth

- 1 min: 60%-65%
- 2 min: 65%-70%
- 3 min: 70%-75%
- 4 min: 75%-80%
- 5 min: 80%-85%
- 10 min: 85%-95%

Routine care

- Provide warmth
- Clear airway if necessary
- Dry
- Ongoing evaluation

Postresuscitation care

© 2010 American Heart Association
Feeding – Breast is best

- Benefits of breastfeeding
  - provides all nutrients in correct amount and proportion for normal growth and development
  - easily digested and absorbed
  - clean and warm
  - anti-infective factors
  - decreases risk of allergy
  - decreases incidence of gastroenteritis
Feeding – Breast is best

- cheaper
- instantly available
- encourages bond between mother and child
- helps involution of uterus
- lose excessive weight gained in pregnancy
- exclusive bf acts as contraceptive
- may reduce the risk of breast cancer
Breastfeeding problems

- What should you do if the infant refuses the breast?
- What causes the infant to choke while feeding?
- How should you manage swollen or painful breasts?
  - normal full breasts
  - engorged breasts
  - mastitis
- How do you prevent painful nipples?
- How should you treat painful nipples?
Thermoregulation

- Normal axillary temp 36.5 – 37
- Normal abdominal skin temp 36 – 36.5
- Oral temp 37 – 37.5; rectal 37.5 – 38 (seldomly used)
- How do newborns produce heat?
  - non shivering thermogenesis (brown fat)
Thermoregulation

- Mechanism of heat loss
  - convection
  - conduction
  - evaporation
  - radiation
Thermoregulation

- Hypothermia
  - abdominal temp < 36 or axillary <36.5
- Less than 35 DANGER!!!
- Infants at risk
  - preterm
  - iugr
  - wasted infants
  - septic
  - hypoxic
- Prevention
Infections

- Components of immune system
  - Humoral / antibodies
  - Cellular / lymphocytes
  - Phagocytic cells
  - Complement system

- Why do newborn infants become infected?

- How do prevent infection?
Infections

- Minor infections
  - conjunctivitis
  - umbilical cord infections
  - skin infections

- Major infections
  - Septicaemia
  - pneumonia
  - meningitis
  - Necrotising enterocolitis
Congenital infections

- HIV and syphilis the most common
- Others: CMV, Rubella, herpes, Toxoplasmosis
Congenital infections

The following may be present with any of the congenital infections:

- Growth restriction
- Hepatosplenomegally
- Jaundice (conjugated)
- Anaemia
- Thrombocytopenia
- Petechiae
- Microcephaly
- Chorioretinitis
- Hydrops (non-immune)
- Skin rash
- Bony changes
Congenital infections

- The following point to more specific infections:
  - **Rubella**: PDA and cataracts
  - **Toxoplasmosis**: Generalised intracerebral calcifications and hydrocephalus
  - **CMV**: Periventricular calcifications and microcephaly
  - **Syphilis**: Large placenta, rash on palms and soles, snuffles

- Growth restriction alone with no other signs is NOT an indication for investigation for congenital infection
- Try and get the PLACENTA sent for histology!!
Respiratory distress

- Any 2 or more of
  - tachypnoea
  - central cyanosis
  - recession
  - grunting
Respiratory distress

- Causes
  - Pulmonary
    - HMD
    - Wet lung syndrome
    - Meconium aspiration
    - Pneumonia
  - Non pulmonary
    - Pneumothorax
    - Heart failure
    - Hypothermia
    - Metabolic acidosis
    - Anaemia
    - Polycythaemia
HMD

- 3 major problems
  - generalised alveolar collapse
  - collapsed alveoli fill with protein rich fluid that forms hyaline membranes
  - spasm in the pulmonary art results blood shunted away from lungs
  - results in resp failure
HMD

- Natural history (in the absence of surfactant)
  - RDS worsens & the fiO2 requirement increases for the first 2-3 days after birth.
  - thereafter RDS improves and oxygen requirements decrease

- Diagnosis

- Management
Wet lung syndrome

• Commonest cause of RDS

• Delay in the clearance of lung fluid

• Natural history
  - may mimic HMD in first few hours after delivery
  - rapid improvement within 24 hrs

• Diagnosis

• Management
Meconium aspiration

- Pathogenesis
- Diagnosis
- Management
Jaundice

Bilirubin Metabolism

R.E. System

Catabolism of Effete RBC

Biliverdin

Bilirubin

Serum Albumin

Ligandin

Glucuronosyl Transferase

Enterohpatic Circulation Bilirubin

Bilirubin Glucuronide

α Glucuronidase

Bilirubin

Fecal Bilirubin

Urobilinogen (Minimal)

Early Peak

Ineffective Erythropoiesis - Bone Marrow

Tissue Heme

Heme Proteins

Liver

R.E. System

Heme Oxygenase

75% Heme

25% Heme
Jaundice - causes

- Physiological vs pathological

- Increased production of bilirubin
  - normal infants with high haemoglobin concentrations
  - Cephalohaematoma or bruising
  - polycythaemia
  - haemolysis
  - infection
Jaundice - causes

- Slow bilirubin conjugation in liver
  - normal healthy term infants have slow conjugation
  - preterm infants
  - cong hypo thyroidism

- Decreased excretion of bilirubin
  - normal term infants have decreased excretion as they reabsorb unconjugated bili from gut
  - hepatitis
  - biliary atresia and any other obstructive liver disease
Apnoea

- Definition
- Central vs Obstructive
Apnoea

- Causes
  - apnoea of prematurity
  - RDS
  - infection
  - hypoxia, hypothermia and hypoglycaemia
  - hyperthermia
  - IVH
  - reflux
  - convulsions
Apnoea

- Management
  - treat underlying cause
  - ABC
  - CPAP
  - caffeine
Hypoxia Ischaemia

Anaerobic Glycolysis → ATP depletion → Impaired Na/K ATPase

Presynaptic Na+ Influx → Membrane Depolarisation → Glutamate Release

Adenosine

Hypoxanthine

VSCC + NMDA + AMPA

Influx Intracellular $\text{Ca}^{2+}$

Activates Proteases

Activates Lipases

Activates NOS

Liberates intracellular $\text{Ca}^{2+}$

Nitric Oxide

FFA → Arachidonic acid

Prostaglandins, leukotrienes, thromboxane

Nitric Oxide

Free iron released from Ferritin and Transferrin

Free iron

Xanthine OXidase

Hypoxanthine

Xanthine

O$_2$
Hypothermia as Neuroprotector

- Decreased brain temp by 2 - 4°C protects
- Earlier initiation = shorter required duration
- 6hrs is maximal delay = 72 hours cooling
Physiology of Hypothermia

- Metabolic Depression – mimics nature.
- Specific Inhibition of Apoptosis.
- Improved protein synthesis.
- Energy conservation - preservation of ATP.
- Inhibition of Glutamate release.
- Decreased intracellular acidosis and lactic acidosis.
- Reduced Nitric Oxide production.
- Decreased free radical generation.
- Reduced Blood-brain barrier breakdown.
- Decreased inflammatory response.
Potential side effects of hypothermia

- Increased pulmonary vascular resistance
- Viscosity $\uparrow$ 2-4% per $1^\circ$C
- Left shift oxygen dissociation curve and $\downarrow$PCO$_2$
- Inhibited ADH secretion – cold diuresis
- Reduced tubular reabsorption of Sodium
- $\uparrow$ PT, PTT and Thrombin times
- Reversible reduction in no. of circulating wbc.
- Decreased wbc chemotactic and phagocytic activity
- Pancreatitis
What is KMC?

- Caring skin-to-skin low birth weight (LBW) babies
- It promotes
  - Effective thermal control
  - Breast feeding
  - Prevention of infection
  - Parental bonding
Components of KMC

1. Skin-to-skin contact
   Early, continuous and prolonged skin-to-skin contact

2. Exclusive breast feeding
   Promotes lactation and facilitates feeding
Pre-requisites of KMC

1. Support to the mother
   - In hospital &
   - At home

2. Post-discharge follow-up
Benefits of KMC to the baby

- **Breast feeding**
  - Increased breast feeding rates
  - Increased duration of breast feeding

- **Thermal control**
  - Effective thermal control
  - Equivalent to conventional incubator care in stable babies
Benefits of KMC to the baby

- **Early discharge**
  - Better weight gain leads to early discharge

- **Lesser morbidity**
  - Regular breathing
  - Less apnea
  - Protection from nosocomial infections
Benefits of KMC to the mother

- Stronger bonding with the baby
- Deep satisfaction
- More confident parents
Origin and Structure

- From 6\textsuperscript{th} week of fetal life it carries 90% of RV output
  = 60% of total cardiac output.
  (only 10% of RV output goes to lungs)

- Prostaglandin E\textsubscript{2} produced in the ductal wall maintains patency
- Sensitivity to PGE\textsubscript{2} decreases with increasing gestational age.

- At term, in utero, diameter = 10mm = aortic diameter

- Histology:
  Thick intima
  Internal elastic lamina between intima and media
  Media = thick smooth muscle in a spiral helix
  (clockwise & anticlockwise)
Ductal closure

- **Last trimester:**
  Intimal mounds on the surface of the pulmonary end of the lumen.

- **At birth – increased Oxygen:**
  Intimal-medial disociation
  Smooth muscle constriction,
  Migration of smooth m. cells
  Cysts & nodules in inner medial layer
  Mounds increase in size

- Functional closure: 82% by 48hrs
- Anatomic closure: 66% by 4 wks

What may happen if the Duct does not close?

- **Cardiovascular Effects**
  - Low Blood pressure ("steal" from aorta)
  - Renal failure – Steal via aorta
  - Gut ischaemia, NEC – Steal
  - PVL – Steal
  - IVH – steal/reperfusion

  More blood returning to left ventricle
  → Heart failure

- **Respiratory effects**
  - Increased blood flow to lungs
  - Stiff lungs
  - pulmonary Haemorrhage
What are the signs of a PDA?

- Low Blood Pressure
- Full Pulses, Murmur (late)
- Wide pulse pressure (late, > 1000g)
- Active praecordium
- Tachycardia (late = ccf)
- Increased vascularity on cxr+cardiomegaly, big liver
- Tachypnoea, Rescession
- Pulmonary Haemorrhage
- Stuck on ventilator
- Apnoea
- High CO2
- Persistant Acidosis
Management of PDA

- Controversial
- Conservative vs medical
Questions

March 2008

**Question 1 (Paper III)**

- An infant weighing 1.3 kg is born vaginally with Apgar scores of 8 and 9 at 1 and 5 minutes respectively. The infant is noted to have “respiratory distress”. His respiratory rate is 70/min and he is grunting. His mother had an uneventful pregnancy but did not “book” at a clinic.
  a) How would you assess the infant’s gestational age? (1)
  b) List THREE physical (external) criteria used to evaluate an infant’s gestational age. (3)
  c) List THREE differential diagnoses for the “respiratory distress” other than hyaline membrane disease. (3)
  d) The infant’s gestational age is estimated to be 30 weeks. She is thought to have hyaline membrane disease.
  e) Describe the natural history of hyaline membrane disease. (3)
  f) Describe the pathophysiology of hyaline membrane disease. (4)
  g) List THREE likely findings on the chest X-ray of this baby. (3)
  h) Describe SEVEN key principles in the management of this infant. (7)
- The infant is noted to be jaundiced on day 2 of life; the total serum bilirubin is 183 μmol/l (conjugated fraction 5 μmol/l).
  i) What are the possible causes of the jaundice and briefly outline your management? (6)
On day 5 the infant is noted to have bounding pulses, a gallop rhythm, a loud systolic murmur and an enlarged liver.
i) What is the likely problem? (2)
j) How would you manage this new problem in the infant? (2)

The mother’s blood results come back as RPR positive.
k) How would you manage the mother and the infant in this regard? (3)

The infant is discharged 33 days after birth.
l) What follow-up arrangements should be made for this infant at discharge? (3)
Sept 2008

Question 1 (PaperII)
Write short notes on
The pathophysiology and management of physiological jaundice of the neonate. (10)

Question 4 (PaperII)
Write short notes on
a) Community-based antenatal interventions that could potentially improve birth weight and prevent prematurity. (10)
Question Three (Paper III)

You are working as a medical officer in the neonatal nursery of a large peri-urban regional hospital. The nursery has 26 beds, including 4 ICU and 6 high care beds, and caters for 12,000 deliveries per annum, so the nursery is regularly overcrowded. The low birth weight rate is 21% and the perinatal mortality rate (PNMR) in the hospital is 46.3/1000.

a) Define “perinatal mortality rate”. (2)
b) Comment on the PNMR in your hospital. (1)
c) What is the difference between the perinatal and neonatal mortality rate? (2)
d) What is the significance of the two rates (i.e. what do they indicate) and what benefit can be derived from monitoring them both? (4)
e) List THREE likely major causes of neonatal mortality at this hospital. (3)

You recently noticed an increase in the number of cases of neonatal sepsis in your nursery with an associated rise in the mortality rate. You are concerned about nosocomial infections and wish to establish an infection control and surveillance system for the nursery.

f) How do you define nosocomial infections? (2)
g) Why is a neonatal nursery in a regional hospital a high risk area for nosocomial infections? (5)
h) Describe, briefly how would you implement an infection control and surveillance system? (5)
Your surveillance system identifies a cluster of Klebsiella infections and the hospital manager invites an outside investigation into the outbreak. The investigators report identify the following factors as contributing to this outbreak – inappropriate admissions leading to overcrowding, understaffing and a breakdown in infection control practices. These have been compounded by contaminated feeds and the use of multidose vials in the nursery. You are asked to respond to the report.

i) Tabulate the different categories of newborn babies in your hospital and identify what facilities you require for the accommodation and care of each category. (5)

j) Which babies require admission to a neonatal nursery? (2)

k) What basic infection control practices will you reinforce in the unit to reduce nosocomial Klebsiella infections? (5)

l) How will you control the preparation and administration of milk feeds to reduce the incidence of contamination? (2)

m) How do you suggest the use of multidose vials be optimised in the nursery? (2)
March 2009

- Write short notes on
  b) The merits and weaknesses of the Growth monitoring and promotion strategy as practiced at the primary health care level. (10)
  c) Breastfeeding as a child survival strategy in South Africa. (10)
  d) Kangaroo mother care under the headings: principles, advantages and application in a hospital setting. (10)

- Write short notes on
  a) Managing a hypoglycaemic newborn infant. (10)
  b) The differential diagnosis and approach to a 2-year-old child presenting with bow legs (genu varum). (10)
  c) The differential diagnosis and management of a 2-day-old infant who presents with bile stained vomiting. (10)
You are called to attend the delivery of a term infant born to a 16-year-old primigravida. Meconium stained liquor has been noted and a vacuum delivery is being attempted.

a) How should an infant delivered through meconium stained liquor be resuscitated? (3)
b) How does this approach differ from an ordinary neonatal resuscitation? (1)

The infant is born and has no respiratory effort and a heart rate of 50 beats per minute. Resuscitation is started and his heart rate improves to over 100 by 5 minutes, he starts gasping at 8 minutes and has sustained respiration by 12 minutes of life. Apgars are 1, 3 and 6 at 1,5 and 10 minutes respectively. The infant is sent to the neonatal high care ward and just after arrival (±45 minutes of life) he has a generalized seizure.

c) Interpret the Apgar at 1 minute (i.e. what does it tell you?). (1)
d) Interpret the Apgar at 5 minutes. (1)
e) What is the significance of the time to first gasp of 8 minutes? (1)
f) What is your differential diagnosis for the seizure? (2)
g) What further information on history may assist in reaching an appropriate diagnosis? (2)
h) What first-line drug would you use to treat the seizure? (1)
i) How would you respond, if the infant has another seizure an hour after this first drug was administered? (2)

A blood gas done on the umbilical artery blood shows a pH: 6.98, pCO2: 6.9kPa (52mmHg); Base Excess: -18.3 mmol/L.

j) Interpret this blood gas. (2)
• After obtaining the history and examining the infant you assess him as possibly having suffered a perinatal asphyxial insult.
  k) Over the next 72 hours what signs would confirm the presence of an asphyxial encephalopathy? (4)
  l) List 4 other systemic abnormalities (other than the neurological manifestations) that might occur in this infant. (2)
  m) Describe your basic approach to the management of this infant in the 1st 72 hours of life. (7)

• The infant stays in the hospital for 13 days. He has no further seizures on treatment. He is tube fed for the first 9 days. He remains somewhat floppy on discharge.

  n) What information (counseling) will you provide the mother about the infant’s prognosis and future care? (6)
  o) What is the most important anthropometric measurement you would document before discharging this infant that would be useful when he comes back for follow up? (1)

• After discussing the situation with the family, the grandmother says she wants to sue the obstetricians involved.
  p) What important test should the obstetrician have requested during labour that might help the defence in court? (1)
  q) What key factors will determine the court’s decision? (3)
Sept 2009

- The advantages of breast milk

- Write short notes on
  Advice you would offer to the parents of a 6-day-old infant with trisomy 21. (10)

- You are on call in the nursery of a regional hospital. An inexperienced colleague in a poorly resourced district hospital 3 hours away requests advice on a 2-day-old infant with a birth weight 1.6kg, a Hb of 10g/l and a total serum bilirubin of 289 μmol/l. What is your assessment and detail the advice you offer to your colleague? (10)

- Write short notes on
  The definition, clinical presentation and causes of neonatal hypoglycaemia. (10)
Question 1

You are the doctor-on-call in a district hospital and are present at the delivery of a premature newborn infant. When you are handed the baby you notice that she is not breathing.

a) Outline, briefly, how you would resuscitate this baby. (6)
b) List THREE (3) drugs that you would like to have available for your resuscitation and when you would administer each of these. (3)

After 20 minutes of resuscitation the baby starts to breathe spontaneously and regularly. You determine that her Apgar scores were 3, 6 and 7 at 1, 5 and 10 minutes respectively.

c) What are the components of an Apgar score and how are they scored? (4)
d) Discuss TWO (2) limitations of the Apgar score. (2)

e) Describe how you would safely transfer her to the nursery. (3)
f) What clinical parameters would you consider in determining the baby’s gestational age? (4)

The baby weighs 750g with a gestational age assessed to be 26 weeks. She has severe respiratory distress which you diagnose as hyaline membrane disease. You wish to transfer her to the closest regional hospital for further management and possible ventilation.

g) Write an appropriate referral letter to the regional hospital. (6)

The regional hospital refuses to accept her on the grounds that her birth weight is too low.

h) Discuss the ethical issues relevant to this decision. (4)

She survives and is eventually discharged home two months later.

You see her 4 months after her discharge. On examination she has possible hydrocephalus and appears to be blind, deaf and malnourished.

i) For each of these four complications of prematurity
   i) Identify the most likely underlying pathophysiological mechanism. (4)
   ii) Describe how you would confirm each diagnosis. (4)