ROUTINE EXAMINATION OF THE NEONATE

ACTIVITY AND LEARNING PACKAGE

If found please return to:
ACKNOWLEDGEMENTS

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1. INTRODUCTION

The following learning package has been developed for you to further extend your role developing the knowledge and skills required to competently perform a full and detailed examination of the well term neonate.

1.1. Objectives

It is expected that on completion of this package you will be able to:

- Understand the relevance of performing an examination
- Outline the expected criteria for performing an examination
- Demonstrate an understanding of the anatomy and physiology of the newborn.
- Demonstrate the ability to perform a gross physical examination of a term neonate
- Identify common variations from the norm
- Be cognizant with legal documentation and referral pathways

1.2. Readings

- The role of the routine neonatal examination: http://bmj.bmjournals.com/cgi/content/full/318/7184/619

1.3. Criteria

The well term neonate refers to the infant whose:

- Gestational age is >37 weeks and < 42 weeks.
- Birth weight is > 2,500 grams and < 4,500 grams
- Had no abnormality identified on antenatal ultrasound
- Apgars at birth were > 7 at 5 minutes

Infants that may be examined by a midwife but will also require assessment by a paediatric MO include:

- Gestation < 37 weeks
- Birth weight < 2,500 grams or > 4,500 grams
- An anomaly identified on antenatal ultrasound
- Apgars at birth <7 at 5 minutes
- Birth through meconium liquor
- Jaundiced and < 24 hours of age
- Family history of congenital conditions (eg metabolic or otherwise)
- If the parents refuse consent for a midwife examination of the neonate
Infants who, following examination by the midwife, require referral to a paediatrician include:

- Identified variances from the norm
- Any concerns the midwife has in relation to the examination

Discharge in these instances is deferred until review by a paediatric Medical Officer.

1.4. Practical Assessment

Following completion of the theoretical aspects of neonatal examination you will be guided through a practical component to develop the skills required to competently assess the well term neonate.

1.5. Capability

In order to achieve completion of your assessment you will be required to successfully complete the theoretical workbook. To maintain your skills, and as part of your professional portfolio evidence of having conducted a minimum of 1 neonatal examination each fortnight must be demonstrated. Reassessment of skills will be undertaken annually.

1.6. Prerequisites

Prior to undertaking the package it is expected that you will watch the CD “Physical Examination of the Newborn”.

1.7. Additional Resources


www.healthynewborns.com, which is the site of Healthy Newborn Partnership with links to resources on newborn issues.

www.accesstohealth.org, which provides an overview of the Maternal and Neonatal Health Program with links to publications and resources
2. BACK TO BASICS: PHYSIOLOGY REVIEW

Current Paediatric Anatomy and Physiology Text

In order to develop the skill to identify variations from the normal, a thorough understanding of the normal is required. The abnormal will then become apparent in most situations. The following section has been provided as a summary to assist you in reviewing your knowledge of the well term infant. For a more comprehensive understanding you will need to access your text.

2.1. Temperature Regulation

- Thermal control is poor
- Normal core temperature is 36-37°C
- Body surface area to weight ratio is higher
- The ability to sweat is limited
- Temperature regulation is inefficient and infant is vulnerable to hypothermia
- An unstable temperature may indicate infection
- They are unable to shiver if they are cold and attempt to maintain body heat by adopting a flexed fetal posture

2.2. Respiratory System

- Respiratory rate is 30-60 breaths per minute
- Breathing is diaphragmatic
- Chest and abdomen rise synchronously
- Breathing pattern is erratic
- Respirations are shallow and irregular and interspersed with brief periods of apnoea
- There is no nasal flaring, grunting, sternal or subcostal recession
- Respiratory pattern alters during sleeping and waking states
- They are obligatory nose breathers
- If nose is blocked they do not become automatic mouth breathers
- The cry is lusty, loud and medium pitch

2.3. Cardiovascular System and Blood

- Heart rate is 120-160 beats per minute
- Heart rate fluctuates in accordance with the baby’s respiratory function and activity or sleep state
- Peripheral circulation is sluggish resulting in acrocyanosis
- Blood pressure fluctuates according to activity
- Total circulating blood volume is 80 millilitres per kg
- Haemoglobin level is between 13-20g/dl
- Breakdown of excess red blood cells in the liver and spleen predispose to jaundice
- Vitamin K dependent clotting factors II (prothrombin), VII, IX and X are low
2.4. Renal System

- The first urine is passed within 24 hours of birth
- Urine is dilute, straw coloured and odourless
- Cloudiness by mucous and urates may be present until intake increases
- The bladder is palpable abdominally when full as the pelvis is small
- The kidneys are functionally immature
- Glomerular filtration rate is low and tubular reabsorption capabilities are limited
- The baby is not able to concentrate or dilute urine in response to fluid intake
- The ability to excrete drugs is limited

2.5. Gastrointestinal System

- The GIT is structurally complete though functionally immature
- Mucous membranes are moist and pink
- Epithelial pearls may be present at the junction of the hard and soft palate
- Sucking and swallowing reflexes are coordinated
- The stomach has a capacity of 15-30 mls
- Cardiac sphincter is weak and predisposes to regurgitation and positing
- Gastric emptying is 2-3 hours
- Feeding is often accompanied by reflex emptying of the bowel
- Bowel sounds are present within 1 hour of birth
- Meconium is present in the large intestine from 16 weeks gestation and is passed within the first 24 hours and totally excreted within 72 hours
- The first stool is blackish green and contains bile, fatty acids, mucous and epithelial cells
- From day 3-5 stools undergo transition and are brownish-yellow
- Once feeding is established yellow faeces are passed
- The consistency and frequency reflect the amount and type of feeding
- The liver is physiologically immature
- Early feeding is required to maintain blood glucose levels
- Feeding stimulates liver function and the colonisation of the gut which promotes the formation of vitamin K

2.6. Immunological System

- There is a marked susceptibility to infection
- Infections gain entry through mucosa of respiratory and gastrointestinal systems
- Localization of infections is poor with minor infections becoming generalized very readily
- Three main immunoglobulins are IgG, IgA and IgM
- IgG crosses the placental barrier and provides some passive immunity
- IgA and IgM do not cross the placental barrier but can be manufactured by the fetus (these levels increase after birth)
- IgA protects against infections of the eyes, respiratory and gastrointestinal tracts
- Breast milk, particularly colostrum provides passive immunity
- Passive immunity can also be given by human immunoglobulin after birth eg Hepatitis B
- Blood grouping compatibility and subsequent haemolytic jaundice is a result of transfer of maternal IgG against red cell antibodies.
2.7. Reproductive System

- Withdrawal of maternal oestrogen may result in breast engorgement
- There is a nodule of breast tissue around the nipple.
- In males
  - Testes are descended into the scrotum
  - Urethral meatus opens at the tip of the penis
  - The prepuce is adherent to the glans
  - Spermatogenesis does not occur until puberty
- In females
  - Labia majora normally covers the labia minora
  - Hymen and clitoris may appear large
  - The total complement of primordial follicles are present in the ovaries
  - Pseudomenstruation may occur due to withdrawal of maternal hormones

2.8. Musculoskeletal System

- Moulding is resolved within a few days of birth
- Posterior fontanelle closes at 6-8 weeks
- Anterior fontanelle remains open until 18 months
- Assessment of hydration and intracranial pressure is possible by palpating the tension of the fontanelle
- The muscles are complete
- The long bones are incompletely ossified to allow growth at the epiphyses

2.9. Special Senses

- Vision:
  - Sensitive to bright light causing them to blink or frown
  - Demonstrate a preference for black and white
  - Focus at a distance of approximately 15-20 cms
  - Can track a moving object within the first 5 days
  - By 2 weeks can differentiate their mother from strangers
  - By 2 months has an interest in colour
  - Has no tears in the eyes and is therefore prone to infection
- Hearing:
  - Will turn towards sound
  - Blinks, startles and then becomes agitated hearing high pitched sounds
  - Is comforted by low pitched sounds
  - Prefers the sound of human voices to other sounds
  - Can discriminate between voices giving preference to their mother
- Smell and Taste:
  - Shows a preference for human milk and sweet tastes
  - Can differentiate the smell of the mother's milk to another woman within a few days
  - Prefers the smell of an unwashed rather than washed breast
  - Turns away from unpleasant smells
• **Touch:**
  - Is acutely sensitive to touch and enjoys skin to skin contact, immersion in water, cuddling and rocking
  - Facial coding of pain is expressed by brow bulging, eyelid squeezing and open lipped crying
  - A puff of air on the face stimulates an inspiration or grasp reflex

• **Sleeping and Waking:**
  - Immediately following birth has an alert and reactive period of about 1 hour followed by a period of sleep
  -Varies its first sleep from a few minutes to several hours then has a period of wakefulness
  - Takes some time to settle into a pattern of sleep/wake
  - Varies in the amount of time spent in each sleep/wake state

• **Sleep states:**
  - 1. Deep sleep
    - Infants eyes are closed
    - respirations regular
    - no eye movement
    - delayed response to stimuli
    - may be intermittent jerky movements
  - 2. Light sleep
    - rapid eye movement is noted
    - respirations are irregular
    - sucking movements occur intermittently
    - ready response to stimuli
    - random movements may occur

• **Wakeful States:**
  - 1. Drowsy state
    - eyes may be open or closed
    - some fluttering of eyelids
    - smiling may occur
    - limb movements are variable
    - startle response is noted
  - 2. Quiet alert state
    - infant is alert to visual and auditory stimuli
    - motor activity is minimal
  - 3. Active alert state
    - infant is reactive to surroundings
    - infant is active
    - minimal periods of this during the first few weeks of life
  - 4. Active crying state
    - cry is vigorous and infant difficult to console
    - there is vigorous muscular activity
    - this may be present for hours in the first few weeks of life
3. THE EXAMINATION

Reading 2: The role of the routine neonatal examination:
http://bmj.bmjjournals.com/cgi/content/full/318/7184/619

3.1. Role of the Examination
Examination of an infant is undertaken initially to provide baseline data and identify the presence of abnormalities and when none are found provide reassurance. Later on an examination will assist in determining appropriate growth, development and behaviour. Consequently, both the examination and its individual components are a form of screening. An understanding of the normal parameters within which the well term infant should fall will enable the identification of variations from the norm and ensure appropriate referral for further assessment and management. Systematic examination may reveal various common abnormalities, which are usually not important, but worry parents nonetheless. Examples include minor birth anomalies such as cephalhaematoma, preauricular tags and erythema toxicum. Consequently, appropriate explanation and reassurance is essential.

3.2. Criteria
Prior to undertaking an examination it is important to ensure that certain criteria have been met. Ideally the examination should be conducted at the bedside to allow for any questions parents may have to be answered. Parents may use this opportunity to discuss a family history they are concerned about or ask for information related to an antenatal finding. The midwife is also able to explain the findings as the examination proceeds which often provides reassurance to the parents. Prior to proceeding it is important to ensure:

- You have introduced yourself
- Consent has been obtained
- Hands have been washed to prevent infection
- The environment is warm and draught free
- There is sufficient light to see clearly
- Examination equipment is available

3.3. History
Prior to undertaking an examination of a neonate, it is important to identify risk factors that may cause potential problems. This can be achieved by reviewing the maternal antenatal history, including perinatal and family history. As parents often examine their infants closely in the first hours following birth, discussion with them may reveal concerns that they may have that have not been reported or documented. The condition of the baby since birth is important and includes feeding and behavioural states. If risk factors are identified these need to be discussed with the paediatric medical officer prior to undertaking the examination.

3.4. Observation
A significant amount of information can be gleaned from simple observation and may be most beneficial if the baby is in a relaxed or sleep state. General characteristics of the infant such as the infant’s colour, skin tone, breathing pattern, general proportions and overall posture can all be observed prior to disturbing the infant. Normal patterns of responsiveness and movement are always reassuring. Alternately, if there is evidence of dysmorphic features, consider possible reasons. Atypical behavioural patterns or signs of illness such as impaired alertness or respiratory problems may be evident.
3.5. General Characteristics

The normal term infant

- weighs around 3.5 kgs
- measures approximately 50 cms
- lies in an attitude of flexion
- often has vernix caseosa present on the skin at birth
- has peripheral cyanosis which is usually not significant
- has fully formed nails often adherent to the tips of the fingers
- has well formed ear cartilage
- has many creases on the palms of the hands and soles of the feet
- has varying amounts of hair including eyelashes and eyebrows
- may have milia present over the nose and cheeks
- mucous membranes are pink and well perfused


3.6. Face, Head and Neck

Following general observation of the infant, the next step is to inspect the face, head and neck of the baby.

3.6.1. Eyes

Both eyes should be visualized to ensure they are present and, an ophthalmoscope is used to assess the red reflex, ascertain the iris is complete and the lens is clear. The iris should be evenly coloured and usually appears bluish in the Caucasian infant and darker in the dark skinned or Asian infant. The corneas should be bright and shiny, and the pupils equal, round and reactive to light. If the infant is unsettled and opening the eyes is difficult, it is important to either settle the infant or document clearly that the eyes have not been checked and return and re-examine when the infant is settled.

3.6.2. Mouth

Checking the mouth includes a visual inspection of the tongue, gums and palate. The mouth should be midline, symmetrical and the lips, tongue and chin should all be in proportion. By gently exerting pressure on the lower mandible and/or lifting the infant off the bed so the head is extended back, it is possible to observe the membranous palate. The palate should be high arched and intact, the uvula should be central. The presence of Epstein’s pearls, a tight frenulum or other slight anomalies should be noted.

3.6.3. Nose

The newborn infant’s nose is occasionally flattened but should be midline with both nares and patent. Patency can be assessed by observing the infant breathing while occluding one nare at a time.

3.6.4. Ears
Development of the cartilage of the ear is an indication of the infant’s maturity. The position of the ears is noted and the upper notch of the pinna should be level with the canthus of the eye. Accessory auricles or small tags of tissue should be noted and reported to the paediatric medical officer. External auditory meatus should be inspected for patency. Newborn hearing screens are undertaken on all infants by trained health professionals.


3.6.5. Head and Neck
The shape of the infant’s head often gives an indication of the position adopted in utero. It is very reassuring to parents to be told that the typical elongation that occurs with a cephalic presentation is normal and will resolve within the first 24 hours if not sooner. The degree of moulding and overriding of the bones at the sutures and fontanelles can be determined by palpating the vault of the skull. In a term infant the bones should be hard. The anterior fontanelle is diamond shaped and lies between the sagittal and coronal sutures. It is approximately 2-3cm wide and 3-4cm long closing at around 18 months of age. The posterior fontanelle is triangle shaped and is located between the lambdoidal and sagittal sutures measuring 1-2 cm closing by 2 months.

Image from: http://www.pedisurg.com/ImagesPtEduc/skull.gif

The presence of a cephalhaematoma or caput succedaneum may be observed over the presenting part caused by pressure from the cervical os. The neck should be examined to ensure that rotation bilaterally and flexion are possible and to exclude the presence of swelling or lesions.

Image from: http://academic.sun.ac.za/healthsciences/schools/medicine/paediatrics/dept/pg02.jpg

3.7. Chest And Abdomen
In the normal infant, the chest and abdomen move synchronously with breathing. The space between the nipples should be noted and breast nodules may be enlarged. Both male and female infants may have swollen breasts at birth. Widely spaced nipples could be related to a chromosomal abnormality and a scaphoid abdomen may indicate a diaphragmatic hernia.

Image from: http://academic.sun.ac.za/healthsciences/schools/medicine/paediatrics/dept/pg05.jpg
3.7.1. Abdomen
The umbilical cord stump should have no signs of redness and be bluish, shiny and moist. The abdomen should be round and pushes out with each breath. Bowel sounds are auscultated before commencing palpation. The abdomen is palpated gently to locate vital organs and identify masses. The liver is palpated in the right costal margin and the tip of the spleen can often be felt at the left costal margin. The kidneys may be palpated in the left lower quadrant.

3.7.2. Chest
Respirations should be counted for a full minute. There should be no retractions, nasal flaring or grunting which indicate respiratory distress. The normal range is 40-60 breaths per minute and there can be considerable variation in the rate and rhythm depending on the infant’s state of arousal. Auscultation of the chest should be undertaken with a warm stethoscope and ideally while the infant is in a quiet state. Neonatal breath sounds are often difficult to ascertain and there may be interference from heart sounds and gastric noises. Breath sounds should be clear both anteriorly and posteriorly. Occasional rales may be heard soon after birth in an asymptomatic infant. Respiratory rate in the newborn is often irregular up to 80 breaths a minute as is the heart rate. Assessment of the heart should commence with observing the chest wall for pulsation. The heart rate is counted for a full minute and should be between 100 and 160 beats per minute. Occasionally a slight murmur may be heard before the ductus arteriosus has completely closed. A short period of a change in heart rate is normal and often associated with the infant’s arousal state. However, bradycardia or tachycardia is abnormal and may be indicative of a possible congenital heart defect. If any of the above abnormalities are noted then referral to the paediatric medical officer for further assessment is mandatory.

3.8. Genitalia And Anus
The external genitalia should be examined carefully particularly if the sex of the infant is in question. If there is any doubt the infant must be referred to the paediatric medical officer. In the normal male the testes have descended into the scrotum, which should be inspected for rugae, size and the presence of the testicles. The foreskin should never be forcibly retracted, however, the placement of the external meatus on the glans penis should be evaluated to exclude hypospadias or epispadias. In the female the labia majora normally covers the labia minora with the hymen and clitoris often appearing large. A white vaginal discharge is normal as is a small bloody discharge which starts on day 2-3 and continues to around day 7.

Undescended testes

Patency of the anus is determined by turning the infant prone, separating the cheeks of the buttocks and visualizing the anus. Instruments or fingers ARE NOT inserted into the rectum.

**Imperforate Anus**


### 3.9. Extremities

Initial observation enables inspection of the length, symmetry, degree of flexion and generalized movement of the infant’s limbs. The digits of both hands and feet are counted and separated to ensure there is no webbing present. Accessory digits may sometimes be found in the clenched fist of a newborn. The axilla, elbows and nail beds are inspected for abnormalities or signs of infection. Normal flexion and rotation of the wrist should be assessed.


The feet are examined for presence of creases, deformity such as talipes equinovarus and, the groin and popliteal spaces are inspected for infection or abnormality. The ankles are also assessed for flexion and rotation. The lower extremities are evaluated for congenital hip dislocation (discussed later).

**Talipes Equinovarus**

3.10. Spine
The infant’s back should be inspected and the vertebrae palpated to determine the presence of any abnormality, swelling, dimples or hairy patches. The spinal column should be straight and flexible. The infant is held prone on the examiner’s hand with the head and lower body drooping. Infants of dark skinned and Asian descent often have a Mongolian Blue Spot located at the base of the spine but may also be located on other areas of the body.


3.11. Reflexes
The infant’s reflex responses are elicited in order to determine normal neurological development. These should be assessed whilst the infant is in a quiet alert state. Absent or weak responses may indicate cerebral damage or abnormality.

Image from: http://www.fcmcdallas.com/images/services_debra.jpg
**SECTION 1**

Using a dictionary or textbook explain the following terms and/or the significance of its presence or absence.

**SKIN**

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<thead>
<tr>
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<tbody>
<tr>
<td>Ecchymosis</td>
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<tr>
<td>Jaundice</td>
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<tr>
<td>Strawberry Naevus</td>
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<tr>
<td>Mongolian Blue Spot</td>
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<tr>
<td>Plethora</td>
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<tr>
<td>Port Wine Stain</td>
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<tr>
<td>Erythema Toxicum</td>
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**SKULL**

<table>
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<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Bulging Fontanelle</td>
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<tr>
<td>FACE</td>
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<td>Palsy</td>
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<table>
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<td>Strabismus</td>
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<td>Red Reflex</td>
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<table>
<thead>
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<tr>
<td>Cleft Soft Palate</td>
<td></td>
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<tr>
<td>Cleft Lip</td>
<td></td>
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<tr>
<td>Frenulum</td>
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<td>Philtrum</td>
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</tr>
</tbody>
</table>
NECK
Torticollis

CHEST
Breast engorgement

ABDOMEN
Scaphoid Abdomen

MALE GENITALIA
Hypospadias
Epispadias
Cryptorchidism

FEMALE GENITALIA
Pseudomenstruation

ARMS
Erb’s Palsy
Klumpke’s Palsy

**HANDS**

- Clinodactyly
- Polydactyly
- Syndactyly
- Simian Crease
- Acrocyanosis

**HIPS**

- Developmental Dysplasia Hip

**LEGS**

- Asymmetry

**FEET**

- Talipes
- Equinovarus
- Equinovalgus
- Calcaneovarus
- Calcaneovalgus
SECTION 2

Describe the following reflexes:

Rooting

Sucking and swallowing reflex

Gag, cough and sneeze

Grasp reflex

Walking and stepping reflexes

Asymmetrical tonic neck reflexes

Traction response

Ventral suspension

SECTION 3

Select a single correct response to each of the following questions:

1. The test for Developmental Dysplasia of the hip is:
   - A. Apgar
   - B. Ortolani
   - C. Silverman
   - D. Bishop
2. Breast engorgement in the neonate is due to the alterations in hormone balance, and can be seen in both males and females. It should be treated by:

- A. aspiration
- B. expression
- C. masterly inactivity
- D. antibiotic therapy

3. Milia:

- A. are small white spots on the hard palate
- B. are white spots sometimes present on the face of a newborn
- C. appear on the tongue when a baby has thrush
- D. appear on the buttocks in nappy rash

4. The umbilical cord stump normally separates by a process of:

- A. nidation
- B. fibrosis
- C. dry gangrene
- D. autolysis

5. In the neonate, a hairy mole at the base of the spine may indicate:

- A. imperforate anus
- B. pilonidal sinus
- C. Hirschsprung’s disease
- D. occult spina bifida

6. Hypospadias is:

- A. a form of polycystic kidney
- B. when the testicles are undescended
- C. when the urethra opens on the under surface of the penis
- D. part of the epididymis

SECTION 4.

Select any number of correct responses between A-E

1. The term newborn baby has:

- A. a head circumference of 38 - 40 cm
- B. an average length of 50 - 54 cm
- C. an apex beat greater than 100 beats per minute
- D. vernix caseosa
- E. linea nigra

2. Which of the following reflexes are present in the normal neonate at birth?

- A. sucking
- B. coughing
- C. swallowing
- D. rooting
- E. bladder control
3. Caput succedaneum:
   • A. is a pathological condition
   • B. is oedema caused by cervical pressure on the scalp
   • C. disappears quickly after birth
   • D. occurs only on the head
   • E. crosses suture lines

4. Cephalhaematoma:
   • A. is an intracranial haemorrhage
   • B. can cause jaundice
   • C. does not cross suture lines
   • D. may take 6 - 8 weeks to resolve
   • E. is subperiosteal bleeding of any of the vault bones of the skull

5. The condition of the infant at birth may be judged satisfactory if
   • A. the extremities are limp
   • B. facial cyanosis is present
   • C. the apex beat is more than 100 bpm
   • D. gentle stimuli produce a cry
   • E. respiratory movements are established in 30 seconds

6. The ‘small-for-dates’ infant born near term:
   • A. is usually hypoglycaemic
   • B. commonly develops pulmonary surfactant deficiency disease
   • C. suffered intrauterine malnutrition
   • D. may have a history of poor placental function tests
   • E. has poor muscle tone, and much vernix

7. Rhesus iso-immunisation may occur:
   • A. following feto-maternal haemorrhage
   • B. when a rhesus negative woman is pregnant with a rhesus positive fetus
   • C. with ABO incompatibility
   • D. following abortion or antepartum haemorrhage
   • E. due to eclampsia

8. Gestational age may be assessed by:
   • A. the firmness of the ear cartilage
   • B. scarf sign
   • C. serum bilirubin
   • D. alignment of ear to opposite heel

9. Which of the following congenital abnormalities may be found when examining the head of a newborn at birth?
   • A. cleft soft palate
   • B. Pierre-Robin Syndrome
   • C. cephalhaematoma
   • D. microcephaly
   • E. all of the above
10. Identify the congenital abnormalities which may be associated with each region numbered 1-3

1.
- A. hydrocele
- B. umbilical hernia
- C. Meckel’s diverticulum
- D. Divergent rectus abdominis muscles
- E. hypospadias

2.
- A. Hirschsprung’s disease
- B. polydactyly
- C. hydrocephaly
- D. splenomegaly
- E. craniostenosis

3.
- A. polydactyly
- B. talipes equinovarus
- C. syndactyly
- D. genu valgum
- E. coloboma

SECTION 5

Indicate whether you think the statements listed below are true or false.

1. The ductus arteriosus usually closes within a few hours of birth, but may remain patent, particularly if the infant is hypoxic and difficult to resuscitate.

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
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</table>

2. Cephalhaematoma is best treated by aspiration.

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
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</table>

3. Vernix caseosa protects the skin from maceration during intrauterine life.

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
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4. The new born baby has an enlarged liver at birth.

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<tr>
<th>True</th>
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5. The infant who suffers from intra-uterine growth restriction in the last few weeks of pregnancy is termed as ‘small-for-dates’ when born near to term.

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
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</table>
6. Newborn babies produce copious tears when they cry.

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
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</table>

Match the items in Group 1 with the most appropriate item in Group 2.

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. soft, bright yellow stool</td>
<td>A. artificially fed baby</td>
</tr>
<tr>
<td>2. firm, pale yellow stool</td>
<td>B. haemorrhagic disease</td>
</tr>
<tr>
<td>3. brownish yellow stool</td>
<td>C. breast fed baby</td>
</tr>
<tr>
<td>4. reddish brown stool</td>
<td>D. gastro-enteritis</td>
</tr>
<tr>
<td></td>
<td>E. changing stool</td>
</tr>
</tbody>
</table>
REFERENCES


Colditz, P. (2004). Physical Examination of the Newborn CD provided by University of Queensland.


General Practice Notebook 2006 Neonatal Examination
http://www.gpnotebook.co.uk/simplepage.cfm?ID=2040135731, Accessed 10.3.06


NHS Quality Improvement Scotland Practice Development and Clinical Effectiveness

Paediatric Policy Examination of the Newborn: http://www.racp.edu.au/hpu/paed/examination/intro.htm, Accessed 10.3.06


Support Team. 2004 Best Practice Statement: Routine Examination of the Newborn:
www.nhshealthquality.org
4. PRACTICAL ASPECTS OF NEONATAL EXAMINATION

Appropriate preparation for the examination involves ensuring both the necessary equipment and the environment is ready and conducive to obtaining accurate information. Time should be allowed to discuss any concerns the parents may have regarding their infant and the examination should be conducted without interruption.

4.1. Equipment:

- Neonatal stethoscope with a bell
- Good light (torch)
- Tape measure
- Ophthalmoscope
- Documentation: mother & infant charts
- Personal Health Record Book

4.2. Environment

- Environment warm (radiant warmer if required)
- Mother / father presence
- Warm wraps
- Clean nappy/ clothes

4.3. Criteria before commencing

- Introduce self
- Explain procedure to parents
- Consent
- Wash hands
- Check Infants ID
- Review history to establish potential/existing risk factors:

4.4. Identified Risk Factors

- Family: evidence of inherited conditions
- Gestational: dates/ ultrasound /fetal growth/maternal disease/ drugs
- Birth: Apgar Scores/ resuscitation / trauma
- Neonatal: bowels / urine/ feeding

4.5. Performance of the examination:

- Cephalocaudal sequence: hands, arms, head, face, neck, thorax, abdomen, hips, legs, feet, back
- Attempt to listen to heart sounds while infant is in a relaxed state
4.6. Assessment of General Characteristics

Observation of:

- Neurological behaviour: degree of activity / lethargy / tone / irritability
- Respirations
- Posture
- Skin: epidermis, subcutaneous tissue:
  - Presence of: vernix / lanugo / milia / erythema toxicum / petechia
  - Colour: plethora / pallor / cyanosis / acrocyanosis / jaundice
- Body proportions: head size to body, chest, trunk, extremities
- Note any dysmorphic features
- Assesses gestational age throughout the examination

4.7. Upper extremities

- Hands
  - Observe: Grasp reflex Head control
  - Separate /count digits: polydactyly, syndactyly (webbing), position of little finger
  - Fingernails – length, colour, blanch, refilling
  - Palm creases (simian crease)
  - Wrist – lateral/medial rotation, extension/flexion
- Arms
  - Observe – symmetry, position of arms (attitude of flexion), tone, length of arms,
    spontaneous or simulated active movements & range of passive movements, skin warmth
  - Palpate clavicles for fractures
  - Palpate R. brachial artery & R femoral artery: delayed / weak ?coarctation of the aorta
  - Count rate 100 - 160

4.8. Head

- Observe for: movement – head, face (bilateral)
- Inspect head for: shape, moulding, caput, cephalhaematoma, trauma
- Head circumference occipital protuberance & supra orbital ridges (moulding < size)
- Relates head circumference, crown-heel length and body weight to gestational age.
- Palpate suture lines: width: Immaturity / hydrocephalus, moulding.
- Palpate fontanelles for number, size, tension
- Palpate skull for firmness
- Feel hair for texture, observe for marks under hair.

4.8.1. Face

- Examine the Ears: Size, shape
- Position (upper notch pinna level with canthus of eye)
- Patency of external auditory canal
- Behind pinna & pre auricular: skin tags, accessory auricles, pits
- Responds to sound
4.8.2. Eyes
- Infant may open eyes spontaneously if held upright & returned to horizontal
- Position in relation to the nose
- Eyebrows - pattern
- Eyelids – ptosis, epicanthic folds
- Eyeballs – size movements
- Sclera – colour
- Iris – colour / speckles
- Red light reflex
- Pupils – equal, cataracts
- Observes for – periorbital oedema, sunken appearance, subconjunctival haemorrhage, discharge.

4.8.3. Nose
- Symmetrical
- Shape, width of the bridge
- Patency of nares

4.8.4. Mouth
- Size
- Philtrum; length
- Lips – symmetry, cleft/s, shape, movement, rooting reflex, sucking
- Open (depress mandible)
- Visualise gums – colour, moistness, clefts cysts, deciduous teeth
- Visualise tongue – position, protrusion, movement, shape, frenulum upper & lower central, (tongue tie no Rx) presence of thrush.
- Examine palate - High arched: Clefts hard / soft palate, junction hard / soft palate, Epstein’s pearls (normal)
- Feeding technique
- Uvula central

4.9. Neck
- Visible length
- Position, body alignment (side to side), full range of movements (flexion, extension)
- Tonic neck reflex
- Sternocleidomastoid muscle (equal, smooth, lymph nodes), tumour limited rotation of the head

4.10. Thorax and respiratory function:
- Size, symmetry, contour
- Respiratory movements – thoracic cage, abdomen
- Rate - 40 – 60 per min
- Periodic breathing normal
- Apnoea >10 sec abnormal
- Chest retraction, grunting, abdominal breathing.
- Minimal flaring alae nasi is normal
- Breathlessness pallor / cyanosis is abnormal.
- Auscultates air entry apex & base, supine & prone: rales /abnormal breath sounds may occur in asymptomatic infant.
4.11. Chest

- Breasts – tissue, size, engorgement
- Nipples – number, position (wide may be a chromosomal abnormality) secretions

4.12. Abdomen

- Shape rounded (scaphoid diaphragmatic hernia)
- Contour, colour
- Cord 2 Arteries 1 vein, discharge, odour, herniation (renal /cardiac abnormalities)
- Palpates abdomen – liver 1cms below ribs, kidneys bimanual, spleen tip palpable
- Inguinal hernia
- Bowel sounds
- Stools - check with parent

4.13. Genitalia

- Male:
  - Prepuce not retracted, urinary meatus, enquires from parent re passage of urine
  - Scrotum - often disproportionately large in term, Hydroceles not uncommon (disappear in time)
  - Testes – two similar size, in scrotum (torsion)
- Female:
  - Labia majora prominent (able to be separated), labia minora, hymen
  - Occasionally mucosal tags
  - Discharge - creamy white (occasionally day 2/3 pseudomenses)
  - Cysts & Imperforate hymen

4.14. Lower Limbs

- Observe:– symmetry, position of legs (attitude of flexion), tone, length of legs, spontaneous or simulated active movements & range of passive movements, skin warmth
- Groin – femoral pulses,
- Thigh – symmetrical creases gluteal & popliteal folds
- Knees – flex onto thigh
- Ankle - flexion & extension of foot
- Feet - talipes positional / fixed
- Soles – creases
- Toes separate / count
- Toenails - length, colour, blanch, refilling
- Stepping reflex
4.15. Back

- Infant prone in ventral suspension over arm
- Inspect truncal tone
- Extra folds in neck
- Symmetry spine
- Palpate spine, neural arches
- Inspect sacral region patent anus / spina bifida / encephalocele
- Inspect coccygeal region
- Observe for tufts of hair (occult spine defect)
- Inspect for amount of lanugo
- Inspect scapula for symmetry

4.16. Nervous system

- Elicit reflexes

4.17. On Completion

- Leave the infant in parents care clean, dry, dressed, wrapped & warm
- Discuss findings with parents
- Provide parents with opportunity to ask questions
- Discuss SIDS prevention, immunization and role of GP / Child Health

4.18. Documentation

- Document findings in - Medical record & Personal Health Record Book
- Report any abnormal findings to Paediatric Medical Officer
5. **PRACTICAL ASPECTS OF EXAMINATION OF THE CARDIOVASCULAR SYSTEM**

5.1. **Objectives**
- Demonstrate the ability to perform a physical examination of a newborn's heart using the recommended procedure.
- Demonstrate the ability to identify abnormal sounds

5.2. **Additional Resources**
You should attempt to accompany credentialled midwives/paediatric registrars while they are assessing newborn infants to gain as much practical skill as possible in listening to normal heart sounds in order to better be able to identify abnormal sounds.

5.3. **Undertaking the Examination**
- The heart is examined whilst the infant is in a quiet state.

5.3.1. **Equipment and Environment**
- Stethoscope
- Overhead radiant source or warm room

5.3.2. **Cardiovascular function**
- Palpate brachial & femoral pulses: weak in the lower limbs? = coarctation of the aorta. Count rate 100 – 160 per min
- Assess capillary refill
- Pulses – brachial, radial, femoral, pedal. If not felt easily, the infant is immediately referred to a paediatric MO
- Determine the position of the heart auscultation or palpation
- Usual point of maximum intensity : Left side 4th intercostal space, mid clavicular line
- Auscultate at the apex: Rate - 100 – 160 beats/min changing with activity, sleep & crying
- Rhythm - regular
- Cardiac Murmurs “swooshing sounds” in the first 24hrs are common. 50% usually soft = closing ductus arteriosus.
- **NB: All Murmurs must be fully assessed by a paediatric MO**

5.4. **On Completion**
- Discuss findings with parents and if abnormal findings the need for paediatric review
- Provide parents with opportunity to ask questions
- Discuss SIDS prevention, immunization and role of GP / Child Health

5.5. **Documentation**
- Document findings in - Medical record & Personal Health Record Book
- Report any abnormal findings to Paediatric Medical Officer
6. PRACTICAL ASPECTS OF EXAMINATION OF THE HIPS

6.1. Objectives

- Demonstrate the ability to perform a physical examination of a newborn’s hips using the recommended procedure.
- Demonstrate the ability to identify “problem hips”.

6.2. Additional Resources

You should attempt to accompany credentialed midwives/paediatric registrars while they are assessing newborn infants to gain as much practical skill as possible in assessing hips in order to better be able to identify those that are abnormal.

6.3. Undertaking The Examination

Consider the following:

- History of developmental dysplasia of hip (previously CDH).
- History of oligohydramnios
- Infants with other features of in-utero compression ie calcaneovalgus.
- Breech presentation especially those with extended legs
- Primigravid pregnancies
- Incidence in girls than boys
- Left hip is more often affected than the right

There are four types of hips to consider:

1. Normal
2. Dislocatable hip, reduced at rest
3. Dislocated hip, reduced by manipulation
4. Dislocated hip, not reducible (fixed dislocation).

While assessing it is important to look for:

- symmetry, position of legs (attitude of flexion - a dislocated hip is held in a slightly adducted & flexed position)
- tone, length of legs, spontaneous or simulated
- active movements & range of passive movements, skin warmth
- Thigh – symmetrical creases gluteal & popliteal folds
- Knees – flex onto thigh

6.3.1. Ortalani Manoeuvre

- Observe the position & spontaneous movements of the hips (nappy off)
- Take the lower legs in your hands thumbs pointing to toward the knees compare the length of the femurs by approximating the hips to the midline.
- DO NOT apply any backward or forward pressure
• Flex hips & knees to 90 degrees
• Flex the knees fully onto the thighs
• Take the flexed legs in the palms of hands thumbs over the medial side of the knee joint 3rd & 4th finger directed down the outside of the legs towards the greater trochanter.
• Without applying any backwards or forwards pressure gently abduct both hips simultaneously.

Findings:
• A NORMAL hip will abduct fully, the thigh coming to rest on the bed.
• A DISLOCATED, REDUCIBLE hip will relocate the femoral head into the acetabular fossa during abduction. (This action can be felt by the examiner “clunk” and often seen by an observer)
• A DISLOCATED, NON-REDUCIBLE hip will abduct to only about 45 degrees

6.3.2. Barlow Manoeuvre
• DISLOCATABLE HIP
• Maintain abduction of each side in turn to stabilise the pelvis while examining the other hip.
• On the side to be examined change your grip by moving your thumb higher up the medial thigh
• At about 45 degrees adduction, push back with your thumb, attempting to dislocate the femoral head
• If the hip is DISLOCATABLE, a distinct movement “clunk” will be felt as the femoral head rides over the posterior edge of the acetabular fossa.
• Gently rock the femur between thumb and 3rd & 4th fingers to confirm dislocatability / reducibility.

6.4. On Completion
• Discuss findings with parents and if abnormal findings the need for paediatric review
• Provide parents with opportunity to ask questions
• Discuss SIDS prevention, immunization and role of GP / Child Health

6.5. Documentation
• Document findings in - Medical record & Personal Health Record Book
• Report any abnormal findings to Paediatric Medical Officer
• NOTE: Repeat examinations by an inexperienced person may compound any pre-existing damage to the joint
7. ASSESSMENT OF THE NEWBORN: PRACTICAL ACTIVITY

The following section has been developed for you to document and make comments while you practice the skill of examination of the newborn. This will hopefully assist you to identify your learning needs in relation to this competency. You may wish to photocopy these pages and utilize them for each practice examination you undertake. Successful achievement of the competency will be based on you meeting the criteria outlined in the skills assessment.

7.1.1. Prepare Infant

- Place in warm environment
- Check time of most recent feed
- Check ID

7.1.2. Prepare Equipment / Environment

- Warm, well lit area
- Tape measure
- Stethoscope
- Ophthalmoscope / auroscope
- Torch

7.1.3. Prepare Self

- Introduce to parents
- Wash hands

7.1.4. Initial Observation

- Sleep state
- Posture
- Weight
- Hydration status
- Activity
- Skin – rashes/ vesicles/ temperature / pigmentation
- Colour – central / peripheral / perfusion
- Symmetry – head/ chest/extremities
- Breathing – patterns /rate

7.1.5. Head

- Observe face for bilateral movement
- Inspect head for
  - shape
  - caput / moulding
  - cephalhaematoma
  - trauma
- Palpate suture lines for overriding/wide spacing
- Measures occipito-frontal circumference
- With neonate in sitting position
  - Palpates fontanelles for number/ size/tension
  - Palpates skull for firmness
7.1.6. Eyes
- Position in relation to bridge of nose
- Observe for periorbital oedema/discharge
- Eyebrows – pattern
- Eyelids – ptosis
- Eyeballs – size/movement
- Scleral colour
- Observe for subconjunctival haemorrhage
- Iris – colour / speckles
- Pupils – equal / reactive
- Red light reflex

7.1.7. Mouth
- Size
- Rooting reflex
- Sucking
- Lips
  - symmetry
  - cleft
  - shape
  - movement
- Gums - colour / moistness/presence of teeth
- Tongue
  - position/ protruding
  - movement/ shape
  - presence of thrush
  - frenulum
- Palate
  - hard/soft
  - intact
  - arch
  - Epstein’s pearls

7.1.8. Ears
- Shape / size / cartilage
- Position in relation to outer canthus of eye
- Patency of external auditory canal
- Skin tags
- Response to sounds

7.1.9. Neck
- Position / visible length
- Body alignment – side to side
- Full range of movement – flexion/extension
- Tonic neck reflex
- Sternocleidomastoid muscles – equal /smooth/nodes
- Head control demonstration
7.1.10. Chest
- Size / symmetry / contour
- Respiratory movements – thoracic cage; abdomen; rate
- Auscultate air entry
- Auscultate heart sounds
- Breast tissue – amount /size/engorgement
- Nipples – number /position

7.1.11. Abdomen
- Colour
- Contour
- Cord – vessels /discharge /odour
- Palpate abdomen / liver

7.1.12. Upper Extremeties
- OBSERVE
- Position of arms –attitude of flexion
- Length of arms
- Spontaneous movement
- Separate and count fingers
- Position of little finger
- Fingernails
  - length
  - colour
  - blanching
  - refilling
- Palm creases
- Wrist
  - lateral / medial rotation
  - extension / flexion
- Scarf sign
- Grasp reflex
- Moro reflex

7.1.13. Lower Extremities
- Legs – length
- Thigh – symmetrical creases
- Femoral pulses
- Knees – flex onto thighs
- Ankle - flexion and extension of foot
- Feet – position / varus deviation / warmth
- Soles – creases
- Toes – separate / count
- Hips – Barlow’s / Ortolani’s Manoeuvre
- Stepping reflex

- WITH INFANT LYING PRONE INSPECT
- Amount of lanugo
- Scapulae for symmetry
• Sacral region
• Coccygeal region
• Palpate spine

7.1.15. Genitalia
• Scrotum / testicles
• Glans penis
• Urinary meatus
• Labia majora
• Labia minora
• Clitoris
• Vaginal discharge

7.1.16. Buttocks / Anus
• Buttocks - symmetry
• Anus
  o placement
  o patency
  o passage of Meconium

7.1.17. General Health Status
• Evaluate growth and nutrition
• Adaptation to extrauterine life
• Gestational age

7.1.18. Documentation
• Document data accurately in
  o personal health record
  o progress notes if applicable
  o perinatal data/ MR 66 form if applicable

7.1.19. On Completion
• Leave infant clean, wrapped and warm
• Clean /dispose of equipment
• Wash hands
• Discuss findings with parents
• Refer to paediatric medical officer as appropriate.
## Demonstrates the ability to assess the health status of a newborn infant

### C: Competent  
S: Requires Supervision  
D: Requires Development

### Performance criteria

<table>
<thead>
<tr>
<th>Reviews:</th>
<th>C</th>
<th>S</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal history / antenatal ultrasound reports for indications of fetal abnormalities</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Introducing self</td>
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<tr>
<td>Obtaining consent and explaining procedure</td>
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<td>Providing privacy</td>
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<tr>
<td>Consulting with the woman regarding her concerns</td>
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<tbody>
<tr>
<td>Weight, head circumference, length</td>
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<tr>
<td>Findings to gestational age</td>
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<tr>
<td>Posture and muscle tone</td>
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<tr>
<td>Skin colour and condition</td>
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<td>Normal movement of head and extremeties</td>
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<th>Examines the infant's trunk, including:</th>
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<tbody>
<tr>
<td>Heart sound and respiratory movement</td>
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<tr>
<td>Chest, abdomen and back</td>
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<tr>
<td>Breast tissue</td>
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<tr>
<td>Umbilicus cord</td>
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<tr>
<td>Spine</td>
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<tr>
<td>Hips</td>
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</tbody>
</table>

| Examines the genitalia, urethral meatus and anus   |       |       |       |

| Assesses reflexes, including grasping, sucking, rooting, stepping, moro |       |       |       |

| Provides information and education to the parents throughout the procedure |       |       |       |

| Evaluates the findings relative to baby and initiates appropriate interventions |       |       |       |

| Consults as per ACM's Midwifery Guidelines for Consultation and Referral |       |       |       |

| Concludes the encounter in a manner acceptable to all participants |       |       |       |

| Documents findings and other relevant information |       |       |       |

### Examining a Newborn Infant

<table>
<thead>
<tr>
<th>Midwife:</th>
<th>Signature:</th>
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<tbody>
<tr>
<td>Assessor:</td>
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| Comments: |       |       |       |

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Routine examination of the neonate (Version 3.1.2010)