8.0 Objectives

After completing this practical, you should be able to:

- identify indications and contraindications for carrying out any diagnostic procedure;
- carry out physical examination of a child;
- place the child in appropriate position during procedures;
- assist the physician in various specialized procedures;
- identify any adverse reaction in child during procedure;
- monitor vital signs; and
- provide nursing care as per needs of the child.

8.1 Introduction

One of the important component of care of sick children is to diagnose/identify the exact problem of children based on observation or physical examination and
certain diagnostic procedures which help you as nursing professional to plan and implement the care needed by individual client/child. This practical will help you to develop and/or improve your skills in conducting physical examination of the child, position the child properly during various procedures and identify any adverse reaction. You will also improve your skills in assisting and providing skilled nursing care to children during various procedures such as lumbar puncture, ventricular, pleural and abdominal taps etc. You may have already a sound practice of doing so in caring adult patients but most of you may have not worked in paediatric wards. You should also go through practical manual BNSL-106–Medical Surgical Nursing. Because most of the procedures which are similar in adults and children have not been discussed in this practical.

8.2 PHYSICAL EXAMINATION OF A CHILD

This practical as you have seen above deals with assisting in various diagnostic procedures of a child. The first responsibility of you as a provider of nursing care is to examine the child physically to identify the problems that need further investigation and care. Now that do we mean by physical examination.

It is a systematic review of the systems of the body by the physician or a nurse. The observations made while examining a child leads to provisional diagnosis and symptomatic care.

Purpose
- Assess health status
- To observe any problems which needs medical or nursing care attention
- To identify nursing priorities and planning nursing care.

Articles
The articles which are needed to be kept ready before examination include;
- Examination table
- Sheet for draping
- Tray with a torch, tongue blade, stethoscope, otoscope, sphygomanometer, percussion hammer, ophthalmoscope, tape, rectal glove, lubricant.

After you have assembled the articles for carrying out physical examination or for assisting the physician in this activity. You have to start examining the child. Before we go on to discuss how to assess a child we shall review the methods of physical examination.

Methods used in physical examination are given below:
- Palpation
- Auscultation
- Percussion
- Inspection
- Measurements

We shall not discuss these steps here but go on to actual procedure.
Procedure

- Gather articles
- Explain procedure to the child and parent
- Maintain privacy
- Keep talking to the child during the examination

Observe the following:

This implies that you have to conduct head to toe examination to make an accurate assessment of a child. There are certain procedures which need skills of a medical specialists. In those cases, you have to assist but you must know what type of skills are needed to carry out specialized examinations.

Head: lumps, cuts, sutures, fontanelles, hygiene, colour and texture of hair

Eyes: pupil reaction to light, equality, haemorrhage, odema, discharges, burning sensation, rubbing

Ears: intact ear drum, discharge, wax, foreign body, hearing less (no response to) vision problems question loud nose.

Nose: running nose, watery discharge, polyps, bleeding, foreign body, nasal congestion

Mouth: rash, colour of throat, conditions of teeth, (tooth eruption, cavities, braces) gums, tongue, inspect for odour,

Face: symmetry, colour (pale, jaundiced etc.)

Neck: enlarged thyroids, lymph nodes in the posterior surface, swallowing reflex, abnormalities.

Chest: abnormal shape (dome, pigeon chest) auscultate for ronchi, grunt, air entry, etc.

Heart: examine various sites for pulse, auscultate for apical beats.

Abdomen: palpate abdomen. Note bowel movement by auscultation all over abdomen. Palpate liver.

Genitalia: In females examine the vulva, any discharge. In male observe penis for site of urethral opening (hypospadias etc.), examine scrotum for presence if testes inguinal hernia.

Limbs: for flexion, extradigits, functions, range of movement, symmetry, hernia pedal ocdena

Spine: alignment, movement.

Measurement of vital signs which are important yardstick of assisting the assisting the functions of body systems.

Vital Signs

- Temperature and pulse
- Blood pressure
- Circumferences of head, chest, mid-arm.
- Height
- Weight
Activity 1

Do physical examination for any child at the time of his admission to a paediatric ward of your workplace and record your findings.

Now you have reviewed what you are going to assess. As you have seen that there are certain procedures where you have to perform assisting function only. In that case your role is multiple as given below. One such role that you need to perform is to position the child during various procedures.

8.3 GENERAL NURSING RESPONSIBILITIES IN DIAGNOSTIC PROCEDURE

Let us understand what are the general responsibilities of nursing personnel while assisting in diagnostic procedures.

• Preparation of child for diagnostic procedure must take into account the child's developmental stage of cognitive ability.

• Nurse must obtain informed consent as needed.

• Explain the procedure to child and parents to prepare them psychologically.

• Prepare the child physically as per the prerequisite of diagnostic procedure.

• Obtain equipment for the procedure and ensure that universal precaution of infections are followed.

• Provide emotional support during the procedure.

• Assess the child's response to the procedure.

8.4 POSITIONING OF A CHILD DURING VARIOUS PROCEDURES

Let us first understand that why positioning is necessary.

Positioning is necessary both for the child's safety during the procedures and to assure the success of the procedure. Always explain to the child and parent what is happening. Now we shall focus on the different positions in which child is placed during various procedures. We shall begin with the position of child during Lumbar puncture.

i) Lumbar Puncture (see Fig. 8.1)

• Place child on side facing you.

• Hold him close to the far edge of the table.

Fig. 8.1: Position of child during lumbar puncture
• Place the child on side with knees, pulled to the abdomen and neck flexed to
  the chin and back is arched as much as possible.

• Seal site with Tincture Benzoin

• Record vital signs, observe for any change in level of consciousness, motor
  activity or other neurologic signs.

• Encourage child to lie in supine position after the procedure, to prevent post
  Lumbar Puncture headache.

• Flex neck and knees of the child and fold them securely as shown in the
  (Fig. 8.1).

• Observe signs of respiratory distress during the procedure.

ii) Jugular Veni Puncture (see Fig. 8.2)

• Restrain body of the child with sheets.

• Position head in hyper extension over the edge of the table.

• Place the child so that the head and shoulders extend over the edge of a
  table with the neck extended and head turned to one side.

• Stabilize head as shown.

• Avoid pressure over the ears.

• After venipuncture, digital pressure is applied to the site with a dry gauze for
  3-5 minutes, or until bleeding stops.

![Fig. 8.2: Positioning of child during jugular puncture](image)

iii) Scalp vein, Subdural, Ventricular Taps (Fig. 8.3)

• Restrain child

• Hold head steady between the hands, as shown.

• Avoid pressure over the ears.
iv) **Femoral Vein Puncture** (See Fig. 8.4)
- Place child in supine position.
- Place legs in “frog leg” position to provide extensive exposure to groin area.
- Restrain arms.
- Hold legs securely at the knees, as shown in Figure.
- Place diaper to protect the site from urine (dotted lines in Figure).
- Pressure is applied to the site after withdrawal of blood to prevent ooze from the site.

v) **Perineal/Rectal Procedures** (Fig. 8.5)
- Place child in supine position.
- Hold legs in thigh flexion and abduction position (as in Fig. 8.5).
- Place diaper to protect site from urine (dotted lines).

Fig. 8.3: Position of child during subdural and ventricular taps and insertion of scalp vein canula

Fig. 8.4: Femoral puncture
Activity 2

Visit a paediatric ward of your work place and assist carrying out all the procedures as mentioned above. Follow the steps while positioning of the child. Record the purpose of each procedure in the child. Follow up the cases and record results.

You have reviewed the positioning and care of child during various diagnostic procedure. Now we shall focus on the routine diagnostic procedures. We shall not go into details of all these as you have already learnt it in your basic training and you are also performing these activities at your work place.

8.5 COMMON ROUTINE DIAGNOSTIC PROCEDURES

We shall review the examination and collection of urine/stool/blood specimens which are used to aid in diagnosis and treatment of a disease.

Purpose

- To facilitate accurate laboratory analysis in diagnosis.
- To ensure correct diagnosis and treatment.
- To evaluate result of treatment given.

8.5.1 Urine and Stool Collection

We shall begin with procedure for collection of urine samples.

Equipment

- Urine collection bag for infants.
- Clean container for older children.

Preparation

The vulva/perineal area must be washed before the collection. The perineum, genitalia and surrounding skin are washed and dried thoroughly.
In smaller children, the collection bag must be strapped carefully as follows:

- Remove the protective paper and expose adhesive surface of the bag.
- Apply the bag with the collecting portion of the bag or test tube downward.
- For males, insert the penis into the test tube or penis and scrotum are placed inside the bag. (Fig. 8.6a,b)

(a)  (b)

Fig. 8.6: Collection of urine sample

- For females, apply the mouth of the bag over the upper portion of the external genitalia over the urinary meatus.
- If the urine specimen is contaminated with faeces, discard and collect another sample.
- Remove bag as soon as the specimen is available.
- When sterile specimens are needed, the child must be catheterized, using absolute aseptic precautions.

Collection of Stools (Faeces)

**Equipment**

Containers, spatulas, diapers, tissues papers, bed pan for older children.

**Procedure**

- Provide privacy for the older child.
- Wash the spatula well before collection.
- Scrap the stool from the bed pan or diaper which ever is used.
- Transfer to the container.
- Label and send to laboratory.
8.5.2 Collection of Blood

It is a procedure done routinely for diagnosis. It can be done in various ways.

i) Capillary Sampling
   - The heel is the most useful area in newborns.
   - The third finger is the common site in older children.
   - The skin is to be cleaned.
   - A single deep, vertical stab is given.
   The area must not be squeezed, since it causes hemolysis.

ii) Venipuncture
   In the older child, the superficial veins may be used.
   The different sites are:
   - Veins of the extremities, especially the arm and hand.
   - External jugular vein.
   - Femoral vein.
   - Scalp vein.
 Restraining firmly to immobilise the site of venipuncture.

- Cleaning of selected site with alcohol.

- The needed specimen is collected by venipuncture and pressure is applied to the puncture site with a drygauze.

### Precautions

The areas of puncture on these veins must be pressed for 3-5 minutes to prevent haemorrhage and formation of haemotoma.

#### 8.5.3 Throat Swab

- Swab both the tonsils and the posterior pharynx when obtaining a throat culture.

- Insert swab stick into the culture tube.

#### 8.5.4 Collection of Sputum

**Purpose:** Sputums collected for the diagnosis of respiratory infections especially tuberculosis and respiratory syncitial virus.

Older children are able to take out sputum as per direction i.e. deep coughing to take out sputum. Infants and small children are not able to follow directions and swallow any sputum produced. Therefore in infants and small children gastric aspiration may be done to collect sputum specimen.

### Activity 3

i) Identify a child requiring urine and stool examination. Collect the urine and stool samples. Record purpose of collections of these samples. Follow up and record the findings.

ii) Assist in the collection of blood sample of a child who is undergoing a heart or abdominal surgery. Record the findings.

### 8.6 ASSISTING IN PROCEDURE OF BIOPSY

Biopsies are removal of a small piece of tissue for examination under microscope. Such examinations are called “Histopathological” examination. The biopsies are called after the name of the tissue to be studied, e.g. bone marrow, liver biopsy etc. The commonest biopsies in a child are the above mentioned biopsies. Let us look at these a bit more in detail. Basically, the nurses’s responsibility lies in assisting for the procedures. Once you know how to assist for these procedures, the same principles is applied to any other biopsy. Let us now focus on bone marrow biopsy.

#### 8.6.1 Bone Marrow Biopsy

It is the puncture and withdrawal of marrow from the flat bones of sternum, spinous process of vertebrae, iliac crest etc. It is also called the bone tap or the sternal puncture or bone marrow aspiration.

**Purpose**

- To determine the presence of blood dyscrasias.

- To assess the progress of various diseases e.g. leukaemia.
• To determine the level of immunity.
• To collect material for culture.

**Indications**

• All types of anaemias.
• Leukaemia.
• Purpuras.
• For secondary deposits of tumors.
• Spleenomegaly.

**Contraindications**

• Skin infections around the sites.
• Eczema.

**Equipment**

• Cotton swabs.
• Antiseptic cleaning solutions.
• Bone marrow puncture tray with 20 ml. syringe.
• Bone marrow needles and stylets.
• Drapes.
• Sterile swabs.
• Glass slides with cover slips.
• Test tubes with normal saline.
• Local anaesthetics.
• Tincture benzoin swab for sealing.
• Gloves.

**Nursing Responsibilities**

• Prepare patient by explanations.
• Obtain written consent.
• Provide privacy.
• Position the child according to site and restrain.
• Clean the area.
• Constantly assure the patient.
• Assist in the procedure.
• Monitor the vital signs of the child during the procedure.
• Send specimens to the laboratory immediately following collection.
• Apply pressure on the site for 5-10 minutes.
• Apply the benzoin swab over site
• Observe carefully for bleeding.
• Check vital signs half hourly for 4 hours and record.
• Clean all articles with soap and running water.
• Dry and reset the tray.
• Send for autoclaving.
• Record the procedure and patient’s reactions.

8.6.2 Liver Biopsy

It is the removal of a piece of a liver tissue with the help of a liver biopsy needle. The needle used here is known as the Vimsilverman’s needle.

Purpose
• To make the correct diagnosis.
• To determine the extent of damage to the liver tissue.
• To Study changes in malnutrition.

Indications
• Cirrhosis of liver.
• Infections or hepatitis.
• Diagnosis of koch’s in liver.
• Hepatomegaly

Contraindications
• Severe anaemia.
• Bleeding disorders.
• Liver abscess.
• Hypoprophoblaemia.

Precautions
• The child must not be anaemic.
• Bleeding time, clotting time must be normal.
• Prothrombin time must be more than 70 per cent.
• No local infection at the site.

Equipment
• Cotton swabs for cleaning the site.
• Cleaning solutions.
• Local anaesthetics.
• Vial with 10 per cent formaldehyde (formaline).
• Sterile tray with Vim-silverman’s needle.
• Syringes.
• Sterile swabs.
• Gloves.

Position of the Child

The child must be placed in a supine position on a firm table. The hands must be held above the head. The right side is to be brought near the edge of the table.

Nursing Responsibilities

• Explain to the patient.
• Provide privacy.
• Obtain consent.
• Prepare the site after positioning, and restraining the child at the chest level.
• Sedate the patient if needed.
• Assist for the procedure.
• Watch vital signs during the procedure.
• Collect and label the specimen.
• Apply benzoin seal at the site.
• Apply pressure on the site, observe for bleeding for 5-10 minutes.
• Check vital signs for half an hour for four hours.
• Record procedure and child’s reactions.
• Send specimens to laboratory.
• Clean all articles under running water with soap.
• Dry and reset the tray.
• Send for autoclaving.

Activity 4

Select a sick child who is undergoing biopsy (any organ). Assist in procedure and give after care of child. Record the procedure and observations.

8.7 ASSISTING IN PROCEDURES FOR TAPPING OF FLUIDS

Now that we have seen the procedure of biopsies, let us look into procedures done for tapping of fluids from cavities in the body. These fluids may exist naturally e.g. cerebro-spinal fluid, or may be the result of a disease process as in “ascites” i.e. collection of fluid in the peritoneal cavity, or in the pleural cavity where it is known as “effusion”. You may need to assist in following tapping procedures.

Cerebro-spinal Fluid Tap

Abdominal Fluid Tap (Abdominal paracentesis)

Thoraco Fluid Tap (Thoracocentesis)

Let us now discuss how CSF is collected.
8.7.1 Collection of Cerebro-spinal Fluid (CSF)

Examination of the CSF is one of the most useful laboratory procedures in neurological diagnosis.

Four types of punctures may be made to collect the CSF. These are:

- Lumbar puncture
- Ventricular puncture
- Cisternal puncture
- Subdural puncture

Now let us know the meaning of each one of the above procedures.

- **Lumbar puncture** is the withdrawal of CSF from the lumbar vertebral space.
- **Ventricular puncture** is the removal of CSF from the ventricles in the brain through the *coronal suture* or anterior fontanelle.
- **Cisternal puncture** is the removal of CSF from the cisterna magna at the nape of the neck.
- **Subdural puncture** is the removal of CSF from the subdural space between the arachnoid and the duramater.

All these above procedures need strict surgical asepsis. The purposes of all these procedures are the same. The purposes are:

**Purposes**
- Diagnostic
- Therapeutic
- Prognostic
- Study of electrolytes, proteins etc.

**Indications—Diagnostic**
- Meningitis
- Haemorrhage
- Acute polyneuritis
- Polio myelitis
- Hydrocephalus
- Spinal compression
- Radiographic studies e.g. myelography.

**Indications—Therapeutic**
- To reduce intra-cranial pressure, e.g. in hydrocephalus and encephalitis etc.
- To inject drugs into subarachnoid space.
- For spinal anaesthesia (Through Lumbar puncture)
- To study the effect of treatment given.
The complications of these procedures are:
- Bleeding
- Infections
- Trauma
- Headache

Nursing Responsibilities
- Explain the procedure to the relative
- Obtain consent.
- Position the child accordingly (refer to "restraints").
- Assist for the procedure.
- Observe the vital signs during and following the procedure.
- Observe area for leakage of CSF/bleeding.
- Send specimens for laboratory investigations.

PS—The articles for these procedures are the same as for biopsies. The difference is only in the size and type of the needle used for the tap. Usually, a large bore needle of number 18 size is used for the tapping.

We shall now focus on abdominal paracentesis and thoracocentesis.

8.7.2 Abdominal Paracentesis (Tapping)

We shall begin with abdominal tapping. It is the withdrawal of fluid from the peritoneal cavity.

Purpose
- Therapeutic to relieve ascites.
- Diagnostic for cultures/electrolyte studies/ study of protein contents.

Indications
Ascites in cirrhosis of liver.

Thoracocentesis (Pleural Tapping)

Thoracocentesis is the removal of pleural fluid for diagnosis or treatment.

Purpose
- To treat pneumothorax
- To treat pleural effusion

Indications
Chest wall injuries, collapse of pleural cavity.

We shall discuss about equipments used and nurse’s responsibilities for both the procedures together.

Equipment for the Procedure
Same type of equipment are required to carry out these two procedures.
Skin cleansing disinfectants

Sterile tray with

- Fenestrated towel for draping.
- Gauze pieces
- Cotton swabs
- Local anesthetics
- Syringes of various sizes
- Needles of various sizes
- Trocar and stylet or wide bore needle
- Sterile tubings with two way stop cock
- Bottle (sterile) for collection of fluid
- Tincture benzoin i.e. compound for seal.

Nurse's Responsibilities

- Explain procedure to relatives.
- Take written consent.
- Provide privacy.
- Administer pre-medication.
- Empty bladder (specially for abdominal tap to prevent injury to the bladder).
- Give position (fowler's position for both—with hands held over the head).
- Assess the child's vital signs during the procedure.
- Assist the doctor.
- Collect the fluid for testing.
- Collect the fluid in a sterile bottle if it is done for therapeutic reasons.
- Monitor vital signs half hourly for four hours.
- Observe bleeding at the site of the tubings and bottle in which the fluid drains. Report if bleeding present.
- Send specimen for testing.
- Clean all articles and prepare tray for autoclaving.
- Record procedure.

Complications

- Shock
- Perforation of vital organs in surrounding areas.
- Infections.

Activity 5

Assist a child undergoing ventricular/abdominal and pleural tap. Record the steps you followed and observe any untoward reactions.
Guideline–Diagnostic Procedures

Name of the child
Age
Diagnosis
Bed No.
Ward
Hospital
Date of the admission

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the diagnostic procedure/investigation</th>
<th>Purposes</th>
<th>Nursing action and observation</th>
<th>Remarks after the procedures</th>
</tr>
</thead>
</table>

8.8 LET US SUM UP

In this practical we have discussed about the various diagnostic procedures and the nurses responsibilities in carrying out these procedures. We mainly focused on physical examination of child, Positioning of child during various procedures, and Routine procedures such as urine, stool and blood collection. At the end we have focused on Biopsy and procedures for taping of fluids.