

Collection of Specimens for Laboratory Examination

During hospitalization of children, the nurse may carry out or assist in certain diagnostic procedures, including collection of specimens of urine, stool, sputum, throat swab, blood and cerebrospinal fluid. These procedures help in diagnosis of various disease conditions and to determine the therapeutic effects of the treatment given.

Infants and young children may not be able to co-operate when specimens are collected. They may not be able to understand the instructions given by the nurse or handle the equipment to be used. Therefore, the nurse has to follow special approaches during collection of specimens with the help from parents or other health team members.

When specimens are collected from the particular child, they must be accurately labeled and accompanied by the fill up laboratory form when sent to the laboratory for immediate processing to find out the normal or abnormal findings and values.

Collection of Urine Specimens

Urine specimens for laboratory examinations can be collected as routine urine specimen, clean-catch specimen and catheterized specimen for culture. Children who are not toilet-trained pose the greatest problem to obtain urine specimen.

Routine urine specimen collection from older children, who can co-operate with the nurse or the mother is relatively easy, but is more difficult from infants. Pediatric urine collection bag is used for infants. The nurse should wash own hands thoroughly before the application of the urine collection bag. After the external genitalia of the child has been cleaned and thoroughly dried, the collection bag is attached to the perineum in the girls. For boys, the penis and scrotum are inserted into the opening of the bag. The infant or toddler is placed in semi-Fowler position and a diaper is placed in position to prevent the displacement of bag. The nurse must check the bag frequently to prevent the urine from leaking and to obtain a fresh specimen for laboratory testing. When the child voids, the bag is removed and the specimen sent to the laboratory.

Clean-catch urine specimen: It is examined for rough estimation of number of bacteria present. In infant and small child, this specimen is obtained in a sterile urine collector. To obtain the specimen, the child's genitalia to be cleaned with soap and water using cotton balls and then rinsed with an antiseptic solution. After the genitalia is thoroughly cleansed, the skin is rinsed with sterile water and dried. When the child has voided, the urine is emptied into a sterile container. To obtain clean-catch specimen from preschool or older child, a sterile container or sterile specimen bottle can be used. Parents may assist in collection of urine. Adequate explanation to be given to the parents.

Urine can be collected as midstream specimen, but it is difficult to obtain from small children. If able to co-operate, the child voids a small amount into an unsterile container and then voids into a sterile container. Twenty-four hours urine collection may be needed in some children.

Collection of Stool Specimens

A stool specimen is collected by using spatula or spoon to transfer a freshly passed stool to a clean covered specimen container. The specimen should not be contaminated by urine. If a stool specimen cannot be obtained, a rectal swab may be taken by gently inserting a swab as far into the rectum as a thermometer is placed and twisting when removing it. Stool specimens and rectal swabs must be sent to the laboratory promptly, especially when it is examined for ova, parasites and cysts.

Collection of Blood Specimens

Blood specimens may be collected by laboratory technicians, physician or nurses. Nurse's responsibility is to prepare sterile articles and collection tubes or containers. The preparation of child for co-operation is very important. The older children are able to co-operate after an explanation of the procedures. The infants and young children cannot understand a verbal explanation. So mummy restraint to be used to complete the procedure quickly. Usually femoral vein puncture or antecubital fossa venipuncture is done to collect the specimen. After the puncture, firm pressure should be exerted over the vein for 3 to 5 minutes to prevent leakage of blood into the subcutaneous tissues following the collection of blood samples.

Children of all ages may fear the taking of samples of their blood. Explanation and application of band-aid may assure the children. Strict asepsis should be followed during collection of blood.

Peripheral capillary blood samples are taken from children by ear-lobe stab or finger stick methods. Peripheral blood samples are taken from infants by a heel stick.

Avoid contamination of specimen during and after collection of blood. Send the specimen to laboratory with label and filled up form. Help the child to verbalize the feeling.

Collection of Throat Swab

Collection of throat swab is an uncomfortable procedure. A sterile swab is used to obtain for throat culture. During collection of throat swab, the nurse should not permit it to touch the lips or tongue on entering or being removed from the mouth. The swab should touch only the most inflamed areas of the throat and tonsils. A tongue blade may be used to depress the tongue, so that the swab can be taken easily. The swab is then placed in a sterile container (test tube) to prevent it from drying prior to examination. Outside of the container should be kept clean to protect persons handling them. Special instructions, like not to wash mouth in the morning, before collection of swab, to be explained. Parents should assist during collection of swab to hold the child and to immobilize the child's head, which should be slightly tilt backward to obtain throat swab. The specimen to be sent to the laboratory promptly.

Collection of Sputum

The sputum specimen from a child who is too young to cough productively is difficult to collect. A suction device called mucus trap is used to obtain such specimen from trachea or bronchi. Children who are old enough to cough deeply and productively may be instructed to do so to collect the sputum specimens. Sputum to be collected with adequate instruction

Routes of Administration of Medications

The most common routes of giving medications are oral and parenteral. Rectal administration and instillation of drops into nose, ear and eye are also practiced in children. Intrathecal administration and inunction may be indicated for some children.

Oral administration of drugs: Pills, tablets and capsules are given to the older children who are able to co-operate in swallowing these forms of drugs. Liquid medications (syrup) are given generally to children below the age of 5 to 6 years because of the danger of aspiration of solid forms of drugs.

Liquid medications may be measured and given in the prescribed amount using various devices. These include glass or plastic medicine cup, 5 ml teaspoon, medicine dropper and plastic syringe. Accuracy is the prime importance in the measuring and administration of medications.

Infants generally accept medications put into their mouths that can be readily swallowed. The medication should be given along the side of the tongue slowly to prevent choking. The child can be placed on lap or in a semisitting position to prevent aspiration.

Toddlers and preschool children usually resist or refuse to take oral medications. They need explanation for co-operation. Sometimes these children need to be restrained by the nurse's hand or by the parent. The child's head is held firmly and medication is given slowly to prevent aspiration.

The older child may also refuse to take oral medication. The nurse should approach firmly and positively. Explanation for co-operation and support help the child to receive the medication.

Parenteral administration of drugs: Parenteral route of giving medications means administering medications not through alimentary canal but by injection through intramuscular, intravenous, subcutaneous, etc.

1. *Intramuscular (IM) administration:* Injection of any kind can hurt and be painful. Preparation for an intramuscular (IM) injection should be given just before it is done, so that children do not have time to build up their anxieties. The child's reaction to the injection depends upon level of the neurological maturity. The infants usually cry due to injection but older children try to get away and need restraining so that the injection can be given as safe and painless as possible.

Selection of site of injection is very important. Intramuscular injection should be given at a site away from major blood vessels and nerves and with adequate muscle tissues to retain and absorb the injected medicine. The IM injection sites in older children and adolescents are the same as for adults, i.e. the posterior gluteal, ventrogluteal, deltoid and quadriceps femoris muscles (rectus femoris). The preferred sites for infants and small children are ventrogluteal, vastus lateralis and rectus femoris muscles (Figs 8.3A to D).

General principles of IM injection to be followed with strict aseptic technique. When injecting less than 1 mL of medication, use a tuberculin syringe for accuracy. After medication is drawn from vial, draw up additional 0.2 to 0.3 mL of air into the syringe, thus clearing needle of medication and preventing medication seepage from the injection site. Needle to be inserted at 45 degree angle in a downward direction toward the knee, when given in rectus femoris muscle. For other site insert needle perpendicular to surface on which the child is lying. The amount of medication should be 1 or 2 mL. After injection, massage the site, unless contraindicated. The complication of fibrosis and contracture of the muscle can be diminished by massage, and range of motion exercises to disrupt and stretch immature scar tissue when multiple

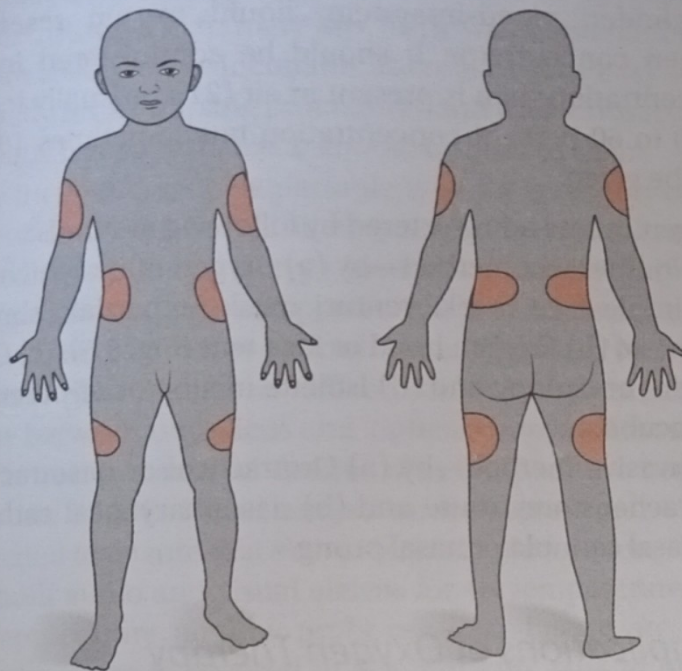


Fig. 8.4: Sites for insulin injection (SC)

injections are being administered. The drug is recorded along with the site of injection, so that injection sites can be rotated.

2. *Subcutaneous (SC) administration:* Certain drugs like insulin and heparin that are not irritating or available in heavy suspensions can be safely injected in small amounts subcutaneously. The sites, same as for IM injection can be used but additional areas of loose areolar tissue like anterior abdominal wall, interscapular or subscapular areas may also be utilized. A small syringe and needle are used and inserted in 45 degree angle holding the pinch of skin firmly between the thumb and index finger. The advantage of subcutaneous route include the presence of many sites for injection and rotation and unlikelihood of damage to vital nerves and blood vessels (Fig. 8.4).

3. *Intravenous (IV) administration:* Intravenous drugs are given more in pediatric practice. They are given to children who require a high serum concentration of a drug and to children who cannot absorb drugs from the gastrointestinal tract because of chronic diarrhea and other problems.

Several types of intravenous drug delivery systems are available. Three methods that can provide absolute control of drug delivery time are: (1) volume control set for single or intermittent administration of drug, (2) manual retrograde injection infusion for children whose fluids are restricted and (3) infusion pump system for continuous drug infusion. With these system only one drug is infused at a time and no flushing of intravenous system is required. Microdrip (60 drops makes 1 mL) is usually used for continuous infusion.

The nurse must be aware of the following aspects when giving drugs intravenously:

- The drug must be prepared for IV use.
- Strict aseptic precautions to be followed.
- Dilute IV medication and inject slowly as prescribed.
- Be knowledgeable regarding the used drugs in details.
- Intravenous drugs generally are not administered with blood or blood products.
- Only one antibiotic at a time should be given and should not be mixed with other drugs.
- Check the site of infusion for proper placement and signs of infiltration and any reactions.
- Heparin lock is used to provide a site for the intermittent administration of intravenous medications. Usually a blood vessel on the dorsum of the hand is used for the site of insertion. After insertion the heparin lock is flushed with a diluted solution of heparin (0.5 to 1.0 mL of a solution of 10 units of heparin per mL of physiologic saline solution). It is reflushed every 2 hours, especially after medication is given, to prevent clot formation.

- Observe IV site frequently, restrain the child to prevent infiltration which can cause rapid and severe tissue necrosis.
- Maintain record in details regarding IV administration of drugs.
- Follow general rules and principles of administration of medication and report any adverse reaction.