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Fundamentals *of* NURSING

Clinical Procedure Manual



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Foreword
Nalini Jeyavanth Santha

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Chapter 4

Specimen Collection

COLLECTION OF BLOOD SPECIMEN

Performing Venipuncture

Definition

Venipuncture is using a needle to withdraw blood from a vein, often from the inside surface of the forearm near the elbow.

Purposes

1. To examine the condition of client and assess the present treatment.
2. To diagnose disease.

Equipments

- Laboratory form
- Sterilized syringe
- Sterilized needles
- Tourniquet: 1
- Blood collection tubes or specimen vials as ordered
- Spirit swabs
- Dry gauze
- Disposable gloves if available: 1
- Adhesive tape or bandages
- Sharps disposal container: 1
- Steel tray: 1
- Ballpoint pen: 1.

Procedure

The procedure of venipuncture is given in Table 4.1.

Table 4.1: Procedure of venipuncture

Sl No	Care action	Rationale
1.	Identify the patient: • Outpatient are called into the phlebotomy area and asked their name and date of birth • Inpatient are identified by asking their name and date of birth	This information must match the requisition

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Sl No	Care action	Rationale
2.	Reassure the client that the minimum amount of blood required for testing will be drawn	To perform once properly without any unnecessary venipuncture
3.	Assemble the necessary equipment appropriate to the client's physical characteristics	Organization facilitates accurate skill performance
4.	Explain to the client about the purpose and the procedure	Providing explanation fosters his/her cooperation and allays anxiety
5.	Perform hand hygiene and put on gloves if available	To prevent the infection of spreading
6.	Positioning: • Make the client to be seated comfortably or supine position • Assist the client with the arm extended to form a straight-line from shoulder to wrist • Place a protective sheet under the arm	To make the position safe and comfortable is helpful to success venipuncture at one try To prevent the spread of blood
7.	Check the client's requisition form, blood collection tubes or vials and make the syringe-needle ready	To assure the doctor's order with the correct client and to make the procedure smooth
8.	Select the appropriate vein for venipuncture	The larger median cubital, basilica and cephalic veins are most frequently used, but other may be necessary and will become more prominent if the client closes his/her
9.	Applying the tourniquet: • Apply the tourniquet 3–4 inches (8–10 cm) above the collection site; never leave the tourniquet on for over 1 minute • If a tourniquet is used for preliminary vein selection, release it and reapply after 2 minutes	To prevent the venipuncture site from touching the tourniquet and keep clear vision Tightening of more than 1 minute may bring erroneous result due to the change of some blood composition
10.	Selection of the vein: • Feel the vein using the tip of the finger and detect the direction, depth and size of vein • Massage the arm from wrist to elbow; if the vein is not prominent, try the other arm	To assure venipuncture at one try
11.	Disinfect the selected site: • Clean the puncture site by making a smooth circular pass over the site with the spirit swab, moving in an outward spiral from the zone of penetration • Allow the skin to dry before proceeding • Do not touch the puncture site after cleaning • After blood is drawn the desired amount, release the tourniquet and ask the client to open his/her fist • Place a dry gauze over the puncture site and remove the needle • Immediately apply slight pressure; ask the client to apply pressure for at least 2 minutes	To prevent the infection from venipuncture site Disinfectant has the effect on drying To prevent the site from contaminating To avoid making ecchymoma The normal coagulation time is 2–5 minutes

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Sl No	Care action	Rationale
	• When bleeding stops, apply a fresh bandage or gauze with tape	Rinsing removes loosened debris and make the mouth taste fresher
12.	• Transfer blood drawn into appropriate blood specimen bottles or tubes as soon as possible using a needless syringe • The container or tube containing an additive should be gently inverted five to eight times or shaking the specimen container by making figure of 8	• A delay could cause improper coagulation • Do not shake or mix vigorously
13.	Dispose of the syringe and needle as a unit into an appropriate sharps container	To prevent the spread of infection
14.	Label all tubes or specimen bottle with client name, age, sex, inpatient number, date and time	To prevent the blood tubes or bottles from misdealing
15.	Send the blood specimen to the laboratory immediately along with the laboratory order form	To avoid misdealing and taking erroneous results
16.	Replace equipments and disinfects materials if needed	To prepare for the next procedure and prevent the spread of infection
17.	Put off gloves and perform hand hygiene	To prevent the spread of infection

Collection of Blood for Culture

Definition

A blood culture is a collection and inoculation of blood into culture medium with the aim of growing pathogenic bacteria or fungi for diagnostic purposes.

Purposes

1. To identify the type of bacteria/fungi present and specific type of antibiotics to use to eradicate the microorganism.
2. To determine whether microorganisms have invaded the patient's bloodstream.

Equipments

A tray containing:
- A pair of sterile gloves
- Alcohol swabs
- Blood culture bottles (two bottles per set)
- Disposable syringe
- Tourniquet
- Sterile gauze pad
- Adhesive strip or tape.

Procedure

The procedure of blood collection for culture is given in Table 4.2.

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Table 4.2: Procedure of blood collection for culture

Sl No	Care action	Rationale
1.	Explain procedure to the patient	To get cooperation from the patient
2.	Arrange and keep the entire article near the patient side	To minimize the unnecessary contamination
3.	Position the patient comfortably	To do the procedure easily
4.	Select and keep the appropriate sample collection container and stick patient profile	To get accurate results and to avoid the specimen does not get missed
5.	Wash hands with soap and water with friction for 15 seconds or use alcohol based hand rub	To prevent infections
6.	Clean the rubber cap of the blood culture bottles with an alcohol pad in a circular motion; allow the alcohol to dry	To prepare the specimen container ready to receive the sample and to prevent the cross contamination
7.	Apply tourniquet 3–4 inches above intended site; palpate for a vein and select site, preferably in the antecubital fossa	To assess the patency of the vein, to get the adequate blood sample and to increase the venous pressure
8.	Wear sterile gloves	To minimize the contamination
9.	Site preparation to be done by: • Vigorously clean the venipuncture site with alcohol swabs and allow drying • Starting at the center of the site, swab concentrically with alcohol swab for 1 minute • Allow the site to dry • Do not touch the venipuncture site after preparation and prior to puncture	To minimize the contamination
10.	Hold the syringe with the bevel of needle facing upwards	To ensure the correct position of the needle
11.	Advance the needle into the patient vein, with patient's arm in a downward position and tube stopper uppermost	This reduces the risk of backflow of any anticoagulant into the patient's circulation
12.	As blood come into view in syringe, withdraw the plunger of syringe softly with steady suction until the required sample is obtained	To get accurate report; in sufficient sample may cause again repuncture for the patient
13.	Remove the tourniquet	To release the pressure
14.	Take out the needle from the punctured area and place the dry sterile cotton and apply gentle pressure	To prevent bleeding
15.	Do not recap the needle and remove the needle from the syringe, discard into sharps container as per institutional policy	To prevent the needle stick injury
16.	Distribute blood equally into aerobic and anaerobic labeled sample container	For investigation process

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Sl No	Care action	Rationale
17.	Gently rotate the bottles to mix the blood and the broth (do not shake vigorously) and send specimen to respective laboratories	To enhance the blood to mix with the liquid
18.	Make the patient comfortable; replace the equipment and wash hands	To make the patient feel comfortable and prevent cross infection
19.	Record the procedure with details and investigation as well as collection	Helps to assess the continuity of care

Arterial Blood Collection

Definition

Arterial blood gases (ABGs) are diagnostic tests performed on blood taken from an artery.

Purposes

1. Arterial blood gases or ABGs are done to evaluate oxygenation and acid-base balance in the body.
2. An ABG test measures the acidity (pH) and the levels of oxygen and carbon dioxide in the blood from an artery.
3. This test is used to check how well your lungs are able to move oxygen into the blood and remove carbon dioxide from the blood.

Equipments

A tray containing:
- A pair of gloves
- Dry cotton/gauze pieces
- Adhesive plaster
- Heparinized syringe and needle
- Alcohol swab
- Injection Xylocaine 2%.

Procedure

The procedure of arterial blood collection is given in Table 4.3.

Table 4.3: Procedure of arterial blood collection

Sl No	Care action	Rationale
1.	Explain the procedure to the patient	To reduce the anxiety and to get the cooperation
2.	Prepare all the articles near the patient bedside	To ease to do the procedure

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Sl No	Care action	Rationale
3.	Check the patient coagulation factors and platelet count before starting the procedure	To prevent bleeding
4.	Feel for radial pulses on both wrists to determine which will be the better site, from which to draw	To avoid to perform an arterial puncture on an extremity; it may cause an inadequate blood supply
5.	Perform the Allen's test on the hand, which has been selected for the puncture	To determine adequate collateral flow
6.	Prepare the puncture site aseptically	To prevent infection
7.	Put sterile gloves and anesthetize the puncture area with 2% Xylocaine, according to the physician order	The use of a local anesthetic is not required, but may relieve uneasiness or be useful in reducing arterial spasm, if any case with difficulty in obtaining an arterial sample
8.	The heparinized syringe should be used to withdraw the blood sample	To prevent clotting of blood
9.	Puncture the skin about 5–10 mm distal to the finger directly over the artery; the puncture angle should be approximately 45° toward the direction of the blood flow	To obtain the blood easily
10.	Slowly advance the needle and syringe with one hand, while continuing to palpate the artery with the other hand; when a flash of arterial blood is observed in the hub of the needle, do not advance the needle further	To prevent deep injury
11.	While holding the syringe and needle motionless with one hand, gently pull back on the plunger of the syringe with the other hand to allow the syringe to fill	To prevent damage of the artery
12.	If the needed amount of blood has been obtained, should remove the needle and syringe rapidly, and press down on the puncture site with sterile gauze	To prevent the bleeding
13.	If any air bubbles present in the syringe, it is to be removed immediately and recap the needle	To prevent the inaccuracy in results
14.	Send the specimen to the blood gas analyzer	To do the analysis
15.	The needle is advanced just slightly under the skin; once the needle is in the artery the syringe will readily fill Arterial blood will pulsate whereas blood from a vein will not; arterial blood is also brighter red (if oxygenation is adequate) than blood from a vein When the needle is withdrawn, a gauze should be placed over the punctured site and pressure applied for about 5 minutes (longer if the patient has bleeding tendencies), if any bleeding occurs at the end of this time, pressure should be maintained until no further bleeding occurs	To obtain the sample

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Sl No	Care action	Rationale
16.	Once the sample is obtained, remove the visible gas bubbles; label the syringe with patient profile	Air bubbles can dissolve into the sample and cause inaccurate results
17.	The sealed syringe is taken to a blood gas analyzer	The sample cannot be immediately analyzed; it is chilled in an ice bath in a glass syringe to slow metabolic processes, which can cause inaccuracy Samples drawn in plastic syringes are not iced and are analyzed within 30 minutes
18.	Document the procedure; collect the arterial blood gas (ABG) report and paste it in the appropriate place in the clinical chart	To monitor differences and detect trends; any irregularities should be brought to the attention of the appropriate senior nursing and medical teams

Points to Note

- Allen test is used to test blood supply to the hand, specifically, the patency of the radial and ulnar arteries. It is performed prior to radial arterial blood sampling or cannulation.

Allen test procedure

1. The hand is elevated and the patient is asked to make a fist for about 30 seconds.
2. Pressure is applied over the ulnar and the radial arteries so as to occlude both of them.
3. Still elevated, the hand is then opened. It should appear blanched (pallor can be observed at the finger nails).
4. Ulnar pressure is released and the color should return in 7 seconds.
5. Inference: Ulnar artery supply to the hand is sufficient and it is safe to cannulate/prick the radial.
6. If color does not return or returns after 7–10 seconds, the test is considered negative and the ulnar artery supply to the hand is not sufficient. The radial artery therefore cannot be safely pricked/cannulated.

Measurement of Capillary Blood Glucose

Definition

The collection of capillary blood from a fingertip quickly evolved as the standard sampling methodology. It is performed in homes and in hospitals for monitoring purposes that require relatively small samples of blood. It is more cost-effective, less traumatic and more convenient to obtain a blood sample by lancing the skin capillaries than it is by using healthcare practitioners to draw a tube of venous blood.

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Purposes

1. Helps to observe immediate and daily levels of blood glucose control and dose adjustments.
2. Helps to identify the value variation of the patient in continuous insulin infusion.
3. To identify hypoglycemia and hyperglycemia.
4. Help out in the safe management of hyperglycemia and hypoglycemia.
5. Determines the effect of daily activities such as physical activity and meals on blood glucose.

Equipments

- Blood glucose meter
- Test strips
- Control solution
- Single use lancets
- Cotton swabs
- Disposable gloves.

Procedure

The procedure of capillary blood glucose measurement is given in Table 4.4.

Table 4.4: Procedure of capillary blood glucose measurement

Sl No	Care action	Rationale
1.	Explain the procedure to the patient	The patient should be attentive of the procedure in order to relieve some of his/her anxiety and to be able to cooperate in the procedure
2.	Ask the patient to sit down or lie down	To ensure the patient's safety
3.	Wash your hands and put on gloves	To decrease the risk of cross infection and risk of contamination
4.	Clean the fingertip with the alcohol swab where has to prick	To minimize the risk of contamination
5.	Allow the area to dry and prick the fingertip with the help of single use lancet	To minimize the risk of cross infection and accidental needle stick injury
6.	Take a blood sample from the pricking side of the finger, ensuring the side of the piercing is rotated; avoid frequent use of the index finger and thumb The finger may bleed without assistance or may need assistance by 'exploiting' to form a droplet of blood, which is large enough to cover the test pad	The side of the finger is used as it is less painful and easier to obtain a hanging droplet of blood; the site is rotated to reduce the risk of infection from multiple stabbing, and to prevent the areas from becoming toughened and to reduce pain

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Sl No	Care action	Rationale
7.	Apply the blood to the testing strip; some test strips are hydrophilic and are dosed/filled from the side and are not dropped directly onto the strip	The window on the test strip allows verification of a correctly dosed strip
8.	Dispose of lancet into a puncture proof sharps container	To reduce the risk of needle stick injury
9.	Record value immediately after the test has been done	To ensure the accuracy of the result
10.	Dispose all the waste according to the hospital policy	To reduce the risk of cross infection
11.	Ensure the patient comfortable and watch for bleeding in the puncture side; if bleed, apply pressure with dry cotton balls	To ensure the patient's comfort and safety To minimize the complication
12.	Wash and dry hands	To prevent cross infection
13.	Record the result in the nurses' notes and in appropriate record (diabetic chart); if any variations in the value are found, it should be intimated immediately to the medical team by the nurses	To prevent complications

Points to Note

Before taking the device to the patient, the monitor needs to be checked for the following:

- Opening date of the strip box.
- The test strip should not be left in the open environment.
- It should be kept in the strip box with closed lids.

Collection of Blood Sample from Arterial Cannula

Definition

Arterial blood sampling blood can be drawn from an indwelling arterial cannula.

Purposes

1. To evaluate the adequacy of ventilatory ($PaCO_2$) acid-base (pH and $PaCO_2$) and oxygenation (PaO_2 and SaO_2) status, and the oxygen-carrying capacity of blood (PaO_2, HbO_2, Hb total and dyshemoglobins).
2. To quantitate the patient's response to therapeutic intervention and/or diagnostic evaluation (e.g. oxygen therapy, exercise testing).
3. To monitor severity and progression of a documented disease process.

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Equipments

- A pair of gloves
- Disposable syringe (5 mL, 10 mL)
- Heparinized syringe (5 mL, 10 mL)
- Labeled specimen container
- Gauze pieces
- Alcohol swab.

Procedure

The procedure of blood sampling from arterial cannula is detailed in Table 4.5.

Table 4.5: Procedure of blood sampling from arterial cannula

Sl No	Care action	Rationale
1.	Explain the procedure to the patient	To ensure that the patient understands the procedure
2.	Arrange and keep all the articles near the patient side	To minimize unnecessary contamination
3.	Wash hands with bactericidal soap and water or bactericidal alcohol hand rub	To minimize the risk of cross infection
4.	Turn stopcock off to patient	To prevent the blood backflow from the line
5.	Remove the bung from stopcock; wipe with alcohol swab and attach sterile syringe to stopcock	To obtain the first sample from the line and prevent the entry of microorganism
6.	Open stopcock to syringe and intra-arterial catheter; aspirate 3 mL of blood and discard it	To get the accurate report
7.	Turn stopcock to the half-closed position, quickly remove syringe and replace with heparinized syringe	To obtain blood sample
8.	Open stopcock to syringe and intra-arterial catheter and obtain arterial blood gas sample	To do the analysis
9.	Close stopcock to the syringe and remove syringe containing blood sample and gently rotate syringe, cover the syringe with an arterial blood gas (ABG) cap to prevent contamination with air	Send for analysis and ensure that the blood and heparin in the syringe are mixed
10.	Activate flush device to clear arterial line	To prevent the clotting of the tube
11.	Turn stopcock off to the patient and flush side port of stopcock into sterile syringe until all blood is cleared from stopcock	To prevent infection and clotting of the tube
12.	Close stopcock, clean with alcohol and replace sterile protective cap	To prevent entry of the microorganisms and direct contamination of the cannula
13.	Check whether pressure infuser cuff is inflated to 300 mm Hg	To prevent back flow of blood into circuit
14.	Analyze or send to nearest blood gas analyzer and document result	To obtain accurate results as soon as possible
15.	Document the procedure in the nurse's record	To perform the follow-up care for the patient

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Points to Note

- Before taking blood sample from arterial line, ensure that arterial line is patent, i.e. the pressure bag is pumped up to 300 mm Hg, the tubing from the arterial site to the 3-way tap is clear and the line flushes easily.

Collection of Blood Sample from Central Venous Catheter

Definition

Blood can be drawn from a central venous access device, where the catheter is threaded into the central vasculature.

Purposes

1. To provide fluid resuscitation.
2. To provide parenteral feeding.
3. To measure the central venous pressure.
4. To administer the irritant drugs.
5. To collect the blood sample.
6. To provide long-term access like transfusion of blood or blood products, administration of drugs such as cytotoxic and antibiotic therapy.

Equipments

- Sterile dressing pack
- Alcohol swab
- A pair of gloves
- Labeled specimen container
- Disposable syringe (5 mL, 10 mL)
- Sterile disposable syringes 10 mL
- Injection: Normal saline 0.9%
- Water for injection.

Procedure

The procedure of blood sampling from central venous catheter is given in Table 4.6.

Table 4.6: Procedure of blood sampling from central venous catheter

Sl No	Care action	Rationale
1.	Explain the procedure to the patient	To get the cooperation and reduce the anxiety of the patient
2.	Arrange the articles near the bedside	To minimize unnecessary contamination
3.	Assess all medications and infusions before selecting a port for sampling	To avoid the dilated sample and to get the accurate results

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Sl No	Care action	Rationale
4.	Wash hands with soap and water or bactericidal hand rub	To reduce the risk of infection
5.	If intravenous (IV) fluid is on flow, switch it off	To get the accurate results
6.	Before removing bung from stopcock, check the clamp or adaptor of the CVP line whether it is locked or not	To prevent bleeding
7.	Remove the bung from the stopcock and clean the catheter with alcohol swab	To minimize the entry of microorganism into the catheter
8.	Connect 10 mL syringe to the stopcock Open the stopcock Release the clamp and withdraw 5–10 mL of blood, close the clamp and discard the blood sample	To prevent contamination and to prevent the mixing
9.	Connect another disposable syringe in the stopcock and release the clamp, and withdraw the required amount of blood	To do the analysis
10.	Once the blood is withdrawn, close the clamp and transfer the blood to labeled specimen container; flush the line with 0.9% normal saline (NS) or sterile water	To prevent blood clotting in the lines
11.	When required, disconnect the administration set from the catheter and cover the end of the set with sterile cap	To reduce the risk of contaminating the end of the administration set
12.	Reconnect the IV fluids or medication as per physician order	To continue the treatment of the patient
13.	Document the procedure in the nurse's record	To perform the follow-up care of the patient

COLLECTION OF URINE SPECIMEN

Definition

Urinalysis in which the components of urine are identified, is part of every client assessment at the beginning and during an illness.

Purposes

1. To diagnose illness.
2. To monitor the disease process.
3. To evaluate the efficacy of treatment.

Nursing Alert

1. Label specimen containers or bottles before the client voids.
   Rationale: Reduce handling after the container or bottle is contaminated.

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Fundamentals *of* NURSING

Clinical Procedure Manual

This book contains two major sections. Section 1 contains all the Basic Nursing Care Procedures and Section 2 contains Advanced Medical and Surgical Procedures, Assisting Procedures and other Nursing Procedures. Each procedure is divided into five parts, such as definition, purposes, equipments, steps of procedure, points to note (if needed). The rationale for each step of procedure is explained clearly with the care action.

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