
Professional Certificate in Vascular Care

Vascular Access Procedures

Vascular Access Procedures:

Vascular access procedures are medical techniques used to gain access to the bloodstream for various purposes, such as administering medication, fluids, blood products, or conducting diagnostic tests. These procedures are crucial in managing patients requiring long-term intravenous therapy, chemotherapy, dialysis, or frequent blood sampling.

Key Terms and Vocabulary:

1. Vascular Access:

Vascular access refers to the means by which healthcare providers gain entry to the bloodstream for medical purposes. It involves the insertion of a catheter or needle into a blood vessel, allowing for the infusion or withdrawal of fluids.

Example: An example of vascular access is the placement of a central venous catheter to administer chemotherapy to a cancer patient.

2. Central Venous Catheter (CVC):

A central venous catheter is a long, thin tube inserted into a large vein near the heart, typically in the neck, chest, or groin. It is used for administering medications, fluids, or blood products, as well as for hemodialysis or monitoring central venous pressure.

Example: A patient with kidney failure may require a central venous catheter for hemodialysis treatments.

3. Peripheral Intravenous (IV) Catheter:

A peripheral IV catheter is a short, thin tube inserted into a peripheral vein, usually in the arm or hand. It is commonly used for short-term intravenous therapy, such as administering medications, fluids, or blood products.

Example: Patients in the emergency room often receive peripheral IV catheters for quick administration of pain medications or fluids.

4. Arteriovenous Fistula (AVF):

An arteriovenous fistula is a surgically created connection between an artery and a vein, typically in the arm. It is commonly used in patients requiring long-term hemodialysis treatments.

Example: A patient with end-stage renal disease may undergo surgery to create an arteriovenous fistula for regular dialysis treatments.

5. Peripherally Inserted Central Catheter (PICC):

A peripherally inserted central catheter is a long, thin tube inserted into a peripheral vein and advanced until the tip reaches a central vein near the heart. It is often used for long-term intravenous therapy, such as chemotherapy or total parenteral nutrition.

Example: A patient undergoing long-term antibiotic therapy may have a PICC line inserted for daily medication administration.

6. Tunneled Catheter:

A tunneled catheter is a type of central venous catheter that is inserted into a large vein near the heart and tunneled under the skin to reduce the risk of infection. It is often used for long-term intravenous therapy in patients requiring frequent access to the bloodstream.

Example: Patients with cystic fibrosis may have a tunneled catheter placed for regular intravenous antibiotic treatments.

7. Dialysis Catheter:

A dialysis catheter is a type of central venous catheter specifically designed for hemodialysis treatments. It is inserted into a large vein near the heart to allow for the removal and return of blood during dialysis sessions.

Example: Patients with kidney failure who are unable to undergo surgery for an arteriovenous fistula may require a dialysis catheter for hemodialysis treatments.

8. Port-a-Cath:

A Port-a-Cath is a type of central venous access device that consists of a reservoir implanted under the skin and connected to a catheter inserted into a central vein near the heart. It is used for long-term intravenous therapy and can be accessed with a special needle when needed.

Example: Patients with cancer undergoing frequent chemotherapy treatments may have a Port-a-Cath implanted for easy and convenient access to the bloodstream.

9. Hemodialysis:

Hemodialysis is a medical procedure used to filter waste products and excess fluids from the blood in patients with kidney failure. It involves using a dialysis machine to circulate the blood through a filter (dialyzer) and return it to the body.

Example: Patients with end-stage renal disease rely on hemodialysis treatments to maintain their health and remove toxins from their blood.

10. Thrombosis:

Thrombosis is the formation of a blood clot inside a blood vessel, obstructing the flow of blood. It can occur in both arteries and veins and may lead to serious complications, such as pulmonary embolism or stroke.

Example: A patient with a central venous catheter may develop thrombosis at the insertion site, requiring treatment to dissolve the clot and restore blood flow.

11. Infection:

Infection is the invasion and multiplication of harmful microorganisms, such as bacteria or fungi, in the body. In vascular access procedures, infections can occur at the insertion site of catheters or needles, leading to local or systemic complications.

Example: Patients with a tunneled catheter are at risk of developing catheter-related bloodstream infections, which may require antibiotic therapy or catheter removal.

12. Complications:

Complications are adverse events or outcomes that arise during or after a medical procedure. In vascular access procedures, complications can include infection, thrombosis, catheter malposition, or catheter dysfunction, among others.

Example: A patient undergoing hemodialysis may experience complications such as catheter dislodgment or clot formation, requiring prompt intervention by healthcare providers.

13. Ultrasound-Guided Vascular Access:

Ultrasound-guided vascular access is a technique that uses ultrasound imaging to visualize blood vessels and guide the insertion of catheters or needles. It helps healthcare providers locate suitable veins and reduce the risk of complications during vascular access procedures.

Example: Healthcare providers may use ultrasound guidance to place a peripheral IV catheter in a critically ill patient with difficult vascular access.

14. Aseptic Technique:

Aseptic technique refers to practices that prevent the introduction of pathogens into a sterile field or the bloodstream during medical procedures. It involves strict adherence to hand hygiene, wearing sterile gloves and gowns, and using sterile equipment to minimize the risk of infection.

Example: Healthcare providers must follow an aseptic technique when inserting a central venous catheter to reduce the risk of catheter-related infections.

15. Flushing:

Flushing is the process of using a syringe filled with saline or heparin solution to clear and maintain the patency of catheters. It helps prevent the formation of blood clots or debris inside the catheter lumen, ensuring proper blood flow during intravenous therapy.

Example: Nurses routinely flush central venous catheters with saline or heparin to prevent occlusions and maintain catheter function.

16. Salvage Technique:

Salvage technique refers to interventions used to maintain the function of a malfunctioning or occluded catheter, such as catheter repositioning, thrombolytic therapy, or catheter exchange. It aims to restore blood flow and prevent the need for catheter removal.

Example: Healthcare providers may use a salvage technique to clear a thrombosed dialysis catheter and avoid the need for urgent catheter replacement.

17. Catheter Dysfunction:

Catheter dysfunction occurs when a catheter fails to function properly, leading to inadequate blood flow or medication delivery. It can result from catheter malposition, occlusions, kinks, or dislodgment, requiring prompt assessment and intervention.

Example: A patient receiving chemotherapy may experience catheter dysfunction due to a kink in the catheter, necessitating repositioning or replacement.

18. Catheter Malposition:

Catheter malposition refers to the improper placement of a catheter tip inside a blood vessel, leading to ineffective therapy, complications, or catheter dysfunction. It can occur during insertion or over time due to catheter migration.

Example: A central venous catheter with a malpositioned tip may fail to deliver medications effectively, necessitating catheter repositioning under fluoroscopic guidance.

19. Catheter-Related Bloodstream Infection (CRBSI):

Catheter-related bloodstream infection is a serious complication of vascular access procedures, characterized by the presence of pathogens in the bloodstream originating from the catheter insertion site. It can lead to sepsis, endocarditis, or other life-threatening conditions.

Example: Patients with long-term central venous catheters are at increased risk of developing CRBSI, requiring vigilant monitoring and prompt treatment.

20. Thrombolytic Therapy:

Thrombolytic therapy is the administration of medication (thrombolytics) to dissolve blood clots in the bloodstream or catheters. It is used to restore blood flow in occluded vessels and prevent complications such as pulmonary embolism or catheter malfunction.

Example: Healthcare providers may administer thrombolytic therapy to a patient with a thrombosed dialysis catheter to restore blood flow and avoid catheter removal.

21. Catheter Exchange:

Catheter exchange involves replacing a malfunctioning or infected catheter with a new one while maintaining vascular access. It is performed to restore catheter function, prevent complications, or treat

catheter-related infections.

Example: Nurses may perform a catheter exchange in a patient with a malfunctioning PICC line to ensure uninterrupted intravenous therapy.

22. Dressing Change:

A dressing change is the process of removing and replacing the sterile dressing covering the catheter insertion site. It helps prevent infection, maintain catheter integrity, and assess the site for signs of complications.

Example: Nurses perform regular dressing changes on central venous catheters to reduce the risk of catheter-related infections and ensure proper wound healing.

23. Catheter Dislodgment:

Catheter dislodgment occurs when a catheter becomes partially or completely detached from the insertion site, compromising vascular access and increasing the risk of complications. It requires immediate intervention to secure the catheter and prevent further displacement.

Example: Patients with a tunneled catheter must avoid activities that may lead to catheter dislodgment, such as pulling on the catheter or engaging in strenuous exercise.

24. Infiltration:

Infiltration is the unintended leakage of intravenous fluids or medications into the surrounding tissue, causing swelling, pain, or tissue damage. It can occur when the catheter tip is dislodged from the vein or penetrates the vein wall.

Example: Nurses must monitor peripheral IV catheters for signs of infiltration, such as swelling or coolness at the insertion site, and take appropriate measures to prevent tissue injury.

25. Extravasation:

Extravasation is the accidental leakage of vesicant drugs or irritating substances into the surrounding tissue, leading to tissue necrosis, ulceration, or scarring. It requires prompt recognition and treatment to minimize tissue damage and prevent long-term complications.

Example: Patients receiving chemotherapy through a central venous catheter must be closely monitored for signs of extravasation, such as pain, redness, or blistering at the infusion site.

26. Phlebitis:

Phlebitis is the inflammation of a vein caused by irritation from catheters, medications, or infection. It is characterized by pain, redness, and swelling along the vein and may lead to complications if left untreated.

Example: Patients with a peripheral IV catheter may develop phlebitis at the insertion site due to frequent medication infusions or inadequate catheter care.

27. Catheter Occlusion:

Catheter occlusion occurs when the lumen of a catheter becomes blocked with blood clots, precipitates, or debris, inhibiting proper blood flow or medication delivery. It requires prompt intervention to restore catheter patency and prevent complications.

Example: Nurses may use a catheter flush or thrombolytic agent to clear a catheter occlusion and ensure uninterrupted intravenous therapy for the patient.

28. Huber Needle:

A Huber needle is a type of non-coring needle designed for accessing implanted ports or Port-a-Caths. It has a special tip that minimizes damage to the septum of the port during needle insertion and withdrawal.

Example: Nurses use a Huber needle to access a Port-a-Cath for medication administration or blood sampling in patients with cancer or other long-term medical conditions.

29. Central Venous Pressure (CVP):

Central venous pressure is the pressure within the large veins near the heart, reflecting the volume and pressure of blood returning to the heart. It is measured using a central venous catheter and provides information about the patient's fluid status and cardiac function.

Example: Healthcare providers may monitor a patient's CVP to guide fluid management in critically ill patients or those with heart failure.

30. Arterial Line:

An arterial line is a catheter inserted into an artery to continuously monitor the patient's blood pressure, draw blood samples, or assess arterial blood gases. It provides real-time information about the patient's cardiovascular status and oxygenation.

Example: Patients in the intensive care unit may have an arterial line placed for close monitoring of blood pressure and oxygen levels during critical illness.

31. Hemostasis:

Hemostasis is the process of stopping bleeding or preventing blood loss from a vascular access site. It involves applying pressure, using hemostatic agents, or securing the catheter to achieve hemostasis and prevent complications.

Example: Nurses ensure proper hemostasis at the insertion site of a central venous catheter to prevent bleeding, hematoma formation, or catheter dislodgment.

32. Doppler Ultrasound:

Doppler ultrasound is a non-invasive imaging technique that uses sound waves to assess blood flow and detect vascular abnormalities. It helps healthcare providers locate veins, assess catheter patency, or diagnose vascular complications.

Example: Physicians may use Doppler ultrasound to confirm proper catheter tip placement in the superior vena cava and assess blood flow during vascular access procedures.

33. Vasospasm:

Vasospasm is the sudden constriction of blood vessels in response to cold, stress, or irritation, leading to reduced blood flow and difficulty in accessing veins. It can complicate vascular access procedures and require measures to relax the vessel and facilitate catheter insertion.

Example: Healthcare providers may apply warm compresses or use local anesthetic agents to prevent vasospasm and facilitate peripheral IV catheter insertion in patients with difficult veins.

34. Steal Syndrome:

Steal syndrome is a condition in which blood flow is diverted from the distal extremity to the arteriovenous access site, causing ischemia, pain, or tissue damage. It can occur in patients with arteriovenous fistulas or grafts used for hemodialysis.

Example: Patients with steal syndrome may experience coldness, numbness, or pain in the affected limb due to reduced blood supply, requiring prompt evaluation and intervention.

35. Thrombectomy:

Thrombectomy is a procedure used to remove blood clots from blood vessels, catheters, or dialysis access sites. It can be performed using mechanical devices, catheters, or surgical techniques to restore blood flow and prevent complications.

Example: Vascular surgeons may perform a thrombectomy to clear a thrombosed arteriovenous fistula and maintain vascular access for hemodialysis treatments.

36. Air Embolism:

An air embolism is a rare but serious complication of vascular access procedures, caused by the entry of air into the bloodstream through catheters or needles. It can lead to cardiovascular collapse, stroke, or respiratory failure if not promptly recognized and treated.

Example: Healthcare providers must ensure proper priming and flushing of catheters to prevent air embolism during central venous catheter insertion or manipulation.

37. Contrast-Induced Nephropathy:

Contrast-induced nephropathy is a form of kidney injury caused by the use of contrast media in diagnostic imaging procedures. It can lead to acute kidney failure in patients with pre-existing renal impairment, requiring close monitoring and preventive measures.

Example: Patients undergoing arteriography or angioplasty may be at risk of developing contrast-induced nephropathy, necessitating hydration and renal function monitoring post-procedure.

38. Stenosis:

Stenosis is the narrowing or constriction of a blood vessel, typically caused by the buildup of plaque or scar tissue. It can lead to reduced blood flow, hypertension, or ischemia in the affected vessel, requiring intervention to restore vascular patency.

Example: Patients with stenosis in their arteriovenous fistula may experience decreased blood flow during hemodialysis, necessitating angioplasty or stent placement to improve access function.

39. Fistulogram:

A fistulogram is a diagnostic imaging procedure used to visualize the structure and function of arteriovenous fistulas or grafts used for hemodialysis. It involves injecting contrast media into the access site and obtaining X-ray images to assess for stenosis or thrombosis.

Example: Nephrologists may perform a fistulogram to evaluate the patency and flow characteristics of an arteriovenous fistula in a patient with kidney failure.

40. Vascular Ultrasound:

Vascular ultrasound is a non-invasive imaging technique that uses sound waves to assess blood vessels, detect abnormalities, and guide vascular access procedures. It helps healthcare providers visualize veins, arteries, and catheter placement in real time.

Example: Nurses may use vascular ultrasound to locate suitable veins for peripheral IV catheter insertion or assess central venous catheter placement in critically ill patients.

41. Transducer:

A transducer is a device that converts electrical signals into sound waves (ultrasound) and vice versa. It is used in vascular ultrasound machines to emit and receive sound waves, producing images of blood vessels, organs, or tissues.

Example: Sonographers use a transducer to scan the arm of a patient and visualize the veins for ultrasound-guided vascular access procedures.

42. Vascular Mapping:

Vascular mapping is a technique used to assess the size,