

Transcultural 2: Review Sheet

***Percutaneous Coronary Interventions:** Performed *skin puncture* rather than a surgical intervention.

Percutaneous Transluminal Coronary Angioplasty: *Balloon tipped catheter* is used to open blocked coronary vessels and resolve ischemia.

Coronary Artery Stent: After PTCA, area that has been treated may close off partially or completely. A Coronary Artery Stent may be placed to overcome these risks.

***Complications:** Can occur during a PCI procedure include *coronary artery dissection, perforation, abrupt closure, or vasospasm.*

Additional: *Acute MI, serious dysrhythmias, and cardiac arrest.*

-Some of these complications may require emergency surgical treatment.

Complications after the procedure may include *abrupt closure of the coronary artery* and a variety of vascular complications, such as *bleeding at the insertion site, retroperitoneal bleeding, hematoma, and arterial occlusion*. Additionally there is a **risk of acute kidney injury from the contrast agent used during the procedure.**

***Postprocedure Care:** *Similar to care for a cardiac catheterization.* Patients who are **not** already hospitalized are **admitted the day of the PCI.** Those with *no complications* go *home the next day.*

During PCI, patients receive *IV heparin or a thrombin inhibitor* and are monitored closely for *signs of bleeding.*

-Patients **may also receive a GP IIb/IIIa agent for several hours following PCI to prevent platelet aggregation and thrombus formation in the coronary artery.**

-Patients may *return to the nursing unit with the large peripheral vascular access sheaths* in place. The sheaths are then **removed after blood studies** indicate that the **heparin is no longer active and the clotting time is within an acceptable range.**

-Usually *takes a few hours*, depending on the amount of heparin giving the procedure.

-Patient must remain flat in bed and keep affected leg straight until the sheaths are removed and then for a few hours afterward to maintain hemostasis.

-**Immobility and bed rest** may cause *discomfort*, treatment may include analgesics and sedation. *Sheath removal and application of pressure* on the vessel insertion site *may cause the heart rate to slow and the blood pressure to decrease.* A **dose of IV atropine** is usually given to treat this response.

-If patient has *unstable lesions and at high risk for abrupt vessel closure* are **restarted on heparin** after sheath removal.

After homeostasis's achieved, a **pressure dressing is applied to the site.** Patients resume self care and *ambulate unassisted within a few hours of the procedure.* The duration of immobilization depends on the size of the sheath inserted, the type of anticoagulant administered, the method of hemostasis, the patients condition, and the physicians preference.

-**Day after surgery**, site is *inspected and the dressing removed.* Patient is instructed to **monitor the site for bleeding or development of a hard mass indicative of hematoma.**

* **Coronary Artery Bypass Graft (CABG):** A surgical procedure in which a blood vessel is grafted to an occluded coronary artery so that blood can flow beyond the occlusion

-*Alleviation of angina that cannot be controlled with medication or PCI.*

- Treatment for left main coronary artery stenosis or multi vessel CAD.
- Prevention of and treatment for MI, dysrhythmias, or heart failure.
- Treatment for complications from an unsuccessful PCI.
- CABG is performed less frequently in women.

CABG procedures are performed with the patient under general anesthesia.

- After procedure, chest tubes and epicardial pacing wires are placed, and incision is closed.*
- Patient then admitted to a critical care unit.*

***Cardiopulmonary Bypass Complications:**

- Hypovolemia:** Most common cause of decreased cardiac output after cardiac surgery.
 - Net loss of blood and intravascular volume.
 - Arterial hypotension, tachycardia, low CVP.
 - Fluid replacement may be prescribed.
- Persistent Bleeding:** Cardiopulmonary bypass causes platelet dysfunction, and hypothermia alters clotting mechanisms.
 - Surgical trauma causes tissues and blood vessels to ooze bloody drainage.
 - Accurate measurement of wound bleeding and chest tube blood is essential.
 - Administration of blood products. Packed RBC's, etc.
 - Administration of desmopressin acetate (DDAVP) to enhance platelet function.
 - If bleeding persists, patient may have to go back to OR.
- Cardiac Tamponade:** Fluid and clots accumulate in the pericardial sac, which compress the heart, preventing blood from filling the ventricles.
 - Arterial hypertension, tachycardia, decreased urine output, and increased CVP.
 - Check chest drainage system for kinks or obstruction.
 - Chest x-ray may show a widening mediastinum.
- Fluid Overload:** IV fluids and blood products increase circulating volume.
 - High CVP and pulmonary artery pressures, as well as crackles, indicate fluid overload.
 - Diuretics are prescribed, and the rate of IV fluid administered is reduced.
 - Alternative treatments include continuous renal replacement therapy and dialysis.
- Hypothermia:** Low body temp leads to vasoconstriction, shivering, and arterial hypertension.
 - Patient is rewarmed gradually after surgery, decreasing vasoconstriction.
- Hypertension:** Results from postoperative vasoconstriction. It may stretch suture lines and cause postoperative bleeding. The condition is usually transient.
 - Vasodilators (nitroglycerin, nitroprusside) may be used to treat hypertension.
 - Administer cautiously to avoid hypotension.
- Tachydysrhythmias:** Increased heart rate is common with preoperative volume changes. Rapid atrial fibrillation commonly occurs during the first few days postoperatively.
 - If this is the primary problem, the heart rhythm is assessed and medications (Cardizem) may be prescribed. Antidysrhythmic agents (beta blockers) are often given before coronary artery bypass graft to minimize the risk.
- Bradycardia:** Decreased heart rate due to surgical trauma and edema affecting the cardiac conduction system.

-Many postoperative patients have temp pacer wires that can be attached to an external pacemaker to stimulate the heart to beat faster. Less commonly, atropine or other meds may be used to increase heart rate.

Cardiac Failure: Myocardial contractility may be decreased preoperatively.

-The nurses observes for reports and signs of heart failure, including hypotension. Increased CVP, increased PAWP, venous distention, labored respirations and edema.

-MI: May occur intraoperatively or postoperatively. Portion of the cardiac muscle dies. therefore, contractility decreases. Impaired ventricular wall motion further decreases cardiac output. Symptoms masked by the post operative surgical discomfort or the anesthesia-analgesia regimen.

-Med management includes diuretics and IV inotropic agents.
-Careful assessment to determine the type of pain the patient is experiencing.
-MI is suspected if the mean BP is low with normal preload.
-Serial electrocardiograms and cardiac biomarkers assist in making the diagnosis.

-Impaired Gas Exchange: During and after anesthesia, patients require mechanical assistance to breathe.

-Anesthesia agents stimulate production of mucus, and chest incision pain may decrease the effectiveness of ventilation.

-Potential for postoperative atelectasis.
-Pulmonary complications are detected during assessment of breath sounds, oxygen saturation levels, arterial blood gases, and ventilator readings.
-Extended periods of mechanical ventilation may be required while complications are treated.

-Neurologic Changes; Stroke: Thrombi and emboli may cause cerebral infarction, and neurologic signs may be evident when patients recover from anesthesia.

-Inability to follow simple commands within 6 hours of recovery from anesthetics, weakness on one side of body or other neurologic changes may indicate stroke.
-Patients who are older or who have renal or hepatic failure may take longer to recover from anesthesia.

-Acute Kidney Injury: May result from hypo perfusion of the kidneys or from injury to the renal tubules by nephrotoxic drugs.

-May respond to diuretics or may require continuous renal replacement therapy or dialysis.
-Fluids, electrolytes, and urine output are monitored frequently.
-May results in chronic renal failure and require ongoing dialysis.

-Electrolyte Imbalance: Postop imbalances in potassium, magnesium, sodium, calcium, and blood glucose are related to surgical losses, metabolic changes, and the administration of meds and IV fluids.

-Monitor electrolytes and basic metabolic studies frequently.
-Implement treatment to correct electrolyte imbalance promptly.

-Hepatic Failure: Surgery and anesthesia stress the liver. Most common in patients with cirrhosis, hepatitis, or prolonged right sided heart failure.

-The use of meds metabolized by the liver must be minimized.
-Bilirubin and albumin levels are monitored, and nutritional support is provided.

Infection: Surgery and anesthesia alter the patients immune system. Multiple invasive devices used to monitor and support patients recovery may serve as a source of infection.

-Monitor for signs of possible infection: Body temp, WBC and differential counts, incision and puncture sites, urine, bilateral breath sounds, sputum.

- Antibiotic therapy may be instituted or modified as necessary.
- Invasive devices are discontinued as soon as they are no longer required. Institutional protocols for maintaining and replacing invasive lines and devices are followed to minimize the risk of infection.

Nursing Management for Cardiopulmonary Bypasses:

- NG tube to decompress stomach.
- Endotracheal tube for providing ventilatory assistance, suctioning and use of end tidal CO₂ monitor.
- Central venous or swan-ganz catheter for monitoring central venous pressure, pulmonary artery pressure, temp, SVO₂. Can be used for determining cardiac output, for venous and pulmonary artery blood sampling, and for fluid and med administration.
- ECG electrodes for monitoring heart rate and rhythm.
- SPO₂ monitor for measuring arterial oxygen saturation
- Assess peripheral pulses: Radial, posterior tibial, dorsalis pedis.
- Neurological assessment
 - Level of responsiveness
 - Hand of grasp
 - Pain
 - Movement
- Assess skin color and temp, color of lips, and color and capillary refill of nail beds.
- Epicardial pacing electrodes to temp pace the heart.
- Mediastinal and pleural chest tubes attached to suction, drainage and wound healing are monitored.
- Radial Arterial Line: used for monitoring arterial blood pressure and for blood sampling.
- Indwelling catheter to closed drainage system for accurate measurement of urine output, a temp probe may be part of the indwelling catheter.

****Mitral Regurgitation:** Involves blood flowing back from the left ventricle into the left atrium during systole.

- Often, edges of mitral valve *leaflets do not close completely during systole* because leaflets and Chordae Tendinae have *thickened and fibrosed*, resulting in their contraction.
- Most **common** causes of mitral valve regurgitation is ***degenerative changes of the mitral valve, and ischemia of the left ventricle.***
- Other causes of ***Mitral Regurgitation include myxomatous changes, which enlarge and stretch the left atrium and ventricle, causing leaflets and Chordae Tendinae to stretch or rupture.***
- Infective Endocarditis*** may cause ***perforation of a leaflet, or scarring following the infection may cause retraction of leaflets.***

Clinical Manifestations: *Usually asymptomatic. Acute Mitral Regurgitation presents severe CHF.*

- Dyspnea, fatigue, and weakness are the most common.
- Palpitations, shortness of breath on exertion, and cough from pulmonary congestion also occur.

Assessment and Diagnostic Findings: Systolic murmur: high pitched, blowing sound at the apex.

- pulse may be regular and of good volume, or may be irregular as a result of extra systolic beats or atrial fibrillation.
- Echocardiography is used to diagnose and monitor the progression of mitral regurgitation.
- Transesophageal echocardiography (TEE) provides best images of mitral valve.

Medical Management: Same medical management as heart failure.

- Benefit from after load reduction by treatment with ACE inhibitors or ARBS.
- Once symptoms develop the patient needs to restrict his or her activity to minimize symptoms.

Surgical Management: Mitral Valvuloplasty

Types of Valves used for Replacements:

Mechanical Valves: Bileaflet, tilting disk, or ball and cage design and are thought to be more durable than tissue prosthetic valves. Therefore they often are used for younger patients. These valves do not deteriorate or become infected as easily as tissue valves.

Tissue Valves: 3 Types- Bioprostheses, homografts, and autografts.

-Tissue valves are less likely to generate thromboemboli, and long term anticoagulation is not required. Tissue valves are not as durable as mechanical valves, thus needing replacement more frequently.

Bioprostheses: Most are from pigs, but some are from cows or horses. Used for aortic, mitral, and tricuspid valve replacement.

Viability: 7-15 years

Used for women of childbearing age because potential complications of long term anticoagulation associated with menses, placental transfer to a fetus, and delivery of a child are avoided.

Also used for patients older than 70, patients with history of peptic ulcer disease, and others who can not tolerate long term anti coagulation.

Homografts: Human valves, obtained from cadaver tissue donations and are used for aortic and pulmonic valve replacement.

-Not always available and very expensive.

-Last about 10 to 15 years

Autografts: Autologous valves are obtained from the patients own pulmonic valve and a portion of the pulmonary artery for use as the aortic valve.

-This is an alternative for children, it may grow as the child grows, women of childbearing age, young adults, patients with a history of peptic ulcer disease, and people who cannot tolerate anticoagulation.

-Most aortic valve autograft procedures are double replacement procedures with a homograft pulmonic valve replacement also performed. Patients can recover without a valve between the right ventricle and pulmonary artery.

Nursing Management: Patients who have undergone percutaneous balloon valvuloplasty with or without percutaneous valve replacement may be admitted to a telemetry unit or ICU.

-Nurse assesses for signs and symptoms of heart failure and emboli, listen for changes of heart sounds every 4 hours, and provides the patient with the same care as for postprocedure cardiac catheterization or percutaneous transluminal coronary angioplasty.

-Patient who are recovering from anesthesia, check vitals every 5-15 minutes, as needed until anesthesia wears off. Then assessed every 2-4 hours as needed.

-IV meds to increase or decrease BP and to treat dysrhythmias or altered heart rates are administered and their effects are monitored.

-Meds are gradually decreased until they are no longer needed.

-After anesthesia wears off, patient moved to telemetry unit, usually 24-72hrs.

-Nursing care continuous as normal, wound care and patient education, etc.

Client Teaching:

-Nurse educates the patient about anticoagulant therapy, explaining the need for frequent follow up appointments.

Mitral Valve Replacement patients on Warfarin: **2-3.5 INR**

Aortic Valve Replacement patients on Warfarin: **1.8-2.2 INR**

-Educate patient about all medications.

-Patients with mechanical valve prosthesis, require education to prevent infective endocarditis.

-Teaches patient how to minimize risk of endocarditis.

- Antibiotic prophylaxis is necessary before dental procedures involving manipulation of gingival tissue.
- Home Care reinforce all new info and self care instructions with patients and families for 4-8 weeks after the procedure.
- Echocardiograms often are performed 3-4 weeks after hospital discharge to further evaluate the effects and results of surgery.
- Echocardiograms usually are repeated every 1-2 years.

Mitral Stenosis: An *obstruction to blood flowing from the left atrium into the left ventricle*. Most often caused by *rheumatic endocarditis*, which progressively **thickens mitral valve leaflets and Chordae Tendineae**. Leaflets often *fuse together*, eventually mitral valve orifice narrows and progressively obstructs blood flow into the ventricle.

Pathophysiology: Normally mitral valve orifice is as wide as 3 fingers. In severe stenosis, the orifice narrows to the width of a pencil. The left atrium has difficulty moving into the ventricle because of increased resistance by the narrowed orifice.

- Poor left ventricular filling, can cause decreased cardiac output.
- Increased blood volume in left atrium causes it to dilate and hypertrophy.
- Because there is no valve to protect pulmonary veins from backward flow of blood from the atrium, the pulmonary circulation becomes congested.
 - As a result, right ventricle must contract against abnormally high pulmonary arterial pressure , eventually hypertrophies, dilates, and fails.
- If heart rate increases, diastole is shortened, thus the amount of time for forward flow of blood is less, and more blood backs into the pulmonary veins.
 - As HR increases, cardiac out put decreases and pulmonary pressure increase.

Clinical Manifestations:

- First symptom of mitral stenosis often is dyspnea on exertion as a result of pulmonary venous hypertension.*
- Symptoms usually develop after the valve opening is reduced by one third to one half its usual size.
- Patients may expectorate blood, experience palpitations, orthopnea, and repeated respiratory infections.
- As a result of increased BP, the atrium dilates, hypertrophies, and becomes electrically unstable.

Assessment and Diagnostic Findings:

- Pulse is weak and often irregular because of atrial fibrillation.
- low pitched, rumbling diastolic murmur** is heard at the apex.
- Echocardiography is used to diagnose quantify the severity of mitral stenosis.

Medical Management: May benefit from anticoagulants to decrease the risk of developing atrial thrombus and may require treatment for angina.

- If atrial fibrillation develops, cardioversion is attempted to restore normal sinus rhythm.
- If unsuccessful, the ventricular rate is controlled with beta blockers, digoxin, or calcium channel blockers.
 - Require anticoagulation for thromboembolism prevention.
 - Patients with mitral stenosis are advised to avoid strenuous activities, competitive sports and pregnancy, all of which increase heart rate.
- Surgical Intervention consists of valvuloplasty , usually a commisurotomy to open or rupture the fused commissures of the valve.
- Percutaneous transluminal valvuoplasty or valve replacement may be performed.

Mitral Regurgitation: Usually asymptomatic, if not, CHF symptoms. Systolic murmur, high pitched blowing valve at the apex.

Mitral Stenosis: First symptom usually dyspnea on exertion. Diastolic low pitch rumbling murmur at apex.

Anatomy of the Vascular System

- Arteries are thick walled structures that carry blood from the heart to the tissues.
- Capillaries lack smooth muscle, composed of a single layer of endothelial cells.
- Veins and Venules are made by joined capillaries make venules, which join to form veins.
- Lymphatic vessels are a complex network of thin walled vessels similar to the blood capillaries.

Function of the Vascular System:

Circulatory Needs of Tissues: Amount of blood flow needed by body tissues constantly changes. When **metabolic needs increase, blood vessels dilate to increase the flow of oxygen and nutrients to the tissues.**

When metabolic needs decrease, vessels constrict and blood flow to the tissues decrease.

- Metabolic demands of tissues increase with physical activity or exercise, local heat application, fever, and infection.
- Reduced metabolic requirements of tissues accompany rest or decreased physical activity.
- If blood vessels fail to dilate in response to the need for increased blood flow, tissue ischemia results.
 - As blood passes through tissue capillaries, oxygen is removed and carbon dioxide is added.

Blood Flow: Always proceeds in the same direction: left side of heart to the aorta, arteries, arterioles, capillaries, venules, veins, vena cava, and right side of heart.

- This unidirectional flow is caused by pressure difference that exists between the arterial and venous systems.

Assessment of Vascular System:

Health History: Nurse obtains an in depth description from the patient with peripheral vascular disease of any pain and its precipitating factors. A muscular, cramp type pain, discomfort or fatigue in the extremities consistently reproduced with the same degree of exercise or activity and relieved by rest is experienced by patients with peripheral arterial insufficiency.

Intermittent Claudication: Pain, discomfort, or fatigue is caused by the inability of the arterial system to provide adequate blood flow to the tissues in the face of increased demands for nutrients and oxygen during exercise.

Rest Pain: Can be when patient is sleeping, or resting, interrupting their sleep.

Physical Assessment: Thorough assessment of patients skin color and temperature and the character of the peripheral pulses is important in the diagnosis of arterial disorders.

Inspection of the Skin: Adequate blood flow warms extremities and gives them a ROSY coloring. Inadequate blood flow results in cool and pale extremities.

- Further reduction of blood flow to these tissues, which occurs when extremity is elevated, for example results in an even whiter or more balanced appearance.

Rubor: A reddish-blue discoloration of the extremities may be observed within 20 seconds to 2 minutes after the extremity is placed in the dependent position.

- Rubor suggests severe peripheral arterial damage in which vessels that cannot constrict remain dilated.

Palpation of Pulses: Palpation of pulses is subjective, and the examiner may mistake his or her own pulse for that of the patient. To avoid this the examiner should use light touch and avoid using only the index finger for palpation, because this finger has the strongest arterial pulsation of all the fingers.

- Absence of a pulse, may indicate Stenosis.

Arteriosclerosis: Hardening of the arteries, the most common disease of the arteries.

Atherosclerosis: The build up of atheroma and/or plaque on the intimal layers of the artery.

Peripheral Arterial Occlusive Disease: Arterial insufficiency of the extremities occurs most often in men and is a common cause of disability. The legs are most frequently affected; however, the upper

extremities may be involved. The age of onset and the severity are influenced by the type and number of atherosclerotic risk factors.

Clinical Manifestations: The hallmark symptom is **Intermittent Claudication**. This pain may be described as aching, cramping, or inducing fatigue or weakness that occurs with the same degree of exercise or activity and is relieved with rest.

- The pain usually occurs in muscle groups distal to the area of stenosis or occlusion.
 - As the disease progresses, patient may have a decreased ability to walk the same distance as before or may notice increased pain with ambulation.
 - When arterial insufficiency becomes severe, the patient has rest pain.
 - Can be unrelieved by opioids.
 - Elevating or placing it in a horizontal position increases the pain, whereas placing the extremity in a dependent position decreases the pain.
- Some patients may sleep with affected leg hanging over the side of the bed. Some patients sleep in a reclining chair in an attempt to prevent or relieve the pain.

Diagnostic Tests:

- Examination of the peripheral pulses is an important part of assessing arterial occlusive disease. Unequal pulses between extremities or the absence of a normally palpable pulse is a sign of PAD.
- The presence, location, and extent of arterial occlusive disease are determined by a careful history of the symptoms and by physical examination. The color and temp of the extremity are noted and the pulses palpated. The nails may be thickened and opaque, and the skin may be shiny, atrophic, and dry, with sparse hair growth. The assessment includes comparison of the right and left extremities.
- The diagnosis of peripheral arterial occlusive disease may be made using CW doppler and ABIs, treadmill testing for claudication, duplex ultrasonography, or other imaging studies described previously.

Medical Management: Generally patients feel better and have fewer symptoms of claudication after they participate in an exercise program.

-If a walking program is combined with weight reduction and cessation of tobacco use, patients often can further improve their activity tolerance.

Aneurysm: A localized sac or dilation formed at a weak point in the wall of the artery. It may be classified by its shape or form. The most common forms of aneurysms are saccular and fusiform. A saccular aneurysm projects from only one side of the vessel. If an entire arterial segment becomes dilated, a fusiform aneurysm develops.

- Very small aneurysms due to localized infection are called mycotic aneurysms.
- The cause of abdominal aortic aneurysm, the most common type of degenerative aneurysm, has been attributed to atherosclerotic changes in the aorta.

Pathophysiology: All aneurysms involve a damaged media layer of the vessel. This may be caused by congenital weakness, trauma, or disease. After an aneurysm develops, it tends to enlarge. Risk factors include genetic predisposition, tobacco use, and hypertension. More than half of patients with aneurysms have hypertension.

Assessment: The most important diagnostic indication of an abdominal aortic aneurysm is a pulsatile mass in the mille and upper abdomen. About 80% of these aneurysms can be palpated. A systolic bruit may be heard over the mass. Duplex ultrasonography or CTA is used to determine the size, length, and location of aneurysm. When aneurysm is small, ultrasonography is conducted at 6 month intervals until the aneurysm reaches a size so that surgery to prevent rupture is of more benefit than the possible complications of a surgical procedure.

Clinical Manifestations: About 40% of patients with abdominal aortic aneurysms have symptoms. Some patients complain they can feel their heart beating in their abdomen when lying down or they may say they feel an abdominal mass or abdominal throbbing. If the abdominal aortic aneurysm is associated with

thrombus, a major vessel may be occluded or smaller distal occlusions may result from emboli. Small cholesterol, platelet, or fibrin emboli may lodge in the interosseous or digital arteries, causing cyanosis and mottling of the toes.

Medical Management: Antihypertensive agents, including diuretics, beta blockers, ACE inhibitors, ARBS, and CCBs are frequently prescribed to maintain the patients blood pressure within acceptable limits.

Surgical Management: Surgery is the treatment of choice for abdominal aortic aneurysms more than 5.5 cm (2 inches) wide or those that are enlarging; the standard treatment has been open surgical repair of the aneurysm by resecting the vessel and sewing a bypass graft in place.

-An alternative for treating an infrarenal abdominal aortic aneurysm is endovascular grafting, which involves the transluminal placement and attachment of a sutures aortic graft prosthesis across an aneurysm.

Nursing Management: Before surgery nursing assessment is guided by anticipating rupture and by recognizing that the patient may have cardiovascular, cerebral, pulmonary and renal impairment from atherosclerosis.

Signs of impending rupture include severe back or abdominal pain, which may be persistent or intermittent. Abdominal pain is often localized in the middle or lower abdomen to the left of the midline.

-Low back pain may be present because of pressure of the aneurysm on the lumbar nerves.

Indications of a rupturing abdominal aortic aneurysm include constant intense back pain, falling blood pressure, and decreasing hematocrit

-Indications of a rupturing abdominal aortic aneurysm include constant intense back pain, falling blood pressure and decreasing hematocrit.

Raynauds Phenomenon: A form of intermittent arteriolar vasoconstriction that results in coldness, pain, and pallor of the fingertips or toes. There are 2 forms of this disorder.

-Primary or Idiopathic: occurs in the absence of an underlying disease.

-Secondary: occurs in association with an underlying disease, usually a connective tissue disorder, such as systemic lupus.

Acrocyanosis is a poorly understood phenomenon that may be benign and require little or no treatment, or the patient may have chronic pain and ulcerations.

Clinical Manifestations: Classic clinical picture of Raynauds reveals pallor brought on by sudden vasoconstriction. The skin then becomes bluish because of pooling of deoxygenated blood during vasospasm. As a result of exaggerated reflow due to vasodilation, a red color (rubor) is produced when oxygenated blood returns to the digits after the vasospasm stops. Numbness, tingling, and burning pain occur as the color changes. The manifestations tend to be bilateral and symmetric and may involve toes and fingers.

Medical Management: Avoiding the particular stimuli that provoke vasoconstriction (cold, tobacco) is a primary factor in controlling raynauds phenomenon. CCB may be effective in relieving symptoms.

-Avoidance of exposure to cold and trauma and implementation measures to improve local circulation are the primary focus of treatment for acrocyanosis.

Venous Disorders: Cause reduction in venous blood flow, causing blood stasis. This may then cause a host of pathologic changes, including coagulation defects, edema formation and tissue breakdown, and an increased susceptibility to infections.

Venous Thromboembolism: DVT and pulmonary embolism collectively make up the condition called thromboembolism.

Pathophysiology: Superficial veins, such as greater saphenous, lesser saphenous, cephalic, basilic, and external jugular veins are thick walled muscular structures that lie just under the skin.

Clinical manifestations: Signs and symptoms are non specific. The exception is phlegmasia cerulean dozens in which the entire extremity becomes massively swollen, tense, painful and cool to the touch. The large DVT creates severe and sudden venous hypertension that leads to tissue ischemia with resultant translocation of fluid into the interstitial space. Venous gangrene occurs in 40-60% of cases and is associated with a poor prognosis for survival.

Assessment: Careful assessment is invaluable in detecting early signs of venous disorders of the lower extremities. Patients with history of varicose veins, hyper coagulation, neoplastic disease, cardiovascular disease, or recent major surgery or injury are at high risk.

-when performing assessment, key concerns include:

- limb pain, feeling of heaviness, functional impairment, ankle engorgement and edema, and areas of tenderness near thrombosis.

Prevention: Patients with a prior history of VTE are increased risk of a new episode. Preventative measures include: application of graduated compression stockings, use of intermittent pneumatic compression stockings, and encouragement of early mobilization and leg exercise. Weight loss, smoking cessation, and regular exercise.

Pharmacological Therapy: Unfractionated heparin, low molecular weight heparin, oral anticoagulants, factor 10a inhibitors, thrombolytic therapy.

Endovascular Management: is necessary for DVT when anticoagulant or thrombolytic therapy is contraindicated, the danger of PE is extreme, or venous drainage is so severely compromised that permanent damage to the extremity is likely.

- A thromboectomy may be necessary
- Mechanical method of clot removal may involve using intraluminal catheters with a balloon or other devices. Some of these spin to break the clot, and others use oscillation to break up the clot to facilitate removal.
- Ultrasound assisted thrombolysis may be another option.
- In patients with chronic iliac vein compression, balloon angioplasty with stent placement may successfully treat the patients chronic leg symptoms.

Monitoring and Managing Potential Complications:

Bleeding: the principal complication of anticoagulant therapy is spontaneous bleeding. Bleeding from the kidneys is detected by microscopic examination of the urine and is often the first sign of excessive dosage. Bruises, nosebleeds, and bleeding gums are also early signs.

Thrombocytopenia: HIT may be a complication of heparin therapy.

Compression Therapy:

Stockings: Usually are prescribed for patients with venous insufficiency. The amount of pressure gradient is determined by the amount and severity of venous disease.

Graduated Compression Stockings should not be confused with Anti-Embolism stockings. Anti embolism provide LESS compression.

These stockings are designed to put 100% of the prescribed pressure gradient at the ankles and less pressure as it travels up to the thigh.

- Check skin for signs of irritation, and calves for tenderness.
- Stockings are contraindicated with patients who have severe pitting edema, because they can produce severe pitting at the knee.
- If patient is too old to apply stocking, friend or family should be able to help.

Hematological Function: The hematologic system consists of the blood and the sites where blood is produced, including the bone marrow and the reticuloendothelial system. Blood is a specialized organ that differs from other organs in that it exists in a fluid state.

Assessment:

A careful health history and physical assessment can provide important info related to a patients known or potential hematologic diagnosis.

Physical Assessment: Should be comprehensive and include careful attention to the skin, oral cavity, lymph nodes, and spleen.

Diagnostic Evaluation: Most hematologic diseases reflect a defect in the hematologic, hemostatic, or REC system. The defect can be quantitative (increased or decreased number of cells) or qualitative (the cells that are produced are defective in their normal functional capacity) or both.

-For most hematologic conditions, continued monitoring via specific blood tests is required because it is very important to assess for changes in test results over time. In general, it is important to assess trends in test results because these trends help the clinician decide whether the patient is responding appropriately to interventions.

Blood and Blood Products:

Blood Processing: Samples of the unit of blood are always taken immediately after donation so that the blood can be typed and tested. Each donation is tested for antibodies to human immunodeficiency Virus, types 1 and 2, hepatitis B core antibody, etc.

-More than 200 antigens have been identified on the surface of RBC membranes.

-The ABO system identifies which sugars are present on the membrane of a persons erythrocytes: A, B, not A and B, or neither A nor B (Type O)

-To prevent a significant reaction, the same type of PRBCs should be transfused. Previously, it was thought that in an emergency situation in which the patients blood type was not known, type O blood could be safely transfused. This practice is no longer recommended.

-The Rh antigen (also referred to as D)is present on the surface of erythrocytes in 85% of the population (Rh Positive). Those who lack the D antigen are referred to as being Rh negative.

PRBCs are routinely tested for the D antigen as well as ABO. Patients should receive PRBCs with a compatible Rh type.

The majority of transfusion reactions are due to clerical error where the patient is transfused an incompatible unit of blood product. Reactions (other than those due to procedural error) are most frequently due to the presence of donor leukocytes within the blood component unit, the recipient may form antibody antigens present on these leukocytes.

-When a patient is immunocompromised, as in the case following stem cell transplant, any donor lymphocytes must be removed from the blood components.

Transfusions

Preprocedures:

1-Confirm transfusion has been prescribed

2-Check patients blood has been typed and cross matched.

3-Verify that patient has signed a written consent form per institution and agrees to procedure.

4-Explain procedure to patient.

5- take patients temp, pulse, respirations, and bp to establish baseline.

6-use hand hygiene

use 20 gauge or larger for packed RBC

use 22 gauge or larger for fresh or frozen plasma

flush plasma tube with saline after

for packed RBC start slow, after 15 mins increase flow rate.

for plasma, infuse each unit over 30-60 mins

Complications: any patient who receives a blood transfusion is at risk for developing complications from the transfusion. During patient education, the nurse should explain risk and benefits and what to expect

during and after the transfusion. Patients must be informed that although it has been tested carefully, the supply of blood is not completely risk free.

Nursing Management: If a transfusion reaction is suspected, the transfusion must be stopped immediately and the primary provider notified.

-A thorough patient assessment is crucial, because many complications have similar signs and symptoms

Following steps are taken to determine the type and severity of reaction:

- Stop transfusion, maintain iv line with normal saline through new iv tubing.
- assess patient carefully
- notify PCP
- Notify blood bank a suspected reaction has occurred.
- Send blood container and tubing to the blood bank for repeat typing and culture

Anemia

Classification of Anemias: A physiologic approach classifies anemia according to whether the deficiency in erythrocytes is caused by a defect in their production (Hypoproliferative anemia), their destruction (hemolytic anemia) or by their loss (bleeding)

In **Hypoproliferative anemias** the marrow cannot produce adequate numbers of erythrocytes.

In **Hemolytic Anemias**, premature destruction of erythrocytes results in the liberation of hemoglobin from the erythrocytes into the plasma; the released hemoglobin is converted in large part to bilirubin, and therefore, the bilirubin concentration rises.

Assessment and Diagnostic Findings: The CBC complete blood count values are useful in determining whether the anemia is an isolated problem or part of another hematologic condition, such as leukemia or myelodysplastic syndrome.

-Bone marrow aspiration may be performed.

Complications: General complications of severe anemia include heart failure, paresthesias, and delirium. Patients with underlying heart disease are far more likely to have angina or symptoms of heart failure than those without heart disease. Complications associated with specific types of anemia include description of each type.

Hypoproliferative Anemia: Iron Deficiency Anemia.

Pathophysiology: Results when the intake of dietary iron is inadequate for hemoglobin synthesis. The most common cause is blood loss.

-Bleeding should be considered the cause of iron deficiency anemia until proven otherwise.

Assessments: The definitive method of establishing the diagnosis of iron deficiency anemia is bone marrow aspiration.

-Few patients with suspected iron deficiency anemia undergo bone marrow aspiration. In many patients the diagnosis can be established with other tests.

-A strong correlation exists between lab values that measure iron stores and hemoglobin levels.

-Other lab tests that measure iron stores are useful but not as precise as ferritin levels.

-Typically patients with iron deficiency anemia have a low serum iron level and an elevated TIBC.

Medical Management:

-Except in the case of pregnancy, the cause of iron deficiency should be investigated. Anemia may be a sign of a curable GI cancer or of uterine fibroid tumors.

-Stool samples should be tested for occult blood

-Several oral iron preparations-ferrous sulfate, ferrous gluconate, and ferrous fumarate, are available for treating iron deficiency anemia. The hemoglobin level may increase in only a few weeks and the anemia can be corrected in a few months.

-Iron store replenishment takes much longer, so the patient must continue taking the iron for as long as 12 months.

-In some cases, oral iron is poorly absorbed or poorly tolerated, or iron supp is needed in large amounts. In these situations, IV administration of iron may be needed.

Nursing Management: Preventative education is important, because iron deficiency anemia is common in menstruating and pregnant women.

-Food sources high in iron include organ meats, other meats, beans, leafy green vegetables, raisins, and molasses.

-Taking iron rich foods with a source of vitamin C enhances the absorption of iron

-Iron is best absorbed on an empty stomach, the patient is instructed to take the supplement an hour before meals.

-Iron tablets with enteric coating may be poorly absorbed and should be avoided.

-Some iron formulations are designed to limit GI side effects by the addition of a stool softener or the use of sustained release formulations to limit nausea or gastritis.

-If taking iron on an empty stomach causes gastric distress, the patient may need to take it with meals. However, doing so diminishes iron absorption by as much as 50%, thus prolonging the time required to replenish iron stores.

-Antacids or dairy products should not be taken with iron, because they greatly diminish its absorption.

-Liquid forms are available that cause less GI distress

Hemolytic Anemias:

Pathophysiology: The erythrocytes have a shortened lifespan, their number in the circulation is reduced. Fewer erythrocytes result in decreased available oxygen, causing hypoxia, which in turn stimulates an increase in erythropoietin release from the kidney. Erythropoietin stimulates the bone marrow to compensate by producing new erythrocytes and releasing some of them into the circulation somewhat prematurely as reiculocytes.

Sickle Cell Anemia: a severe hemolytic anemia that results from inheritance of the sickle hemoglobin gene, which causes the hemoglobin molecule to be defective.

Assessments:

The patient with sickle cell trait usually has a normal hemoglobin level, a normal hematocrit, and a normal blood smear. In contrast, the patient with sickle cell anemia has a low hematocrit and sickled cells on the smear. The diagnosis is confirmed by hemoglobin electrophoresis.

Medical Management:

Treatment for sickle cell anemia is the focus of continued research. However, aside from the equally important aggressive management of symptoms and complications, there are few primary treatment modalities for sickle cell diseases.

-HSCT Hematopoietic stem cell transplant may cure sickle cell anemia. Only available to few because of lack of compatible donors or severe organ damage.

-Hyrdroxyurea (Hydrea) is a chemo agent that is effective in increasing fetal hemoglobin levels in patients with sickle cell anemia, thereby decreasing the formation of sickled cells.

Polycythemia: refers to an increased volume of RBCs. When hematocrit is elevated (more than 55% in males, more than 50% in females) Dehydration can cause an elevated hematocrit but not typically to the level to be considered polycythemia. It is classified as either primary or secondary.

-Primary Polycythemia is called polycythemia vera

-Secondary polycythemia is caused by excessive production of erythropoietin.

Med Management: When secondary polycythemia is mild, treatment may not be necessary, when treatment is necessary, it involves treating the primary condition. If the cause cannot be corrected (smoking cessation or treating COPD) therapeutic phlebotomy may be necessary in symptomatic patients to reduce blood viscosity and volume as well as when the hematocrit is significantly elevated.

Neutropenia: A neutrophil count of less than 2000/mm results from a decreased production of neutrophils or increased destruction of these cells. Neutrophils are essential in preventing and limiting bacterial infection. A patient with neutropenia is at increased risk for infection from both exogenous and endogenous sources. The risk of infection are common endogenous sources. The risk of infection is based not only on the severity of the neutropenia but also on its duration.

Med Management: Treatment varies on cause. If neutropenia medication is induced, the offending agent stopped immediately if possible. Treatment of an underlying neoplasm can temporarily make the neutropenia worse, but with bone marrow recovery, treatment may actually improve it.

-Corticosteroids may be used if the cause is an immunologic disorder.

-If neutropenia is accompanied by fever, patient is considered to have an infection and usually is admitted to the hospital. Cultures of blood, urine, and sputum, as well as chest x ray are obtained.

Nursing Management: Preventing and educating about infections. Teaching patients in outpatient when and how to seek medical care.

-Patients at risk for neutropenia should have blood drawn for a CBC with differential.

Thrombocytopenia: Low platelet levels can result from various factors: Decreased production of platelets within the bone marrow, increased destruction of platelets or increased consumption of platelets.

Assessment: Can usually be diagnosed by examining the bone marrow via aspiration and biopsy.

Med Management: Treatment of secondary thrombocytopenia is usually treatment of the underlying disease. If platelet production impaired, platelet transfusions may increase the platelet count and stop bleeding or prevent spontaneous hemorrhage.

-The most common cause of excessive of platelet destruction is immune thrombocytopurpura.

Nursing Management:

-Nurse considers the cause of thrombocytopenia, the likely duration of it, and the overall conduct of the patients education is important, as are interventions to promote patient safety, particularly fall prevention in the older adult or patient who is frail.

-Same interventions as a patient with cancer who is at risk for bleeding.

Hemophilia: