Canadian Council of Cardiovascular Nurses | Conseil canadien des infirmières et infirmiers en soins cardiovasculaires

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CARDIOVASCULAR NURSING PRACTICE STANDARDS | 2023

This document and all that it encompasses is dedicated to the memory of a dear friend, colleague, and mentor Dr Paula Price.

Dr. Paula Marie Price RN MN PhD (Nursing)

May 3, 1958 - January 23, 2019

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PREFACE

The Canadian Council of Cardiovascular Nurses (CCCN) is the voice of cardiovascular nursing in Canada. This publication, Cardiovascular Nursing Practice Standards 2023, reflects the thinking of the specialty practice of cardiovascular nursing and should be reviewed in conjunction with provincial and institutional nursing policies, procedures, and practices.

As the voice of cardiovascular nursing in Canada, we assert that the scope of practice for a cardiovascular nurse requires specialty knowledge and skills. Such knowledge and skills enable the delivery of cardiovascular education, encourage primary prevention, assist in cardiovascular disease detection, and offer treatment to patients, families, communities, and populations. The cardiovascular nursing scope and practice are rooted in research and evidence-based practice.

Acquiring the specialty knowledge required to be a competent nurse working in the field of cardiovascular nursing is the responsibility of the individual nurse. The CCCN strongly recommends all cardiovascular nurses become members of the CCCN. This membership has numerous benefits and one of the most valuable is access to the website www.cccn.ca to assist with a commitment to life-long learning.

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BACKGROUND

These standards represent particular times and perspectives and therefore require regular revisions every five years or ad hoc to reflect changes in practice. The last standards for cardiovascular nursing were published in 2015.

The standards have been designed to reflect the expectation of a nurse who has worked a minimum of two years in the field of cardiovascular nursing. They assume a competency in general nursing practice and allow for recognition of excellence in a specialty practice. The standards support the beliefs and values of the Canadian Council of Cardiovascular Nurses (CCCN). The standards also acknowledge and embrace the foundations of standards previously developed by the Canadian Nurses Association (CNA, 2017), provincial nursing associations, and other specialty nursing groups. These standards are designed to guide cardiovascular nurses, in any area of practice, to achieve quality care for persons manifesting some aspect of cardiovascular disease.

VISION STATEMENT

The vision of Canadian cardiovascular nursing is to maximize the cardiovascular health of all Canadians through five key areas: health promotion, disease prevention, management of acute episodes and chronic conditions, palliation, and rehabilitation to promote optimal heart-healthy living. A population health approach, in conjunction with the concepts of health and social care partnerships, serve as a foundation for these revised standards. The goals of a population health approach are to maintain and improve the health status of the entire population and to reduce inequities in health status between population groups (Canadian Institute for Health Information, 2023).

To achieve this end, a broad range of factors and conditions known to influence health must be considered and acted on. Health and social care partnerships are key to improving patient outcomes through evidence-based practice, knowledge transfer, and advocacy. The cardiovascular nurse provides comprehensive care to individuals, families, groups, communities, and populations.

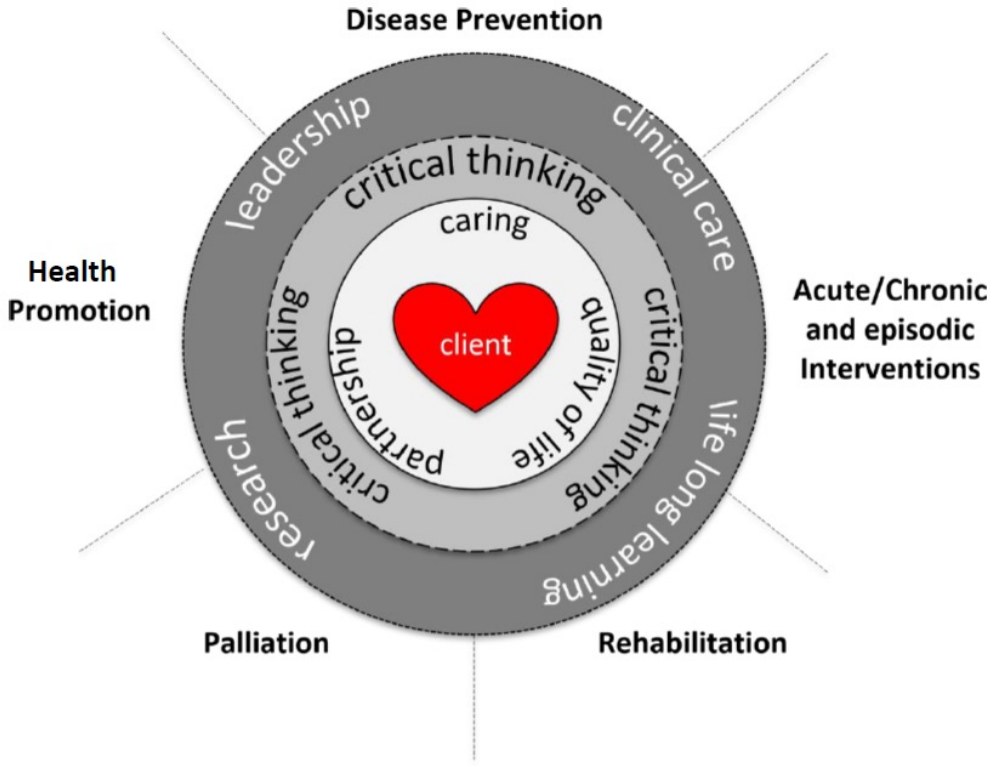
Cardiovascular nurses are committed to the provision of safe, competent nursing care. They work in collaboration with other members of the health care team, with the client/patient at the center of the relationship. Cardiovascular nurses support initiatives that enhance the unique body of knowledge that is cardiovascular nursing. The practise of cardiovascular nursing occurs in a wide range of settings, which vary from tertiary care institutions to community health care agencies. These practice settings provide primary, acute, and long-term care and may be found in both urban and rural settings.

FRAMEWORK

The conceptual framework pictured below represents key elements that guided the development of previous cardiovascular nursing standards and is the framework that has enabled CCCN to build and expand to provide a more competency-based set of standards.

This framework depicts specialized nursing care that encompasses values and beliefs inherent to our practice of cardiovascular nursing and articulates that practice beyond key concepts common to all nursing. The client is the core of the framework, reflecting our essential belief that the interventions of the cardiovascular nurse also depend on what the client is experiencing.

Cardiovascular nursing is influenced by the paradigm of caring, which highlights the concepts of partnership and quality of life. Furthermore, these concepts are influenced by such factors as critical thinking, experience, research, education, and leadership. These concepts and factors operate across the five key cardiovascular nursing elements: promotion, prevention, rehabilitation, acute/chronic and episodic interventions, and palliation. The lines of the framework are broken to depict the interaction and the interconnectedness among elements. At any given point in the client's cardiovascular experience, the nurse should consider all elements simultaneously to provide comprehensive quality care.



(CCCN, 2015)

FOUNDATIONAL CONCEPTS

Three key concepts have been identified that are foundations of the nurse/client relationship in cardiovascular nursing. These are caring, partnership, and quality of life.

Caring:

Caring is an integral part of cardiovascular nursing and incorporates both the art and science of nursing care. Cardiovascular nursing views the art of caring as "being with" as opposed to "doing to" a client, wherein a trusting and supportive relationship exists to potentiate the health and well being of the client. Caring suggests support for the client's unique social, emotional, and spiritual strengths during times when difficult therapeutic decisions need to be made, or when an unfavourable prognosis has been indicated. The nurse facilitates a client's internal and external supportive resources and empowers the client with trust, confidence for decision-making, and hope for outcomes in a timely and effective manner (Canadian Council of Cardiovascular Nurses [CCCN], 2015).

Partnership:

Partnerships are special helping-trusting relationships between nurses and clients. Cardiovascular nurses build relationships with clients based on mutual respect, authentic communication, cooperation, and confidentiality. Each partner makes contributions to the health relationship and has complementary rights and responsibilities. Partnerships are supported indirectly by identifying barriers to achieving optimal heart health. Early recognition and attention to barriers commonly experienced by cardiovascular clients are essential skills for cardiovascular nurses. By partnering with the healthcare team and the client to address these issues, many barriers become more manageable or possibly eliminated (CCCN, 2015).

Quality of Life:

Quality of life is a personal value and outlook on life, based on beliefs and cultural and socio-economic factors. It is dynamic in nature and reflects the client's personal choices in life and their particular situation. Cardiovascular nurses need to respect individuals' diversity and client choices (CCCN, 2015).

ASSUMPTIONS

- Cardiovascular nurses include licensed practical nurses (LPNs or PNs), registered nurses (RNs), advanced practice registered nurses (clinical nurse specialists [CNSs] and nurse practitioners [NPs]), nurse educators, administrators, case managers, quality specialists, and researchers. The word nurse encompasses all of the above.
- The ethical tradition of nursing is distinctive and self-reflective and mandates the nurse follow the CNA code of ethics.
- At this time, CCCN practice standards do not include the additional competencies required for an advanced practice nurse.
- A nurse, regardless of specialty, is licensed and authorized by a province or territory to practise nursing.
- Lifelong learning, an obligation and responsibility of all nurses, is an expectation and is deemed necessary to maintain and increase competence in cardiovascular nursing practice.
- CCCN practice standards are intended for use by a nurse that has been practising in the cardiovascular

field for a minimum of two years or more.

- CCCN practice standards are developed with the intentional omission of the pediatric population. For information on pediatric populations, please see the Society of Pediatric Cardiovascular Nurses: https://spcnonline.org/ or https://api.paednurse.ca/uploads/FINAL_Paediatric_Nursing_Standards_September_2017_daaa17ca21.pdf.
- All nurses entering the field of cardiovascular nursing in Canada will have foundational competency in:
    - Medical assistance in dying
    - Cultural competence and cultural safety
    - Substance use

    These competencies can be found at https://www.cna-aiic.ca/en/certification/exam-preparation/general-competencies
- Capacity to maintain these cardiovascular standards is relative to the province/territory, institution, and field of cardiovascular nursing and is not meant to marginalize or disadvantage any nurse, practice area/unit, or province/territory.
- CCCN prohibits the use of the CCCN practice standards in a punitive manner.
- Canadian institutional policies and procedures supersede these practice standards.
- CCCN acknowledges that the scope of practice can be unique to a province, territory, or institution.
- Each chapter of this document utilizes the nursing process: assessment, diagnosis, planning, implementation, and evaluation. This process was developed in the 1950' and is still utilized today in 2023 (Toney-Butler & Thayer, 2022).
- Foundational knowledge is defined as knowledge obtained from an undergraduate nursing degree.
- The list of competencies is not exhaustive and will be revised every five years, or as needed.

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1 ISCHEMIC HEART DISEASE

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In Canada, heart disease is the second leading cause of death after cancer and is a leading cause of hospitalization (Public Health Agency of Canada (PHAC), 2018). Ischemic heart disease, the most common form of heart disease, is the number one cause of "years of life lost" (PHAC, 2018).

Ischemic heart disease (IHD), also referred to as coronary heart disease (CHD) or coronary artery disease (CAD), describes a group of clinical syndromes that are characterized by myocardial ischemia: an imbalance between myocardial oxygen supply and demand (Urden et al., 2021). This mismatch of oxygen supply and demand is commonly caused by atherosclerotic plaques made up of substances such as cholesterol, lipids, and calcium. The atherosclerotic plaque builds up on the walls of one or more of the major arteries that feed the heart muscle, the coronary arteries (PHAC, 2018). These plaques can grow over time and cause the coronary arteries to narrow, leading to a reduction in flow of oxygen-rich blood to the heart muscle. These plaques can also rupture, causing a sudden reduction or cessation in oxygen-rich blood flow to cardiac tissue distal to the narrowing or stenosis (Urden et al., 2021).

Ischemic heart disease can be categorized as either stable or unstable and the manifestations are dependent on duration, severity, and acuity of ischemic episodes (Urden et al., 2021). Stable ischemic heart disease, or stable angina, refers to the presence of flow-limiting coronary lesions that restrict the heart's ability to increase blood flow in response to an increase in myocardial oxygen demand and results in the development of transient angina pectoris (Perputue & Keegan, 2021; Urden et al., 2021). Unstable IHD, or acute coronary syndrome (ACS) encompasses acute myocardial ischemia or infarction along a continuum, from non-ST-elevated ACS, which includes both unstable angina and non-ST-elevated myocardial infarction (MI), to ST-elevated MI (Perputue & Keegan, 2021; Urden et al., 2021).

Foundational knowledge required:

- Anatomy and physiology of the cardiovascular system.
- Signs and symptoms of ischemic heart disease.
- Systematic approach to obtaining a nursing history and physical exam.

Specialty knowledge required:

- Advanced cardiovascular auscultation skills (S3, S4, systolic and diastolic murmurs).
- Advanced use of inspection and palpation as it relates to the cardiovascular system.
- In-depth knowledge of the medical management of IHD. This includes the pharmacological management and or prevention of IHD as well as the lifestyle modification measures required to manage and prevent IHD.
- In-depth knowledge of managing IHD through the use of interventional cardiology.

- Understanding of the indications for cardiovascular surgical revascularization.
- Intense knowledge and ability to offer patient and family education as it relates to IHD.
- Ability to apply evidence-based guidelines for IHD management into practice.
- Ability to have an in-depth understanding of ischemic chest pain including the classic and prodromal signs and how this relates to race, gender, and ethnicity.

COMPETENCY 1A: IDENTIFICATION OF ISCHEMIC HEART DISEASE

Assessment:

The cardiovascular nurse will:

- Obtain a thorough and targeted history including:
    a. Past medical history.
    b. Best possible medication history.
    c. Presenting symptoms including a comprehensive pain assessment using a recognized format (example: PQRST where P stands for palliative or precipitating factors, Q for quality of pain, R for region or radiation of pain, S for subjective descriptions of pain, and T for temporal nature of pain [the time the pain occurs]).
    d. Cardiovascular risk factors (modifiable and nonmodifiable).
    e. Social history including recreational drug use.
- Perform a focused cardiovascular physical assessment including:
    a. Inspection, auscultation, and palpation.
- Understand diagnostic examinations including:
    a. 12- & 15- lead electrocardiogram (ECG).
    b. Cardiovascular biomarkers and other laboratory examinations.
    c. Cardiovascular angiogram.
    d. Echocardiogram, exercise stress test, computed tomography (CT) angiogram, magnetic resonance imaging (MRI), positron emission tomography (PET) scan, and other nuclear medicine examinations.
- Understand the indications for coronary angiography, exercise stress tests, echocardiograms, nuclear medicine examinations: cardiac CT scan, MRI, and PET scan.

Nursing Diagnosis:

The patient is at risk for acute and or chronic ischemic pain related to decreased myocardial flow as evidenced by facial expressions, altered behaviour and or expression of pain.

Plan:

The cardiovascular nurse will use specialty knowledge to:

- Understand the need for non-invasive and invasive cardiac testing and continued monitoring.
- Assist the patient in altering activities of daily living to manage signs and symptoms of IHD.

- Enable the nurse to assist the multidisciplinary healthcare team and provide a unique perspective into the plan of care for the patient.

Interventions:

The cardiovascular nurse will use specialty knowledge to:

- Manage typical and atypical signs and symptoms of ischemic heart disease.
- Manage life threatening emergencies related to IHD.
- Administer life saving interventions.
- Administer pharmacological and nonpharmacological therapies.
- Assist in patient preparation for diagnostic examinations.
- Educate the patient and family on IHD as it pertains to symptom management, treatment options and lifestyle modifications.

Evaluation:

The cardiovascular nurse will evaluate the educational needs of the patient and family are met using therapeutic communication.

COMPETENCY 1B: MANAGEMENT OF ISCHEMIC HEART DISEASE

Assessment:

The cardiovascular nurse will:

- Have specialty knowledge of the treatment options for ischemic heart disease. These options include the medical management, interventional cardiology management, and the surgical management.
- Obtain a focused cardiovascular history and perform a physical assessment as outlined in the previous competency.

Nursing Diagnosis:

The patient:

- May display fear and anxiety related to a medical diagnosis of IHD as evidenced by vocalizing said fears and manifesting the physical signs of anxiety.
- Is at risk of adverse events related to medical, interventional, or surgical intervention as evidenced by a physiological change in condition.
- Potentially have an altered body image related to a change in wellness as evidenced by changes in behaviour.

Plan:

The cardiovascular nurse will use specialty knowledge to manage the actual and potential complications of IHD as they relate to the medical, interventional, or surgical management.

Interventions:

The cardiovascular nurse will:

- Measure, record, and report vital signs including temperature, pulse, respiration, blood pressure, oxygen saturation, and rhythm interpretation (rate, rhythm, PR, QRS, QTc interval measurement [in some provinces]).
- Administer oxygen therapy, medication therapy to manage ischemic pain.
- Use specialty knowledge to manage the actual and potential complications of IHD as they relate to the medical, interventional, or surgical management.

Evaluation:

The cardiovascular nurse will evaluate:

- The effectiveness of interventions prescribed to manage the IHD through therapeutic communication and improvement in IHD symptoms.
- The educational needs of the patient and family are met using therapeutic communication analyzing objective and subjective data.

COMPETENCY 1C: PATIENT EDUCATION AS IT RELATES TO ISCHEMIC HEART DISEASE

Assessment:

The cardiovascular nurse will:

- Assess the need to provide patient and family education on the topics of:
    a. Medications and symptom management.
    b. Lifestyle modification, including physical activity, smoking cessation, heart healthy diet, intimacy, and follow-up care.
    c. Assess patient readiness to attend cardiovascular rehabilitation programs.

Nursing Diagnosis:

The patient:

- May display reluctance to embrace lifestyle modification as evidenced by a lack of engagement or compliance.
- Is at risk of suffering from anxiety and or depression related to a medical diagnosis of IHD that could be evidenced by changes in usual behavior.

Plan:

The cardiovascular nurse will use specialty knowledge to provide the appropriate education regarding lifestyle modification and pharmacological management of IHD.

Interventions:

The cardiovascular nurse will:

- Provide patient and family education beginning at the time of diagnosis and ensure opportunities for reinforcement are provided at a key point in the recovery and follow-up visits.
- Ensure the patient has a referral to cardiovascular rehabilitation.

Evaluation:

The cardiovascular nurse will evaluate the education provided to the patient and family by developing a therapeutic relationship and using effective closed loop communication.

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2 CARDIOVASCULAR RHYTHMS

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Interpretation and treatment of cardiovascular arrythmias is the foundation of cardiovascular nursing and often one of the first educational competencies obtained by the cardiovascular nurse (Woods et al., 2019). This area of nursing practice ranges from understanding the hemodynamic consequences of tachycardia and bradycardia (medical floor/clinic) to full scope where measurements are obtained, and interpretation is based on an intense assessment (intensive care unit [ICU]/critical care unit [CCU]) and critical thinking (Phalen and Aehlert, 2019).

The scope of this chapter recognizes the core competencies of a cardiovascular nurse previously mentioned in this document and to avoid redundancy will focus on cardiovascular rhythms only.

Foundational knowledge required:

- Ability to identify tachycardia, bradycardia, and normal sinus rhythm.
- Physiological indicators of hemodynamic instability.

Specialty knowledge required:

(Depending on practice area as mandated by province/territory or institution.)

- Application of 3- and 5-lead bedside monitoring leads.
- Interpretation and management of the following rhythms:
    - Sinus rhythms
    - Atrial rhythms
    - Supraventricular rhythms
    - Junctional rhythms
    - Heart blocks (HB [1st degree HB, 2nd degree type I, 2nd degree type II, 3rd degree HB])
    - Idioventricular rhythms
    - Ventricular tachycardia and fibrillation
    - Asystole
    - Paced rhythms
    - Pulseless electrical activity (PEA)

COMPETENCY 2A: BASIC CARDIAC MONITOR INTERPRETATION

Assessment:

The cardiovascular nurse will:

- Obtain a focused history and perform a physical assessment aimed at identifying causes of the arrythmia and the actions that precipitate and or palliate the arrythmia.
- Recognize signs and symptoms that indicate adequate (stable) or inadequate (unstable) cardiac output.
- In certain practice settings the nurse will measure and understand normal values for:
    - Atrial rate.
    - Ventricular rate.
    - Setermine if the rhythm is regular or irregular.
    - Measure the PR interval, QRS duration, QT interval as well as corrected QT interval (QTc) in some provinces.

Nursing Diagnosis:

The patient is at risk for hemodynamic instability related to cardiac arrythmias as evidenced by a change in vital signs (heartrate [HR], blood pressure [BP], respiratory rate and oxygen saturated hemoglobin [SpO2]).

Plan:

The cardiovascular nurse will use specialty knowledge to provide the appropriate education regarding lifestyle modification and pharmacological management of IHD.

Interventions:

The cardiovascular nurse will:

- Apply 3- and 5-lead bedside leads to assess cardiac rhythms.
- Obtain laboratory investigations such as electrolytes, drug levels, thyroid stimulating hormone (TSH).
- Use specialty knowledge to manage and treat arrythmias according to the most recent advanced cardiovascular life support (ACLS) guidelines.
- This specialty knowledge can include activation of a “CODE BLUE” or EMS/911; administration of basic life support (BLS) and or ACLS procedures as well as administration of pharmacological, nonpharmacological and or electrical therapies.
- Nurses working in specialized units should obtain ACLS certification through Heart & Stroke Canada every two years and BLS annually.

Evaluation:

The cardiovascular nurse will evaluate, through the use of a physical assessment and effective communication, to determine if interventions provided were successful in achieving an adequate cardiac output or restoring homeostasis.

COMPETENCY 2B: 12 & 15 LEAD ECG

Assessment:

The cardiovascular nurse will assess the need to perform a 12- or 15-lead ECG based on the indications.

Nursing Diagnosis:

The patient is at risk of cardiac ischemia related to an acute coronary syndrome as evidenced by ST and T wave abnormalities on a 12 and possibly a 15-lead ECG.

Plan:

The cardiovascular nurse will use the ECG as a diagnostic tool to determine the need for nursing or medical intervention.

Interventions:

The cardiovascular nurse will:

- Perform a 12 and possibly a 15-lead ECG (dependent on province/territory and institution).
- Analyze the ECG for evidence of ST segment elevation, ST segment depression or T wave abnormalities in contiguous leads (Urden, 2021).
- Determine if notification of medical personnel is warranted.

Evaluation:

The cardiovascular nurse will ensure appropriate nursing management of the patient occurs based on the 12-lead ECG test results.

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3 INTERVENTIONAL CARDIOLOGY

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Cardiac catheterization and other procedures carried out in the cardiac catheterization laboratory are performed by an interventional cardiologist. The catheterization lab team consists of specially trained nurses and medical radiation technologists working collaboratively with the physician. Additional personnel may also be required.

Other valuable information that can be obtained from cardiac catheterization includes (and is not limited to) left ventricular ejection fraction (LVEF), wall motion abnormalities, left ventricular end diastolic pressure (LVEDP), right ventricular systolic pressure (RVSP), and aortic valve gradients.

Indications for cardiac catheterization can include:

- Stable angina.
- ***ACS:*** unstable angina, non-ST elevation myocardial infarction (NSTEMI), ST elevation myocardial infarction (STEMI).
- Diagnostic angiogram used to define coronary anatomy and/or rule out CAD (which may help in diagnosis of other conditions).

Results of the coronary angiogram help direct a treatment plan. Treatment plans usually fall under three categories:

1. ***Medical therapy*** – consideration of other causes of symptoms if there is an absence of a cause found during cardiac catheterization, or optimizing medical therapy for established coronary artery disease; consultation to other specialties as needed, such as electrophysiology.
2. ***Coronary intervention*** – can be performed as an ad-hoc procedure immediately after the coronary angiogram, for the treatment of obstructive coronary artery disease and some coronary artery dissections.
3. ***Surgical consultation*** – obtained as necessary for CAD not suitable for treatment with percutaneous coronary intervention (PCI) or severe multi-vessel CAD, or for certain valvular or structural cardiac problems (Woods et al., 2019; Urden et al., 2021).

Interventional cardiology procedures to be reviewed in this chapter include cardiac catheterization (cardiac cath)/coronary angiography, percutaneous transluminal coronary angioplasty (PTCA), and coronary stenting. Percutaneous coronary intervention refers to coronary angioplasty, with or without the use of a stent. Other procedures often performed in the cardiac catheterization lab, such as transcathether aortic valve implantation (TAVI), percutaneous transluminal mitral valvuloplasty, atrial septal defect closure, transcatheter mitral valve repair, balloon pump insertion, and coronary high-risk interventional procedures (CHIPs) will not be discussed in this chapter. For nurses working in a cardiac catheterization laboratory, please follow the specific standards for your specialty in addition to this document.

The scope of this chapter recognizes the core competencies of a cardiovascular nurse previously mentioned in this document and to avoid redundancy this chapter will focus only on interventional cardiology.

Foundational knowledge required:

- Basic coronary anatomy and physiology.
- Signs, symptoms of IHD.

Specialty knowledge required:

- In-depth knowledge of coronary anatomy.
- Indications and complications of percutaneous coronary interventions.

COMPETENCY 3A: PRE-PROCEDURAL MANAGEMENT OF A PATIENT FOLLOWING A CORONARY INTERVENTION

Assessment:

The cardiovascular nurse will:

- Obtain a focused history:
    - History of presenting symptoms.
    - Cardiac risk factors including obstructive sleep apnea.
    - Past/current medical history, and surgical history (especially cardiac or vascular).
    - Medications and allergies.
    - Vital signs as well as pain assessment.
    - Pertinent lab results.
    - Patient's understanding of all preparations and the proposed procedure.
- Perform a physical assessment:
    - Obtain weight/height, inspect the patient for general cardiovascular wellness; inspect for potential vascular access sites.
    - Auscultation of lung/heart sounds and vascular bruits.
    - Palpation of peripheral pulses.
- Examine/assess the patients' ability to lay flat and follow instructions.
- Assess creatinine clearance and consider renal protection strategies (intravenous [IV] fluid).
- Consider the need for pre-treatment of contrast allergies as ordered (may include diphenhydramine, cetirizine, IV or oral steroids).

Nursing Diagnosis:

The patient may display fear and anxiety related to a medical diagnosis of IHD as evidenced by vocalizing fear and displaying the clinical signs of anxiety.

Plan:

The cardiovascular nurse will prepare the patient and family for the interventional cardiac procedure anticipating and managing system delays and mitigating any patient fear and anxiety while ensuring ischemic chest pain is managed appropriately.

Interventions:

The cardiovascular nurse will:

- Explain the rationale for preparations and for the cardiac catheterization and answer questions appropriately.
- Ensure that pre-procedural restrictions on oral intake are followed according to the facility's established guidelines.
- Ensure that medications to be given and/or held pre-procedure are clarified with the interventional cardiologist, particular attention is paid to anticoagulant medications, diabetic medications, and diuretics.
- Perform pre-procedure preparations, such as access site (radial and femoral) shave and wash with antiseptic solutions, IV insertion/maintenance, medication administration and documentation, vital sign/patient condition documentation, and pre-procedure checklists.

Evaluation:

The cardiovascular nurse:

- Evaluates and revaluates the patient's condition in an ongoing manner to ensure adequate cardiac output.
- Evaluates the patient's understanding of their condition and of the procedure through therapeutic communication as evidenced by analyzing subjective and objective data.

COMPETENCY 3B: PERIPROCEDURAL MANAGEMENT OF THE PATIENT DURING A CORONARY INTERVENTION

The competencies related to periprocedural management are unique to the cardiac catheterization nurse and beyond the scope of this document. The CCCN recognizes cardiac catheterization nurses as a unique subspecialty of the cardiovascular nurse. That subspecialty nurse will follow the standards set forth in this document in addition to the standards outlined by the institution, association, or provincial regulatory body for that subspecialty.

Assessment:

The cardiovascular nurse will:

- Perform a physical assessment:
    - Vital signs.
    - Auscultation for femoral bruit (if femoral approach).
    - Monitoring for signs of limb ischemia from procedural limb.

    - Respiratory and cardiovascular assessments including cardiac rhythm.
    - Assess for post-procedure complications including:
        - Signs of bleeding (internal or external).
        - Vasovagal response.
        - Effects of medications and contrast used in the catheterization lab.
        - Changes in vital signs or cardiac rhythm that decrease cardiac output.
- Assess the patients' level of understanding regarding the results of the procedure and readiness for patient education related to cardiac risk factor modification.

Nursing Diagnosis:

The patient:

- May have risk of bleeding related to vascular access as evidenced by the presence of blood, hematoma, lower serum hemoglobin, and hemodynamic instability.
- May have risk of myocardial ischemia related to complications of the procedure as evidenced by hemodynamic instability.
- Fear and anxiety related to the unknown as evidenced by verbalization of fear and apprehension.

Plan:

The cardiovascular nurse will:

- Provide interventions to maintain adequate cardiac output.
- Provide education for self-care of the procedure site at discharge.
- Provide education on medication management on discharge.
- Provide education on procedure outcomes as they relate to the chosen management strategy.

Interventions:

The cardiovascular nurse will:

- Provide nursing and prescribed interventions to assist in recovery (including pharmacological, pain management, electrical therapy, manual pressure at procedure site, intravenous fluids).
- Alert appropriate healthcare providers of a change in patient condition.
- Review individual results and assist the patient to understand the degree of IHD.
- Provide education on lifestyle modification, and strategies to manage self care and enhance recovery.
- Educate the patient of potential complications post-procedure and nursing and patient management strategies.

Evaluation:

The cardiovascular nurse evaluates:

- Hemodynamic stability through changes in vital signs, cardiac rhythm, or physical assessment.
- Patient education through observation of patient practices and therapeutic communication.

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4 HEART FAILURE

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In Canada, there are 750,000 people living with heart failure (HF), which affects people of all ages. There are over 100,000 people diagnosed with HF each year in Canada. One in three Canadians has been touched by HF, either because they have it themselves, or a family member or close friend has been diagnosed with HF. Four in ten Canadians do not know what HF is, and two thirds do not know there is no cure for HF (Canadian Cardiovascular Society & Canadian Heart Failure Society, 2023).

The scope of this chapter recognizes the core competencies of a cardiovascular nurse previously mentioned in this document and to avoid redundancy will focus only on HF.

Foundational knowledge required:

- Definition of HF.
- NYHA (New York Heart Association) Classification.
- Causes of HF.
- Risk factors for HF (modifiable and non-modifiable).
- Common co-morbidities in people with HF (diabetes, renal impairment, atrial arrythmias, chronic obstructive pulmonary disease (COPD), depression, cognitive impairment).
- Understanding the relevant assessment components and common tools used in the diagnosis of heart failure as recommended in people with an established HF diagnosis.
- Understanding on the management of chronic heart failure, including the need for identifying and treating reversible causes or the underlying cause of HF, the pharmacological management, and role of device therapy.

Specialty knowledge required:

- Classifications of HF-based ejection fraction (EF; reduced EF, moderate EF, and preserved EF).
- Compensatory mechanisms in acute and chronic HF.
- Advanced physical assessment skills including auscultation, inspection, and palpation.
- Disease trajectory and prognosis of HF.
- High risk features for severe or advanced HF.
- Patient self-care strategies.
- Device therapy.
- Ddvanced therapies.
- End-of-life considerations.

COMPETENCY 4A: ASSESSMENT AND DIAGNOSIS OF HEAT FAILURE

Assessment:

The cardiovascular nurse will:

- Obtain a focused history (in addition to the standard cardiovascular assessment):
    - Presenting or current symptoms (shortness of breath [SOB], orthopnea, paroxysmal nocturnal dyspnea, pitting edema, fatigue, or atypical HF symptoms specific to the patient such as nocturia, delirium, poor appetite).
    - Functional capacity/activity level and limiting symptoms; NYHA Classification.
    - Underlying etiology if known (ischemic, valvular, viral, myocarditis, chemotherapy, tachycardia-induced, substance abuse, genetic, and idiopathic).
    - Trigger for clinical deterioration when applicable (question "What is the precipitant in the setting of decompensated heart failure?").
    - Past and current medical history (including recent hospitalizations, noncardiac comorbidities)
    - Cardiac risk factors.
    - Medications and alternative therapies (prescription, non-prescription, herbal supplements, cannabis, potential interactions).
    - Psychosocial history (substance use, occupation).
    - Perceived health and coping challenges (cognition, activities of daily living).
    - Social and family support.
- Perform a physical assessment:
    - In addition to the standard cardiovascular exam, the nurse will focus on findings to help determine fluid status, such as pitting edema, crackles in the lungs, ascites, postural hypotension, decreased air entry to lung bases.
- Diagnostic investigations:
    - Heart rhythm to identify heart rate and rhythms, such as atrial fibrillation (AF, afib), atrial and ventricular premature beats, and previous myocardial infarctions.
    - Understand the indications for diagnostic tests, such as echocardiogram, chest X-ray, 12- and 15-lead ECG, Holter monitoring, exercise stress test, nuclear scans, right and left heart catheterizations, cardiac MRI.
    - Pharmacological treatment guidance: serum creatinine, calculated creatinine clearance, CBC, brain natriuretic peptide (B-type [BNP] or N-terminal pro b-type [NT pro-BNP]), electrolytes, lipid profile, iron profile, thyroid function.

Nursing Diagnosis:

The patient is at risk for:

- Activity intolerance that may be related to:
    - Inadequate tissue perfusion from decreased cardiac output (chronic vs acute).
    - Hypervolemia from worsening heart failure.
    - Skeletal muscle weakness and deconditioning.

    - Poor sleep quality (HF symptoms, sleep apnea).
- Poor health related quality of life that may be related to:
    - Activity intolerance/ symptom burden.
    - Social isolation.
    - Psychological distress such as symptoms of anxiety or depression.
    - Feelings of uncertainty.
- Acute decompensation and decreased cardiac output that may be related to:
    - Decreased cardiac tissue perfusion, acute decompensation.
    - New or worsening arrythmia (e.g., afib, ventricular arrythmias) – may be accompanied by palpitations, pre-syncope, syncope, or cardiac arrest (especially in patients with LVEF <35%).

Plan:

The cardiovascular nurse will:

- Ensure the assessment includes actual and potential problems based on patient risk for potential problems common to the HF population.
- Assess the patient for current symptoms and fluid assessment using subjective and objective findings and explore possible reasons for any changes.
- Assist the patient/caregiver in developing a daily routine or participating activities that maximizes the opportunity for enhancing quality of life.
- Collaborate with other members of the health care team as needed to address patient needs based on assessment findings.

Interventions:

The cardiovascular nurse will:

- Explore possible reasons for any changes in patient status and collaborate with other healthcare providers to meet the patient's needs.
- Provide patient/caregiver support and education regarding action plan to address changes in status.
- Engage in a shared decision-making process with patient/caregiver regarding action plan.
- Provide patient education with a focus on autonomy and self care.

Evaluation:

The cardiovascular nurse will:

- Monitor and evaluate response to treatment using subjective and objective findings.
- Provide suggestions for adjustments to the treatment plan based on findings.

COMPETENCY 4B: PHARMACOLOGICAL MANAGEMENT OF THE PATIENT DIAGNOSED WITH HEART FAILURE

Assessment:

The cardiovascular nurse will:

- Assess the patient for potential side effects (blood pressure, pulse, renal function, electrolytes).
- Assess for interactions between medication.

Nursing Diagnosis:

The patient:

- Is at risk for significant adverse reactions related to poly-pharmacopoeia as evidenced by low/high serum potassium, symptomatic hypotension or bradycardia, renal impairment, and subjective data suggesting a negative impact on quality of life.
- Nonadherence to medications related to unwanted side effects, cost, and inadequate knowledge.

Plan:

The cardiovascular nurse will work with all members of the healthcare team to ensure the patient and family are well educated on the pharmacological management of heart failure and medication adherence and regimen are optimized.

Interventions:

The cardiovascular nurse will:

- Administer evidence-based medications (i.e., beta-blocker, angiotensin converting enzyme inhibitor [ACEi]/angiotensin receptor blocker [ARB], angiotensin receptor/neprilysin inhibitor [ARNI], mineralocorticoid receptor antagonist [MRA], sodium-glucose co-transporter 2 inhibitor [SGLT2i], diuretics) in patients with heart failure in accordance with the latest national heart failure guidelines.
- Identifying patients for whom the above medications are most suitable and when they are contraindicated for use.
- Monitor patient for potential side effects that includes abnormal subjective and objective assessment findings (e.g., symptomatic hypotension, worsening renal function, abnormal electrolytes).
- Help develop an individualized escalation plan for the development of serious side effects.
- Provide education that respects the patient's cultural beliefs, values, preferences, and socioeconomic status to optimize medication adherence.
- Provide medication education including a plan for special events and "sick days".
- Collaborate with patient/caregiver, use a shared decision-making process to optimize patient adherence.
- Work with other healthcare team members as needed to support medication adherence (e.g., pharmacist, social worker, physician).

Evaluation:

The cardiovascular nurse will:

- Evaluate the efficacy of patient education by developing a therapeutic relationship with the patient and

family using both subjective and objective data.

- Evaluate the adherence to a medication regime by utilizing best possible medication history tools and community pharmacists and other healthcare providers.

COMPETENCY 4C: PATIENT EDUCATION AND PROMOTION OF SELF CARE IN THE HEART FAILURE PATIENT

Assessment:

The cardiovascular nurse will:

- Assess the patient and family understanding of the diagnosis and trajectory of the disease.
- Assess the patient's/family's ability and resources to engage in self-care behaviour (e.g., monitoring daily weights and symptoms, develop an action plan when changes occur).

Nursing Diagnosis:

The patient is at risk for:

- Non-adherence or difficulty engaging in recommended self-care activities that may be related to:
    - Knowledge deficit.
    - Misalignment with patient/caregiver values or goals.
    - Cognitive deficits.
    - Psychological distress (anxiety, depression).
    - Lack of social support.

Plan:

The cardiovascular nurse will ensure the timeliness and appropriate delivery of patient-focused education materials.

Interventions:

The cardiovascular nurse will:

- Explain the pathophysiology of heart failure to the patient/family or caregiver at a level that the patient/family will understand and is relevant to their situation.
- Explain the patient assessment findings and treatment plans using appropriate terminology.
- Assist the patient to develop a self-care plan that includes how to monitor for symptoms, including daily weights and develop an individualized action plan for any changes.
- Encourage participation in a cardiovascular rehabilitation program.
- Be aware and facilitate (where possible) additional tools/resources for ongoing patient/family self-care education.
- Collaborate with other members of the healthcare team to meet patient needs for supporting self-care when the patient/caregiver require additional supports (e.g., remote care monitoring, community partners).

Evaluation:

The cardiovascular nurse will evaluate the comprehension of patient/family education initiates and develop a plan to provide additional education or resources where knowledge or self care engagement gaps exist

Special note: The cardiovascular nurse should be aware of the CCCN position statement on “End of Life Care”.

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5 VASCULAR DISEASE

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Vascular diseases affect the peripheral vessels as well as the larger more central vessels. Atherosclerotic plaque formation is the most common affliction; however, arteries can develop dissections and or aneurysms and veins can develop varicosities. Vascular disease is a growing epidemic and is directly related to an aging population, an increase in obesity, and chronic conditions like Type II diabetes (Urden et al., 2021). Peripheral arterial disease (PAD) is often underrecognized and undertreated and is therefore associated with significant cerebrovascular and cardiovascular complications (Abramson et al., 2022).

The scope of this chapter recognizes the core competencies of a cardiovascular nurse previously mentioned in this document and will focus on acute and chronic vascular disease to avoid redundancy.

Foundational knowledge required:

- Anatomy and physiology of the circulatory system.
- Anatomy of blood vessels.
- General signs and symptoms of claudication and intermittent claudication.

Specialty knowledge required:

- Use pathophysiologic mechanisms to differentiate between peripheral venous and arterial disease.
- Management strategies for acute versus chronic peripheral disease.
- Types of arterial disease, such as acute arterial disease, chronic arterial disease, Buerger's disease, and Raynaud's disease.
- Types of venous disease, such as varicose veins and chronic venous insufficiency, thrombophlebitis, and chronic deep vein thrombosis (DVT).
- Presentation and management of cerebral, thoracic, and abdominal aneurysms and dissections.
- Presentation and management of pulmonary embolism.

COMPETENCY 5A: PERIPHERAL VASCULAR DISEASE

Assessment:

The cardiovascular nurse will:

- Use the skills of inspection, auscultation, and palpation to differentiate between arterial and venous insufficiency.
- Obtain a focused history:

    - Symptoms of acute and chronic arterial disease and venous disease.
    - Risk factor assessment (smoking, family history, age, obesity, hypertension, diabetes, and dyslipidemia).
    - Pain assessment – rest pain, walking pain, intermittent claudication.
    - Medications and alternative therapies used to manage symptoms.
    - Psychosocial history (e.g., occupation, recent travel, substance use).
- Perform a physical assessment:
    - Signs of pain, pulselessness, pallor, poikilothermia, paresthesia, paralysis.
    - Inflammatory markers.
    - Doppler ultrasounds.
    - Ankle-brachial index calculation.
    - Skin changes – thickening of nails, drying of skin.
    - Hair loss common on lower limb – skin has a shiny appearance.
    - Temperature changes between limbs.
    - Wasting of muscle or soft tissue.
    - Pain assessment.
    - Staging of ulcers and gangrene.

Nursing Diagnosis:

The patient:

- Is at risk for both acute and chronic decreases in blood flow related to alterations in blood vessel integrity as evidenced by pain (acute or chronic), decreased exercise capacity, and additional signs of compromised blood flow.
- Is at risk of poor tissue integrity and loss of digits or limbs relating to alterations in blood vessel integrity as evidenced by the presence of ulcers, open wounds, gangrene.

Plan:

The cardiovascular nurse will work with the multidisciplinary team to develop a plan of care that promotes vascular wellness and the prevention of complications related to impaired arterial and or venous blood flow.

Interventions:

The cardiovascular nurse will:

- Educate the patient on the importance of medication compliance regarding antiplatelet and anticoagulation treatments used with stents, inferior vena cava filters, arterial disease, and with thrombophlebitis.
- Calculate an ankle-brachial index and document the trend over time.
- Provide smoking cessation education.
- Educate the patient on diabetes management and importance of Hemoglobin A1C within normal limits.
- Educate the patient on management of dyslipidemia and statin therapy.

- Ensure the patient is fitted for appropriate limb compression therapy if indicated.
- Intervene to prevent actual and potential complications related to vascular procedures (diagnostic and surgical interventions) in the pre-, peri- and postoperative phases of management.

COMPETENCY 5B: LARGE VESSEL VASCULAR DISEASE (AORTIC, PULMONIC, AND CEREBRAL)

Assessment:

The cardiovascular nurse will:

- Perform a physical assessment focusing on:
    - Inspection for evidence of connective tissue diseases (Marfans syndrome) and or neurovascular disorders.
    - Auscultation looking for new murmurs or bruits.
    - Palpation of pulse for variation in strength and quality from left to right.
    - Assess for palpable abdominal masses.
    - Comprehensive neurovascular assessment including Glasgow Coma Scale (GCS), Ramsay sedation scale (RSS), Clinical Institute Withdraw Assessment (CIWA).
- Obtain a history:
    - Focusing on the type of pain the patient is complaining of (pressure versus ripping or tearing), “headaches”, chest, or lower limb pain with walking.
    - Recent trauma.
    - Known coagulopathies.
    - Risk factor assessment (family history of vascular aneurysms or dissections, age, obesity, smoking, hypertension, connective tissue disorders, diabetes and dyslipidemia).
    - Psychosocial history (e.g., occupation, recent travel, substance use).

Nursing Diagnosis:

The patient:

- Is at risk for an altered cardiac output related to diseases of the thoracic and or abdominal aorta, as evidenced by an altered level of consciousness, coronary chest pain, or altered peripheral circulation.
- Is at risk of an oxygen supply and demand imbalance related to a pulmonary embolism as evidenced by low arterial oxygen saturation, altered level of consciousness, and myocardial ischemic pain.
- At risk for significant neurological insult related to disruption in cerebral blood flow as evidenced by a change in level of consciousness, altered respiratory pattern, or coma.

Plan:

The cardiovascular nurse will:

- Through collaboration with the interdisciplinary team, expedite care to minimize complications related to diseases of the large vessels.

- Develop a plan of care that quickly assesses and identifies possible large vessel disease that could compromise blood flow and alter end organ perfusion.

Interventions:

The cardiovascular nurse will:

- Educate the patient and family on the actual and potential complications of the medical, interventional, and open surgical treatment for each of the following:
    - Cerebral aneurysms.
    - Cerebral vascular accident (emboli and hemorrhagic).
    - Thoracic and thoracoabdominal aneurysms.
    - Abdominal aortic aneurysms.
    - Type A and B thoracic dissection.
    - Pulmonary embolism (PE) and saddle PE.
- Manage the pre- and post-procedural/surgical complications related to cerebral vascular disease interventions.
- Manage the complications of an embolic or hemorrhagic cerebral event.
- Manage the pre- and post-procedural/surgical complications related to thoracic endovascular aortic repair (TEVAR) and open surgical repair.
- Provide basic and advanced cardiovascular life support when indicated.

Evaluation:

The cardiovascular nurse will continuously assess and intervene to prevent or minimize actual and or potential complications related to peripheral or large vessel trauma or diseases

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6 INFLAMMATORY HEART DISEASE (IHD)

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Inflammatory heart disease can be caused by an infectious process, rheumatic disease, autoimmune disorders, toxins, allergic disease, cardiac devices, prosthetic valve implantation, or be idiopathic. Inflammatory heart disease can present clinically with pericarditis, myocarditis, or endocarditis (with or without pericardial effusion), or involve multiple organs. The cardiac involvement may be the first manifestation of a systemic disease or may occur years after the primary disease process has been identified. The severity of the illness is directly related to the pathogen/cause, age, and comorbidities of the patient (Woods et al., 2019).

Foundational knowledge required:

- Anatomy of the heart including layers.
- Understanding of the electrical conduction system of the heart.
- General knowledge of triggers for activation of the systemic inflammatory response.
- Clinical manifestations of inflammation.
- Understanding of infectious, rheumatic, autoimmune, toxic, and allergic diseases and idiopathic causes of IHD.
- Harm reduction strategies for patients with inflammatory heart disease linked to substance use.
- Myocardial injury related to coronavirus and related vaccine administration.

Specialty knowledge required:

- Advanced understanding of the electrical conduction system and proximity to heart valves.
- Enhanced knowledge of the common pathogens and illnesses that cause peri-, myo-, and endocarditis.
- Management of actual and or potential complications related to IHD.
- Symptom management and treatment plan for inflammatory heart disease.
- Specialty knowledge related to:
    - Coxsackievirus A & B, Echovirus, Corona Virus, Poliovirus, Influenza A/B, Respiratory Syncytial Virus, Mumps, Measles, Rubella Viruses, Chikungunya Hepatitis C, HIV, Dengue, Yellow Fever, Rabies Virus, Parvovirus B19, Cytomegalovirus, Human Herpes virus-6, Epstein-Barr, Varicella – Zoster, Herpes simplex.
- Bacterial (Staphylococcus, Streptococcus, Pneumococcus, Meningococcus and others).
- Fungal (Aspergillus, Actinomyces).
- The practitioner must also consider autoimmune causes, toxic causes along with idiopathic causes of inflammatory heart disease.

COMPETENCY 6A: PERICARDITIS, MYOCARDITIS AND ENDOCARDITIS

Assessment:

The cardiovascular nurse will:

- Obtain a focused history:
    - Implantable cardiovascular devices such as pacemakers, implantable cardioverter defibrillators (ICDs), or atrial septal defect closure devices.
    - Congenital heart disease.
    - Recent dental and other invasive/surgical procedures.
    - Recent myocardial infarction.
    - Recent infections, joint inflammation, and lymphadenopathy.
    - Autoimmune syndromes (Lupus).
    - Radiation therapy.
    - Pregnancy.
    - Prescription and non-prescription medications including recreational use of substances.
    - Unexplained fatigue, malaise.
    - Travel to foreign countries.
- Perform a physical assessment:
    - Thorough pain assessment with particular attention to aggravating and alleviating maneuvers, for example, Is relief obtain with leaning forward?
    - Assess jugular venous distention.
    - Auscultation of heart sounds for evidence of a pericardial friction rub, S3, S4, systolic and diastolic murmurs.
    - Auscultation of lung fields for evidence of a pleural friction rub or crackles.
    - Assess for the presence of a pulsus paradoxus using manual blood pressure cuff.
    - Palpation of the precordium and abdomen for:
        - Positive hepatojugular reflex (HJR).
        - Splenomegaly.
    - Peripheral edema.
    - Examine the digits for presence of Oslers nodes, Janeway lesions.
    - Evidence of petechia, rashes, or conjunctival hemorrhage.

Nursing Diagnosis:

The patient is at risk for:

- Pericardial tamponade related to pericardial effusions caused by the inflammatory process as evidenced by the presence of a pulsus paradoxus, SOB, and hypotension.
- Low cardiac output related to impaired myocardial function as evidenced by signs and symptoms of heart failure.

- Cerebral embolic event related to the presence of valvular vegetations that may become mobile as evidenced by a change in neurological assessment.

Plan:

The cardiovascular nurse will:

- Work with the interdisciplinary team to identify the cause of the inflammatory heart disease.
- Develop a plan of care to manage the symptoms of IHD.
- Intervene to manage the actual and potential complications of acute and chronic inflammatory heart disease.

Interventions:

The cardiovascular nurse will:

- Interpret lab results including:
    - Blood cultures, CBC, electrolytes, inflammatory markers (ESR, CRP), coagulation studies, renal function, viral titres.
- Assist the healthcare team to obtain transthoracic or transesophageal echocardiograms, ECGs, chest X-rays, nuclear medicine scans, PET and MRI scans, cardiac biopsies, and cardiac catheterizations.
- Perform a comprehensive neurological assessment to assess for evidence of infective vegetation dislodgement (unique to the diagnosis [Dx] of endocarditis).
- Assess cardiovascular rhythm and or 12-lead ECG for evidence of conduction abnormalities (heart block in particular) and manage any arrhythmias.
- Measure and report a significant auscultatory gap on blood pressure assessment.
- Measure and report a new or worsening pericardial friction rub.
- Report a new or worsening cardiac murmur.
- Assess and manage signs of low cardiac output (tachycardia, SOB, chest pain, or hypotension).
- Measure, report, and manage any signs of hemodynamic compromise.
- Measure, report, and manage signs and symptoms of pulmonary edema.
- Manage vasopressors and or inotropic support if required (refer to heart failure and or cardiogenic shock competencies).
- Recognize the need for cardiac assist devices such as intra-aortic balloon counter pulsation therapy; Impella, or left, right or bilateral ventricular assist devices (VADs) or extra corporeal membrane oxygenation (ECMO).
- Provide basic life or advanced life support if needed and within the scope.
- Provide education on the potential cause of the IHD and future avoidance if applicable.
- Provide education to the patient and family on symptom management, recognition of signs and symptoms and indicators that medical attention is required.
- Provide pharmacological and nonpharmacological interventions for management of symptoms and for treatment of IHD.

Evaluation:

The cardiovascular nurse will:

- Continuously evaluate the patient for signs of improvement or deterioration and intervene to prevent complications related to inflammatory heart disease.
- Evaluate patient and family understanding of the disease process through effective and therapeutic communication.

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7 CARDIOVASCULAR SURGERY

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Cardiovascular surgery is any surgery that involves the heart and or great vessels. The two most common procedures are coronary artery bypass grafting (CABG) and valve repair and replacement. The turn of the 21st Century has brought exciting new procedures to the cardiovascular operating room and has led to subspecialties within the field. There are healthcare providers that specialize in aortic surgery, valvular surgery, minimally invasive, and robotic surgeries. These advances in the field of surgery have provided surgical options for patients previously thought to be inoperable or high-risk candidates (Woods et al., 2019). The nurse caring for the cardiovascular surgery patient must have a specialty knowledge of the common comorbidities that patients present with, and the anticipated complications associated with these issues (Urden et al., 2021).

The scope of this chapter will focus on pre- and post-operative cardiovascular surgery, while recognizing and echoing the core competencies of a cardiovascular nurse previously outlined in this document.

Foundational knowledge required:

- Anatomy and physiology of the heart and vascular system.
- Pre-operative conditions that increase mortality and morbidity of the patient undergoing surgery.
- Common post-operative complications related to general anesthetic.

Specialty knowledge required:

Where most cardiac surgeries are only performed in specialty facilities, there are certain competencies that would be unreasonable to expect a cardiovascular nurse in a non-cardiac surgery facility to master.

- Indications for surgical verses interventional or medical management.
- Indications for less invasive surgical procedures (transcatheter aortic valve replacement [TAVR] verses surgical valve replacement *[SAVR]), mitraclip, TEVAR.
- General pre-operative investigations, such as angiogram, echocardiogram, cardiac CT, chest X-ray, vein mapping, and pulmonary function tests.
- Potential complications of cardiopulmonary bypass.
- Advanced cardiovascular assessment skills related to assessing heart and lung sounds.
- Strategies to enhance preoperative health in the cardiovascular surgery patient.
- General knowledge of the following procedures: CABG, valve surgery, TEVAR, Bentall procedure, Ross procedures, left atrial appendage closures, ventricular septal defect closure, left ventricular aneurysm repair, repairs of the thoracic aorta, and others).
- Signs and symptoms of surgical complications related to cardiovascular surgery.
- Post operative and discharge management in particular sternal precautions.

- Management of brady arrhythmias using dual chamber temporary epicardial pacing wires.

COMPETENCY 7A: PRE-OPERATIVE CARDIOVASCULAR SURGICAL CARE

Assessment:

The cardiovascular nurse will:

- Obtain a focused history:
    - Include items previously discussed in a routine cardiovascular history with the addition of:
        - Indications for surgery.
        - Informed consent.
        - Previous surgical history (vascular and or varicose vein surgery).
        - History of diabetes.
        - Alcohol and recreational drug use.
        - Ensure the exam results are available for hemoglobin (HGB) A1C, liver function tests, coagulation studies, renal function, chest X-ray, 12-lead ECG, echocardiogram reports, and pulmonary function tests.
- Perform a physical assessment:
    - Auscultate heart and lungs for the presence of murmurs, additional heart sounds, and crackles in the lung fields.
    - Assess the tongue, throat, and dentation for potential problems with endotracheal intubation.
    - Assess potential graft sites, such as arms and legs for arterial abnormalities and or varicosities.

Nursing Diagnosis:

The patient:

- Will have a reduction in post-operative complications as evidenced by an uncomplicated post-operative stay, achieved through the use of pre-operative optimization. Pre-operative optimization is defined as any intervention aimed at improving overall health, such as a cardiovascular rehabilitation, weight reduction programs, lifestyle modification to decrease the risks associated with hyperglycemia, or pulmonary rehabilitation to improve functional capacity.
- May experience fear and anxiety related to cardiovascular diagnosis and treatment options.

Plan:

The cardiovascular nurse will develop a plan of care that identifies and proactively manages the areas of preoperative concern and the patient/family members emotional well being

Interventions:

The cardiovascular nurse will:

- Provide education to the patient and family about the surgical procedure.
- Provide education to the patient and family on the potential complications and how they could be

managed.

- Provide education to the patient and family on what to expect in the ICU (appearance of patient, IV lines, urinary catheter, endotracheal tubes, and chest tubes).
- Facilitate participation in cardiovascular rehabilitation programs and ensure the patient has the proper support to enable attendance at the rehabilitation program.
- Identify and report to the multidisciplinary team any of the following:
    - Pre-operative cardiovascular concerns such as arrythmias, hypertension, or vascular abnormalities.
    - Pre-operative respiratory concerns such as abnormal anatomy that could interfere with administration of general anesthetic, or underlying pulmonary pathology that could prolong mechanical ventilation.
    - Pre-operative gastrointestinal (GI) concerns such as a predisposition to upper or lower GI bleeding.
    - Pre-operative renal concerns such as poor creatinine clearance.
    - Pre-operative mobility limitations and gait imbalances, such as amputations, chronic pain, and other recent surgeries.

Evaluation:

The cardiovascular nurse will:

- Through therapeutic communication, verify that the patient and family have a full understanding of the surgical procedure and potential complications.
- Follow up with consulting services to ensure the goals of pre-operative optimization are achieved and revise the plan if necessary.

COMPETENCY 7B: POST-OPERATIVE CARDIOVASCULAR SURGICAL CARE

Assessment:

The cardiovascular nurse will:

- Review the patient record including the history and physical assessment to identify areas of concern.
- Perform a shift assessment that includes a head-to-toe or systems assessment and report any abnormalities to the multidisciplinary team:
    - ***Neurological:*** complete Glasgow coma scale (GCS), sedation score, pain score, assess the need for a CIWA, delirium and confusion assessment.
    - ***Cardiovascular:*** continuously assess for Becks triad (hypotension, tachycardia, and muffled heart sounds) and electrical alternans, obtain vital signs, assess heart sounds and the presence of S3 or S4 in addition to new or enhanced murmurs, arrythmias, hyper/hypotension, advanced hemodynamics, such as pulmonary artery catheter measurements, peripheral pulses and edema, capillary refill, interpret and measure cardiac rhythm, review postoperative 12-lead ECG, and serial troponin.
    - ***Respiratory:*** airway patency, SpO2 and end tidal carbon dioxide (CO2), work of breathing, lung sounds, arterial blood gas analysis, ability to wean from mechanical ventilation and oxygen

requirements.

- ***Genitourinary (GU)/gastrointestinal (GI):*** assess urine output and presence of bowel sounds.
- ***Extremities:*** pulses, edema, capillary refill.
- ***Surgical sites:*** assess wound integrity, sternal stability, and dressing condition.
- ***Lines and drains:*** assess all insertion sites and intravenous infusions, ensure the 5 Rs of medication administration are adhered to, assess chest drains for consistency and amount of drainage, assess pleural chest tubes for fluctuation and evidence of an air leak.
- ***Lab examinations:*** assess all bloodwork.
- ***Pain:*** acute versus chronic, incisional versus ischemic, and response to analgesic or pain management intervention.

- Assess readiness to transfer from ICU to an alternate level of care.

Nursing Diagnosis:

The patient:

- Is at risk for poor wound healing related to poor glycemic control as evidenced by wound drainage and or signs of inflammation around the surgical site.
- Is at risk for prolonged mechanical ventilation related to poor pulmonary function as evidenced by an inability to wean from mechanical ventilation.
- Is at risk for low cardiac output related to the possibility of:
    - Poor left ventricular function.
    - Intraoperative myocardial infarction.
    - Blood loss.
    - Vasoplegic shock and inadequate fluid resuscitation.
    - Arrythmias.
- Is at risk for post-operative delirium related to cardiopulmonary bypass, loss of sleep wake cycle, and medication interactions as evidenced by a change in usual behaviour.
- Is at risk of renal dysfunction related to cardiopulmonary bypass and nephrotoxic medications as evidenced by a low urine output and or elevated serum creatinine.
- Have post-operative pain related to surgical incisions.

Plan:

The cardiovascular nurse will develop a plan of care that minimizes post-operative complications and fosters independence and self care early in the post-operative period to ensure a timely discharge from hospital

Interventions:

The cardiovascular nurse will:

- Intervene to correct any abnormal vital sign using the airway breathing circulation (ABC) pneumonic.
- Notify and correct abnormal bloodwork with particular attention to hemoglobin, white blood cell count, coagulation studies, acid base imbalances, serum potassium, magnesium as well as creatinine and urea.
- Ensure adequate cardiac output by optimizing preload, afterload, and contractility.

- Ensure respiratory optimization through early extubation and early ambulation protocols; anticipate the development of atelectasis and or pleural effusions and the need for intervention such as a pleurocentesis.
- Multimodal management of post-operative pain with acetaminophen, opioids, non-steroidal anti-inflammatory drugs (NSAIDs), regional anesthetic blocks and nonpharmacological strategies, such as music therapy or meditation.
- Prevent cardiovascular tamponade by milking or stripping mediastinal drains frequently; anticipate the need for an emergent pericardiocentesis.
- Manage post-operative bleeding (internal/external) with the administration of blood products and other coagulation products; anticipate the need for an emergent sternotomy.
- Prevent the negative hemodynamic consequences of brady arrhythmias by initiating temporary pacing via epicardial pacing wires.
- Provide BLS and ACLS when indicated.
- Anticipate the occurrence of AF and take measures to reduce the hemodynamic consequences; administer antiarrhythmics such as amiodarone, IV magnesium and betablockers.
- Prevent sternal dehiscence by employing sternal precautions.
- Transition medications from intravenous to oral therapies.
- Initiate oral intake.
- Reinforce pre-operative teaching for the patient and integrate the family into the daily plan of care.
- Prevent and/or manage post-operative constipation with dietary and pharmacological support.

Evaluation:

The cardiovascular nurse will:

- Evaluate the goals of treatment through therapeutic communication with the patient.
- Measure physiologic parameters such as vital signs and serum lab tests to evaluate readiness for discharge home.

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8 VALVULAR HEART DISEASE

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In Canada, the prevalence of valvular heart disease is estimated at 2.5%. The prevalence of valvular disease increases markedly after the age of 65 years, related to degeneration of the valves. The two most common abnormalities are aortic stenosis (AS) and mitral regurgitation, which accounts for three in four cases of valvular disease. Rheumatic heart disease still represents 22% of valvular heart disease in Europe (Urden et al., 2021; Woods et al., 2019).

Many of the heart failure competencies align with valvular heart disease. Adult congenital heart disease is discussed in Chapter 10 and many of those competencies will also align with this chapter.

Foundational knowledge required:

- Anatomy and physiology of cardiovascular system.
- Pathophysiology of valvular heart failure.

Specialty knowledge required:

- Advanced assessment skills: specifically related to the characteristics of systolic and diastolic murmurs.
- Diagnostic and treatment strategies for stenosis and regurgitation of the aortic, mitral, pulmonic, and tricuspid valves.
- Systolic murmur severity grading is 1-6 and diastolic grading is 1-4.

COMPETENCY 8A: CARE OF THE PATIENT WITH VALVULAR DISEASE

Assessment:

The cardiovascular nurse will:

- Obtain a focused history:
    - Previous valve replacement or atrial myxomas.
    - Familial history of valve disease.
    - Dyslipidemia.
    - Anticoagulation.
    - Congenital heart disease or connective tissue disorders.
    - Rheumatic fever.
    - Intravenous drug use.

    - Recent dental and other invasive/surgical procedures.
    - Best possible medication history.
- Perform a physical assessment:
    - Assess and monitor for compromised cardiac output.
    - Inspect and observe the patient for signs and symptoms of heart failure.
    - Assess and monitor hemodynamics and signs of fluid overload or electrolyte imbalances due to diuretics and management of heart failure symptoms.
    - Inspect for an elevated or abnormal jugular venous pressure (JVP).
    - Observe for malar flush often associated with mitral stenosis.
    - Auscultate the heart and record the characteristics of the murmur heard.
- Timing (systolic or diastolic), shape (intensity over time), location (aortic, pulmonic, Erbs point, tricuspid, mitral), radiation, pitch, grade, and quality:
    - Auscultate the chest for extra heart sounds such as S3 or S4.
    - Palpation of the precordium for heaves and or thrills and point of maximum impulse (PMI) displacement.
    - Palpate pulses looking for pulsus parvus et tardus present with AS or a water hammer pulse present with aortic regurgitation (AR).
    - Observe peripheral extremities for edema, mottling, or discolouration related to poor perfusion.
    - Palpate the abdomen and liver for a positive hepatojugular reflex (HJR) often observed with tricuspid valve stenosis or regurgitation.
    - Assess for the following signs of acute AR: Quincke's sign (pulsatile flushing of compressed nail bed), DeMusset's sign (bobbing of head with pulse), Corrigan's pulse (water hammer pulse), Muller's sign (bobbing of the uvula with the pulse), Duzozier's sign (biphasic femoral pulse heard with stethoscope), Hills sign (BP higher in arm than legs), Traube's sign (pistol shot pedal pulses).
- Obtain diagnostic exams:
    - Obtain 12-lead ECG to assess for AF associated with mitral stenosis, or other conduction abnormalities such as heart block.
    - Chest X-ray for evidence of calcification around the valve and annulus.
    - Echocardiogram for degree of stenosis, valve area, and degree of regurgitation.
    - Cardiac catheterization, CT scan, and MRI.

Nursing Diagnosis:

The patient:

- Is at risk for pulmonary edema related to a dysfunctional heart valve as evidenced by SOB, fatigue and other signs and symptoms of heart failure.
- Has potential for harm related to the need for long term oral anticoagulation.
- Is at risk for falls and reduced capacity for activities of daily living, secondary to symptoms such as SOB, fatigue, dizziness, chest pain, and/ or syncope.

Plan:

The cardiovascular nurse will assist the interdisciplinary team to develop a plan of care that manages symptoms of heart failure while addressing the underlying cause of the abnormal valve function.

Interventions:

The cardiovascular nurse will:

- Interpret data from the diagnostic exams and provide education to the patient and family related to the diagnosis.
- Provide education on the treatment options for managing the valvular abnormality.
- Provide education on the choice of mechanical verses tissue valve replacement.
- Provide education on surgical verses interventional valve replacement/repair.
- Provide education on the need and choice of anticoagulation therapy.
- Provide education on lifestyle modification to minimize the impact of heart failure symptoms on quality of life.
- Provide education on smoking cessation, reducing alcohol intake, heart healthy (low sodium, low fat) diet, regular exercise, and close monitoring of blood glucose.
- Administer medication therapy to mange preload, afterload, and contractility for symptom management.
- Provide BLS and or ACLS if indicated.
- Support the patient to make an informed decision on treatment options based on realistic expectations and manageable goals.
- Assist with pre-operative optimization when surgery is indicated.

Evaluation:

The cardiovascular nurse will:

- Evaluate the patient's understanding of treatment options for the valvular disease management through therapeutic communication.
- Evaluate the effectiveness of the treatment provided by assessing and reporting an improvement in patient condition using both subjective and objective data.

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9 CARDIOGENIC SHOCK

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Cardiogenic shock (CS) accounts for approximately 100,000 annual hospital admissions in the United States. Cardiogenic shock is a complex and life-threatening emergency that can lead to multisystem organ failure (Phalen & Aehlert, 2018).

Cardiogenic shock is defined as persistent hypotension and tissue hypoperfusion due to cardiac dysfunction in the presence of adequate intravascular volume and left or right ventricular (RV) filling pressures (Phalen & Aehlert, 2018). It is a clinical condition of inadequate tissue perfusion because of cardiac dysfunction and occurs when either systolic or diastolic dysfunction of the heart's pumping action results in decreased cardiac output.

The most common cause of CS is left ventricular failure due to extensive MI. Cardiogenic shock happens in 5% to 8% of STEMI patients. Acute MI has many complications that can lead to CS, such as left or right ventricular infarction, pump failure, ventricular wall rupture, reinfarction, or infarction extension. Other possible causes of CS include myocarditis, myocardial contusion, pulmonary embolism, end-stage cardiomyopathy, and severe congenital heart disease (Phalen & Aehlert, 2018).

Organ hypoperfusion is a central feature of CS. The resultant tissue ischemia and reduced nutrient delivery, if persistent, may lead to multi-organ failure, including altered mental status, oliguria, narrow pulse pressure, and an increased lactic acid level (Tsangaris et al., 2021.)

Foundational knowledge required:

- Anatomy and physiology of the cardiovascular system.
- Signs and symptoms of ischemic heart disease, heart failure, valvular disease.
- Systematic approach to obtaining a nursing history and physical exam.

Specialty knowledge required:

- Advanced cardiovascular assessment.
- Management of a hemodynamically unstable patient (may include transfer to more definitive care environment).
- Specialty scope of practice is reserved for those nurses working in critical care and could include:
    - Care of a mechanically ventilated patient.
    - Initiation, weaning, and titrating vasopressors and positive inotropic drugs.
    - Care of the patient receiving left ventricular devices, such as intra-aortic balloon pumps, Impella, VAD or extracorporeal membrane oxygenation (ECMO), or biventricular VAD.

COMPETENCY 9A: OPTIMIZING CARDIAC OUTPUT

Assessment:

The cardiovascular nurse will:

- Obtain a focused history:
    - Height and weight to calculate cardiac index using thermodilution method.
    - In addition to points mentioned in previous competencies the history should focus on:
        - Previous myocardial infarction.
        - Previous coronary revascularization strategies.
        - Recent diagnosis of COVID-19 or receipt of COVID-19 vaccine.
        - Exposure to toxins.
- Perform a physical assessment:
    - Assess ABC and intervene if needed.
    - Assess vital signs and advanced hemodynamics to determine diagnosis and need to add additional hemodynamic support.
    - Assess cardiac rhythm and 12-lead ECG for signs of an ACS.
    - Assess chest X-ray and other diagnostic exam results.

Nursing Diagnosis:

The patient:

- Is at risk for an altered breathing pattern related to an imbalance in ventilation and perfusion associated with pulmonary edema as evidenced by an abnormal breathing assessment, low SpO2 and altered arterial blood gas.
- May have impaired gas exchange related to altered oxygen supply as evidenced by mental status change and acid-base imbalance.
- May have decreased cardiac output related to decreased myocardial contractility and dysrhythmias as evidenced by reduced stroke volume and presence of dysrhythmias.
- Fluid volume excess related to compromised regulatory mechanisms secondary to heart failure as evidenced by increased central venous pressure (CVP), jugular vein distension, oliguria, and edema.
- Altered skin integrity related to inadequate tissue perfusion or disseminated intravascular coagulation as evidenced by the presence of skin excoriation, blisters, and pressure ulcers.
- Risk of infection related to altered tissue perfusion and decreased immune system as evidenced by an elevation in white blood cells and possible decrease in platelet count.

Plan:

The cardiovascular nurse will establish a plan of care in collaboration with the multidisciplinary team that provides adequate cardiac output to meet the patient's metabolic needs

Interventions:

The cardiovascular nurse will:

- Provide BLS or ACLS as warranted.

- Monitor vital signs frequently: temperature, pulse, respirations, BP, SpO2, and urine output (minimum q1hr).
- Assist with insertion of an arterial line and central venous IV.
- Ensure adequate ABC as your primary survey and continue to secondary survey as needed.
- Assess the need for advanced hemodynamic monitoring with a pulmonary artery catheter or other advanced hemodynamic assessment.
- Obtain, interpret, and report the results of a complete blood count (CBC), electrolytes, urea, creatinine, coagulation studies, arterial blood gases, mixed venous oxygen saturation, lactate level, and intervene to improve tissue perfusion.
- Obtain, interpret, and report 12-lead ECG and chest X-ray findings.
- Improve tissue perfusion by optimizing heart rate, preload, afterload, and contractility with goal directed therapy. This therapy could include pacing the bradycardic patient, administering fluid (crystalloid or colloid as indicated), use of vasopressors to achieve mean arterial pressure of at least 60 mmHg, positive inotropic drugs to enhance contractility.
- Provide respiratory support with supplemental oxygen and identify the need for an advanced intervention such as high-flow humidified oxygen (Optiflo) or the need for mechanical ventilation via endotracheal tube.
- Identify the need for ventricular assist devices.
- Provide the patient with sedation to minimize the work of breathing (WOB).
- Continuous renal replacement therapy or dialysis may be indicated if the patient is demonstrating signs of acute tubular necrosis, such as acidosis, hyperkalemia, or severe volume overload.
- Assist with the administration of inhaled nitric oxide for right ventricular (RV) failure or severe CS.

Evaluation:

The cardiovascular nurse will evaluates if goal-directed therapy is successful when the patient shows increased perfusion as evidenced by strong peripheral pulses, baseline heart rate for the patient, no dysrhythmias, adequate blood pressure, normal skin colour, normal oxygenation, and absence of acidosis

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10 CARDIOVASCULAR DEVICES AND ELECTROPHYSIOLOGY STUDIES

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Sudden cardiac death is the leading cause of death in Canada, affecting 50,000 people per year in Canada – more than breast cancer, lung cancer, and AIDS combined. Approximately 120,000 Canadian patients live with either a pacemaker or ICD (Woods et al., 2019).

Foundational knowledge required:

- Anatomy and physiology of the cardiovascular system in addition to foundational knowledge previously mentioned in chapters 1–9.

Specialty knowledge required:

- Advanced anatomy and physiology of the cardiovascular system.
- Advanced cardiovascular rhythm interpretation.
- Advanced understanding of how an ICD works.
- Advanced knowledge of how a VVI, VDD, DDD, AAI, and rate responsive pacemaker works, as well as understanding the override pacing component of an ICD.

Assessment:

The cardiovascular nurse will:

- Obtain a focused history in addition to topics identified in previous competencies the nurse will:
    - Identify the signs and symptoms related to the rhythm disturbance.
    - Identify actions that aggravate or alleviate the symptoms.
    - Review all medications and assess their influence on heart rhythm.
    - Identify any oral anticoagulation medications.
    - Identify any pertinent medications that need to be placed on hold for the electrophysiology procedure or device implant.
- Perform a physical assessment:
    - General cardiovascular assessment with a focus on vascular access, skin integrity for device implant, presence of skin infections/lesions that could lead to endocarditis development.

Nursing Diagnosis:

The patient:

- Is at risk for sudden cardiac death related to electrophysiology procedure as evidenced by the presence

of ventricular tachycardia, ventricular fibrillation.

- Is at risk for endocarditis related to endocardial lead placement as evidenced by increased white blood cell count, local inflammation, and malfunction of the cardiac device.
- Is at risk for pneumothorax, vascular pseudoaneurysm, hematoma formation related to cannulation of the access site for cardiac device or electrophysiology study as evidenced by sudden SOB, femoral bruit, or bleeding internal or external at cannulation site.

Plan:

The cardiovascular nurse will develop a plan of care with the interdisciplinary team that minimizes risk of complications, length of hospital stays and provides the best opportunity for independent self care

Interventions:

The cardiovascular nurse will:

- Provide education to the patient and family regarding the procedure, including the pre-procedure requirements, during the procedure expectations, and post-procedure care and follow up.
- Provide education regarding care of the device and or access site following the procedure.
- Provide education on vagal maneuvers for patients experiencing rapid heart rates.
- Interpret results of ECG, echocardiogram, and Holter monitor/loop recorder and reports abnormal findings.
- Ensure the patient has received pre-procedural shave preps, pre-procedure medications and education.
- Monitor for post-procedure arrythmias including measurement of PR, QRS and QTc intervals as well as monitoring for heart block.
- Intervene with BLS or ACLS as warranted.
- Intervene to minimize the consequences of complications, such as application of direct pressure for bleeding, assist with chest tube insertion for pneumothorax, and assist with pericardiocentesis for cardiac tamponade; also assist with ultrasound guide resolution of a femoral artery pseudoaneurysm.
- Ensure informed consent is obtained and that the patient understands the consequences of receiving an ICD.
- Provide education on end-of-life care and the decision to deactivate an ICD.

Evaluation:

The cardiovascular nurse will:

- Evaluate patient and family comprehension through therapeutic communication.
- Evaluate success of the procedure as evidenced by the absence of procedural complications and resolution of the primary heart rhythm concern.

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11 ADULT CONGENITAL HEART DISEASE

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Congenital heart disease is the world's leading birth defect. About one in 80–100 Canadian children are born with CHD. Sixty years ago, only about 20% of children survived to adulthood; that number has since increased to about 90%. This has resulted in a growing population of young adults who require life-long cardiac care. There are an estimated 257,000 Canadians with congenital heart disease (Sable, 2020).

Of the 257,000 Canadians with CHD, two-thirds are adults. At least half will encounter complications, multiple surgeries, and or suffer a sudden cardiac death. It is imperative the general cardiology nurse understands the constantly evolving and ever-growing CHD population (Sable, 2020).

Congenital heart disease occurs as result of a fault during embryogenesis, between 3–12 weeks' gestation, without any identified cause. One of three things happens, leading to CHD:

1. There is a persistence of a normal fetal structure, like with a patent ductus arteriosus (PDA) or patent foramen ovale (PFO).
2. There is an arrest in the normal stage of development as with a ventricular septal defect (VSD), atrial septal defect (ASD), atrioventricular septal defect (AVSD), double inlet right ventricle (DIRV), double outlet right ventricle (DORV), Ebstein anomaly, or truncus arteriosus.
3. There is an error in development such with transposition of the great arteries (TGA) or tetralogy of fallot (TOF).

There are some illnesses, like rubella, or medications, like angiotensin-converting-enzyme inhibitors (ACE-i) that can cause CHD, as well as drugs and alcohol. There is a familial tendency for some CHD, which suggests a genetic link, but most do not. There are several genetic disorders that can have a high incidence of CHD, example is Noonan syndrome that has 75%–80% occurrence of associated CHD, you can have the disorder without the associated CHD. As well, genetic heart disease, like hypertrophic cardiomyopathy (HCM) is not considered CHD. Aortopathies, like Marfan syndrome, Loeys-Dietz syndrome, vascular Ehlers-Danlos syndrome (all genetic connective tissue disorders) are not considered as CHD either.

The list of CHDs is long and complicated with numerous surgeries offered for correction and this makes it difficult to provide a comprehensive review of CHD for the purpose of this document. Therefore, we have chosen to divide CHD into simple, moderate, or complex congenital heart disease.

- Simple: repaired/unrepaired ASD, VSD, PDA, mild isolated pulmonary stenosis, Bicuspid Aortic Valve (BAV).
- Moderate: total anomalous pulmonary venous return (TAPVC), partial anomalous pulmonary venous connection (PAPVC), AVSD, coarctation of the aorta, Ebstein's anomaly, TOF.
- Complex: any cyanotic congenital heart defect, DORV, interrupted aortic arch, any single ventricle morphology (including tricuspid atresia DIRV and hypoplastic left ventricle syndrome [HLHS]; Ossa et al., 2023).

Foundational knowledge required:

- Anatomy and physiology of the normal cardiovascular system.
- Understand and identify what is and is not considered CHD.
- Systematic approach to obtaining a nursing history and physical exam.

Specialty knowledge required:

- Identify common red flags with CHD population.
- Identify what is considered normal for the patient with CHD.
- Identify common presentations for patients with CHD.

COMPETENCY 11A: IDENTIFY PATIENTS WITH ADULT CONGENITAL HEART DISEASE

Assessment:

The cardiovascular nurse will:

- Obtain a focused history and perform a physical assessment identical to those discussed in previous chapters.
- Identify if patient has CHD.

Nursing Diagnosis:

The patient is at risk for arrythmia and heart failure related to underlying CHD

Plan:

The cardiovascular nurse will use specialty knowledge:

- To understand the defects and the risk for arrythmia as well as atrioventricular (AV) blocks.
- To understand the defects that put patients at risk for heart failure.
- To assist the multidisciplinary healthcare team and provide a unique perspective into the plan of care for the patient.

Interventions:

The cardiovascular nurse will use specialty knowledge:

- To manage arrythmias or heart failure symptoms as they present, recognizing the uniqueness of the CHD patient presentation.
- To manage life threatening emergencies related to CHD.
- To facilitate necessary referrals for required testing or interventions.
- To educate patient or care giver on management of arrhythmia/heart failure including pharmacological and non-pharmacological methods.
- Discuss general wellness and weight management to minimize cardiovascular stress on an already

strained heart.

Evaluation:

The cardiovascular nurse will:

- Evaluate patient's adherence with treatment plan through medication review and assessment of symptoms.
- Evaluate if the educational needs of the patient and family are being met, using therapeutic communication analyzing objective and subjective data.

COMPETENCY 11B: MANAGEMENT OF CONGENITAL HEART DISEASE

Assessment:

The cardiovascular nurse will:

- Recognize the unique physical and psychological needs of the CHD patient.
- Obtain a focused history and perform a physical assessment exactly like the one outlined in the previous competency.

Nursing Diagnosis:

The patient:

- May display signs of anxiety and fear related to the complexity of chronic illness as evidenced vocalizing feelings and manifesting the clinical symptoms of anxiety.
- At risk for low self esteem related to a chronic health challenge as evidenced by a lack of motivation.
- Is at risk of adverse events related to medical, interventional, or surgical intervention as evidenced by a physiological change in condition.
- Potentially have an altered body image related to a change in wellness as evidenced by changes in behaviour or chronicity of illness.

Plan:

The cardiovascular nurse will use specialty knowledge to manage the actual and potential complications of CHD as they relate to the medical, interventional, or surgical management

Interventions:

The cardiovascular nurse will:

- Ensure the patient and family have the contact information for an adult congenital heart disease (ACHD) cardiologist and clinic and are aware of the frequency of follow up.
- Facilitate a consultation with the specialty cardiologist (in person or virtual) at least once every 1–5 years.
- Work with the patient, family, and multidisciplinary team to develop a plan of care that promotes independence and fosters a caring relationship built on trust and mutual respect.

- Discuss and develop a plan on how to manage employer expectations regarding the potential need for planned sick days.
- Advocate for this patient population as they can be dismissed by healthcare providers related to fear or lack of understanding of the condition.
- Discuss and develop a plan for end-of-life care as with any other patient.

COMPETENCY 11C: UNDERSTANDING OF THE UNIQUE NEEDS OF THE CHD PATIENT

Assessment:

The cardiovascular nurse will understand the special needs of the CHD patients

Nursing Diagnosis:

The patient may develop physical and life-threatening harm as evidenced by patient presentation

Plan:

The cardiovascular nurse will use basic knowledge of CHD to help minimize potential risk/complication to the patient

Interventions:

The cardiovascular nurse will:

- Use bubble filter for all IV lines in all unrepaired ASDs and AVSDs.
- Always understand what is the normal oxygen and hemoglobin level for patients with a Fontan (often oxygen saturations are lower and hemoglobin [HgB] levels are higher).
- Understand the risk of intubation in a patient with Fontan (want to avoid any positive pressure that will drop the patient's cardiac output).
- Be aware of the guidelines on who requires sub-bacterial endocarditis (SBE) prophylaxis.
- Understand the increased risk to a CHD patient wishing to become pregnant and facilitate referral to cardio-obstetrics to help insure safe pregnancy for both mom and baby.

Evaluation:

The cardiovascular nurse will:

- Assess patient's safety with any required procedures.
- Evaluate patients'/care givers' understanding of the unique needs that surround a patient with CHD.

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12 HEALTH PROMOTION, PREVENTION AND CARDIOVASCULAR REHABILITATION

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Cardiovascular disease is the second leading cause of death in Canada. Cardiac rehabilitation (CR) has a long, robust history in Canada, and there are established Canadian clinical practice guidelines. While the effectiveness of CR in the Canada is clear, only 34% of eligible patients participate. Women and ethnic minority groups are significantly underrepresented because of a lack of referral or physician recommendation, travel and distance, insufficient time to dedicate, and low perceived need. The Canadian Association of CR is one of the founding members of the International Council of Cardiovascular Prevention and Rehabilitation, and they have a mandate to promote CR globally (Grace et al., 2014).

Foundational knowledge required:

- Anatomy and physiology of cardiovascular system.
- Comprehensive understanding of acute and chronic IHD.

Specialty knowledge required:

- In-depth knowledge of motivational interviewing.
- Comprehensive understanding of exercise physiology.
- Comprehensive understanding of exercise stress tests.
- Comprehensive understanding of behaviour modification strategies.
- Comprehensive understanding of the following guidelines:
    - Cardiovascular rehabilitation guidelines.
    - Dyslipidemia guidelines.
    - Hypertension guidelines.
    - Atrial fibrillation guidelines.
    - Heart failure guidelines.
    - Fitness to drive guidelines.
    - Diabetes guidelines.
    - Canadian activity guidelines.
    - Canada food guide.
    - Smoking cessation practices.
    - Impact of gender and ethnicity on cardiovascular health.

Assessment:

The cardiovascular nurse will:

- Assess personal wellness, motivation for change, and ability to lead by example.
- Assess personal commitment and capacity to lobby for health policy change at local, provincial, and global levels.
- Assess the patient's ability to participate in cardiovascular rehabilitation with regard to:
    - Physical wellness.
    - Motivation.
    - Financial fitness.
    - Family support.
    - Availability of a program.
- Obtain a comprehensive history and perform a physical assessment to establish a baseline for measurement of success.

Nursing Diagnosis:

The patient:

- Experience an improved exercise capacity related to an individualized cardiovascular rehabilitation program as evidenced by an increase in functional capacity.
- Develop coping strategies related to a chronic disease management as evidenced by an objective and subjective discussion.

Plan:

The cardiovascular nurse will:

- Develop a code of conduct that exemplifies a healthy lifestyle with an understanding that individuals make choices based on numerous factors. All advocacy work is carried out in a judgement free environment.
- The nurse will collaborate with patient and family to develop a plan for cardiovascular rehabilitation. This plan will be present during the four phases of cardiovascular rehabilitation: 1. in hospital period; 2. post-discharge, pre-exercise period, 3. exercise and education programs; 4. maintenance phase.
- Influence health policy related to physical fitness, healthy school lunch programs, smoking cessation as evidenced by the presence of a nursing voice on local, provincial, and federal health committees.

Interventions:

The cardiovascular nurse will:

- Work to influence decision-making bodies to improve patient access to care.
- Advocate for healthy food and beverage choices in all public venues including schools.
- Promote strategies developed by the Heart & Stroke Foundation of Canada.
- Use the ask, assist, advise strategy for smoking cessation at all points of patient contact.
- Advocate for local, provincial, and federal protected green space for recreation.

- Lead by example whenever possible.
- Consultation to cardiovascular rehabilitation on the day of admission.
- Educate the patient and family on the following:
    - ***Nutrition:*** include sodium and saturated fat reduction strategies.
    - ***Exercise:*** 150 minutes per week or 30 minutes most days of the week; two hours per day for children.
    - Smoking cessation.
    - Medication compliance.
    - All other modifiable cardiovascular risk factors.
- Encourage independence and promote self care through motivational interviewing and supporting patient decision making.

Evaluation:

The cardiovascular nurse will measure global success of cardiovascular rehabilitation program by a reduction in hospital readmission rates for cardiovascular disease, reduction in the percentage of the population that smoke/vape, reduction in body mass index and an increase in exercise capacity

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CONCLUSION

The cardiovascular nurse will utilize the best available research to enhance the art and science of cardiovascular nursing. This research is analyzed through a critical lens and integrated into daily practice. Best practice and medical guidelines form a template for the nurse to develop a plan of care that is comprehensive, patient-centred and delivered in a holistic manner using a multidisciplinary team.

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