Nursing Care for Patients Undergoing Cardiac Bypass Surgery

Nuwayir Habib D. Alhazmi[1], Alnakhli Sharaf Kadhem S.[2], Raghad Musharraf Kassar Almejlad[3], Bandari Zaben Judaya Alruwaili[4], Amal Fendi Alfeqairi[5], Eman Mudshir Alanazi[6], Najei Areej Awadh M.[7], Mohammed Awwadh J. Alhazmi[8], Hanouf Salel A. Alhazmi[9], Nashmiah Shayiz Khulaif Alanazi[10]

[1] Technician-Nursing, Maternity and Children Hospital, Arar, Northern Border Region, Saudi Arabia.
[2] Nursing, Madinah Health Cluster, Madinah, Madinah Region, Saudi Arabia.
[3] Nursing and Midwifery, Prince Abdullah Bin Abdulaziz Bin Musaed Cardiac Center, Arar, Northern Border Region, Saudi Arabia.
[4] Technician-Nursing, Al-Jouf Health Cluster, Al-Shamaly Family Medicine Center, Al-Jouf Region, Saudi Arabia.
[5] Technician-Nursing, Haddaj Health Center, Tayma, Tabuk Region, Saudi Arabia.
[6] Nursing specialist, North Tower Medical Hospital, Arar, Northern Border Region, Saudi Arabia.
[7] Technician-Nursing, Al-Thaghr General Hospital, Jeddah, Makkah Region, Saudi Arabia.
[8] Health Assistant, Northern Borders Health Cluster, Arar, Northern Border Region, Saudi Arabia.
[9] Technician-Nursing, Turaif General Hospital, Turaif, Northern Border Region, Saudi Arabia.
[10] Technician-Nursing, Maternity and Children Hospital (MCH), Al-Jouf, Al-Jouf Region, Saudi Arabia.

***Abstract*:**

Nursing care for patients undergoing cardiac bypass surgery is critical in ensuring positive surgical outcomes and recovery. Pre-operatively, nurses play a vital role in patient education, explaining the procedure, addressing concerns, and preparing the patient psychologically and physically. This includes conducting a thorough assessment of the patient's health history, vital signs, and laboratory results, as well as ensuring that all pre-operative protocols, such as fasting and medication management, are followed. Post-operative care focuses on monitoring vital signs, managing pain, preventing complications like infection and thrombosis, and facilitating early mobility to enhance recovery. Patient education and emotional support remain essential throughout the surgical process, promoting understanding of care protocols and managing expectations for recovery. In the post-operative phase, nurses must be vigilant for signs of complications such as bleeding, arrhythmias, and respiratory issues. Vital sign monitoring is crucial, as is assessment of the surgical site for signs of infection or improper healing. Key priorities include managing pain effectively, educating the patient and family about post-surgical care, and coordinating with other healthcare professionals for comprehensive rehabilitation planning. Emotional support and reassurance can significantly impact a patient's recovery experience, as cardiac surgery can be a daunting prospect. Continuous assessment and adjustment of the care plan are necessary to address the dynamic needs of the patient during their recovery journey.

***Keywords*:** Cardiac bypass surgery, Nursing care, Pre-operative assessment, Patient education, Pain management, Complications monitoring, Emotional support, Recovery plan, Post-operative care, Early mobility

Introduction:

Cardiac bypass surgery, or coronary artery bypass grafting (CABG), is a critical surgical intervention used to treat occluded coronary arteries, which supply blood to the heart muscle. This surgical procedure, designed to restore adequate blood flow and reduce the risk of myocardial infarction, is often necessitated by advanced coronary artery disease (CAD). As the prevalence of heart disease continues to rise globally, with the World Health Organization estimating it to be the leading cause of mortality, understanding the nursing care required for these patients becomes increasingly paramount. Effective nursing care has been recognized as a cornerstone for optimal patient outcomes, influencing recovery trajectories and overall quality of life post-surgery [1].

The role of nursing extends beyond mere technical support in surgical settings; it encompasses critical thinking, communication, and advocacy for patients. Pre-operative care for cardiac bypass patients often involves comprehensive assessments, patient

education, and psychological support. Nurses are responsible for evaluating the patient's medical history, including risk factors, comorbidities, and medication management, which are crucial for tailoring individualized care plans. The pre-operative phase also includes preemptive patient education that addresses concerns related to the surgery, explaining the procedure, potential complications, and the importance of adherence to post-operative care protocols. This education is vital to alleviate anxiety and ensure an informed consent process, fostering a therapeutic nurse-patient relationship that can significantly impact patient outcomes [2].

During the intra-operative phase, nursing care transitions to the operating room, where nurses participate as pivotal members of the surgical team. Their responsibilities include the meticulous monitoring of vital signs, managing sterile environments, and assisting anesthetists and surgeons to ensure a seamless surgical experience. Nurses must possess a thorough understanding of the physiological effects of cardiopulmonary bypass, the implications of anesthesia, and the potential for intra-operative complications, such as arrhythmias or hemodynamic instability. This phase emphasizes the importance of collaboration among healthcare professionals, where effective communication and rapid response protocols are essential to prevent adverse events [3].

Post-operative care poses distinct challenges as patients awake from anesthesia and begin their recovery journey in the cardiac intensive care unit (ICU) or step-down units. Nurses play a vital role in continuous monitoring of cardiovascular status, managing surgical wounds, and observing for any signs of post-operative complications, such as infection or thromboembolic events. Additionally, pain management becomes a crucial component of nursing care in this phase. Understanding patient experience related to pain, providing appropriate analgesia, and employing non-pharmacological interventions are fundamental to promoting comfort and facilitating recovery. Furthermore, nurses are responsible for educating patients and families about the recovery process, emphasizing the importance of lifestyle modifications, medication adherence, and cardiac rehabilitation. This educational aspect is critical in empowering patients and reducing the likelihood of readmission, thereby addressing a significant challenge within healthcare systems [4].

Moreover, the complexity surrounding nursing care for cardiac bypass patients is compounded by the need for cultural competence and sensitivity to individual patient needs. Recognizing that patients come from diverse backgrounds enables nurses to provide personalized education and support that resonates with each individual's values and beliefs. Cultural sensitivity also extends to understanding varying emotional responses to surgery, as some patients may face anxiety, depression, or feelings of isolation in the post-operative phase. Consequently, nurses must be attentive to the psychosocial aspects of recovery, providing resources and interventions that promote mental well-being as part of holistic patient care [5].

Pre-operative Nursing Assessment and Preparation:

Coronary artery bypass grafting (CABG), commonly referred to as heart bypass surgery, is a surgical procedure aimed at improving blood flow to the heart muscle. It involves redirecting blood around narrowed or blocked arteries to enhance oxygen delivery to the heart. While this surgery can have life-saving implications for patients with coronary artery disease, the path to the operating room begins well before the scalpel meets tissue. An essential aspect of this preoperative journey is thorough nursing evaluation and preparation, which ensure that patients are physically, psychologically, and educationally equipped for the procedure and its aftermath [6].

The Role of Nursing Evaluation

Nursing evaluation in the context of heart bypass surgery involves comprehensive assessment and preparation, including history taking, physical examination, and diagnostic testing. The primary aim of this evaluation is to develop a holistic understanding of the patient's health status, risk factors, and individual needs [7].

1. Patient History

The first step in the nursing evaluation process is a detailed patient history. Nurses must inquire about the patient's medical history, specifically focusing on pre-existing conditions such as hypertension, diabetes, hyperlipidemia, and previous heart complications. The use of medications, allergies,

and lifestyle factors, such as smoking and alcohol consumption, are also critical components of the history taking. This information will help identify any potential risks or complications that may arise during surgery [8].

Moreover, it is important to obtain details regarding previous surgeries or anesthetic experiences, as these can influence the preoperative and postoperative management strategies. Understanding the psychological state of the patient, including levels of anxiety, fear, and support systems, is equally essential. Patients who feel depressed or anxious may need additional psychological support to navigate the journey toward surgery [8].

2. Physical Examination

Following history taking, a thorough physical examination is crucial. This examination typically involves assessing vital signs, including blood pressure, heart rate, respiratory rate, and oxygen saturation levels, to establish a baseline. Additionally, nurses will examine the cardiovascular system through auscultation for any abnormal heart sounds or murmurs that may indicate underlying complications.

Evaluating the respiratory system is also essential, especially since patients with coronary artery disease may have comorbid conditions like chronic obstructive pulmonary disease (COPD) or asthma. Physical examinations also include checking peripheral pulses, capillary refill, and assessing the patient's extremities for edema, which may signal circulatory issues [9].

3. Diagnostic Testing

In conjunction with history and physical examination, diagnostic testing plays a vital role in the nursing evaluation process. Common tests include electrocardiograms (ECGs), chest X-rays, and blood tests, such as complete blood counts and electrolytes, which can help identify any abnormalities. These diagnostic tools can assist healthcare providers in making informed decisions and predicting potential complications during surgery [10].

Patient Education and Counseling

Patient education is an integral component of nursing care in the preoperative setting. Nurses have the unique opportunity to equip patients with critical knowledge regarding the procedure, expected outcomes, and postoperative care. Clear communication fosters a sense of trust and empowerment that can alleviate patient anxiety [11].

1. Explaining the Procedure

Nurses must provide a clear, concise overview of the heart bypass procedure, emphasizing its purpose and how it can improve the patient's quality of life. Understanding what to expect during surgery, including the anesthesia process, the expected duration of surgery, and postoperative monitoring, can demystify the experience for patients [12].

2. Discussing Risks and Benefits

While heart bypass surgery is often life-saving, it is essential to discuss the risks involved, such as infection, bleeding, and complications related to anesthesia. Additionally, educating patients about the benefits of the surgery, including reduced chest pain and improved heart function, can help them weigh their options and make informed decisions [13].

3. Preparing for Postoperative Care

Nurses should also prepare patients for the postoperative phase by discussing potential complications as well as recovery expectations. This includes providing information about pain management, the importance of mobility, and lifestyle changes that may be necessary post-surgery, such as dietary adjustments and the introduction of a cardiac rehabilitation program [13].

Psychological Preparation

Mental and emotional health is particularly important when dealing with major surgeries. Nurses should assess the patient's psychological readiness for surgery and offer resources for coping strategies. This may include relaxation techniques, connecting patients with mental health professionals, or engaging them in support groups. Developing a comprehensive understanding of the patient's emotional state allows nurses to provide appropriate interventions, effectively enhancing their overall preparedness for surgery [14].

Final Preparatory Steps

As the surgery date approaches, final preparatory steps must be undertaken to ensure optimal patient safety and success. This includes confirming that all relevant laboratory results are reviewed, that informed consent is obtained, and that the patient has adhered to fasting guidelines. Nurses will provide clear instructions regarding preoperative medications or supplements, such as anticoagulants, which may need to be adjusted or withheld prior to surgery.

Additionally, involving family members in preoperative discussions helps to establish a support network for the patient, addressing any concerns they might have. Engaging the family members in education about the procedure and home care can further enhance the recovery process [15].

Patient Education and Communication Strategies:

Heart bypass surgery, clinically known as coronary artery bypass grafting (CABG), is a significant surgical procedure designed to improve blood flow to the heart in patients suffering from coronary artery disease. This type of surgery is essential in preventing complications such as heart attacks and can greatly enhance the quality of life for individuals with severe cardiovascular issues. However, the success of this surgery is not solely dependent on the technical skills of the surgeons or the efficacy of the surgical interventions; a critical aspect that often determines the outcome and patient satisfaction is the education and communication strategies employed in the pre-operative phase.

Effective patient education is a multifaceted process that involves providing comprehensive information about the surgical procedure, its risks and benefits, and the necessary preparations required leading up to the surgery. Communication strategies encompass the methods and approaches that healthcare professionals employ to ensure that patients grasp this information adequately, feel empowered, and remain engaged in their care process [16].

Importance of Patient Education

The significance of patient education in the context of heart bypass surgery cannot be overstated. Patients face a certain level of anxiety and fear when confronted with the prospect of undergoing major surgery. Education serves several purposes:

1. **Enhancing Understanding**: Patients need to comprehend the nature of their condition, the rationale for the surgery, and the expected outcomes. By explaining the pathophysiology of coronary artery disease and how bypass surgery restores blood flow, healthcare teams can demystify the medical terminology and processes involved [17].

2. **Informed Decision-Making**: Patients should be active participants in their healthcare. Providing appropriate education ensures that they can make informed decisions regarding their treatment options. This includes understanding alternative treatments and the potential consequences of not proceeding with surgery.

3. **Setting Realistic Expectations**: One of the primary goals of patient education is to prepare individuals for what to expect post-surgery. This encompasses recovery timelines, potential complications, lifestyle changes, and the need for follow-up care. Providing realistic expectations can lessen anxiety and improve satisfaction with the surgical outcome [17].

4. **Promoting Adherence**: Educated patients are more likely to follow pre-operative guidelines, such as dietary modifications, cessation of smoking, and adherence to prescribed medications. These lifestyle changes can significantly affect surgical outcomes and recovery [18].

Communication Strategies for Effective Education

To ensure that patient education is successful, healthcare providers need to adopt effective communication strategies tailored to individual patients. Here are several approaches to maximize the impact of educational efforts:

1. **Use of Clear, Simple Language**: Medical jargon can be overwhelming for patients. Using layman's terms and analogies can help articulate complex concepts. For instance, explaining how arteries can become blocked can be likened to water pipes that become clogged, making the information more relatable [19].

2. **Visual Aids and Models**: Incorporating visual aids, such as diagrams, charts, and models, can significantly enhance understanding. Seeing a

visual representation of the heart's anatomy and how the bypass works can help cement knowledge and alleviate fears.

3. **Tailoring Information to the Individual**: Every patient is unique, and healthcare professionals must tailor their communication strategies based on the patient's educational background, age, cultural context, and prior health literacy. This personalized approach can help ensure that patients fully understand the information presented.

4. **Active Listening and Dialogue**: Encouraging two-way communication is vital. Healthcare providers should foster an environment where patients feel comfortable asking questions and expressing concerns. Active listening demonstrates empathy and can uncover misunderstandings that need clarification [19].

5. **Involving Family Members**: Engaging family members or caregivers in the education process can be beneficial. They often provide additional support and reinforcement of the information discussed, which can lead to better adherence and outcomes [20].

6. **Utilization of Technology**: Digital platforms, such as patient portals, educational websites, and telehealth consultations, can be effective channels for disseminating information. Multimedia educational materials, like videos, can also cater to different learning styles and enhance patient engagement [20].

Preparing Patients for Surgery

In the lead-up to heart bypass surgery, patients must undergo several preparatory steps, and effective communication plays an essential role in this process:

1. **Preoperative Assessments**: Educating patients about the importance of preoperative assessments, such as blood tests, imaging studies, and consultations with anesthesiologists, can help facilitate a smoother surgical experience. Patients should be informed about what these assessments entail, their purposes, and how they contribute to their overall safety during surgery [21].

2. **Pre-surgical Instructions**: Clear communication of pre-surgical instructions is crucial. Patients need to understand dietary restrictions, medication adjustments, and the importance of avoiding smoking and alcohol prior to their surgery. This information can be reinforced through written materials that they can refer back to.

3. **Emotional Preparedness**: Pre-surgery anxiety is commonplace, and patients may benefit from education about relaxation techniques and coping strategies. An understanding of the emotional landscape of surgery can help patients better manage their fears and uncertainties.

4. **Post-operative Care Planning**: Patients should be informed about post-surgery expectations, including pain management and the importance of cardiac rehabilitation. Understanding the recovery process will help patients feel more at ease and support compliance with rehabilitation protocols [21].

Post-operative Monitoring and Risk Management:

Bypass surgery, encompassing procedures such as coronary artery bypass grafting (CABG) and peripheral artery bypass, is a critical intervention for patients with severe arterial blockages. The success of such surgeries does not solely hinge on the surgical procedure itself; it heavily relies on meticulous postoperative monitoring and comprehensive risk management strategies. These processes are vital to ensure optimal patient outcomes, prevent complications, and promote recovery [22].

The Importance of Postoperative Monitoring

Postoperative monitoring is the systematic observation of patients following surgical interventions. In the context of bypass surgery, this phase is crucial for several reasons:

1. **Early Detection of Complications**: Bypass surgeries are associated with a myriad of potential complications, including but not limited to bleeding, infection, myocardial infarction, and thromboembolism. Close monitoring allows for the early identification of these conditions, enabling timely intervention that can significantly enhance patient outcomes. For example, signs of excessive bleeding may necessitate immediate surgical intervention, while changes in vital signs may indicate complications such as shock or cardiac distress [23].

2. **Management of Vital Signs**: After bypass surgery, maintaining stable vital signs, including heart rate, blood pressure, and oxygen saturation, is imperative. Continuous monitoring using advanced devices allows healthcare providers to assess the patient's hemodynamic status and make necessary adjustments to medications, fluids, or oxygen therapy, thereby preventing complications associated with instability, such as organ dysfunction [23].

3. **Assessment of Surgical Site**: Regular assessments of the surgical site are essential not just for identifying signs of infection, but also for evaluating the integrity of the bypass graft itself. Monitoring includes assessing for signs of graft patency and ensuring that the surgical site is healing appropriately [24].

4. **Supportive Care**: Bypass surgery can lead to significant postoperative pain, anxiety, and other psychological effects, which need to be managed effectively. Monitoring helps to assess these factors, allowing healthcare providers to offer adequate analgesia and psychological support [24].

Key Elements of Postoperative Monitoring

The postoperative period typically involves two phases: the immediate recovery phase in the intensive care unit (ICU) and the subsequent ward care phase. Each phase poses distinct monitoring challenges [25].

- **Intensive Care Unit (ICU) Monitoring**: In the ICU, patients receive continuous monitoring of vital signs, hemodynamic parameters, and neurological status. Advanced technologies such as telemetry, invasive blood pressure monitoring, and pulse oximetry are standard. Nurses and intensivists remain vigilant for complications like cardiac arrhythmias or ischemic events [26].

- **Ward Care Monitoring**: After stabilization, patients transition to the ward setting, where monitoring becomes more focused on recovery indicators. This includes assessments of mobility, pain management, and the patient's ability to partake in rehabilitation activities. Here, the role of nurse-led assessment is pivotal, ensuring that any signs of deterioration are noted and addressed promptly [27].

Risk Management Strategies

Risk management in postoperative care for bypass surgery encompasses a range of strategies designed to minimize complications, enhance recovery, and optimize surgical outcomes. These strategies are multifactorial and can be categorized into preoperative, intraoperative, and postoperative elements [28].

1. **Preoperative Risk Assessment**: Identifying patients at high risk for complications prior to surgery is a foundational step in risk management. This involves comprehensive evaluations, including medical histories, physical exams, and diagnostic tests. Common risk factors include age, comorbidities such as diabetes or chronic obstructive pulmonary disease (COPD), and the presence of previous cardiac events [29].

2. **Protocol Development**: Establishing clinical pathways and protocols for postoperative care is a vital component. Evidence-based guidelines inform healthcare teams about standard practices for monitoring, pain management, and rehabilitation, reducing variability in care and enhancing patient outcomes. For instance, protocols for early mobilization post-surgery have been shown to decrease the risk of thromboembolism and improve recovery times [29].

3. **Multi-Disciplinary Approach**: Effective risk management in bypass surgery requires a collaborative approach, involving surgeons, anesthesiologists, nurses, and rehabilitation specialists. Regular interdisciplinary rounds can facilitate communication about patient progress and concerns, leading to proactive adjustments in care.

4. **Patient Education and Involvement**: Educating patients about their role in recovery is crucial. Informing them about potential complications, signs to watch for, and the importance of adhering to prescribed medications can empower patients to be active participants in their recovery process. A University of Michigan study found that patients who are better informed tend to have fewer complications and shorter hospital stays.

5. **Utilization of Technology**: Advances in technology also play a pivotal role in monitoring and risk management. Telemedicine and remote monitoring can provide ongoing support post-

discharge, allowing healthcare professionals to track patient data and intervene proactively when necessary. This is particularly vital for patients living in remote areas or those unable to attend frequent follow-up appointments [30].

Challenges and Future Directions

Despite the comprehensive strategies in place for postoperative monitoring and risk management, several challenges persist. Variability in patient responses to surgery, underlying comorbidities, and systemic constraints in healthcare delivery can complicate both monitoring efforts and the implementation of risk management protocols.

Looking to the future, continuous improvement in monitoring technologies, such as the development of wearable health devices that provide real-time data, holds great promise [31]. Additionally, the integration of artificial intelligence and machine learning for predictive analytics in risk management could revolutionize postoperative care by anticipating complications based on patient data [31].

Pain Management Protocols in Post-operative Care:

Post-operative pain management is an essential component of the recovery process following cardiovascular surgery. The procedures involved, such as coronary artery bypass grafting (CABG), heart valve repair or replacement, and arrhythmia surgery, often result in significant postoperative discomfort due to both surgical trauma and the manipulation of tissues surrounding the heart. Effective pain management is crucial for enhancing patient satisfaction, promoting early mobilization, and reducing the risk of complications [32].

Understanding Post-Operative Pain in Cardiovascular Surgery

Post-operative pain is typically classified as acute, which generally resolves within a few days to weeks following surgery. The pain experienced by patients undergoing cardiovascular surgery can stem from several factors including incisional pain, muscle soreness from retraction during the procedure, and discomfort related to thoracic tubes or monitoring devices. The perception of pain can vary significantly among patients based on factors such as medical history, pain threshold, psychological status, and even socioeconomic factors [32].

The effective management of this pain is imperative. Inadequately managed pain can lead to several adverse outcomes. It can hinder mobility, delay recovery, increase the length of hospital stay, elevate stress levels, and encourage a cascade of physiological responses that may complicate existing cardiac conditions. Therefore, establishing robust pain management protocols is essential in the context of post-operative care for cardiovascular patients [33].

Multimodal Pain Management Strategies

The principle of multimodal analgesia is fundamental in modern pain management protocol for post-operative cardiovascular surgery. This approach entails the use of two or more analgesic agents or techniques to achieve superior pain control while minimizing the use of opioids and their associated side effects [34].

Pharmacological Interventions:

Non-Opioid Analgesics: Agents such as acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) like ibuprofen or ketorolac are often employed as the first line of defense against post-operative pain. These medications work by blocking the production of inflammatory mediators, thus reducing pain perception and inflammation [35].

Opioid Analgesics: While opioids are potent analgesics effective for managing severe pain, their use must be carefully monitored due to the risk of addiction, tolerance, and various side effects such as respiratory depression and constipation. A common strategy employed is to initiate opioids at the lowest effective dose and only for a limited duration.

Adjunct Medications: Certain adjuvant medications, such as gabapentin or pregabalin, which are traditionally used for neuropathic pain, can be beneficial in managing post-operative pain, particularly in reducing opioid requirements and enhancing overall analgesic effects [35].

Regional Anesthesia Techniques:

The use of neuraxial anesthesia, such as epidural or spinal analgesia, can significantly reduce pain levels and improve comfort during the postoperative period. Epidural analgesia, in particular, allows for the continuous administration of local anesthetics, providing effective pain relief while minimizing

systemic opioid use. It is crucial, however, that the risks associated with neuraxial techniques, including potential complications like hematoma or infection, are thoroughly evaluated [36].

Alternative Therapies:

Methods such as physical therapy, acupuncture, and cognitive-behavioral therapy may serve as adjuncts to conventional pain management strategies. Implementing early mobilization protocols not only aids in pain management but also encourages quicker recovery and reduces the risk of venous thromboembolism, which can be a concern in this patient population.

Individualized Pain Management

Recognizing that each patient's experience of pain and response to treatment is unique is essential in creating effective post-operative pain management protocols. Healthcare providers should assess individual baseline pain levels, preferences, and potential contraindications to specific medications or therapies before tailoring a pain management plan [37].

Preoperative Assessments: Comprehensive preoperative evaluations should include pain history and potential risk factors for chronic post-surgical pain. For example, patients with a history of chronic pain disorders or anxiety may require more aggressive pain control strategies.

Patient Education: Educating patients about the pain management process, setting realistic expectations for their recovery, and encouraging them to participate in their care can enhance feelings of control and reduce anxiety, thereby improving subsequent pain outcomes [38].

The Role of the Healthcare Team

Effective pain management in the post-operative setting necessitates a multidisciplinary approach. The healthcare team should communicate openly and collaborate frequently to continually assess and modify pain management strategies as needed [39].

Nurses and Allied Health Staff: These professionals play an integral role in monitoring patients' pain levels, administering medications, and implementing non-pharmacological pain relief measures. Their ability to promptly respond to patients' reports of pain can lead to timely adjustments in treatment protocols.

Pain Management Specialists: In complex cases, involving pain management specialists can provide additional insight into advanced techniques and therapies that may enhance pain relief.

Patient Involvement: Self-reporting of pain by patients is crucial for assessing pain levels accurately. Discussion about treatment choices should involve patients to facilitate shared decision-making, empowering them to express their needs effectively [50].

Rehabilitation and Recovery Pathways:

Bypass surgery, commonly referred to as coronary artery bypass grafting (CABG), is a surgical procedure used to treat coronary artery disease. By creating a new route for blood flow to the heart, bypass surgery alleviates symptoms, improves heart function, and can even prolong life. However, the journey to recovery following such an invasive procedure requires a well-structured rehabilitation program designed to restore physical health, improve psychological well-being, and enhance overall quality of life [51].

At its core, bypass surgery involves taking a healthy blood vessel from another part of the body, such as the leg, arm, or chest, and attaching it to the coronary arteries to circumvent the blocked sections. Although this surgery can significantly reduce heart-related symptoms such as chest pain and shortness of breath, patients often face an arduous recovery process fraught with physical and emotional challenges. Effective rehabilitation is crucial; it not only aids in physical recovery but also supports mental health and lifestyle changes needed for long-term success [52].

Rehabilitation after bypass surgery serves multiple essential functions. Primarily, it aims to help patients regain strength and endurance, manage pain, and reduce the risk of future cardiovascular events. Research has shown that structured rehabilitation programs can aid in the recovery process by providing tailored exercise regimens, nutritional counseling, and psychological support. Importantly, effective rehabilitation can enhance the patient's quality of life and overall satisfaction with their health outcomes [52].

Phases of Recovery

Recovery from bypass surgery can generally be divided into three phases, each requiring specific

interventions aimed at helping the patient regain full functionality.

1. **Immediate Post-Operative Phase**: This phase begins in the hospital and can last for several days. During this time, healthcare professionals monitor vital signs, observe for any complications, and manage pain through medication. Initial mobility exercises are encouraged to prevent blood clots and improve circulation. Patients may engage in light activity, such as sitting up or walking short distances, as soon as they are stable [53].

2. **Early Rehabilitation Phase**: Typically commencing one to two weeks post-surgery, this phase emphasizes gradually increasing physical activity. Patients might attend a cardiac rehabilitation program, usually held in outpatient facilities. Under professional supervision, activities evolve from low-impact exercises such as walking and stationary cycling to more structured physical training. Throughout this phase, education about lifestyle modifications, such as smoking cessation and dietary adjustments, is provided.

3. **Long-Term Rehabilitation Phase**: This phase can extend for several months to years after surgery and focuses on maintaining physical fitness and heart health. Patients are encouraged to continue exercising regularly and adhere to a heart-healthy diet, which includes increased fiber, healthy fats, and reduced salt and sugar intake. Psychological support may be necessary during this stage to address issues like anxiety or depression, which can arise in the context of major surgery [53].

Exercise Prescription in Rehabilitation

Exercise plays a pivotal role in recovery from bypass surgery. The American Heart Association recommends that patients engage in supervised cardiac rehabilitation programs for at least 12 weeks. These programs typically commence with an evaluation conducted by a healthcare professional, who assesses the patient's cardiovascular fitness and establishes a personalized exercise plan.

Low to moderate intensity exercises are usually the cornerstone of rehabilitation, with walking and stationary cycling being commonly prescribed. The goal is to gradually increase physical activity levels, allowing patients to become reacquainted with their body movements without overexertion. Resistance training may also be introduced later, focusing on improving muscle strength and endurance [54].

Nutritional Guidance

Dietary changes form a significant aspect of the recovery pathway. Post-surgery, patients are advised to adopt a heart-healthy diet which promotes cardiovascular health and prevents further complications. This includes:

- **Fruits and Vegetables**: High in vitamins, minerals, and antioxidants, these foods can help reduce inflammation and support overall health [55].
- **Whole Grains**: Foods such as whole wheat bread, brown rice, and oats can assist in lowering cholesterol levels and providing sustained energy.
- **Lean Proteins**: Options such as fish, poultry, legumes, and low-fat dairy are recommended for muscle repair and overall recovery.
- **Healthy Fats**: Incorporating sources of omega-3 fatty acids, like fatty fish, flaxseeds, and walnuts, can aid heart health while reducing inflammation [55].

Food intake should be monitored to manage weight and ensure that blood sugar levels remain stable. Often, dieticians specializing in cardiac health collaborate with patients to establish long-term dietary strategies [55].

Psychological Support

Recognizing and addressing the psychological impact of bypass surgery is crucial for complete rehabilitation. The experience of undergo such an invasive procedure can lead to feelings of anxiety, depression, and a sense of loss of control over one’s body. Therefore, psychological support, in the form of counseling or group therapy, is often recommended. Emotional well-being can significantly affect compliance with rehabilitation protocols, making it imperative to address psychological health in tandem with physical recovery [56].

Another vital component of rehabilitation is educating patients about their condition and the importance of reducing future cardiovascular risks. This includes managing chronic conditions such as diabetes and hypertension, adhering to prescribed medications, and avoiding known risk factors such

as smoking and excessive alcohol consumption. Regular follow-up appointments with healthcare providers are critical for monitoring heart health and making appropriate adjustments to treatment plans [56].

Psychosocial Support and Emotional Well-being:

Heart bypass surgery, formally known as coronary artery bypass graft (CABG) surgery, is a procedure that can significantly improve the quality of life for individuals suffering from heart disease. While the physical aspects of the surgery, such as the technical execution and recovery from anesthesia, are often the primary focus, it is equally crucial to recognize the psychosocial dimensions that accompany such a life-altering experience [57].

Coronary artery disease (CAD) occurs when the coronary arteries, responsible for supplying blood to the heart muscle, become narrowed or blocked. This can lead to symptoms such as angina (chest pain) and increases the risk of heart attacks. Heart bypass surgery seeks to restore adequate blood flow to the heart muscle by creating a detour around blocked arteries using grafts taken from other parts of the body. While the procedure can alleviate symptoms and improve heart function, the journey does not end at the operating table. The surgery and the lifestyle changes that follow prompt a significant emotional and psychological adjustment [57].

The Psychosocial Aspects of Heart Disease

Psychosocial support encompasses a wide range of services and interventions aimed at addressing the psychological and social factors influencing an individual's healthcare experience. For patients undergoing heart bypass surgery, the emotional impacts can be profound and multifaceted. Fear, anxiety, and depression are common responses to a major medical event, often exacerbated by concerns regarding physical limitations, potential complications, and emotional distress from the diagnosis itself [58].

1. **Anxiety and Depression**: Many patients may experience heightened anxiety levels leading up to the surgery. Worries about the risks of surgery, potential changes in lifestyle, and concerns about mortality can manifest emotionally and psychologically. Post-operative depression is also common; the abrupt transition from being active to a period of recovery can lead to feelings of isolation, helplessness, and sadness [59].

2. **Change in Self-Identity**: Following heart bypass surgery, patients may struggle with their sense of self. Pre-existing identities, often tied to their physical capabilities, are challenged, which can affect self-esteem and body image. A man or woman who once viewed themselves as active may now need assistance with everyday activities, leading to a profound identity shift [59].

3. **Family Dynamics**: Patients often report feeling like a burden to their families during recovery. Additionally, the psychological burden of illness does not rest solely on the patient; family members may also experience stress, anxiety, and even depression as they navigate their loved one's health challenges and changes in daily routines.

The Importance of Psychosocial Support

Research has demonstrated that the psychosocial aspect of recovery can significantly affect physical health outcomes post-surgery. Emotional well-being is not simply an ancillary aspect of health but a vital component affecting recovery and long-term health outcomes. Key benefits of providing robust psychosocial support to cardiac patients include:

1. **Improved Compliance**: Patients who receive adequate emotional support are more likely to adhere to post-operative instructions, including medication regimens and lifestyle modifications. Effective support can foster a sense of empowerment, making patients feel more equipped to make necessary changes for their health [60].

2. **Reduced Complications**: Emotional distress can lead to increased complications following surgery. Studies indicate that patients experiencing high levels of anxiety and depression post-operatively may have higher rates of complications, including infections and longer hospital stays. A responsive support system can mitigate such outcomes [60].

3. **Enhanced Quality of Life**: Emotional well-being directly correlates with overall quality of life. Patients who receive support are likely to experience a more profound sense of normalcy and fulfillment post-surgery, positively affecting their social connections, work, and familial relationships [60].

Strategies for Implementing Psychosocial Support

Integrating psychosocial support into the treatment plan for patients undergoing heart bypass surgery requires a multifaceted approach involving healthcare professionals, family, and community resources [61].

1. **Preoperative Counseling**: Offering psychological counseling before surgery can help patients process their fears, set realistic expectations, and prepare mentally for the procedure and recovery. Cognitive-behavioral therapy, stress management techniques, and relaxation exercises can be beneficial [61].

2. **Support Groups**: Patient-support groups can serve as invaluable resources for those recovering from heart bypass surgery. Connecting with others who share similar experiences allows patients to express their concerns and feelings, reducing feelings of isolation.

3. **Family Involvement**: Involving family members in the recovery process can be incredibly beneficial. Education around the emotional and practical aspects of recovery can help family members provide the necessary support while also addressing their concerns.

4. **Routine Follow-Up**: Regular follow-up appointments with healthcare professionals that include mental health assessments can help identify emerging emotional problems. Addressing these issues early on can prevent long-term psychological distress.

5. **Holistic Health Programs**: Incorporating wellness programs that focus on both physical and emotional health can promote healing. Activities such as yoga, meditation, and nutrition counseling can help patients achieve a well-rounded recovery [61].

Interdisciplinary Collaboration in Nursing Care:

Heart bypass surgery, clinically known as coronary artery bypass grafting (CABG), is a critical surgical procedure aimed at alleviating symptoms of coronary artery disease and improving overall heart function. This complex intervention is characterized by its multifaceted nature, not only involving surgeons but also a wide array of healthcare professionals. In this context, multidisciplinary cooperation becomes essential, particularly in nursing care, ensuring that patients receive comprehensive and cohesive support throughout their surgical journey [62].

Nurses occupy a central position in the continuum of care for patients undergoing heart bypass surgery. Their responsibilities encompass a wide range of tasks that span the preoperative, intraoperative, and postoperative phases. In the preoperative phase, nurses are instrumental in patient education, addressing concerns and misconceptions surrounding the surgical procedure, and ensuring that patients are psychologically prepared. They provide a thorough assessment of the patient's medical history, vital signs, and current medications, which are crucial for devising an effective care plan [62].

During the intraoperative phase, nurse anesthetists and surgical nurses collaborate closely with the surgical team, monitoring the patient’s vital signs, managing anesthesia, and facilitating a seamless surgical experience. After the procedure, postoperative nurses assume critical responsibilities for monitoring recovery, managing pain, preventing complications, and supporting patient and family education related to post-surgical care [62].

Multidisciplinary Collaboration: Key Players

A successful heart bypass surgery program relies heavily on the collaboration of various healthcare professionals. Each member of the multidisciplinary team brings a unique set of skills and expertise that is vital for patient outcomes. Here are some primary contributors:

1. **Surgeons**: Cardiothoracic surgeons perform the actual surgical procedures. Their expertise is crucial for making intraoperative decisions and managing complex cardiac conditions [63].

2. **Anesthesiologists**: These specialists monitor and administer anesthesia during surgery, ensuring that the patient remains stable and comfortable under sedation.

3. **Pharmacists**: Clinical pharmacists play a pivotal role in medication management. They ensure that patients receive appropriate pharmacotherapy pre- and post-surgery and monitor for potential drug interactions.

4. **Physical and Occupational Therapists**: Postoperative recovery often requires rehabilitation services. Physical therapists assist with restoring mobility and strength, while occupational therapists focus on helping patients regain independence in daily activities [63].

5. **Dietitians**: Nutritional support is essential for recovery. Dietitians educate patients about heart-healthy eating and assist in formulating tailored dietary plans that align with medical needs.

6. **Social Workers and Case Managers**: They provide psychosocial support, addressing patients' emotional and social challenges. They also facilitate discharge planning ensuring that patients have the necessary resources in place to continue recovery at home [63].

Benefits of Multidisciplinary Cooperation

The importance of a multidisciplinary approach in nursing care for heart bypass surgery cannot be overstated. This cooperation yields numerous benefits that enhance both patient outcomes and the overall healthcare experience:

1. **Holistic Patient Care**: By collaborating, healthcare professionals can provide comprehensive care that addresses the diverse needs of the patient, including medical, psychological, and social dimensions [64].

2. **Improved Patient Outcomes**: Studies have shown that patients treated by multidisciplinary teams experience fewer complications, shorter hospital stays, and better overall satisfaction with care [64].

3. **Enhanced Communication**: Regular team meetings and updates foster clear communication between members, ensuring continuity of care and reducing the risk of errors.

4. **Patient Education**: Multidisciplinary cooperation enriches patient education efforts. Nurses can leverage the expertise of other specialists to provide comprehensive information that empowers patients to make educated decisions about their care [65].

5. **Support for Families**: Multidisciplinary teams also extend support to families, offering resources and guidance throughout the surgical process; this alleviates anxiety and builds a solid support system around the patient [65].

Challenges to Multidisciplinary Cooperation

Despite the numerous advantages, establishing effective multidisciplinary cooperation in nursing care for heart bypass surgery can be fraught with challenges. Some of the common hurdles encountered include:

1. **Communication Barriers**: Different professional cultures can lead to misunderstandings or misinterpretations. Ensuring that all team members are on the same page requires effective communication strategies [66].

2. **Role Clarity**: Misalignment of roles and responsibilities can lead to overlaps or gaps in care delivery. Clear definitions and mutual respect for each profession’s contributions are essential [67].

3. **Time Constraints**: Schedules and workloads can make it challenging for members to consistently meet or coordinate care effectively. Finding time for teamwork within a busy healthcare environment often requires concerted effort and prioritization [68].

4. **Interdisciplinary Training**: Not all healthcare professionals receive training on collaborative practices. Incorporating interprofessional education into healthcare training programs can be a solution but requires systemic changes [69].

Conclusion:

In conclusion, the study on "Nursing Care for Patients Undergoing Cardiac Bypass Surgery" highlights the critical role of nursing in improving patient outcomes during the perioperative period. Effective nursing care encompasses comprehensive preoperative assessments, meticulous intraoperative monitoring, and attentive postoperative management, significantly contributing to reduced complications, enhanced recovery, and overall patient satisfaction.

Key findings suggest that tailored nursing interventions, including patient education, pain management, and emotional support, are essential in addressing the unique needs of patients undergoing this complex procedure. Implementing evidence-based practices and fostering a collaborative environment among healthcare professionals further enhances the quality of care provided.

Ultimately, the study emphasizes the need for ongoing training and support for nursing staff to adapt to evolving practices in cardiac care, ensuring that patients receive the highest level of compassionate and effective care throughout their surgical journey. Future research should continue to explore innovative nursing strategies to optimize outcomes for this vulnerable population, thereby reinforcing the pivotal role of nursing in cardiac surgery.

References:

1. Alvarez F, Jazayerli ML, Alhalabi O, et al. Aspirin dosage for the prevention of graft occlusion in people undergoing coronary surgery. Cochrane Database Syst Rev 2016;(3):CD012113.
2. Tanguay J-F, Bell AD, Ackman ML, et al. Canadian Cardiovascular Society. Focused 2012 update of the Canadian Cardiovascular Society guidelines for the use of antiplatelet therapy. Can J Cardiol 2013;29:1334–45.
3. Imazio M, Hoit BD. Post-cardiac injury syndromes. An emerging cause of pericardial diseases. Int J Cardiol 2013;168:648–52.
4. Hannan EL, Zhong Y, Lahey SJ, et al. 30-day readmissions after coronary artery bypass graft surgery in New York State. JACC Cardiovasc Interv 2011;4:569–76.
5. Morice M-C, Serruys PW, Kappetein AP, et al. Five-year outcomes in patients with left main disease treated with either percutaneous coronary intervention or coronary artery bypass grafting in the synergy between percutaneous coronary intervention with taxus and cardiac surgery trial. Circulation 2014;129:2388–94.
6. Bellay-Cote EP, Lamy A, Devereaux PJ, et al. Definitions of post-coronary artery bypass grafting myocardial infarction: variations in incidence and prognostic significance. Eur J Cardiothorac Surg 2020;57:168–75.
7. Adler Y, Charron P, Imazio M, et al. ESC Scientific Document Group. 2015 ESC guidelines for the diagnosis and management of pericardial diseases: the task force for the diagnosis and management of pericardial diseases of the European Society of Cardiology (ESC) endorsed by: the European Association for Cardio-Thoracic Surgery (EACTS). Eur Heart J 2015;36:2921–64.
8. Kulik A, Ruel M, Jneid H, et al. American Heart Association Council on Cardiovascular Surgery and Anesthesia. Secondary prevention after coronary artery bypass graft surgery: a scientific statement from the American Heart Association. Circulation 2015;131:927–64.
9. Imazio M, Brucato A, Cemin R, et al. ICAP Investigators. A randomized trial of colchicine for acute pericarditis. N Engl J Med 2013;369:1522–8.
10. Khan NK, Järvelä KM, Loisa EL, et al. Incidence, presentation and risk factors of late postoperative pericardial effusions requiring invasive treatment after cardiac surgery. Interact Cardiovasc Thorac Surg 2017;24:835–40.
11. Moreyra AE, Deng Y, Wilson AC, et al. Incidence and trends of heart failure admissions after coronary artery bypass grafting surgery. Eur J Heart Fail 2013;15:46–53.
12. Kirklin JW, Kouchoukos NT. Kirklin/Barratt–Boyes cardiac surgery: morphology, diagnostic criteria, natural history, techniques, results, and indications. 4th ed. Philadelphia: Elsevier/Saunders; 2013.
13. Jensen JK, Poulsen SH, Mølgaard H. Cardiac tamponade: a clinical challenge. e-Journal of Cardiology Practice 2017;15.
14. Hardesty RL, Thompson M, Lerberg DB, et al. Delayed postoperative cardiac tamponade: diagnosis and management. Ann Thorac Surg 1978;26:155–64.
15. Imazio M, Brucato A, Rovere ME, et al. Contemporary features, risk factors, and prognosis of the post-pericardiotomy syndrome. Am J Cardiol 2011;108:1183–7.
16. Ezekowitz JA, O'Meara E, McDonald MA, et al. 2017 comprehensive update of the Canadian Cardiovascular Society guidelines for the management of heart failure. Can J Cardiol 2017;33:1342–433.
17. Cardiac Care Quality Indicators Report. Ottawa: Canadian Institute for Health Information; 2017.
18. Arora RC, Manji RA, Singal RK, et al. Outcomes of octogenarians discharged from the hospital after prolonged intensive care unit length of stay after cardiac surgery. J Thorac Cardiovasc Surg 2017;154:1668–78.e2.

19. Serhiyenko VA, Serhiyenko AA. Cardiac autonomic neuropathy: risk factors, diagnosis and treatment. World J Diabetes 2018;9:1–24.

20. Conte JV, Baumgartner WA, Owens SGT, et al. The Johns Hopkins manual of cardiac surgical care. 2nd ed. Milton (ON): Elsevier Canada; 2008.

21. Herdy AH, López-Jiménez F, Terzic CP, Milani M, Stein R, Carvalho T, Serra S, Araujo CG, Zeballos PC, Anchique CV, Burdiat G, González K, González G, Fernández R, Santibáñez C, Rodríguez-Escudero JP, Ilarraza-Lomelí H. South American guidelines for cardiovascular disease prevention and rehabilitation. Arq Bras Cardiol. 2014;103(2 Suppl 1):1–31.

22. Winkelmann ER, Dallazen F, Bronzatti AB, Lorenzoni JC, Windmöller P. Analysis of steps adapted protocol in cardiac rehabilitation in the hospital phase. Rev Bras Cir Cardiovasc. 2015;30:40–48.

23. Amorim H, Cadilha R, Parada F, Rocha A. Progression of aerobic exercise intensity in a cardiac rehabilitation program. Rev Port Cardiol. 2019;38:281–286.

24. Sadeghi M, Garakyaraghi M, Taghavi M, Khosravi M, Sarrafzadegan N, Roohafza H. The impacts of cardiac rehabilitation program on exercise capacity, quality of life, and functional status of coronary artery disease patients with left ventricular dysfunction. Rehabil Nurs. 2015;40:305–309.

25. Diab MS, Bilkhu R, Soppa G, Edsell M, Fletcher N, Heiberg J, Royse C, Jahangiri M. The influence of prolonged intensive care stay on quality of life, recovery, and clinical outcomes following cardiac surgery: a prospective cohort study. J Thorac Cardiovasc Surg. 2018;156:1906–1915.e3.

26. Sandesara PB, Lambert CT, Gordon NF, Fletcher GF, Franklin BA, Wenger NK, Sperling L. Cardiac rehabilitation and risk reduction: time to "rebrand and reinvigorate". J Am Coll Cardiol. 2015;65:389–395.

27. Griffo R, Ambrosetti M, Tramarin R, Fattirolli F, Temporelli PL, Vestri AR, De Feo S, Tavazzi L, ICAROS investigators. Effective secondary prevention through cardiac rehabilitation after coronary revascularization and predictors of poor adherence to lifestyle modification and medication. Results of the ICAROS Survey. Int J Cardiol. 2013;167:1390–1395.

28. Thomas RJ, Balady G, Banka G, Beckie TM, Chiu J, Gokak S, Ho PM, Keteyian SJ, King M, Lui K, Pack Q, Sanderson BK, Wang TY. 2018 ACC/AHA clinical performance and quality measures for cardiac rehabilitation: a report of the American College of Cardiology/American Heart Association Task Force on performance measures. J Am Coll Cardiol. 2018;71:1814–1837.

29. Piepoli MF, Hoes AW, Agewall S, Albus C, Brotons C, Catapano AL, Cooney MT, Corrà U, Cosyns B, Deaton C, Graham I, Hall MS, Hobbs FDR, Løchen ML, Löllgen H, Marques-Vidal P, Perk J, Prescott E, Redon J, Richter DJ, Sattar N, Smulders Y, Tiberi M, van der Worp HB, van Dis I, Verschuren WMM, ESC Scientific Document Group. European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice. Eur Heart J. 2016;37:2315–2381.

30. Mares MA, McNally S, Fernandez RS. Effectiveness of nurse-led cardiac rehabilitation programs following coronary artery bypass graft surgery: a systematic review. JBI Database System Rev Implement Rep. 2018;16:2304–2329.

31. Achttien RJ, Staal JB, van der Voort S, Kemps HM, Koers H, Jongert MW, Hendriks EJ, Practice Recommendations Development Group. Exercise-based cardiac rehabilitation in patients with coronary heart disease: a practice guideline. Neth Heart J. 2013;21:429–438.

32. Borzou SR, Amiri S, Salavati M, Soltanian AR, Safarpoor G. Effects of the first phase of cardiac rehabilitation training on self-efficacy among patients undergoing coronary artery bypass graft surgery. J Tehran Heart Cent. 2018;13:126–131.

33. Law MR, Wald NJ, Rudnicka AR. Quantifying effect of stations on low density lipoprotein cholesterol, ischemic heart disease, and stroke: systematic review and meta-analysis. BMJ. 2003;326(7404):1423.

34. Zung WW. A self-rating depression scale. Arch Gen Psychiatry. 1965;12(1):63–70.

35. Henderson A, Zernike W. A study of the impact of discharge information for surgical patients. J Adv Nurs. 2001;35(3):435–441.

36. McGrath BM, Norris CM, Hardwicke-Brown E, Welsh RC, Bainey KR. Quality of life following coronary artery bypass grafting graft surgery vs. percutaneous coronary intervention in diabetics with multivessel disease: a five-year registry study. Eur Heart J Qual Care Clin Outcomes. 2017;3(3):216–223.

37. Hammill BG, Curtis LH, Schulman KA, Whellan DJ. Relationship between cardiac rehabilitation and long-term risks of death and myocardial infarction among elderly Medicare beneficiaries. Circulation. 2010;121(1):63–70.

38. Popejoy LL, Moylan K, Galambos C. A review of discharge planning research of older adults 1990-2008. West J Nurs Res. 2009;31(7):923–947.

39. Goch A, Misiewicz P, Rysz J, Banach M. The clinical manifestation of myocardial infarction in elderly patients. Clin Cardiol. 2009;32(6):E46–E51.

40. Theobald K, McMurray A. Coronary artery bypass grafting graft surgery: discharge planning for successful recovery. J Adv Nurs. 2004;47(9):483–491.

41. Allen JK, Dennison-Himmelfarb CR, Szanton SL, Bone L, Hill MN, Levine DM, et al. Community outreach and cardiovascular health (COACH) trial: a randomized, controlled trial of nurse practitioner/community health worker cardiovascular disease risk reduction in urban community health centres. Circ Cardiovasc Qual Outcomes. 2011;4(6):595–602.

42. Johnston G, Goss JR, Malmgren JA, Spertus JA. Health status and social risk correlates of extended length of stay following coronary artery bypass grafting. Ann Thorac Surg. 2004;77(2):557–562.

43. van Walraven C, Oake N, Jennings A, Forster AJ. The association between continuity of care and outcomes: a systematic and critical review. J Eval Clin Pract. 2010;16(5):947–956.

44. Zung WW. A rating instrument for anxiety disorders. Psychosomatics. 1971;12(6):371–379.

45. Price P. Physiologic effects of first-time sitting among male patients after coronary artery bypass grafting graft surgery. Dynamics. 2006;17(1):12–19.

46. Rosamond W, Flegal K, Furie K, Go A, Greenlund K, Haase N, et al. American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics 2008 update: a report from the American Heart Association statistics committee and stroke statistics subcommittee. Circulation. 2008;117(4):e25–146.

47. Wagner EH. The role of patient care teams in chronic disease management. BMJ. 2000;320(7234):569–572.

48. Carroll A, Dowling M. Discharge planning communication education and patient participation. Br J Nurs. 2007;16(14):882–886.

49. Scholte op Reimer WJ, Jansen CH, de Swart EA, Boersma E, Simoons ML, Deckers JW. Contribution of nursing to risk factor management as perceived by patients with established coronary heart disease. Eur J Cardiovasc Nurs. 2002;1(2):87–94.

50. Lawie GM, Morris GC, Earle IV. Long-term results of coronary artery bypass grafting, analysis of 1698 patients followed 15 to 20 years. Ann Surg. 1991;213(5):377–378.

51. Hammill BG, Curtis LH, Schulman KA, Whellan DJ. Relationship between cardiac rehabilitation and long-term risks of death and myocardial infarction among elderly Medicare beneficiaries. Circulation. 2010;121(1):63–70.

52. Zimmerman L, Barnason S, Nieveen J, Schmaderer M. Symptom management intervention in elderly coronary artery bypass grafting graft patients. Outcomes Manag. 2004;8(1):5–12.

53. Powers WJ, Rabinstein AA, Ackerson T, et al. 2018 guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 2018;49:e46–110.

54. Bessissow A, Khan J, Devereaux PJ, et al. Postoperative atrial fibrillation in non-cardiac and cardiac surgery: an overview. J Thromb Haemost 2015;13(Suppl 1): S304–12.

55. Horne D, Kehler S, Kaoukis G, et al. Depression before and after cardiac surgery: Do all patients

respond the same? J Thorac Cardiovasc Surg 2013;145:1400–6.

56. Andrade JG, Aguilar M, Atzema C, et al. The 2020 Canadian Cardiovascular Society/Canadian Heart Rhythm Society comprehensive guidelines for the management of atrial fibrillation. Can J Cardiol 2020;36:1847–948.
57. Whitlock R, Healey JS, Connolly SJ, et al. Predictors of early and late stroke following cardiac surgery. CMAJ 2014;186:905–11.
58. Tsai TL, Sands LP, Leung JM. An update on postoperative cognitive dysfunction. Adv Anesth 2010;28:269–84.
59. Indja B, Seco M, Seamark R, et al. Neurocognitive and psychiatric issues post cardiac surgery. Heart Lung Circ 2017;26:779–85.
60. Newman MF, Mathew JP, Grocott HP, et al. Central nervous system injury associated with cardiac surgery. Lancet 2006;368:694–703.
61. Kerbaul F, Collart F, Giorgi R, et al. Role of endogenous adenosine as a predictive marker of vasoplegia during cardiopulmonary bypass and postoperative severe systemic inflammatory response. Crit Care Med 2006;34:640–5.
62. Shih C-C, Shih C-M, Su Y-Y, et al. Potential risk of sternal wires. Eur J Cardiothorac Surg 2004;25:812–8.
63. Diabetes Canada Clinical Practice Guidelines Expert Committee; Imran SA, Agarwal G, Bajaj HS, et al. Targets for glycemic control. Can J Diabetes 2018; 42 (Suppl 1):S42–6.
64. Diabetes Canada Clinical Practice Guidelines Expert Committee; Malcolm J, Halperin I, Miller DB, et al. In-hospital management of diabetes. Can J Diabetes 2018;42(Suppl 1):S115–23.
65. McKhann GM, Grega MA, Borowicz LM, Jr, et al. Is there cognitive decline 1 year after CABG? Comparison with surgical and nonsurgical controls. Neurology 2005;65:991–9.
66. January CT, Wann LS, Alpert JS, et al. American College of Cardiology/American Heart Association Task Force on Practice Guidelines. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol 2014; 64:e1–76.
67. Rosner MH. Acute kidney injury associated with cardiac surgery. Redo Card Surg Adults 2012;9781461413:37–52.
68. Sylivris S, Levi C, Matalanis G, et al. Pattern and significance of cerebral microemboli during coronary artery bypass grafting. Ann Thorac Surg 1998;66:1674–8.
69. Newman MF, Kramer D, Croughwell ND, et al. Differential age effects of mean arterial pressure and rewarming on cognitive dysfunction after cardiac surgery. Anesth Analg 1995;81:236–42.