

## Mitral Stenosis: An Updated Review for Nursing Intervention Protocols

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### Abstract

*Mitral stenosis (MS) is a valvular heart disease characterized by the narrowing of the mitral valve, primarily caused by rheumatic fever. This condition leads to impaired blood flow from the left atrium to the left ventricle, resulting in symptoms such as dyspnea, fatigue, and palpitations. If untreated, MS can lead to severe complications like pulmonary hypertension, heart failure, and thromboembolic events. Despite advancements in medical and surgical interventions, MS remains a significant health concern, particularly in developing countries where rheumatic fever is prevalent. This review aims to provide an updated overview of mitral stenosis, focusing on its pathophysiology, clinical manifestations, diagnostic approaches, and treatment options. Additionally, it emphasizes the role of nursing interventions in managing symptoms, preventing complications, and improving patient outcomes. The review synthesizes current literature on mitral stenosis, including its etiology, risk factors, diagnostic criteria, and management strategies. It highlights the importance of echocardiography for diagnosis and severity classification, as well as the role of medical, surgical, and nursing interventions. Nursing protocols for monitoring, symptom management, patient education, and infection prevention are discussed in detail. Mitral stenosis is a progressive disease that requires timely intervention to prevent complications. Medical management focuses on symptom control, anticoagulation for atrial fibrillation, and prevention of rheumatic fever recurrence. Surgical options, such as percutaneous mitral balloon valvuloplasty (PMBV) and mitral valve replacement, are effective in severe cases. Nursing care plays a critical role in monitoring fluid balance, managing symptoms, educating patients, and preventing infections. Early detection and coordinated care are essential for improving patient outcomes. Mitral stenosis remains a significant cardiovascular condition, particularly in regions with limited access to healthcare. Effective management requires a multidisciplinary approach, including medical therapy, surgical intervention, and comprehensive nursing care. Early diagnosis, patient education, and adherence to treatment protocols are crucial for improving quality of life and reducing complications.*

**Keywords:** *Mitral Stenosis, Rheumatic Fever, Valvular Heart Disease, Nursing Interventions, Percutaneous Mitral Balloon Valvuloplasty, Mitral Valve Replacement, Pulmonary Hypertension, Anticoagulation, Patient Education.*

### Introduction

Mitral stenosis (MS) is a type of heart valve disease marked by the narrowing of the mitral valve opening. This condition restricts blood flow from the left atrium to the left ventricle, leading to various cardiovascular complications. The primary cause of MS is rheumatic fever, which remains the leading factor despite the decline of this condition in developed countries due to widespread use of antibiotics. Rheumatic fever often leads to long-term damage to the heart valves, and mitral stenosis typically develops over several

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decades following the initial infection. Initially, MS may not produce significant symptoms, and many individuals remain asymptomatic for years. The clinical manifestation of mitral stenosis tends to emerge gradually as the valve's ability to regulate blood flow diminishes. As the stenosis worsens, patients may experience symptoms such as shortness of breath, fatigue, and palpitations, especially during physical exertion. The pathophysiology of MS involves the thickening and fibrosis of the mitral valve leaflets and the chordae tendineae, causing the valve to stiffen and lose its ability to open fully. Over time, this results in elevated pressure in the left atrium and pulmonary circulation, which can lead to pulmonary edema and right heart failure if left untreated. The diagnosis of MS often relies on echocardiographic evaluation, which allows for the assessment of valve morphology, the size of the valve opening, and the degree of stenosis. Treatment typically involves managing symptoms and, in severe cases, surgical intervention, such as valve replacement or balloon valvuloplasty.

### *Nursing Diagnosis*

Patients with mitral stenosis are at risk for inadequate perfusion due to fluid overload, which significantly impacts cardiovascular function. The accumulation of excess fluid leads to increased preload and elevated pressures within the pulmonary and systemic circulation, resulting in hemodynamic instability. A key indicator of fluid overload is rapid weight gain, often exceeding three pounds daily, which reflects worsening fluid retention and inadequate compensatory mechanisms. This excessive fluid accumulation contributes to the development of peripheral edema, pulmonary congestion, and subsequent respiratory distress. Patients experiencing inadequate perfusion often present with dyspnea, particularly during exertion or while lying flat, due to increased pulmonary capillary pressure. Palpitations may also occur, reflecting compensatory tachycardia as the heart struggles to maintain adequate cardiac output. Additionally, fatigue is a common symptom due to reduced oxygen delivery to tissues, leading to decreased exercise tolerance and overall functional decline. Anxiety frequently accompanies these physiological changes, as patients may experience heightened distress due to their symptoms and uncertainty about disease progression. The progression of fluid overload further exacerbates gastrointestinal symptoms, including anorexia, which results from congestion of the hepatic and gastrointestinal circulation. As the condition advances, patients may report chest discomfort due to increased workload on the heart and reduced coronary perfusion. Effective management of inadequate perfusion requires continuous monitoring of fluid status, early identification of worsening symptoms, and appropriate therapeutic interventions, such as diuretic therapy, dietary modifications, and, in severe cases, surgical procedures to alleviate mitral valve obstruction.

### *Causes*

Rheumatic fever remains the leading cause of mitral stenosis, primarily resulting from an untreated or inadequately treated streptococcal infection. The inflammatory response triggered by rheumatic fever leads to progressive fibrosis and thickening of the mitral valve leaflets, ultimately causing stenosis. The clinical manifestations of mitral stenosis typically appear decades after the initial rheumatic episode, making early diagnosis and treatment of streptococcal infections critical in preventing long-term complications. In addition to rheumatic fever, other less common causes contribute to mitral stenosis. Degenerative calcification of the mitral valve leaflets can occur with aging, leading to restricted valve mobility and reduced orifice size. Congenital heart defects, such as parachute mitral valve or congenital mitral stenosis, may also result in early-onset disease. Furthermore, certain infectious and systemic conditions contribute to mitral valve dysfunction. Infective endocarditis can lead to valvular damage and stenosis due to persistent inflammation and tissue destruction. Several systemic and metabolic disorders have been linked to mitral stenosis. Mitral annular calcification, commonly seen in elderly patients and those with chronic kidney disease, can impair valve function. Endomyocardial fibroelastosis, a rare pediatric condition, leads to fibrotic thickening of the endocardium, affecting cardiac function. Malignant carcinoid syndrome, systemic lupus erythematosus, Whipple disease, and Fabry disease are also associated with valvular abnormalities, including mitral stenosis. Additionally, autoimmune diseases such as rheumatoid arthritis can cause valvular inflammation and fibrosis, further contributing to stenotic changes.

### *Risk Factors*

The risk of developing mitral stenosis varies based on geographic location, socioeconomic status, and demographic factors. Rheumatic heart disease, the primary cause of mitral stenosis, has become rare in developed countries due to improved healthcare access and widespread antibiotic use. The incidence in these regions is estimated to be approximately 1 in 100,000. However, in developing nations, where access to early diagnosis and treatment of streptococcal infections is limited, the prevalence remains significantly higher. In Africa, for instance, the prevalence reaches 35 cases per 100,000, highlighting the ongoing burden of rheumatic disease in low-resource settings. Gender and age also influence the likelihood of developing rheumatic mitral stenosis. Studies indicate that the condition is more common in females, with symptoms often emerging between the third and fourth decades of life. This delayed onset is attributed to the progressive nature of rheumatic valve damage, which typically manifests clinically years after the initial inflammatory insult. Other contributing factors include poor socioeconomic conditions, inadequate medical care, and genetic predisposition, which may increase susceptibility to rheumatic fever and its complications. Understanding these risk factors is essential for targeted prevention strategies, early detection, and appropriate management of mitral stenosis in high-risk populations [1][2].

### *Assessment*

Mitral stenosis typically manifests 20 to 40 years after an episode of rheumatic fever. The most common symptoms include orthopnea and paroxysmal nocturnal dyspnea, which result from increased pulmonary venous pressure. Patients may also experience palpitations, chest pain, and hemoptysis. In cases where the left atrial volume is significantly increased, thromboembolism may occur. If right-sided heart failure develops, additional symptoms such as ascites, peripheral edema, and hepatomegaly may be present. Symptoms often worsen with physical exertion and pregnancy due to increased circulatory demands. Fatigue and generalized weakness are common, reflecting decreased cardiac output and reduced oxygen delivery to tissues. Cardiac auscultation reveals several characteristic findings. The first heart sound is typically loud and may be palpable due to the increased closing force of the mitral valve. In cases of severe pulmonary hypertension secondary to mitral stenosis, the pulmonic (P2) component of the second heart sound (S2) is accentuated. An opening snap (OS) may be heard following the aortic (A2) component of S2, indicating the forceful opening of the mitral valve due to elevated left atrial pressure. A mid-diastolic rumbling murmur with presystolic accentuation is a hallmark of mitral stenosis. This low-pitched murmur is best heard with the bell of the stethoscope at the apex. It becomes more pronounced in the left lateral decubitus position and with isometric exercise. In advanced cases, signs of right-sided heart failure and pulmonary hypertension become evident. These include jugular venous distension, parasternal heave, hepatomegaly, and ascites. Other clinical findings may include atrial fibrillation, a left parasternal heave (suggesting right ventricular hypertrophy), and a tapping apical beat due to an accentuated first heart sound.

### *Evaluation*

Mitral stenosis is assessed using both noninvasive and invasive diagnostic methods. Noninvasive techniques include electrocardiogram (ECG), chest X-ray, echocardiogram, and exercise echocardiogram. Invasive evaluation involves cardiac catheterization, which is performed when noninvasive tests yield inconclusive results or when clinical findings do not align with imaging assessments [3][4][5]. ECG findings often indicate left atrial enlargement through characteristic P wave changes. Severe pulmonary hypertension is suggested by right axis deviation and right ventricular hypertrophy. Atrial fibrillation is frequently detected, reflecting the impact of left atrial pressure overload on cardiac rhythm [3][4][5]. Chest X-ray findings vary with disease progression. In the early stages, the cardiac silhouette may appear normal, but subtle changes such as straightening of the left heart border, prominent main pulmonary arteries, and upper pulmonary vein dilation may be observed. As mitral stenosis advances, chest X-ray reveals enlargement of all cardiac chambers, pulmonary arteries, and pulmonary veins, reflecting chronic pressure overload and volume redistribution [3][4][5].

Echocardiography is essential for evaluating mitral stenosis etiology, morphology, severity, and treatment planning. Morphological analysis of the mitral valve includes assessments of leaflet mobility, flexibility,

thickness, calcification, subvalvular fusion, and commissural appearance. The Wilkins and Padial scoring systems are used to quantify mitral valve pathology. The Wilkins score grades leaflet mobility, thickness, calcification, and subvalvular impairment on a scale of 1 to 4, with a total score of less than 8 predicting better outcomes. The Padial score similarly evaluates leaflet thickening, commissural calcification, and subvalvular disease, with a score below 10 indicating favorable prognosis [3][4][5]. Exercise echocardiography is performed using either an upright treadmill or supine bicycle while Doppler recordings measure transmitral gradient and pulmonary artery systolic pressure at rest and during exertion. This test assesses hemodynamic response to stress, aiding in the identification of patients who may benefit from intervention [3][4][5]. Cardiac catheterization is reserved for cases where noninvasive tests are inconclusive. It provides direct hemodynamic measurements of mitral valve function and pulmonary pressures. The procedure is recommended when there is a significant discrepancy between noninvasive imaging results and clinical findings regarding disease severity (Class I, Level of Evidence C) [3][4][5].

#### *Classification of Severity of Mitral Valve Stenosis*

Mitral valve stenosis is classified based on mean gradient pressure, pulmonary artery systolic pressure, and valve area. In mild mitral stenosis, the mean gradient pressure is less than 5 mmHg, pulmonary artery systolic pressure remains below 30 mmHg, and the valve area is greater than 1.5 cm<sup>2</sup>. Patients with mild stenosis may remain asymptomatic or present with mild exertional dyspnea. Moderate mitral stenosis is characterized by a mean gradient pressure between 5 and 10 mmHg, pulmonary artery systolic pressure ranging from 30 to 50 mmHg, and a valve area between 1.0 and 1.5 cm<sup>2</sup>. Symptoms in this category often include increased dyspnea on exertion and reduced exercise tolerance. Severe mitral stenosis is defined by a mean gradient pressure exceeding 10 mmHg, pulmonary artery systolic pressure greater than 50 mmHg, and a valve area less than 1.0 cm<sup>2</sup>. Patients with severe stenosis typically experience significant functional limitations, orthopnea, and pulmonary congestion due to elevated left atrial pressure. The classification of severity is critical for guiding clinical management and determining the need for intervention, such as percutaneous mitral balloon valvotomy or surgical valve replacement.

#### *Mitral Valve Anatomy According to the Wilkins Score*

The Wilkins score is used to assess mitral valve anatomy based on four criteria: mobility, thickening, calcification, and subvalvular thickening. A Grade 1 valve has high mobility with only leaflet tip restriction, near-normal thickness of 4 to 5 mm, a single area of increased echogenicity indicating mild calcification, and minimal subvalvular thickening. Grade 2 valves exhibit slightly reduced mobility with mid-leaflet thickening (5 to 8 mm), scattered calcification at leaflet margins, and chordal thickening extending to one chordal length. In Grade 3, mobility is further reduced with leaflet movement primarily from the base, thickness extends throughout the leaflet (5 to 8 mm), calcification reaches the mid-leaflets, and subvalvular thickening extends to the distal third of the chords. Grade 4 represents the most severe involvement, with minimal or absent leaflet movement in diastole, extensive leaflet thickening exceeding 8 to 10 mm, widespread calcification throughout the leaflets, and severe subvalvular thickening extending to the papillary muscles. The Wilkins score helps determine the feasibility of percutaneous mitral balloon valvotomy, with lower scores indicating better procedural outcomes.

#### *Medical Management of Mitral Stenosis*

The management of mitral stenosis involves medical therapy, percutaneous mitral balloon valvuloplasty (PMBV), and surgical intervention. While no medical therapy can relieve the fixed obstruction of the mitral valve, pharmacological treatment aims to prevent complications, control symptoms, and reduce the risk of thromboembolic events. The primary goals of medical management include preventing endocarditis, reducing the incidence of new cases of rheumatic fever, managing symptoms, and decreasing the risk of stroke or systemic embolism. Endocarditis prophylaxis is recommended only for high-risk patients undergoing dental procedures that involve gingival tissue manipulation or perforation of the oral mucosa. High-risk patients include those with a prosthetic heart valve, a history of infective endocarditis, or cardiac valvuloplasty with prosthetic material. These individuals require prophylactic antibiotics to prevent infective endocarditis, which can further compromise valvular function and increase morbidity.

Rheumatic fever prophylaxis is essential in patients with a history of streptococcal pharyngitis, as recurrent episodes can worsen mitral stenosis. Benzathine penicillin remains the primary prophylactic treatment, administered intramuscularly to prevent rheumatic fever recurrence. This approach is particularly important in regions where rheumatic heart disease is endemic and accounts for a significant proportion of mitral stenosis cases. Symptom management depends on whether the patient is in normal sinus rhythm or atrial fibrillation. In patients with normal sinus rhythm, symptom relief is achieved using diuretics to reduce pulmonary congestion and alleviate dyspnea. Beta-blockers and calcium channel blockers are commonly prescribed to control heart rate, particularly in patients with exertional symptoms due to an elevated heart rate. These medications help prolong diastolic filling time, reducing left atrial pressure and improving cardiac output. In patients with atrial fibrillation, rate control is the primary therapeutic target. Beta-blockers, calcium channel blockers, and digitalis are used to slow atrioventricular conduction and control ventricular response. If the patient is hemodynamically unstable, direct current cardioversion is performed to restore sinus rhythm. In stable patients, restoring sinus rhythm is generally preferred over rate control, as it improves functional capacity and overall quality of life. Long-term rhythm management strategies, such as catheter ablation or antiarrhythmic drug therapy, may be considered in selected patients to prevent recurrence of atrial fibrillation.

Anticoagulation therapy is essential for patients with mitral stenosis and atrial fibrillation, prior embolic events, or the presence of a left atrial thrombus. Warfarin is the anticoagulant of choice, as newer direct oral anticoagulants (DOACs) have not been approved for mitral stenosis-related atrial fibrillation. The international normalized ratio (INR) should be maintained at a target of 2.5 to minimize the risk of thromboembolism while avoiding excessive bleeding complications. Antiplatelet agents such as aspirin are not recommended for reducing thromboembolic risk in mitral stenosis. For patients with symptomatic moderate or severe mitral stenosis, PMBV is the preferred intervention if valve morphology is favorable and there is no left atrial thrombus or significant mitral regurgitation. This percutaneous procedure improves symptoms by increasing the mitral valve area and reducing the mitral valve gradient. Candidates for PMBV typically exhibit symptoms classified as New York Heart Association (NYHA) functional class II or higher, or have evidence of pulmonary hypertension. Mitral valve replacement surgery is indicated in patients with symptomatic moderate or severe mitral stenosis when PMBV is contraindicated or when valve morphology is unfavorable. Surgical intervention is considered Class I, Level of Evidence B, particularly for patients with severe calcification, subvalvular fusion, or extensive mitral regurgitation. While mechanical prosthetic valves require lifelong anticoagulation, bioprosthetic valves offer the advantage of reduced thromboembolic risk but have limited durability. Medical management plays a crucial role in mitigating symptoms and preventing complications in mitral stenosis. However, timely intervention with PMBV or surgery is necessary for patients with progressive disease or significant hemodynamic impairment [6][7][8].

### *Nursing Management of Mitral Stenosis*

Nursing management of mitral stenosis (MS) focuses on monitoring patients, preventing complications, managing symptoms, and providing education and support for self-care. Effective nursing care is vital to improving patient outcomes, particularly in preventing endocarditis, managing symptoms, and minimizing the risk of thromboembolic events. A multifaceted approach is required to ensure optimal care for these patients.

#### *Monitor Vital Signs*

Continuous monitoring of vital signs is a fundamental aspect of nursing care for patients with mitral stenosis. Given the potential for hemodynamic instability, regular assessments of heart rate, blood pressure, respiratory rate, and oxygen saturation are essential. These patients are at risk of arrhythmias, such as atrial fibrillation, and signs of heart failure, such as elevated heart rate and low blood pressure. Close monitoring allows early identification of any deterioration in the patient's condition, such as worsening pulmonary edema or the development of atrial fibrillation, which requires immediate intervention.

### *Universal Precaution for Infection Control*

Infection prevention is crucial for patients with mitral stenosis, especially in preventing infective endocarditis (IE) and reducing the incidence of rheumatic fever. Since patients with MS are at an increased risk of bacterial infections that may lead to endocarditis, universal precautions should be followed diligently. The nursing staff must emphasize the importance of hygiene and infection control practices, particularly before invasive procedures, dental work, or any procedures that could compromise the mucosal barriers. Additionally, prophylactic antibiotics should be administered before such procedures for high-risk patients. Nurses should also ensure that patients are educated about the signs and symptoms of endocarditis, such as fever, fatigue, and new heart murmurs, which require prompt medical attention.

### *Symptom Management*

Symptom management is central to nursing care in mitral stenosis. The most common symptoms of MS include dyspnea, fatigue, palpitations, and orthopnea. Nurses should assess these symptoms regularly and ensure that they are managed effectively through both pharmacological and non-pharmacological interventions. Diuretics, beta-blockers, or calcium channel blockers may be administered to reduce pulmonary congestion and control heart rate. Oxygen therapy may be needed to relieve dyspnea and improve oxygenation, especially if pulmonary edema is present. Nurses should also educate patients about avoiding activities that could exacerbate symptoms, such as heavy lifting or extreme exertion. Patients should be encouraged to rest and adopt positions that ease breathing, such as sitting upright or using multiple pillows to sleep.

### *Monitor Signs and Symptoms of Deep Vein Thrombosis (DVT)*

Mitral stenosis, particularly in the presence of atrial fibrillation, increases the risk of thromboembolic events, including deep vein thrombosis (DVT). Nurses should assess patients regularly for signs and symptoms of DVT, such as swelling, redness, or warmth in the legs. Prompt recognition of DVT can prevent further complications like pulmonary embolism. In addition to monitoring clinical signs, nurses should educate patients on the importance of early ambulation and the use of compression stockings, if appropriate, to prevent blood stasis and reduce the risk of thrombus formation.

### *Elevate Legs Above the Heart*

To improve venous return and reduce the risk of swelling or edema in patients with mitral stenosis, elevating the legs above the heart is an important nursing intervention. This position helps to promote the return of venous blood to the upper body and reduces the burden on the right side of the heart. Patients should be encouraged to rest with their legs elevated whenever they are sitting or lying down, particularly if they are experiencing edema. Nurses should also assess for signs of edema and report any worsening to the healthcare team, as it may indicate fluid overload or worsening heart failure.

### *Monitor Fluid Intake to Avoid Fluid Overload*

In patients with mitral stenosis, careful monitoring of fluid intake and output is essential to avoid fluid overload, which can exacerbate pulmonary edema and worsen heart failure. Nurses should assess the patient's fluid balance daily, ensuring that fluid intake is within prescribed limits. Restricting fluid intake may be necessary for patients with significant edema or pulmonary congestion. Regular monitoring of urine output and weight is also vital, as rapid weight gain (more than 3 pounds in one day) can be an early sign of fluid retention.

### *Assess ECG and Monitor INR*

ECG monitoring is necessary for patients with mitral stenosis to detect any arrhythmias, particularly atrial fibrillation, which is common in MS. Atrial fibrillation increases the risk of thromboembolic events, necessitating anticoagulation therapy. Nurses should assess the ECG for any abnormalities in rhythm or

conduction. Additionally, patients receiving anticoagulation therapy with warfarin require frequent monitoring of their international normalized ratio (INR). Nurses should ensure that the INR is maintained within the therapeutic range (usually 2.5) to prevent both bleeding complications and thromboembolic events. Any changes in the INR should be communicated promptly to the healthcare provider.

#### *Listen to the Lungs as Pulmonary Edema is Common*

Pulmonary edema is a common complication in mitral stenosis, particularly in advanced stages. Nurses should regularly auscultate the lungs to detect early signs of pulmonary congestion, such as crackles or wheezing, which can indicate fluid accumulation in the lungs. Prompt intervention, such as diuretics or oxygen therapy, is necessary if pulmonary edema is suspected. Nurses should also assess the patient's respiratory rate and oxygen saturation, as these may indicate the severity of the condition. Patients should be educated on the signs of pulmonary edema, including shortness of breath, coughing, and pink frothy sputum, which require immediate attention.

#### *Listen to the Heart: MS Presents with a Loud S1*

A key physical finding in mitral stenosis is the loud first heart sound (S1), which results from the forceful closure of the mitral valve due to the narrowed orifice. Nurses should listen carefully to the heart sounds during auscultation, noting the intensity and timing of the S1. The presence of a loud S1 can be an indicator of the severity of the stenosis and is important for assessment during the patient's regular visits. Nurses should also be familiar with the characteristic murmur of mitral stenosis, which may help in assessing the progression of the disease and guiding treatment decisions.

#### *Encourage Diet: Failure to Thrive is Common*

Failure to thrive is a common issue in patients with severe mitral stenosis, particularly in children or elderly patients, due to the increased metabolic demands of the heart and reduced appetite. Nurses should encourage a balanced diet rich in nutrients and assist with meal planning to ensure adequate caloric intake. In some cases, patients may need enteral feeding support if they are unable to meet their nutritional needs orally. Monitoring weight and assessing malnutrition are important components of nursing care.

#### *Educating Patients on the Disease and Surgery*

Education is a vital component of nursing management in mitral stenosis. Nurses should ensure that patients understand their condition, the progression of the disease, and the potential need for surgical interventions such as percutaneous mitral balloon valvuloplasty or mitral valve replacement. Clear communication about the risks, benefits, and expected outcomes of surgery will help alleviate anxiety and allow patients to make informed decisions about their care. Nurses should also provide information on lifestyle modifications, such as avoiding excessive physical exertion, managing symptoms, and adhering to prescribed medications. Regular follow-up appointments should be scheduled to assess the patient's progress and provide ongoing support. In conclusion, nursing management of mitral stenosis involves a comprehensive approach that includes vigilant monitoring, effective symptom management, and patient education. By implementing these strategies, nurses can significantly contribute to improving the quality of life and clinical outcomes for patients with mitral stenosis.

#### *When to Seek Help for Mitral Stenosis*

Patients with mitral stenosis need to be vigilant about their symptoms and seek help if they experience any significant changes. Early intervention can prevent further complications and improve outcomes. The following signs and symptoms indicate when immediate medical attention should be sought:

### *Weight Gain Greater Than 3 Pounds Daily*

Rapid weight gain of more than 3 pounds in one day is a warning sign of fluid retention. This can indicate worsening heart failure, particularly in patients with mitral stenosis. Fluid buildup, often in the lungs or extremities, can exacerbate pulmonary edema and further strain the heart. Monitoring daily weight is essential for managing fluid status, and any significant weight gain should be reported to a healthcare provider immediately. Timely intervention, including diuretics or adjusting fluid intake, can help alleviate symptoms and prevent further complications.

### *Shortness of Breath*

Shortness of breath (dyspnea) is a common symptom in mitral stenosis, especially as the disease progresses. However, sudden or worsening shortness of breath, especially at rest or while lying flat, can indicate pulmonary congestion or edema, which requires immediate attention. This condition arises when blood backs up into the lungs due to the heart's inability to pump effectively. If the patient is experiencing significant difficulty breathing or has a sudden onset of breathlessness, they should seek emergency care to assess the severity and provide appropriate interventions, such as oxygen therapy or diuretics.

### *Chest Pain*

Chest pain in patients with mitral stenosis should always be treated with caution. It may indicate myocardial ischemia (lack of blood flow to the heart muscle) or angina, which can occur if the heart is under increased stress due to the obstruction of the mitral valve. Chest pain could also signify a heart attack or other serious cardiovascular conditions, which require immediate medical evaluation. Any new, unexplained chest pain or discomfort should be assessed promptly by a healthcare provider to rule out life-threatening causes and initiate appropriate treatment. Patients with mitral stenosis should be proactive in monitoring their symptoms and seeking help when necessary. Weight gain, shortness of breath, and chest pain are critical signs that require immediate medical attention. By recognizing these warning signs early, patients can reduce the risk of serious complications and improve their quality of life.

### *Outcome Identification for Mitral Stenosis*

Historically, the prognosis for patients with mitral stenosis was poor, particularly before the advent of open-heart surgery. In the absence of effective surgical interventions, the disease often led to severe complications, including heart failure, thromboembolic events, and premature death. However, with advancements in surgical techniques, particularly mitral valve replacement (MVR), the outlook for patients with mitral stenosis has greatly improved. In the modern era, mitral valve replacement provides a substantial increase in survival rates, offering patients a better prognosis compared to earlier procedures like commissurotomy. Studies have shown that patients who undergo MVR generally experience a significant improvement in survival, with a ten-year survival rate of around 80%. This survival rate reflects advancements in surgical techniques, post-operative care, and management of complications.

Despite these improvements, the prognosis remains less favorable for patients who develop pulmonary hypertension, a common and serious complication of mitral stenosis. Pulmonary hypertension occurs when elevated pressures in the left atrium and pulmonary veins are transmitted to the lungs, leading to increased pressure in the pulmonary arteries. For patients with this condition, survival rates drop significantly, with many individuals experiencing a survival duration of less than three years after diagnosis. Furthermore, other complications associated with mitral stenosis can negatively impact long-term outcomes. Stroke is a particularly concerning complication due to the increased risk of thromboembolic events in patients with atrial fibrillation, a common arrhythmia seen in mitral stenosis. Persistent atrial fibrillation can further complicate the clinical picture, leading to worsening heart failure and an increased risk of stroke. These factors contribute to the overall morbidity of the disease, even in patients undergoing surgical intervention. In summary, while the prognosis for mitral stenosis has greatly improved with the availability of mitral valve replacement, outcomes are still influenced by the presence of pulmonary hypertension, stroke, and atrial



fibrillation. Early diagnosis, appropriate management, and timely intervention are key to improving the long-term survival and quality of life for patients with mitral stenosis.

### *Monitoring in Mitral Stenosis Management*

Effective management of mitral stenosis requires careful monitoring of several clinical parameters to assess disease progression, guide treatment decisions, and prevent complications. Below are the key aspects of monitoring that should be routinely performed in patients with mitral stenosis:

#### *Blood Pressure*

Blood pressure is a critical parameter to monitor, as both elevated and low blood pressure can worsen the condition. High blood pressure can exacerbate left atrial pressure, further increasing the risk of pulmonary congestion, while low blood pressure can indicate heart failure or inadequate cardiac output. Regular blood pressure monitoring helps in adjusting medications, such as antihypertensives or diuretics, to maintain optimal heart function.

#### *Temperature*

Temperature monitoring is essential for detecting any signs of infection, such as endocarditis, which is a significant risk for patients with mitral stenosis, particularly in the presence of artificial valves or a history of rheumatic fever. An elevated temperature could indicate systemic infection, necessitating further investigation and potentially antibiotic therapy.

#### *Respiration*

Respiratory rate and oxygen saturation should be monitored regularly to detect any signs of pulmonary edema or respiratory distress, which are common in advanced mitral stenosis. An increased respiratory rate or the need for supplemental oxygen can signal worsening heart failure or pulmonary hypertension, requiring immediate medical intervention.

#### *Complete Blood Count (CBC) with Differential*

A CBC with differential help monitors signs of infection (e.g., elevated white blood cell count) or anemia, which can worsen the symptoms of mitral stenosis. Anemia can exacerbate fatigue and weakness in patients with compromised cardiac function. Additionally, a differential helps assess the distribution of various white blood cells, which could provide insight into ongoing systemic conditions.

#### *Comprehensive Metabolic Panel (CMP)*

The CMP is vital in monitoring kidney function, electrolytes, and overall metabolic status. Mitral stenosis can lead to fluid retention, electrolyte imbalances, and renal impairment, particularly in the setting of diuretic therapy or heart failure. Regular CMP testing ensures that electrolytes are balanced, and that renal function is adequate, which is essential for preventing complications.

#### *Fluid and Electrolyte Balance*

Monitoring fluid and electrolyte levels is crucial to prevent fluid overload, especially in patients with advanced mitral stenosis or heart failure. Electrolyte imbalances, particularly low potassium or sodium levels can exacerbate arrhythmias and worsen heart failure symptoms. Proper fluid management is essential to avoid pulmonary congestion, ascites, or peripheral edema.

### *International Normalized Ratio (INR)*

For patients on anticoagulation therapy, such as warfarin, monitoring the INR is critical to ensure that the blood's clotting ability is appropriately managed. An INR that is too low increases the risk of thromboembolic events, such as stroke, while an INR that is too high increases the risk of bleeding. Regular INR testing ensures that patients with mitral stenosis and atrial fibrillation remain within the therapeutic range to prevent complications.

### *Electrocardiogram (ECG)*

An ECG is an essential tool for assessing the presence of atrial arrhythmias, especially atrial fibrillation, which is common in patients with mitral stenosis. Atrial fibrillation increases the risk of thromboembolic events and can worsen symptoms of heart failure. Regular ECG monitoring helps detect any changes in the rhythm and provides information on the heart's electrical activity, guiding decisions regarding rate control, rhythm conversion, or anticoagulation therapy. Regular monitoring of these parameters is critical for patients with mitral stenosis to prevent complications and guide treatment decisions. By closely tracking blood pressure, temperature, respiration, blood counts, electrolytes, INR, and ECG findings, healthcare providers can ensure timely interventions and optimal patient care. These measures help mitigate the risks associated with mitral stenosis, improve patient outcomes, and provide a clearer understanding of disease progression.

### *Coordination of Care in Mitral Stenosis Management*

Upon diagnosing mitral stenosis, a comprehensive and coordinated care plan is essential to ensure optimal patient outcomes. This includes regular monitoring, patient education, interdisciplinary communication, and timely interventions to address the multifaceted needs of the patient.

### *Patient Education and Regular Follow-up*

Education is a fundamental component of managing mitral stenosis. Patients need to understand the importance of monitoring their symptoms and adhering to treatment protocols. Those who remain asymptomatic should undergo annual evaluations, including echocardiograms, to assess the progression of the disease and detect any potential complications. Regular check-ups will help in identifying the need for surgical intervention or adjustments in medical therapy as the disease progresses. For patients experiencing palpitations, which are common in mitral stenosis due to atrial fibrillation or other arrhythmias, a Holter monitor may be necessary to confirm the presence and pattern of these arrhythmias. This allows for more accurate diagnosis and helps in planning appropriate treatment strategies such as rate control or rhythm conversion.

### *Anticoagulation Therapy and Monitoring*

Patients with mitral stenosis, particularly those with atrial fibrillation, are at an increased risk for thromboembolic events. As a result, many patients will require anticoagulation therapy, commonly with warfarin, to reduce this risk. Given the risks associated with anticoagulation, it is crucial for the pharmacist to collaborate with the healthcare team to ensure that monthly blood work, including INR testing, is performed. The INR levels must be carefully monitored and adjusted to maintain therapeutic anticoagulation, reducing the risk of stroke or bleeding complications. The patient should also be educated on the signs of bleeding or clotting to ensure that they can seek immediate medical attention if necessary.

### *Nutritional Support*

Failure to thrive is a common issue in patients with mitral stenosis, particularly in advanced stages of the disease. Patients may experience poor appetite, fatigue, or difficulty maintaining a proper diet due to the strain on the heart. A dietary consult is often beneficial to address these concerns, ensuring that patients

are receiving the appropriate nutrients to support overall health and energy levels. Proper nutrition plays a critical role in managing heart failure symptoms and improving patient outcomes.

### *Surgical Intervention and Prosthetic Valve Education*

Surgical intervention may be required in some cases, especially when patients develop significant symptoms, pulmonary hypertension, or heart failure. Patients should be thoroughly educated on the types of prosthetic valves available, including mechanical and biological options. The pros and cons of each type of valves should be discussed, considering the patient's age, lifestyle, and medical history. For instance, mechanical valves require lifelong anticoagulation, while biological valves may not, but they tend to have a shorter lifespan. The decision regarding which prosthetic valve to use should involve careful consideration by the cardiologist, surgeon, and patient. This ensures that the chosen valve type aligns with the patient's long-term health goals and quality of life.

### *Infection Prophylaxis and Coordination with Healthcare Team*

Mitral stenosis patients, particularly those with a prosthetic valve or a history of endocarditis, are at risk for developing infective endocarditis. It is essential for patients to understand the importance of prophylactic antibiotics before any invasive procedures, such as dental work or surgery, that could lead to bacteremia. The primary care provider, pharmacist, and nurses should all coordinate in educating the patient about the signs and symptoms of an infection, as well as the importance of adhering to prophylaxis guidelines. Additionally, the interdisciplinary team should provide a comprehensive care plan, involving the cardiologist, primary care provider, pharmacist, and nurses, to ensure that all aspects of the patient's care are managed effectively. This coordinated approach helps in optimizing treatment, preventing complications, and ensuring that the patient receives the best possible care throughout the course of the disease. Coordination of care for patients with mitral stenosis is critical for ensuring effective disease management and improving patient outcomes. Through patient education, regular monitoring, anticoagulation management, nutritional support, and surgical preparation, the healthcare team can address the multifaceted challenges posed by this condition. A collaborative approach involving all members of the care team, including the primary care provider, pharmacist, and nursing staff, helps ensure that patients receive comprehensive care tailored to their individual needs, ultimately leading to better quality of life and improved long-term prognosis [1][12].

### *Risk Management*

Risk management in mitral stenosis focuses on preventing complications and improving patient outcomes through a collaborative, interprofessional approach. Mitral stenosis, often resulting from rheumatic fever, has a higher prevalence in populations with inadequate treatment for streptococcal infections. The rise of cases in the U.S. is attributed to increased immigration from regions where rheumatic fever remains prevalent. As such, the primary preventive strategy is ensuring effective management of strep throat with antibiotics to prevent rheumatic fever and, consequently, mitral stenosis [11][12]. Once diagnosed, patients need to be educated on the potential need for surgery, particularly if symptoms become severe. Asymptomatic patients should receive annual evaluations, including echocardiograms, to monitor disease progression. For those with palpitations, a Holter monitor is recommended to detect atrial arrhythmias. In many cases, anticoagulation with warfarin is necessary, especially for patients with atrial fibrillation, a common complication of mitral stenosis. This requires close monitoring of the INR, ensuring therapeutic levels to reduce the risk of thromboembolic events. Nurses play a crucial role in managing anticoagulation therapy and should coordinate regular blood tests [11]. Dietary consults are also essential for patients, as failure to thrive is common in those with advanced mitral stenosis. Malnutrition and weight loss can exacerbate symptoms, making nutritional support an important aspect of care. Additionally, patients are educated on the types of prosthetic valves available, as the choice of valve depends on individual factors such as age, lifestyle, and comorbidities. A cardiac surgery nurse is integral in helping patients understand their options and the long-term implications of valve replacement surgery [12]. Lastly, preventing infection is critical. Patients with mitral stenosis, particularly those with prosthetic valves, are at higher risk for infective endocarditis. Prophylactic antibiotics before invasive procedures are necessary to reduce the risk

of valve infection. The primary care provider, pharmacist, and nursing team must work closely to ensure patients understand the importance of infection prevention and adherence to prescribed therapies [12].

### *Discharge Plan*

Discharge planning for patients with mitral stenosis involves several critical components to ensure continuity of care and prevent complications after hospitalization. One of the key aspects is medication reconciliation, which ensures that all prescribed medications are accurately documented and that any changes made during the hospital stay are communicated to the patient and their primary care provider. This is especially important for patients on anticoagulation therapy, as improper use of medications like warfarin can lead to serious complications, such as bleeding or thromboembolic events. Follow-up appointments are another crucial element of discharge planning. These should be scheduled to monitor the patient's progress, check for any potential complications, and assess the effectiveness of the treatment plan. Patients should be educated on the importance of attending these appointments, especially for ongoing evaluations like echocardiograms, INR monitoring, and assessments for atrial fibrillation or signs of heart failure. Coordination with specialists, including cardiologists and dietitians, may also be necessary for patients requiring long-term management. Additionally, patients should be educated on lifestyle modifications and self-monitoring techniques, particularly if they are prescribed anticoagulation therapy or require dietary adjustments due to failure to thrive. The healthcare team should provide the patient with clear instructions on when to seek help, such as signs of stroke, heart failure, or infection, which may indicate complications [13-19].

### **Conclusion**

Mitral stenosis (MS) is a complex and progressive valvular heart disease that poses significant challenges to both patients and healthcare providers. Its primary cause, rheumatic fever, underscores the importance of early diagnosis and treatment of streptococcal infections to prevent long-term complications. Despite the decline of rheumatic fever in developed countries, MS remains a prevalent condition in low-resource settings, highlighting the need for global health initiatives to address this preventable disease. The clinical manifestations of MS, including dyspnea, fatigue, and palpitations, often emerge decades after the initial rheumatic insult, making early detection and monitoring critical. Advanced diagnostic tools, such as echocardiography, play a pivotal role in assessing the severity of stenosis and guiding treatment decisions. Medical management focuses on symptom relief, anticoagulation for atrial fibrillation, and prevention of rheumatic fever recurrence. However, in cases of severe stenosis, surgical interventions like percutaneous mitral balloon valvuloplasty (PMBV) or mitral valve replacement are necessary to improve hemodynamics and patient outcomes. Nursing care is integral to the management of MS, particularly in monitoring fluid balance, managing symptoms, and preventing complications such as pulmonary edema and thromboembolic events. Nurses also play a vital role in patient education, ensuring that individuals understand their condition, adhere to treatment regimens, and recognize signs of worsening symptoms. Infection prevention, particularly in patients with prosthetic valves, is another critical aspect of nursing care, requiring close collaboration with the healthcare team. The prognosis for patients with MS has improved significantly with advancements in surgical techniques and postoperative care. However, complications such as pulmonary hypertension, atrial fibrillation, and thromboembolic events continue to impact long-term outcomes. Early intervention, coordinated care, and patient adherence to follow-up protocols are essential for optimizing outcomes and enhancing quality of life. In conclusion, mitral stenosis is a multifaceted condition that demands a comprehensive and multidisciplinary approach to management. By combining medical, surgical, and nursing interventions, healthcare providers can effectively address the challenges posed by MS and improve the lives of patients affected by this debilitating disease.

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## ضيق الصمام التاجي: مراجعة محدثة لبروتوكولات التدخل التمريضي

### الملخص :

**الخلفية:** تضيق الصمام التاجي (MS) هو مرض قلبي صمامي يتميز بتضيق الصمام التاجي، والذي يسببه بشكل رئيسي الحمى الروماتيزمية. تؤدي هذه الحالة إلى ضعف تدفق الدم من الأذين الأيسر إلى البطين الأيسر، مما يسبب أعراضاً مثل ضيق التنفس، التعب، والخفقان. إذا لم يتم علاجها، يمكن أن تؤدي الـ MS إلى مضاعفات شديدة مثل ارتفاع ضغط الدم الرئوي، وفشل القلب، والأحداث التخثرية. على الرغم من التقدم في التدخلات الطبية والجراحية، لا يزال تضيق الصمام التاجي يشكل مصدر قلق صحي كبير، خاصة في البلدان النامية التي تنتشر فيها الحمى الروماتيزمية.

**الهدف:** تهدف هذه المراجعة إلى تقديم نظرة محدثة عن تضيق الصمام التاجي، مع التركيز على الفيزيولوجيا المرضية، والتظاهرات السريرية، وطرق التشخيص، وخيارات العلاج. كما تسلط الضوء على دور التدخلات التمريضية في إدارة الأعراض، والوقاية من المضاعفات، وتحسين نتائج المرضى.

**الطرق:** تجمع هذه المراجعة الأدبيات الحالية حول تضيق الصمام التاجي، بما في ذلك أسبابه، وعوامل الخطر، ومعايير التشخيص، واستراتيجيات العلاج. كما تبرز أهمية التصوير بالموجات فوق الصوتية للقلب في التشخيص وتصنيف شدة المرض، بالإضافة إلى دور التدخلات الطبية والجراحية والتمريضية. يتم مناقشة بروتوكولات التمريض للمراقبة، وإدارة الأعراض، وتعليم المرضى، والوقاية من العدوى بالتفصيل.

**النتائج:** تضيق الصمام التاجي هو مرض تقدمي يتطلب تدخلاً في الوقت المناسب للوقاية من المضاعفات. يركز العلاج الطبي على التحكم في الأعراض، والعلاج المضاد للتخثر في حالات الرجفان الأذيني، ومنع تكرار الحمى الروماتيزمية. الخيارات الجراحية مثل القسطرة بالبالون التاجي (PMBV) واستبدال الصمام التاجي فعالة في الحالات الشديدة. يلعب الرعاية التمريضية دوراً حاسماً في مراقبة توازن السوائل، وإدارة الأعراض، وتعليم المرضى، والوقاية من العدوى. يعد الكشف المبكر والرعاية المنسقة أمرين أساسيين لتحسين نتائج المرضى.

**الاستنتاج:** لا يزال تضيق الصمام التاجي يشكل حالة قلبية وعائية كبيرة، خاصة في المناطق التي تعاني من محدودية الوصول إلى الرعاية الصحية. يتطلب العلاج الفعال نهجاً متعدد التخصصات، بما في ذلك العلاج الطبي، والتدخل الجراحي، والرعاية التمريضية الشاملة. يعد التشخيص المبكر، وتعليم المرضى، والالتزام ببروتوكولات العلاج أمراً بالغ الأهمية لتحسين جودة الحياة وتقليل المضاعفات.

**الكلمات المفتاحية:** تضيق الصمام التاجي، الحمى الروماتيزمية، أمراض القلب الصمامية، التدخلات التمريضية، القسطرة بالبالون التاجي، استبدال الصمام التاجي، ارتفاع ضغط الدم الرئوي، العلاج المضاد للتخثر، تعليم المرضى.