Role Of Nursing Intervention For Patients With Heart Failure: A Depth Study

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Abstract: Heart failure is a chronic condition that has a high global prevalence and global burden that stems from reduced quality of life in patients, in addition with frequent hospitalizations, medicine costs and decreased life expectancy. Considering the crucial role nursing personnel play in patient care, it could be pragmatic to reiterate the general understanding for heart failure and emphasize the positive results of nursing interventions. **Aim of the study:** to formulate a comprehensive review about the role of nursing intervention in patients presenting with heart failure **Materials and methods:** This review is an extensive search of PUBMED from the year 2016 to 2026. **Conclusion:** Heart failure is disease with high fatality, disability and constant need hospitalizations. These factors increase the economic burden on these patients and reduce their quality of life. Considering the importance of the nursing interventions to the patients, reiteration of knowledge about heart failure along with personalized care by nursing personnel, and increasing the acceptance of independent nursing diagnoses can aim to improve the outcomes of treatment in patients with heart failure and reduce readmissions.

Keywords: Nursing; Interventions; Heart Failure; Management

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Introduction

Heart failure (HF) is defined as a complex clinical syndrome characterized by any structural or functional impairment of ventricular filling or ejection of blood. It is a disorder causing a high mortality and morbidity worldwide. It has a global prevalence of 26 million necessitating better management to prevent the costs of recurrent hospitalization and reduction of the associated disabilities and death.[1] Accounting for the role of nursing in patient care and hospitalization, a deeper understanding of heart failure would help to provide better care and results for patients.

A higher percentage of patients report with HFpEF compared to HFrEF. On basis of the left ventricle ejection fraction (LVEF), heart failure can be classified as: [1]

TABLE 1: Classification of Heart Failure Based of LVEF [1].

Classification	Parameters
HF with reduced ejection fraction (HFrEF)	LVEF ≤40%
HF with mildly reduced ejection fraction	LVEF 41% to 49% and evidence of HF (spontaneous or provokable elevated cardiac biomarkers or elevated filling pressures)
HF with preserved ejection fraction (HFpEF)	LVEF ≥50% and evidence of HF (spontaneous or provokable elevated cardiac biomarkers or elevated filling pressures)
HF with improved ejection fraction	LV EF >40%, with previously documented LV EF ≤40%

The ACC/AHA staging of HF are:

TABLE 2: ACC/AHA Staging of HF [2].

Staging	Description
Stage A	• At risk for HF • No current or past symptoms, structural heart disease, or evidence of elevated cardiac biomarkers, but risk factors are present • Risk factors include hypertension, diabetes, metabolic syndrome, cardiotoxic medications, or having a genetic variant for cardiomyopathy
Stage B	• Pre-HF • Patients have no signs or symptoms of HF but have risk factors and structural heart disease, evidence of elevated filling pressures (by invasive or noninvasive assessment), or persistently elevated cardiomarkers in the absence of other reasons for elevated markers, like chronic kidney disease or myocarditis
Stage C	• Symptomatic HF • Patients with current or past history of HF symptoms
Stage D	• Advanced HF • Patients with refractory symptoms that interfere with daily life or recurrent hospitalization despite targeted guideline-directed medical therapy

Etiology

The etiology of heart failure is multifactorial, with the most common cause being coronary artery disease (CAD) leading to ischemic heart disease. The etiologies are classified broadly as intrinsic heart disease and pathologies: infiltrative, congenital, valvular, myocarditis-related, high-output failure, and secondary to systemic disease.[2] The four most common etiologies accounting for two-third cases are ischemic heart disease, chronic obstructive pulmonary disease (COPD), hypertensive heart disease, and rheumatic heart disease. Higher rates of ischemic heart disease and COPD are seen in high-income countries, with higher rates of hypertensive heart disease, cardiomyopathy, rheumatic heart disease, and myocarditis in lower-income countries.[1]

TABLE 3: Causes Of Heart Failure [3].

Etiology	Features
Underlying causes	Structural abnormalities (congenital or acquired) affecting the peripheral and coronary arterial circulation, pericardium, myocardium, or cardiac valves→ increased hemodynamic burden or myocardial or coronary insufficiency
Fundamental causes	Biochemical and physiologic mechanisms → increased hemodynamic burden or a reduction in oxygen delivery to the myocardium → impairment of myocardial contraction
Precipitating causes	Precipitated by progression of the underlying heart disease (e.g.: further narrowing of a stenotic aortic valve or mitral valve) or various conditions (fever, anemia, infection) or medications (chemotherapy, nonsteroidal anti-inflammatory drugs [NSAIDs]) that alter the homeostasis of heart failure patients
Genetics of cardiomyopathy	Dilated, arrhythmic right ventricular and restrictive cardiomyopathies

Over half the cases of HF are caused by the four common underlying factors such which include: hypertension, diabetes, obesity, and smoking with at least one third of the US adults having at least of these risk factors.[3] According to the Framingham Heart Study, the prevalence of CHF was 8 per 1000 males that are aged 50 to 59 year with an increment up to 66 per 1000 for the age group of 80 to 89. The incidence of CHF is more in men than women worldwide.[4][5]

Pathophysiology

Heart Failure can be described as a progressive disease. An acute insult to the cardiac anatomy or any genetic mutation induced secondary alteration, cardiac tissue infiltration, ischemia, valvular heart disease, myocarditis, or acute myocardial injury would lead to initiation of the compensatory mechanisms which can lead to maladaptation upon exhaustion. The chronic activation of the compensatory mechanisms employed to maintain cardiac input reduce the responsiveness of the beta-receptor and adrenaline stores.[6]

The neuroendocrine system compensates for reduced cardiac output by mobilizing chemical messengers such as ET-1, vasopressin, and catecholamines (epinephrine and norepinephrine)-causing vasoconstriction which increases the afterload. Camp initiates an increase in the cytosolic

calcium in the myocytes. The myocardial contractility increases, further preventing myocardial relaxation. Impaired myocardial relaxation when combined with elevated afterload and myocardial contractibility increases the oxygen demand. The consequence of paradoxical need for increased cardiac output to meet the myocardial demand is myocardial cell death and apoptosis.[2]

As the apoptosis continues, a perpetuating cycle of increased neurohumoral stimulation and maladaptive hemodynamic and myocardial responses is created by decreased cardiac output and increased demands. The depletion of myocytes impairs cardiac contractility, resulting in a reduced ejection fraction (EF) and insufficient emptying of the left ventricle (LV). This subsequent rise in ventricular volume and pressure ultimately leads to pulmonary congestion. Antidiuretic hormone is released by the renal hypoperfusion which further potentiates the sodium and water retention. The increase of central venous and intrabdominal pressure causes the renal blood flow to reduce which further decreases the GFR.[2]

Diagnosis

Presentation

The most widely used classification for heart failure in both, clinical practice and studies is the New York Heart Association (NYHA) classification which helps to quantify the clinical assessment for HF. The cardinal symptom of left ventricular failure is breathlessness, with the severity progressively increases as: exertional dyspnea, orthopnea, paroxysmal nocturnal dyspnea, dyspnea at rest, and acute pulmonary edema.[4]

The other cardiac signs and symptoms seen are chest pain/pressure, palpitations, and peripheral edema. The noncardiac symptoms include anorexia, nausea, weight loss, bloating, fatigue, weakness, oliguria, nocturia, and cerebral symptoms of varying severity, ranging from anxiety to memory impairment and confusion.[4] An S3 or S4 gallop might be present.[2] Other findings include: pulsus alternans, accentuation of P2 heart sound, and cardiac cachexia.[4] It is observed that the older patients with heart failure frequently have preserved ejection fraction and an atypical and/or delayed presentation.[8] It is essential to identify the triggers of acute decompensation which include recent infection, noncompliance with cardiac medications, use of NSAIDs, or increased salt intake.[2]

Investigations

Patients of heart failure require a comprehensive assessment to exclude any other conditions that might present similarly. The assessment involves different blood profiles like Complete blood count (CBC), iron, liver, and kidney profile, along with additional diagnostic techniques.[2]

TABLE 5: Laboratory Investigations Of Heart Failure [2].

Laboratory Investigations	Clinical Notes
Complete blood count (CBC)	Presence of anemia or leukocytosis maybe suggestive of an infection that can trigger CHF
Liver profile	Hepatic congestion secondary to HF results in elevation of gamma-glutamyl transferase levels, aspartate aminotransferase (AST), and alanine aminotransferase (ALT)
Renal profile	• Indicates renal injury that is associated with HF and guide in the medication choice • Serum sodium level has prognostic value
Urine studies	• In possible cases of amyloidosis, urine and serum electrophoresis and monoclonal light chain assay can be performed • If the clinical suspicion is high despite a negative light chain testing, bone scintigraphy can be performed
Serum B-type natriuretic peptide (BNP)	• It can aid in differentiation of cardiac from noncardiac causes of dyspnea in patients who have ambiguous presentation • It is an independent predictor of left ventricular end-diastolic pressure and can be used to assess mortality risk in patients with HF • Elevated in renal dysfunction, atrial fibrillation, and older patients • Falsely low in patients with obesity, hypothyroidism, and advanced HF (due to myocardial fibrosis)
Cardiac enzymes	• Troponin I or T are persistently elevated when there is ongoing myocardial injury

	• It can in predicting adverse outcomes and mortality

Additional diagnostic studies that can be used are:
TABLE 6: Additional Testing [2].

Diagnostic Study	Clinical Notes
Electrocardiogram	• Evidence of prior infarction, chamber enlargement, intraventricular conduction delay, or arrhythmia • Can predict the patient's response to device for HF: presence of ventricular desynchrony, with a QRS duration of more than 120 msec
Chest radiography	• Can be used to assess the degree of pulmonary congestion and cardiac contour (cardiomegaly) • Indicative findings: enlarged cardiac silhouette, edema at the lung bases, and vascular congestion • Absence of findings does not rule out the presence of heart failure
Echocardiography	• Modality of choice in patients with HF • Readily available bedside test • Denotes structural abnormalities in cardiac chambers and valves and helps to visualize focal wall motion abnormalities • Alternative for patients with obesity, pregnancy, or mechanical ventilation: Transesophageal electrocardiography (TEE)
Cardiac catheterization	Can aid in diagnosis of ischemic cardiomyopathy and evaluate intracardiac pressures
Computed Tomography	• Can be used to assess coronary artery disease
	in young patients with ventricular dysfunction • Assess patients that might have conditions causing HF: congenital heart disease, tumors • Evaluation of stent patency and grafts
Other studies	• SPECT-myocardial perfusion imaging • Cardiac magnetic resonance imaging • Radionuclide multiple-gated acquisition (MUGA) scan • Noninvasive stress imaging • Genetic testing

Differential diagnoses could include: Acute kidney injury (AKI), acute respiratory distress syndrome (ARDS), bacterial pneumonia, cardiogenic pulmonary edema, chronic obstructive pulmonary disease (COPD), cirrhosis, community-acquired pneumonia (CAP), emphysema, Goodpasture Syndrome, Idiopathic Pulmonary Fibrosis (IPF), interstitial (Non-idiopathic), pulmonary fibrosis, myocardial infarction, nephrotic syndrome, neurogenic pulmonary edema, pulmonary embolism (PE), respiratory failure, venous insufficiency, and viral pneumonia.[4]

Management of heart failure

The management of heart failure aims at controlling the clinical symptoms, minimizing morbidities and prevent any possible mortalities, while reducing costs of hospitalizations. The management is based on the pharmacological and non-pharmacological modalities. Pharmacotherapy involves administration of diuretics, vasodilators, inotropic agents, anticoagulants, beta blockers, angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), calcium channel blockers (CCBs), digoxin, nitrates, B-type natriuretic peptides (BNPs), I(f) inhibitors, angiotensin receptor-neprilysin inhibitors (ARNIs), soluble guanylate cyclase stimulators, sodium-glucose cotransporter-2 inhibitors (SGLT2Is), and mineralocorticoid receptor antagonists (MRAs). Cation is to adhered while using NSAIDs, CCBs, and some antiarrhythmic medication as they might exacerbate the heart failure. [4] The use of these drugs varies with the staging of the disease according to the ACC/AHA staging of the disease.[1] The non-pharmacological interventions depend on the severity of the disease and aim at dietary sodium and fluid restriction; physical activity as appropriate; and attention to weight gain**.** The possible surgical options involve: revascularization procedures, arrhythmia treatment, cardiac resynchronization therapy (CRT), implantable

cardioverter-defibrillators (ICDs), valve replacement or repair, heart transplantation, and ventricular assist devices (VADs). [4] The possible complications that vigilance should be observed for are: Reduced quality of life, arrhythmia and sudden cardiac death, cardiac cachexia, cardiorenal disease, liver dysfunction, functional valvular insufficiencies (e.g.: functional MR or TR), mural thrombi and risk of thromboembolism (brain, kidney, lung, major limb vessels), recurrent hospitalizations and nosocomial infection, and mortality.[2]

Role of nursing interventions in patient care

A study by Gravely-Witte et al observed that access to chronic disease management programs for outpatients may help in delays in seeking care for HF symptoms.[9] Vera emphasized that nursing diagnoses serve as a chassis for organizing care for patients. He also highlights that the major nursing goals that require focus are centered around promoting physical activity, palliative care of fluid overload symptoms, alleviation of fatigue, anxiety management, imparting health education that is comprehensive while cultivating empowerment amongst patients towards their decision making.[10] Baker prioritized on nursing interventions to include a calm environment for patients, while educating about ways to conserve energy and recommending cardiac rehabilitation.[11] Fraser et al recommended to encourage nursing personnel to pursue specialty courses such as American Association of Heart Failure Nurse's Certified Heart Failure Nurse (CHFN) to enhance their expertise and competence in caring for patients with HF.[12]

Kumari et al observed that implementation of Heart Failure Nursing Protocol (HF-NP) by providing necessary information about heart failure showed significant outcomes by reducing breathing difficulty, activity intolerance, depression and increasing self-care adequacy, exercise intensity, and quality of life of the patients.[13] Similar observations were reported by Longhini et al and Marques et al, transitional care of patients with heart failure after hospital discharge involving phone calls and digital interventional along with home care could improve self-care in patients.[14][15] Shan et al brought spotlight to the emotional support, and the guidance provided to the patients by nurses for physical and psychological challenges that are associated with heart diseases. They recommend methods such as electronic health records, mobile health applications, telehealth, clinical decision support systems, and the use of artificial intelligence.[16]

Zhang et al noted that comprehensive nursing care treatments for heart failure patients reduced heart failure-related readmissions compared to conventional therapy.[17] Padua et al observed that the most frequent nursing diagnoses for patients with decompensated heart failure made were risk of infection, decreased cardiac output, and excessive fluid volume. These observations helped in making intervention such as vital signs monitoring, fluid monitoring, and positioning which overall helped to improve patient outcomes.[18] Parallel study by Oliveira et al demonstrated that nursing diagnoses using NANDA-I reduce the morbidity and mortality in patients.[19] In a study by Strömberg et al, it was noted that the intervention group that received nurse-led care reported fewer admissions and deaths after 12 months compared to the control group- a 55% decrease. The intervention group also had greater self-care scores compared to the control group.[20]

It is observed that creating working environments that are inclusive and collaborative with digital technologies in heart failure should be embraced with the nursing staff as help to provide transformative care to the patients.[21] Srivastava highlighted the challenges involving ensuring patient adherence, and providing solution to any barriers that might be experienced while accessing necessary resources. They recommended addressing these obstacles by personalized messages, expansion of resources, and ongoing professional development which can be utilized by healthcare professionals to optimize care delivery.[22]

Conclusion

Heart failure is disease with high fatality, disability and constant need hospitalizations. These factors increase the economic burden on these patients and reduce their quality of life. Considering the importance of the nursing interventions to the patients, reiteration of knowledge about heart failure along with personalized care by nursing personnel, and increasing the acceptance of independent nursing diagnoses can aim to improve the outcomes of treatment in patients with heart failure and reduce readmissions.

Conflict of Interest

The authors state that they have no financial and others conflicts of interest.

Author contributions

The first drafts of the work are written by the original author and the cross-ponding author's supervisor. Each author contributed to the essay, collected data, edited it, created tables, and received permission to submit it to a journal for publication.

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Ethical Approval

Not Applicable

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