

## Heart Failure: A Review

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### Abstract

In the United States, Heart Failure (HF) was the main cause of 1 out of 8 deaths in 2017 with a countrywide cost assessed at \$30.7 billion in 2012. Current statistics have shown that HF increase with age and more than 10% among people older than 70 years old with 1.4 million under 60 years and more than 5% of HF is found among individuals age 60-69. We extracted related articles from validated sources using PubMed, Medline and other search engines. The articles were evaluated and categorized based on HF relevant keywords. Results of this study revealed that patients with HF are living longer, however, gaps in communication on the part of the health care providers are detrimental to their patients' care outcomes. Hence, primary healthcare providers need to bridge the gap in communication to enable them provide appropriate and sustainable HF management with great provider-client relationships through effective education.

**Keywords:** Heart failure; Prevalence; Resources; Agencies; Management; Nurse practitioners

### Background

Heart failure is a prolonged, gradual disease categorized by failure of the heart muscles to supply enough blood to meet the nutritious and oxygen need of the body [1]. Six and half million Americans, aged 20 and above were affected with HF and it is projected that by 2030, more than 8 million would be affected, increasing the mortality rate to 46% [2]. In United States, HF was the main cause of 1 out of 8 deaths in 2017 with a countrywide cost assessed at \$30.7 billion in 2012 [3].

Unfortunately, Americans of all ages have approximately, 555,000 new cases each year [4]. Current statistics have shown that HF increase with age and more than 10% among people older than 70 years old with 1.4 million under 60 years and more than 5% of HF is found among individuals age 60-69 [4].

According to Bozkurt & Khalaf, HF is more common in females than in males with 50% prevalent in females and almost 50% of individuals confirmed with HF would expire in 60 months. However, investigators also documented that survival rate is significantly reduced in both genders and the cases of HF has decreased in females. In addition, it has been reported that males and young individuals have greater survival rates when compared to their females and older counterparts [5].

Studies have shown that females in general exhibit

diminished left ventricular output resulting in poor outcomes when compared to their male counterparts. However, medical therapies have shown no changes in management approaches between males and females in the recommendations as approved by the HF guidelines [5].

Unfortunately, numerous persons with HF were affected due to behaviors that are unhealthy which could have been changed to reduce morbidity and mortality rates incurred from cardiovascular diseases. Hence, functional and sustainable strategies are needed to enable individuals access to quality education and training to empower individuals to change to better lifestyles that lead to early prevention of chronic diseases which are precursors to HF [6]. These chronic conditions could be decreased if precautionary measures are in place to prevent or stop the risk factors to this deadly but preventable disorder.

### Prevalence

As mentioned earlier, HF affects males and females of all ages and it is an important cause of increased morbidity in both genders. The risk of developing cardiovascular disease is 1:2 for males and 1:3 for females [7]. Both genders, however, have equal lifetime risks of developing HF by the age of 40 after which the ratio of emerging HF for both males and females is 1:5 [7].

Also, HF rises as individual advances in age, and unfortunately, older females tend to be at a higher risk when compared to the males counterparts. In addition, it is important to note that as the cases of HF doubles in males of ages 65-85 years,

the HF incidence rate triples for females of same age range [7]. Also, for a decreased age, the aggregate occurrence of HF is higher in males when compared to females but levels off at age 80 among the two genders [5].

There is a trend that females are surviving more than the males, when the HF cause is not related to muscle death. Hence, females with HF have better prognosis than males when the causative factor is not related to heart attack, although, females with HF usually exhibit severe symptoms, especially in those with HF preserve ejection effect. However, frequent admissions are reduced with improved outcomes for females when compared to males after adjustment for baseline variables [5]. Non-Hispanic black females tend to die more, although with increased survival rates when compared to the male counterparts. The non-Hispanic whites cases were lowered when compared to their non-Hispanic blacks and Hispanics females [8].

Currently, the Sodium Zirconium Cyclosilicate and Patiromer have been appraised for hyperkalemia management, but they are beneficial in the deterrence of hyperkalemia in HF. Currently, individuals with overt chronic kidney disease with high serum potassium levels (4.8 or 4.9 mEq/l) are not given Renin-Angiotensin-Aldosterone System (RAAS). Sodium Zirconium Cyclosilicate and Patiromer are helpful in patients who had stopped taken pRAAS after experiencing a high potassium symptom. This management strategy would empower health care providers to start using RAAS inhibitors in patients with hyperkalemia adverse effects and there have been recommendations for further investigation towards optimization of RAAS inhibitors [9]. The speed at which Sodium Zirconium Cyclosilicate is being adopted by health care providers indicates that this novel medications may be of a better management option for abrupt hyperkalemia, although more investigations are recommended. Furthermore, there has been a call to exercise caution in prescribing potassium inhibitors as they are to be prescribed to only designated patients at this early evaluation period [9].

According to Blair, Patiromer cannot be absorbed and it is capable of replacing calcium in the gastrointestinal tract, thereby increases the excretion of potassium and reduction of serum potassium levels in the system [10]. United States has approved the use of Patiromer and many countries are adopting this medication for the treatment of hyperkalemia in adults. Blair further documented that since Patiromer reduces serum potassium levels and the risk of recurrent of high serum potassium in patients with chronic kidney disease or diabetic nephropathy with or without HF, it is therefore, allowed to be used with RAAS inhibitors in majority of patients who would not have had such an opportunity for a positive treatment outcomes.

Patiromer stabilizes potassium in patients with HF with hyperkalemia reduction, enabling concomitant administration and spironolactone titration. This medication has been proven to be well tolerated, with decreased hyperkalemia. Hypomagnesemia has been the most common adverse events with mild or moderate severity, suggestive of the use of oral form of Patiromer in prolonged management of hyperkalemia [10].

## Resources and Agencies

In 1998, the World Health Organization (WHO) initiated the Cardiovascular Research project in collaboration with WHO and other research institutes. This collaborative initiative extended globally to including many other research institutions in various countries of the world such as Australia, Switzerland, and United States, to name a few. These research institutes and organizations are responsible for six esteem collaborative research centers in the globe [6].

In addition, WHO initiated the “Global Hearts” project launched by United Nation General Assembly in 2016. The initiative objectives are to decrease, prevent and control the wide spread of cardiovascular disease, especially in developing countries. The “Global Hearts” is a program that collaborates with other research institutions including the stroke and hypertension organizations to combat and reduce the morbidity and mortality rates of cardiovascular diseases including HF, all over the globe [6].

The center for disease control (CDC) is a renowned government agency and it supports cardiovascular prevention in the entire United States. The CDC focus is on preventing the causative factors, thereby, reducing health disparities at state, local, and numerous ethnic groups using surveillance and measurable research tools [8].

Another important organization is the AHA which is involved in funding opportunities focused on cardiovascular and causative factors prevention programs. The “Million Hearts” projects for 2022 and the “Well-Integrated Screening and Evaluation for Women across the Nation” also, known as “WISEWOMAN” are critical public-private initiatives for cardiovascular prevention activities.

Over a period of five years, the “Million Hearts” has been busy with other organizations to prevent save one million hearts from heart attacks and strokes. This is accomplished through the use of antiplatelet as tolerated, and health lifestyles to prevent high blood pressure, obesity, cholesterol, smoking cessation and alcohol in moderation. The initiative also develops innovative ways to work with healthcare organizations and communities to initiate data driven measures in certain targeted centers with expansion numerous centers to reach out to both underserved and underinsured population [8].

The “WISEWOMAN” program is focused on females of ages 40-64 years, who are uninsured and under-insured with low-income. These individuals are been enabled, encouraged and empowered to understand the benefits of decreasing the HF risk factors. These projects are implemented through risk factor screenings and networking with individuals to encourage them in engaging in healthy lifestyle behavior changes, health resource availability and disease management that promote HF management with sustainability [8].

## Existing Barriers

Health disparities exist in gender, age and treatment of HF.

Females develop HF at advanced age when compared to males which predispose the females to higher morbidity and mortality. Also, HF accounts for at least half the cases in women with preserved ejection fraction than in men with the same diagnosis. Bozkurt and colleague also documented that disparities still exist in HF treatment among males when compared to females although the recommended and approved management showed no differences in treatment approaches between males and females. The investigators recommended that additional studies are needed to shed light on various methods, causative factors, and targeted treatment for HF in females [5].

According to Strachan, Kryworuchko & Li communication is a critical barrier to patients with advanced heart failure among health care providers. Some of these challenges include unclear communication about the goals of care, leaving it suboptimal. In addition, advanced health technology is an added gap in communication for older health care providers [11]. These challenges underline the urgency needed to understand and take appropriate steps to resolve these challenges. The investigators iterated that these challenges are detrimentally affecting clients and their family members than the healthcare organizations and the primary care providers' goals for treatment outcomes. Hence, needed training communication and technology usage warrant further investigations for optimal care and treatment outcomes [11].

Studies have recommended that multifaceted strategies by nurses are needed for collaborative and goal oriented strategies that would facilitate goals of care communication among between patients, family members, and health care providers. Strachan and colleagues concluded that functional communication strategies are needed to bridge the gap in care communication the patients, family members and clinicians for positive discharge outcomes [11].

## Review of Literature

Relevant articles were retrieved from PubMed, Medline using keywords on the classifications and prevalence of heart failure. This extraction yielded critical information on the HF categorization into 4 stages based on the disease severity [12]. **Stage I:** There are no symptoms or limitations in ordinary physical activity. **Stage II:** There are mild symptoms with a slight limitations during ordinary activity. **Stage III:** There are significant limitations in activity during less-than-ordinary activity and **Stage IV:** There are severe limitations at rest.

A study by Magnussen, *et al.* (2019) addressed the relationship between mortality rates, cardiovascular causative factors, prevalent cardiovascular diseases, and bio-markers' rankings. The investigators also tested the incident of HF with their attributable risks between women and men during their implementation. The researchers used community-based method in with 78,657 individuals comprised of 51.7% women of 49.5 years of age ranging from 24.1 to 98.7 years. Their results showed that there were gender differences for vital signs, bio-markers, and a reduced HF risk factors in females [13].

Another study by Lindmark *et al.* (2019) examined the trends in HF epidemiology and analytical measures through a systematic cohort study using hospital datasets. The project methods included adults with HF occurrence with 2 or more than International Codes for Diseases numbers [14]. The data were selected from the hospital data warehouse with the second cohort from 2010-2015 electronic health records admissions of primary or secondary care patients in two communities. The investigators' results also showed that the frequent of new cases of HF declined while previous cases increased, suggesting that patients with HF are living longer with the disease. Their investigation correlates with past reported epidemiological studies that are kept and used as quality control for future analytical measures and treatment for HF patients.

The third study by Lawson, *et al.* (2019) investigated on the outcomes of the causative factors and the developments related to the outcomes of patients with diabetes and HF incidents using inpatients' datasets. The data were extracted with variables on hospital admissions and mortality rates from 1998 to 2017 and samples selected from participants within the age group of 30 years or older [15]. The results showed that increases causative factors and the rise of non-cardiac development among individuals with diabetes and HF showed that it is imperative that prevention of HF comorbidities such as type 2 diabetes, obesity and other precursors to HF should be focused in preventing and finally eliminating factors that leads to increase in HF morbidity and mortality.

Although, pharmacological managements are not usually effective in advanced cases of HF, it has been documented that novel therapeutic agents, are in their developmental stages and these agents, further research are needed before they could be used for the treatment of patients with HF [16].

## Management

Patients with HF are usually admitted in intensive care units with oxygen monitoring. Other pharmacological agents used are based on causative factors and clinical manifestation for airway obstruction. HF is managed with pharmacological and non-pharmacological remedies.

**Pharmacological:** Angiotensin-converting enzyme inhibitors or angiotensin receptor blockers are among the first choices for HF management. These medications act as modifiers and vasodilators for left ventricle ejection fraction functionality. Hydralazine and nitrates could be used as substitutes in patients who are sensitive to the first line medications. In addition, Beta-adrenergic blockers also act as neuro-hormonal modifiers, to improve the left ventricular ejection fraction symptoms and patients' survival [16]. Adjuvants such as the aldosterone antagonists are used for additive diuresis to reduce HF symptoms, normalize heart beats, while digoxin increases cardiac output, and decreases hospitalizations. Thrombosis and embolic events are prevented using anticoagulants while inotropic agents restore organ perfusion and reduce congestion in HF patients with reduced ejection fraction to increase cardiac output thereby decreasing the triggering the neuro-humoral system. It is also important to

consider correction of systemic factors as in thyroid dysfunction, infections, uncontrolled diabetes and hypertension [16].

According to Lainscak (2017), Sodium Zirconium Cyclosilicate and Patiromer are helpful in patients who had stopped taken PRAAS after experiencing a high potassium symptom. This management strategy would empower health care providers to start using RAAS inhibitors in patients with hyperkalemia adverse effects and there have been recommendations for further investigation towards optimization of RAAS inhibitors [9].

**Non-Pharmacological:** Lifestyle changes such as dietary counseling as in removing salt from the dining table with sodium restriction according to AHA and JCN 8 of 2,400mg daily. In addition, dietary modification should include high fiber diet with vegetables (20-35%), Fat (< 30%) and protein restriction to 20-25%. There should be structured cardiac rehabilitation program as tolerated by the patients and the exercise should be scheduled when patient energy level is high, in between activities. Smoking and alcohol to be consumed in moderation as 12oz for beer, 5oz for wine and one half for distilled drinks.

### Nurse Practitioner's Implications

While renowned institutions and organizations have been involved in the prevention and management of HF. Practitioners effort should be focused on patients and their families through education on anticipated clinical manifestations and referral of patients with severe form of the diseases and comorbidities. According to Strachan, Kryworuchko & Li (2018), communication between the patients and their health care practitioners is a critical barrier to patients with advanced heart failure. Many challenges exist including unclear communication about the goals of care, leaving it suboptimal. Patients are to be referred to specialist and counseling when needed, based on the disease severity [11].

As Lindmark pointed out in his 2019 study that HF incident is declining and individuals with HF are living longer, it is expected that nurse practitioners should be at fore-front to educate their patients on self-care promotion, including family members involvement in adherence to medications such as titration of diuretic medication in appropriate individuals for early intervention. However, clear communication is critical when it comes to HF patient management according to Strachan and colleagues who iterated that individuals and their family members are critical variables than the health institutions for a positive care discussions [11]. In addition, knowledge gaps on lifetime changes, medications, adverse effects and friendly health technologies should be emphasis as contingency strategies to increase positive discharge outcomes.

In conclusion, this paper has reinforced the fact that HF is a global health alarm with negative impact on the global economy. Although HF affects all ages, the prevalent is more in older adults. Health disparities still exist in the HF treatment of females when compared to males especially when cardiac ischemia is involved.

This study also revealed that patients with HF are living longer ever than before, however, gaps in communication on the part of the health care providers are detrimental to their patients' care outcomes. Hence, Nurse practitioners need to assist in bridging the gap in communication to enable them provide appropriate and sustainable HF management with great provider-client relationships through effective education.

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