

12-2015

Identifiable Risk Factors Associated with Congestive Heart Failure Hospital Readmissions

Kimberly M. Snyder

Follow this and additional works at: <http://scholarworks.uark.edu/nursuht>



Part of the [Nursing Commons](#)

Recommended Citation

Snyder, Kimberly M., "Identifiable Risk Factors Associated with Congestive Heart Failure Hospital Readmissions" (2015). *The Eleanor Mann School of Nursing Undergraduate Honors Theses*. 41.
<http://scholarworks.uark.edu/nursuht/41>

This Thesis is brought to you for free and open access by the The Eleanor Mann School of Nursing at ScholarWorks@UARK. It has been accepted for inclusion in The Eleanor Mann School of Nursing Undergraduate Honors Theses by an authorized administrator of ScholarWorks@UARK. For more information, please contact scholar@uark.edu.

Identifiable Risk Factors
Associated with Congestive Heart
Failure Hospital Readmissions

A thesis submitted in partial fulfillment
of the requirements for the degree of
Bachelor of Science in Nursing

by

Kimberly Snyder

December 2015
University of Arkansas

Dr. Nan Smith-Blair
Thesis Director

Prof. Wendy Sisson
Committee Member

Dr. Peggy Lee
Committee Member

Abstract

It is important to analyze patterns of risk factors associated with congestive heart failure (CHF) readmission rates. Today, if a CHF patient is readmitted within 30 days of their initial discharge the hospital will not be reimbursed for the stay. The aims of this study are to see if there is an association between patients readmitted within 30, 60, and 90 days of the initial discharge and to identify patterns of risk factors associated with CHF readmissions. A search of the CINAHL research database was conducted, using the key words "heart failure", "signs and symptoms", "readmission rates" and "comorbidities". The study was a retrospective chart review that consisted of a randomized sample of 52 patients readmitted from 2012-2014 with a primary diagnosis of congestive heart failure. Results showed there was a significant association between 30 and 60 day readmissions, but not 30 and 90 day readmissions. Identified risk factors included sex, overt clinical symptoms (dyspnea, fatigue and weakness, edema) and ejection fractions.

Identifiable Risk Factors Associated with Congestive Heart Failure Hospital Readmissions

The leading cause of hospitalization and death in people age 60 years of age and over is congestive heart failure (CHF). There are more than 1 million hospital admissions for this condition in the United States annually. (10) Reducing the readmission rate to hospitals has become an increasingly important task. (21) A common timeframe to measure readmission used by Centers for Medicare and Medicaid services (CMS) is 30 days of the index hospitalization. While some cases of readmission are unpreventable, the majority are considered to be due to poor clinical outcomes suggesting the patient was discharged too early or that optimal patient education was not achieved. (1)

Congestive Heart failure (CHF) is a condition where the heart fails to pump an adequate amount of blood to the body. CHF normally occurs when another condition has weakened the heart to the point where it can no longer keep up with the demands of body tissues. Pathology such as coronary artery disease, hypertension, faulty heart valves, cardiomyopathy, myocarditis, myocardial infarction, congenital heart defects and heart arrhythmias can predispose patients to CHF. While CHF is a significant threat to a patient's health, it is possible to live with CHF if the disease is properly managed. Patients suffering from unmanaged CHF strain healthcare resources due to frequent readmissions associated with high costs of care. Identifying risk factors associated with CHF readmission rates is crucial in the effort to decrease this pattern. Once patterns of risk factors are identified, patient specific interventions can be planned and implemented. (6)

The southeastern United States (Alabama, Arkansas, Mississippi, Oklahoma, Louisiana, and Georgia) has commonly been referred to as the "stroke belt" of the nation. Now research is concluding that CHF may also be more common in these identified states. In the latest statistical analysis, the southeastern United States showed higher numbers of CHF patients indicating these states are also now living in the "Heart Failure Belt". (2)

Literature Review

Patient factors contributing to CHF readmission

Readmissions to the hospital within 30 days of a previous discharge are responsible for 24% of all Medicare expenditures, adding up to approximately \$2 billion annually. (19) Patients discharged with CHF are strongly associated with hospital 30-day readmission. Identifying and controlling common risk factors is crucial to alleviate the financial burden and to better manage the patient's disease. (19) In a survey assessing patient characteristics associated with chronic disease including CHF the average age of respondents was 77. Of those, 83% had a pension card, 53% had an income less than \$20,000 a year, 41% had no formal education qualifications, 31% reported having no access to a car for transportation, over 34% lived alone, 22% did not have a close friend or relative who regularly took care of them, 68% reported poor health, and 53% of participants had mild to severe psychosocial stress. This study found that programs dedicated to targeting medication adherence, health behaviors, and social isolation helped reduce the readmission rates associated with elderly patients with chronic diseases. (17)

Assessment of comorbidities associated with CHF can help determine a patient's risk for hospital readmission. One study found the most frequent comorbidities associated with CHF readmissions were diabetes (34%), previous myocardial infarction (13.8%), atrial fibrillation (34%), chronic obstructive pulmonary disease (26.1%), and renal disease (14.4%). This same study determined the most common risk factors associated with 7-day readmission (time in which readmission is most avoidable) were kidney diseases, discharge requiring home care services, and discharge against medical advice. (3)

While looking at patient comorbidities is important, it is also necessary to take into account what happens at home once the patient is discharged. One study found patients most likely to be readmitted in the first two weeks of discharge were sicker, less compliant with prescribed medication, and received home-care that was not up to standard for CHF. Along with this, it speculated that social

work activity is needed to perform extensive assessments of day-to-day needs post discharge and arrangements to meet those needs. (11, 18) The use of a multidisciplinary team post-discharge is a key component in the goal to keep the patient from being readmitted. Stewart and coworkers found that a specialized cardiac nurse is the best provider for home follow up care because the nurse can provide a realistic picture of the patient's response to the prescribed treatment and management. (22)

Hospital factors contributing to CHF readmission

There are factors associated with hospital structure and processes that can increase or decrease the risk of CHF patient readmission. Joynt and colleagues found patients discharged from facilities with a higher volume of CHF patients received a higher quality of care specific to their disease process and were less likely to be readmitted than patients discharged from hospitals that did not have a high volume of CHF patients. The downside to this finding is that hospitalization costs in hospitals with high volume of CHF patients were higher. . More research is needed to determine if the higher costs of providing CHF care in the high-volume hospitals are offset by the lower readmission rates. (8)

Researchers have found that patients discharged from a cardiac specific unit are less likely to be readmitted than patients discharged from a general medical unit. Several reasons may account for this difference. Cardiac nurses are more familiar with CHF and patients are more likely to be discharged with CHF education from a heart failure outpatient team. Additionally patients on a cardiac specialty unit receive care from healthcare teams dedicated to cardiac health. (17) There are some factors affecting CHF patient readmissions however, that are difficult to measure such as whether the patients primary care provider is comfortable in dealing with the severity of the patient's condition, and whether the patient's family and/or friends are available to assist in the care of the patient. In some circumstances patients may be readmitted for tests and procedures which may be safer and easier to perform in the inpatient setting than in an outpatient setting. (5) Hospital Based CHF disease management programs

have been successful reducing hospital readmissions when inpatient consolation and education, outpatient CHF clinic, cardiac home care, and compliance monitoring are available. (4, 9)

Signs and Symptoms Associated with CHF

Because there is no gold standard in the diagnosis of CHF, it is important for healthcare providers to recognize key signs and symptoms of this syndrome. In CHF, the ventricular walls endure a great amount of stress, hypertrophy, and excessive volume pressure. This stress results in the release of B-Type Natriuretic Peptide (BNP) and N-Terminal proBNP (NT-proBNP) into the blood stream. These markers are elevated in patients with heart failure and low levels help rule out patients who do not have heart failure. These markers are also useful in monitoring the effectiveness of treatment and decrease with successful therapeutic management. (16). In a systemic review of BNP and NT-proBNP researchers found that in emergency departments or urgent care centers these markers are better for ruling out than ruling in heart failure. They also found that these markers were very beneficial in the primary care setting to identify patients at risk for developing heart failure (16).

One prevalent sign of heart failure is a lowered left ventricular ejection fraction. It is preferred for patients to have an ejection fraction of 60% or greater. In patients with worsening heart failure, their ejection fraction can become lower than 15% (15). Although a low ejection fraction is a key feature in the diagnosis of heart failure, it is also important to note that not all heart failure patients have a decreased ejection fraction. Heart failure can be classified as either HF with preserved ejection fraction (HF-PEF) and HF with reduced ejection fraction (HF-REF). Treatment for these two groups of patients differs so it is important for heart failure patients to have their ejection fraction measured. Although the treatments between the two groups are different, a study from Dubai found no difference in mortality rates between the two and hospital stay between the groups was very similar. Ischemic heart disease was the main cause of HF-REF while asthma and COPD were mostly associated with HF-PEF. Previously it

was thought HF-PEF was a misdiagnosis of respiratory disease. However, today use of NT-proBNP can differentiate heart failure from respiratory insufficiencies (20).

A majority of heart failure readmissions are associated with fluid retention and congestion; with the greater the fluid retention the more likely the patient is to be readmitted. Fluid retention leads to edema, dyspnea, and fatigue. These are the most common symptoms among heart failure emergency room visits and readmissions. One study found early dyspnea relief was one of the most important factors in saving heart failure patients from expensive readmissions (14). One of the best ways for a patient to know if he or she is retaining fluid is to perform daily morning weights. Non-compliance with daily weights has been associated with an increase in both morbidity and mortality in heart failure patients (13). Researchers at the University of North Carolina conducted a study to determine if self-reported recall of weight changes verses diary logs of weights had an impact on readmission rates. They found that 80% adherence to a diary weight log was associated with fewer readmissions, while self-reported recall of weights did not produce any decrease in readmission (7). It is important for clinicians and patients alike to be knowledgeable of and track the associated signs and symptoms of heart failure exacerbation to decrease readmission to the hospital.

Study Aims

The aim of this study was to identify patterns in readmissions and risk factors in CHF patients who required readmission to the hospital within 30 days, 60 days, and 90 days of the initial hospital discharge with the primary diagnosis of CHF.

Study Questions:

1. Is there an association between patients readmitted to the hospital within 30 days, 60 days, and 90 days?

2. Do the patients readmitted to the hospital within 30 days, 60 days, and 90 days present a pattern of risk factors?

Methodology

This quality improvement project was conducted following approval by the University of Arkansas Institutional Review board and Washington Regional Medical Center's Quality Improvement Department. All patient information was de-identified in compliance with guidelines of the Health Insurance Portability and Accountability Act (HIPAA). Each patient was assigned a random case number as an identifier. Once the patient's electronic medical record was reviewed, the hospital record could not be identified or accessed again.

Project Design and Population. This project consisted of a retrospective medical records review of patients readmitted to Washington Regional Medical Center following their initial hospitalization with the primary diagnosis of CHF between the years of 2012-2014. The project sample consisted of 52 adults over the age of 18 with a primary diagnosis of CHF. Patients whose primary diagnosis was not CHF were not included in the study. Pregnant women and children were also excluded. Demographic data (e.g., age, sex, ethnicity), and insurance type (private, Medicare, self-pay) was extracted from the electronic medical records. Additionally, the ejection fraction, overt clinical symptoms (e.g., dyspnea, edema, fatigue and weakness) and medication compliance was tracked.

Statistical analysis. Baseline characteristics were presented as frequency (percent) for categorical variables, as mean + SD for normally distributed continuous variables, and as median (interquartile range) for continuous variables with skewed distributions. The chi-square test for association or a Fisher's exact test (for cells having an expected count less than 5) was used to test the null hypothesis that there is no relationship between criterion and predictor variables. A p value of .05 was used as the level of statistical significance. To determine the effect size the symmetric measure Phi

was determined. A paired t-test was used to determine whether the mean difference between paired ejection fraction observations was statistically significantly different from zero.

Results

The randomized sample consisted of 52 patients with a primary diagnosis of CHF readmitted to the acute care setting within 30 days, 60 days, and/or 90 days of their initial discharge. Demographics of the sample included 33 males and 19 females. Results showed a primarily homogenous Caucasian sample in which only 1 patient was Hispanic and 1 patient who did not have a documented race. The average age of the group was 76.1 (SD=15.9). The sample consisted of 34 patients covered by Medicare, 5 patients by Medicaid, and 8 patients by private insurance. Thirty-four patients presented with a history of tobacco use and 10 patients were noted to be current smokers.

Descriptive Statistics

The study population consisted of 54.0% of patients readmitted to the hospital within 30 days, 42.9% of patients readmitted within 31-60 days, and 29.4% of patients readmitted from 61-90 days following initial discharge. (Figure 1) Only 1 patient in the study was readmitted within 30, 60, and 90 days of the initial discharge.

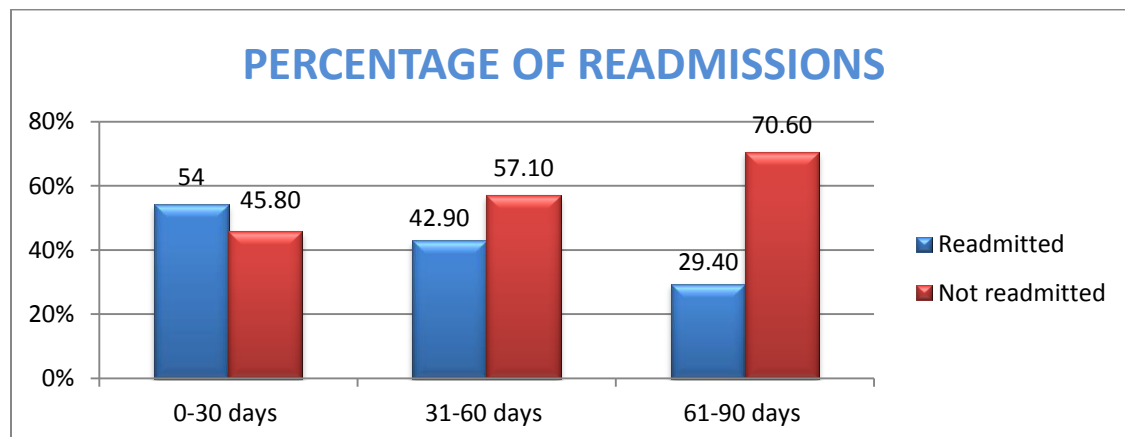


Figure 1: Percent of readmissions and non-readmissions of patients whose primary diagnosis was CHF at 30, 60, and 90 days post initial hospitalization.

Clinical Symptoms

In the initial hospital stay 96.2% of patients presented with dyspnea, 84.6% presented with edema, and 92.3% presented with fatigue and weakness. We found patients readmitted within 30 days presented with dyspnea (96.2%), edema (84.6%), fatigue and weakness (92.3%). This trend was also seen in patients readmitted between 31-60 days of their initial readmission with dyspnea (95.7%, edema (82.6%, and fatigue and weakness (91.3%). Of patients readmitted 61-90 days following initial admission for CHF, dyspnea (93.3%) and fatigue and weakness (93.3%) continues to be major presenting symptoms with edema (66.7%) slightly less of a presenting symptom. (Figure 2)

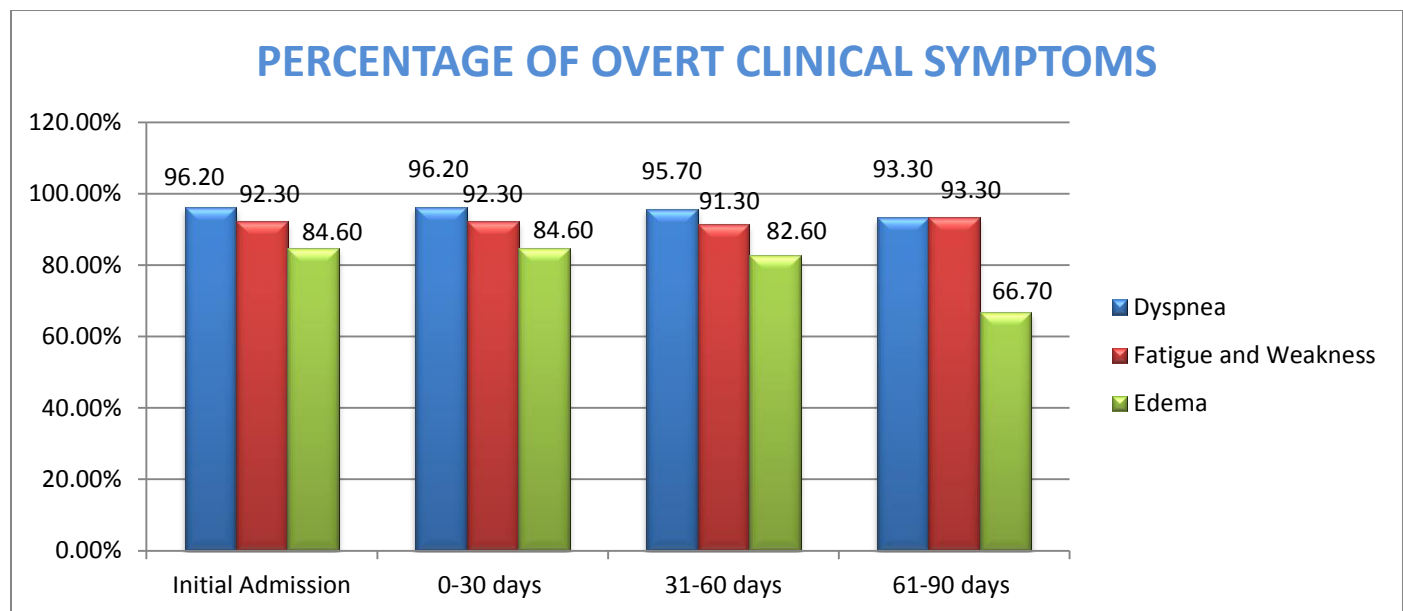


Figure 2. Percentage of presenting clinical symptoms of patients with a primary diagnosis of CHF on initial admission and readmission at 30, 60, and 90 days.

Ejection Fraction

No significant difference was noted in the ejection fractions between the initial discharge (42.6%) and 30 day readmission in patients (43.2%, SD=19.59). However, ejection fractions of patients

who were readmitted at 31-60 days (33.7%, SD=17.88) and 61-90 days (11.67%, SD=17.54) demonstrated a decline from initial and 30 day readmission ejection fractions. (Figure 3)

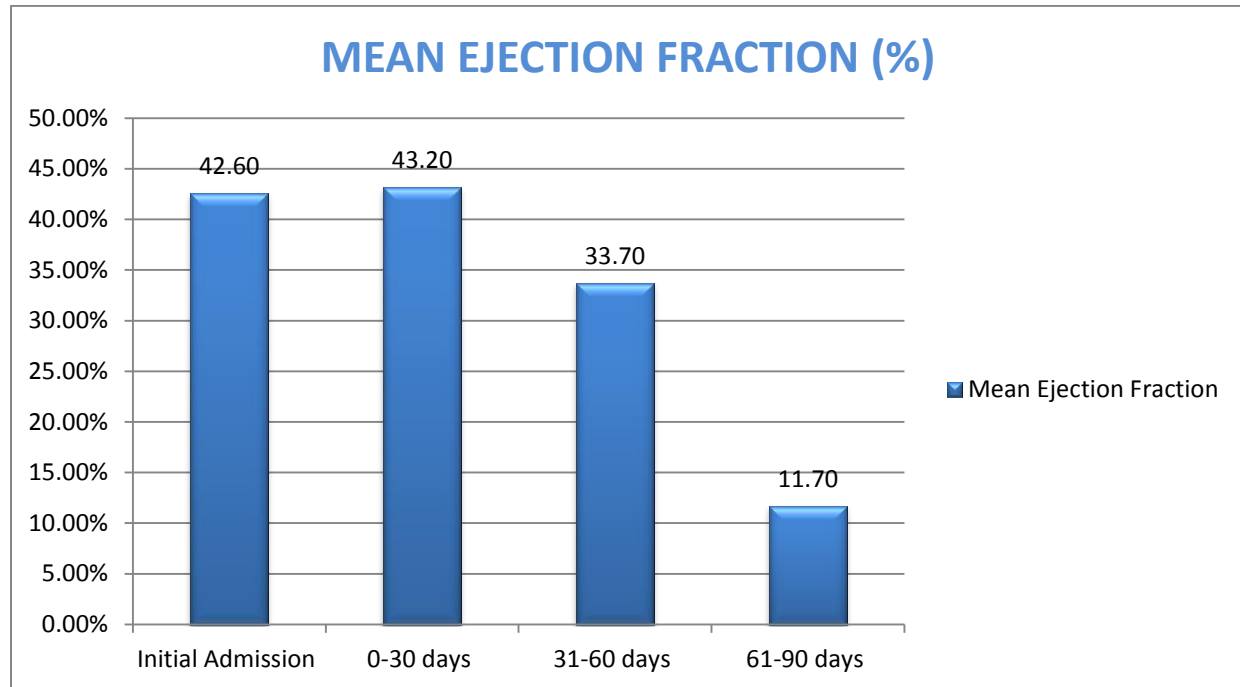


Figure 3. Mean ejection fractions of patients with a primary diagnosis of CHF during initial admission and at 30, 60, and 90 day readmissions.

Paired initial ejection fractions were compared with 30, 60 and 90 day readmissions. There were 18 patients who were readmitted at 30 days who had ejection fractions documented upon initial CHF admission and at their 30 day readmission. Examination with a paired-samples t-test was used to determine whether there was a statistically significant mean difference between the initial ejection fraction and the 30 day readmission ejection fraction. No statistical significance was demonstrated.

Eighteen patients were admitted at 60 days post initial hospitalization and also had ejection fractions documented at the 60 day re-admission. A paired-samples t-test was used to determine whether there was a statistically significant mean difference between the initial ejection fraction and the 60 day readmission ejection fraction. No statistical significance was demonstrated.

A total of 11 patients were admitted at 90 days post initial hospitalization and also had ejection fractions documented at the 90 day re-admission. A paired-samples t-test was used to determine whether there was a statistically significant mean difference between the initial ejection fraction and the 90 day readmission ejection fraction. No statistical significance was demonstrated (Table 1).

Table 1: Comparison of paired ejection fractions in between initial ejection fraction and 30, 60 and 90 day readmissions.

		Mean	t	Df	Sig (2--tailed)
30 day readmission (N=18)	Initial EF	45.83 (SD=18.17)	1.57	17	.134
	30 day EF	43.22 (SD= 19.59)			
60 day readmission (N=18)	Initial EF	36.33 (SD= 17.55)	2.008	17	.061
	60 day EF	33.83 (SD=17.43)			
90 day readmission (N=11)	Initial EF	37 (SD=15.96)	.107	10	.917
	90 day EF	36.73 (SD=18.43)			

Comorbidities

Specific comorbidities included histories of chronic obstructive pulmonary disease (38.5%), moderate to severe renal disease (34.6%), type I or type II diabetes (32.7%), previous myocardial infarction (22%), cerebrovascular disease (21.2%), and peripheral vascular disease (19.2%). Additional

comorbidities included dementia (11.5%), connective tissue disease (5.8%) and peptic ulcer disease (1.9%). (Figure 4)

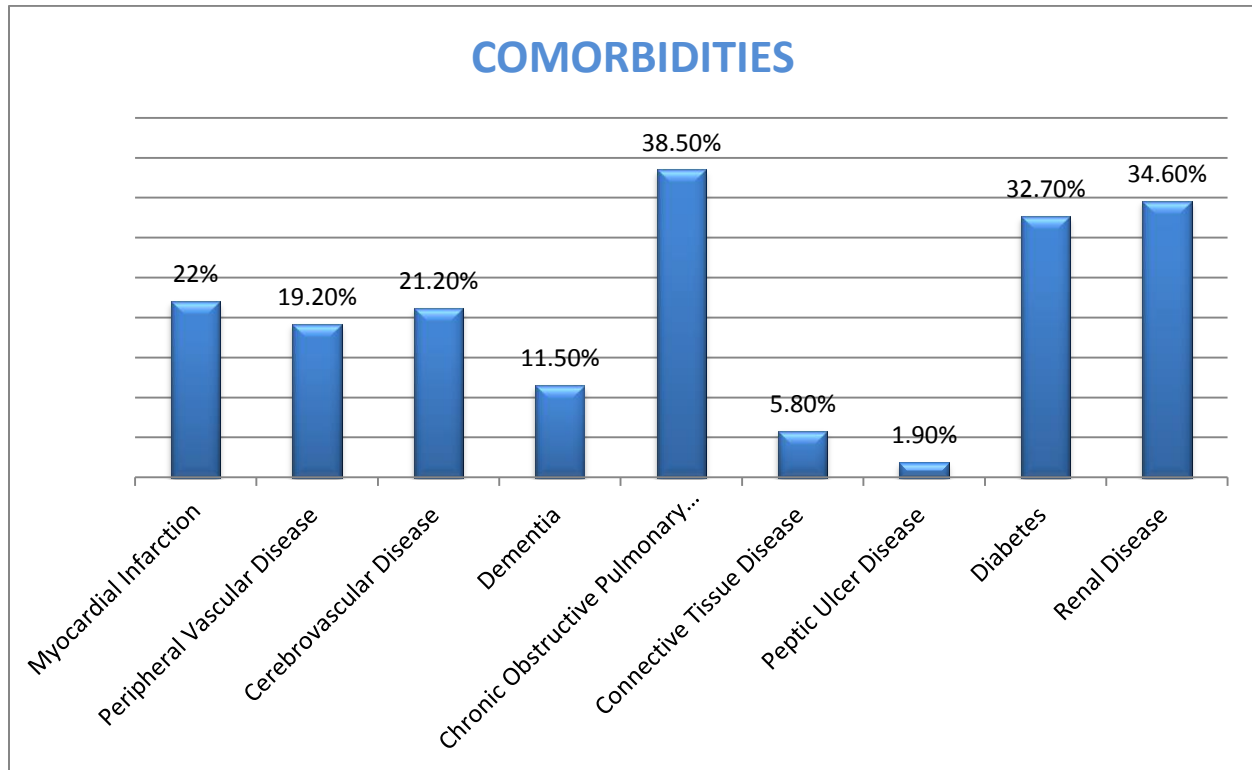


Figure 4. Comorbidities noted in patient in the study.

Initial and Readmission Associations

A Chi-Square test for association was conducted to test the null hypothesis that there was no relationship between the 30 day readmission and 60 day and 90 day readmissions. Results indicated a significant association between 30 and 60 day readmissions [$\chi^2(1) = 14.14, p = .005$]. A moderately strong association between 30 and 60 day readmission was noted ($\phi = -.543, p = .005$).

A Chi-Square test for association was conducted to determine if there was an association between 30-day readmission rates and 60 and 90-day readmission rates. Results indicated a significant association between 30 and 60 day readmissions [$\chi^2(1) = 14.14, p = .005$]. A moderately strong

association between 30 and 60 day readmission was noted $\mu = -.543, p = .005$. (Figure 5) A Chi-Square test for association was conducted between 30 day and 90 day readmissions. There was no significant association between 30 day and 90 day readmissions. There was not a statistically significant difference between readmissions at 30 and 90 days post initial hospitalization. (Table 2)

Table 2: 30-day * 60-day

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14.141 ^a	1	.000		
Continuity Correction ^b	11.955	1	.001		
Likelihood Ratio	14.961	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	13.846	1	.000		
N of Valid Cases	48				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.79.

b. Computed only for a 2x2 table

Table 3: 30-day * 90-day

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.461 ^a	1	.497		
Continuity Correction ^b	.125	1	.724		
Likelihood Ratio	.460	1	.498		
Fisher's Exact Test				.532	.361
Linear-by-Linear Association	.451	1	.502		

N of Valid Cases	48			
------------------	----	--	--	--

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.96.

b. Computed only for a 2x2 table

A chi-square test for association conducted between 30 day readmissions and insurance type demonstrated no significant association between 30 day readmissions and insurance type.

A chi-square test for association was conducted between sex of the patients and 30-day readmissions. There was a statistically significant association between sex and 30 day readmission rates. [$\chi^2(1) = 4.19, p = 0.041$]. There was a moderately strong association between sex and 30 readmissions.

[$\mu = .296, p = .041$] (Figure 5)

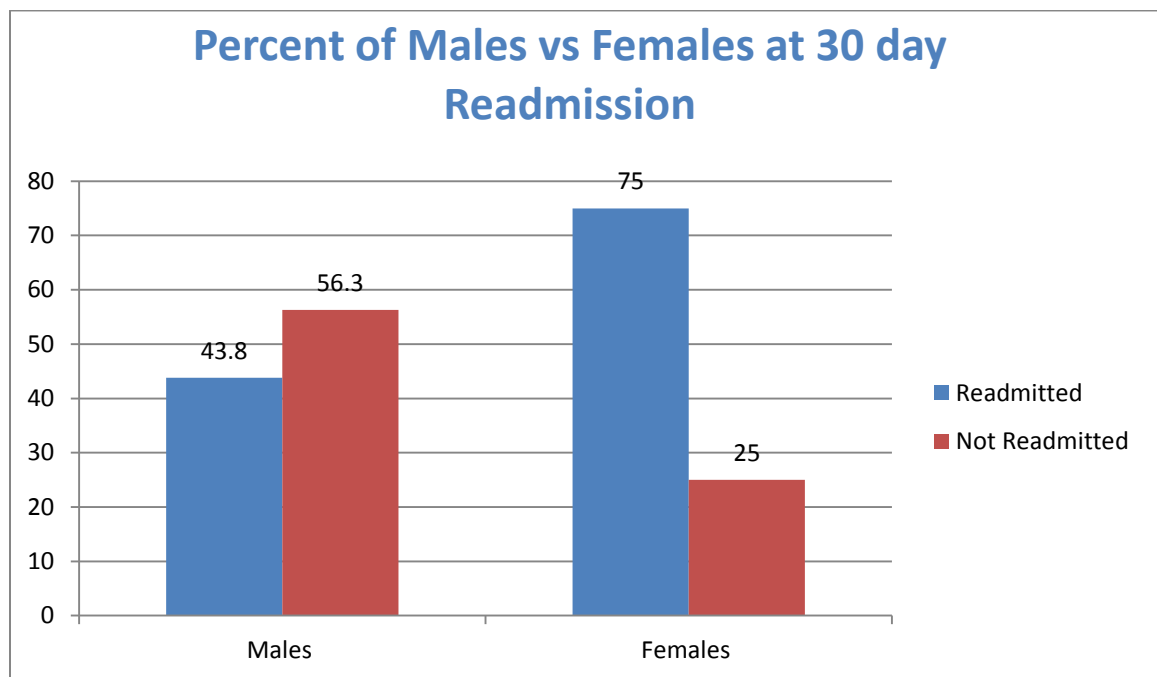


Figure 5. Comparison of male versus female patients with a primary diagnosis of congestive heart failure readmitted at 30 days post initial hospitalization.

Discussion

It is important to note that the majority of subjects in this randomized sample were men. This is not a surprising finding because cardiovascular disease rates are higher in men than in women. Our sample group mean age of 76 coincides with the national statistics with the majority of patients in the hospital setting being over the age of 65. Our study sample proved to be a homogenous Caucasian (98%). Our random sample only contained 1 subject of Hispanic origin. The lack of inclusion of other ethnic backgrounds limits the generalizability of the study.

This study demonstrated a statistically significant increase in readmissions within 30 days of initial hospitalization. Patients in our study may have been in the plateau phase in their health or may have progressed to the phase where palliation and hospice care were in place. Palliation and hospice care could account for a decrease in readmission rates at 90 days. It is important to note that females in our study had significantly higher 30 day readmission rates than men. Results showed 75% of females were readmitted within 30 days, while only 43.8% of males were readmitted within 30 days. This could be associated with cardiovascular disease rates in men versus women.

It was hypothesized that insurance type may affect readmission rates; however, it was proven to be statistically insignificant.

Challenges in Predicting CHF readmission

As noted in the literature review, dyspnea, fatigue and weakness, and edema are key symptoms of a heart failure exacerbation. The results of the study align with the literature noting that the majority of the patients presented with dyspnea, fatigue, and weakness when admitted within 30 days, 60 days, and 90 days. Progressive renal impairment among other comorbidities has been increasingly recognized as potent predictors of adverse outcomes during readmission. Additional associated diagnoses, including atrial fibrillation, ischemic heart disease, and hypertension also confer higher readmission

risks. Comorbidities such as diabetes, pulmonary disease and other non-cardiac illness may raise the risk for both heart failure and non-heart-failure-related complications. One unexpected finding was the percentage of readmissions when comparing 30 days, 60 days, and 90 days. It would be expected that patient readmissions would increase the longer they have been without acute care treatment, meaning the 61-90 day readmissions should have been the highest. However, we found the opposite in that the highest percent of readmissions (54%) occurred within 30 days of the initial discharge. For an ejection fraction to be considered within normal limits it should be between 55 and 70%. The mean ejection fraction of patients readmitted within 30 days was found to be 43.2% well below normal. The mean ejection fraction continued to decrease at 60 day and 90 day readmissions. Patients readmitted within 31-60 days had a mean ejection fraction of 33.7% and patients readmitted within 61-90 days had a mean ejection fraction of 11.7%, which is significantly lower than the normal level. However, when examining paired patient admissions from initial hospitalization to 30, 60 and 90 days no statistically significant difference in mean ejection fraction was noted. It is of interest that the only patient who was readmitted at 30, 60 and 90 days had an ejection fraction of 20% consistently with all three readmissions.

Limitations

There were some limitations of the study. The randomized sample of 52 patients was relatively small; a larger sample may have provided different results. Another limitation of the study was involving the demographics of the Northwest Arkansas region. Readmission patterns related to race were unable to be identified due to lack of inclusion of other ethnic groups of patients. Also, tracking medication compliance was part of the project design; however, this was rarely charted so significance was unable to be determined. Patients were not followed individually to their "fate" within the study. Some patients

therefore may have entered palliative care, hospice, or died prior to the 90 day mark thus skewing results.

Conclusion

In conclusion, there was a strong association between 30 day and 60 day readmissions; however there was no significant association between 30 day and 90 day readmissions. Over half of the sample was readmitted within 30 days, whereas only 29.4% were readmitted within 90 days. Female patients had a 31.2% higher rate of 30-day readmissions as compared to male patients. Of the 52 patients, diabetes and COPD were the most common comorbidities. Dyspnea, fatigue and weakness, and edema were presented in high rates among 30, 60 and 90 day readmissions. Effective strategies for preventing CHF readmissions must examine opportunities for management across the full continuum of the disease. Additional emphasis on discharge coordination, transitional care planning, and early follow-up by a heart failure clinic is needed. The presenting symptoms for rehospitalization included dyspnea, fatigue, and weakness and weight gain. Strategies to manage these presenting symptoms outside the hospital setting may impact the readmission rates of patients.

References

1. AbdelRahman, S. E., Zhang, M., Bray, B. E., & Kawamoto, K. (2014). A three-step approach for the derivation and validation of high-performing predictive models using an operational dataset: Congestive heart failure readmission case study. *BMC Medical Informatics and Decision Making, 14*, 41-41.
2. Ahmed, A., Feller, M.A., Mujib, M., Zhang, Y. (2011). Evidence of a “Heart Failure Belt” in the Southeastern United States. *Am J Cardiol, 10* (6): 935-937.
3. Eastwood, C. A., Howlett, J. G., King-Shier, K., McAlister, F. A., Ezekowitz, J. A., & Quan, H. (2014). Determinants of early readmission after hospitalization for heart failure. *The Canadian Journal of Cardiology, 30*(6), 612-618.
4. Holst, D. P., Kaye, D., Richardson, M., Krum, H., Prior, D., Aggarwal, A., Bergin, P. (2001). Improved outcomes from a comprehensive management system for heart failure. *European Journal of Heart Failure, 3*(5), 619-625.
5. Howell, S., Coory, M., Martin, J., & Duckett, S. (2009). Using routine inpatient data to identify patients at risk of hospital readmission. *BMC Health Services Research, 9*, 96-96.
6. John Hopkins Medicine. (2014). Conditions & Treatments: Congestive Heart Failure. Retrieved from John Hopkins Medicine: http://www.hopkinsmedicine.org/heart_vascular_institute/conditions_treatments/conditions/congestive_heart_failure.html
7. Jones, C., D., Holmes, G., M., Dewalt, D., A., Erman, B., Wu, J., Cene, C., W., Pignone, M. (2014). Self-reported recall and daily diary-recorded measures of weight monitoring adherence: Associations with heart failure-related hospitalization. *BMC Cardiovascular Disorders, 14*(1), 12-12.
8. Joynt, K. E., Orav, E. J., & Jha, A. K. (2011). The association between hospital volume and

- processes, outcomes, and costs of care for congestive heart failure. *Annals of Internal Medicine*, 154(2), 94-102.
9. Knox, D., & Mischke, L. (1999). Implementing a congestive heart failure disease management program to decrease length of stay and cost. *Journal of Cardiovascular Nursing*, 14(1), 55-74.
 10. Lee, D. S., & Ezekowitz, J. A. (2014). Risk stratification in acute heart failure. *The Canadian Journal of Cardiology*, 30(3), 312-319.
 11. Li, H., Morrow-Howell, N., & Proctor, E. K. (2004). Post-acute home care and hospital readmission of elderly patients with congestive heart failure. *Health & Social Work*, 29(4), 275-285.
 12. Longman, J. M., Rolfe, Margaret, Passey, M. D., Heathcote, K. E., Ewald, D. P., Dunn, T., Morgan, G. G. (2012). Frequent hospital admission of older people with chronic disease: A cross-sectional survey with telephone follow-up and data linkage. *BMC Health Services Research*, 12, 373-373.
 13. Lyngå, P., Persson, H., Hägg-Martinell, A., Hägglund, E., Hagerman, I., Langius-Eklöf, A., & Rosenqvist, M. (2012). Weight monitoring in patients with severe heart failure (WISH). A randomized controlled trial. *European Journal of Heart Failure*, 14(4), 438-444.
 14. Mentz, R. J., Hernandez, A., F., Stebbins, A., Ezekowitz, J., A., Felker, G., M., Heizer, G., M., Ponikowski, P. (2013). Predictors of early dyspnoea relief in acute heart failure and the association with 30-day outcomes: Findings from ASCEND-HF. *European Journal of Heart Failure*, 15(4), 456-464.
 15. Moayed, Y., & Kobulnik, J. (2015). Chronic heart failure with reduced ejection fraction. *CMAJ: Canadian Medical Association Journal*, 187(7), 518-518.
 16. Oremus, M., McKelvie, R., Don-Wauchope, A., Santaguida, P., L., Ali, U., Balion, C., Raina, P. (2014). A systematic review of BNP and NT-proBNP in the management of heart failure: Overview and

- methods. *Heart Failure Reviews*, 19(4), 413-419.
17. Park, L., Andrade, D., Mastey, A., Sun, J., & Hicks, L. (2014). Institution specific risk factors for 30 day readmission at a community hospital: A retrospective observational study. *BMC Health Services Research*, 14, 40-40.
18. Proctor, E. K., Morrow-Howell, N., Li, H., & Dore, P. (2000). Adequacy of home care and hospital readmission for elderly congestive heart failure patients. *Health & Social Work*, 25(2), 87-96.
19. Rich, M. W., & Freedland, K. E. (1988). Effect of DRGs on three-month readmission rate of geriatric patients with congestive heart failure. *American Journal of Public Health*, 78(6), 680-682.
20. Saheb Sharif-Askari, N., Sulaiman, S. A. S., Saheb Sharif-Askari, F., Al, S. H., Tabatabai, S., & Al-Mulla, A. (2014). Hospitalized heart failure patients with preserved vs. reduced ejection fraction in dubai, united arab emirates: A prospective study. *European Journal of Heart Failure*, 16(4), 454-460.
21. Smith, A. C. (2013). Effect of telemonitoring on re-admission in patients with congestive heart failure. *Medsurg Nursing: Official Journal of the Academy of Medical-Surgical Nurses*, 22(1), 39-44.
22. Stewart, S., Marley, J. E., & Horowitz, J. D. (1999). Effects of a multidisciplinary, home-based intervention on unplanned readmissions and survival among patients with chronic heart failure: A randomized controlled study. *Lancet*, 354(9184), 1077-1083.