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Evaluating the Efficacy of Motivational Interviewing on Enhancing Medication Adherence for Heart Failure Patients at An Academic Health System

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Evaluating the Efficacy of Motivational Interviewing on Enhancing Medication Adherence for Heart Failure Patients at An Academic Health System

by

ELIZABETH MARY VILLANUEVA, PHARMD

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Introduction

Heart disease is one of the leading causes of death in the United States.[1] Heart disease encompasses several heart related disorders, one of which is heart failure. Heart failure is caused by structural or functional changes leading to the inability of the heart to pump blood out to the rest of the body.[1] Over the years, it has become a clinical and public health problem.[1] There are over 5.7 million individuals living in the United States today with heart failure and over 20% of these individuals are readmitted for heart failure within 30 days of being seen.[2,3] In 2015, there were 4.5 million individuals living in Harris County and 16% of those individuals were living with heart failure.[4] The Harris Health System hospital average for heart failure readmission rate is 22.9%, which is comparable to the national average of 22%.[5,6]

Since 2012, after the implementation of the readmission reduction program as a part of the affordable care act, hospitals have been looking for ways to decrease their 30-day readmission rates.[7] Many hospitals created transition of care programs to manage, address, and prevent increases in readmission for chronic diseases such as heart failure. Hospital readmissions can lead to adverse events for patients and increased expenditures for hospitals.[8] While hospital readmissions are not favorable and sometimes are not 100% preventable, studies have shown that successful implementation of multidisciplinary approaches to the transition of care process results in fewer instances of readmissions.[5] Studies have found readmission rates are tied to breakdowns in three main areas: communication, patient education, and accountability.[8,9] There are several transitional care models currently being used, most of which typically contain a multidisciplinary approach through communication, collaboration, and coordination.[8] These models have proven to be effective at reducing re-hospitalizations by 30-50% and a savings of approximately $4,000 per patient.[10,11]

Medication adherence is a preventable factor contributing to readmission when not followed. If patients don't pick up their heart failure medications, it can lead to a worsening progression of their disease and eventually heart failure decompensation which will land the patient back into the hospital. Heart failure medications help manage symptoms of the disease, prolonging life and improving overall quality of life.[12] A study conducted by the National Community Pharmacist Association (NCPA) showed that 75% of adults displayed at least one non-adherent behavior over the course of an entire year.[13] Several factors make medication adherence a challenge, such as breakdowns in communication, long duration of treatment, frequent dosing, complex treatment schemes, and a low level of health literacy among patients.[12] Currently in the United States, it is estimated that $300 billion dollars per year are spent due to medication nonadherence.[12] Medication nonadherence then translates to potential readmission to a hospital due to disease progression resulting in further costs from medication related hospitalizations.[12]

Communication is an essential component in improving medication adherence. In 2009, Zohierek (et al) showed a 19% increase in nonadherence in patients whose healthcare provider communicated poorly.[14] When information is not delivered in a manner that is easy to understand, it leaves the patient who is receiving the information confused and less likely to elicit a behavior change such as medication adherence. Medication education should be delivered to the patient in a method that effectively elicits the desired adherence behavior to prevent readmissions, and ultimately improve the overall population health.

Motivational interviewing (MI) is a technique which can be used to help combat these challenges and empower the patient to change their behavior and improve their health.[15] According to the center for evidence-based practices, MI is a conversational approach to elicit change driven by the patient.[16] There have been several studies evaluating the ability of MI to produce behavioral change. MI was first used in the treatment of substance abuse disorders.[16,17] Since then, MI use has expanded to many other disease states, including heart failure, and is considered as a best practice for communication.

In 2015, Creber (et al) developed a study design to evaluate the feasibility and efficacy of MI to improve self-care of patients with heart failure.[18] This study consisted of a 1-hour MI session prior to discharge and a follow up phone call 3 to 4 days later.[18] After 90 days, the study evaluated the improvement of the patients self-care using the Self-Care of Heart Failure Index (SCHFI) v. 6.2 which is used to determine the patients self-care maintenance, management, and confidence level.[18] Patients who received the MI based session showed improvements in their self-care maintenance over 90 days compared to usual care. Many studies have analyzed the effect of MI on the value it brings to behavior change.

A recent study in hypertensive patients provided 30-minute MI counseling sessions every 3 months for 1 year. [19] Medication adherence was determined through the electronic pill cap system called medication events monitoring system (MEMS). [19] The MI intervention resulted in long term steady maintenance of medication adherence compared to the usual care group.[19] In another study, pharmacy students were trained to provide MI via telephone to patients taking angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin II receptor blockers (ARBs).[20] This was a prospective study evaluating adherence to ACEIs/ARBs.[20] The pharmacy students found that better medication adherence was seen in patients who received 2 or more calls.[20]

This study would be the first to evaluate the effects of MI on patients picking up/refilling their heart failure medications. Currently, Lyndon B. Johnson (LBJ), a Harris Health System hospital, admits 35 patients a month on average for heart failure. Based on a small chart review of patients admitted to LBJ during the month of June, approximately 40% of heart failure patients pick up their medication within 24 to 48 hours after being discharged with a prescription. This study will evaluate the efficacy of MI on the improvement of medication adherence for heart failure patients.

Methods

Setting

Harris Health System is located within Harris County, which spans across the city of Houston and into the surrounding cities. Harris Health System is an academic healthcare system established in November 1965 to provide health care to the residents of Harris County who are indigent.[21] Harris Health System is comprised of a multitude of health centers to include: “2 hospitals, 19 community health centers, 5 same-day clinics, 1 dialysis center, and several mobile health units”.[21] LBJ is a level 3 trauma center with 207 licensed beds and contains both inpatient

and outpatient pharmacies, clinics and other outpatient care services within the facility.[21] The LBJ pharmacy department initially provided discharge counseling education via the teach back method and disease state education to patients with heart failure being discharged from hospital.

Study Design

This study is a prospective study utilizing historic control. This study assessed the primary outcome of medication adherence in heart failure patients admitted prior to study start (without MI) compared to patients who received MI.

Investigators

Our investigators comprised of pharmacy students in their fourth year of pharmacy school, who were participating in 6-week advanced pharmacy practice experiential (APPE) rotations at LBJ from schools of pharmacy in Texas. The pharmacy students worked under the supervision of pharmacists currently working at LBJ who were recruited and trained to conduct the discharge counseling sessions.

Training

Our educators were trained over the course of two days for a total of six hours with a combination of didactic and hands on training. During this time, the educators learned about MI and were given time to practice the skills needed to carry out the education. During day one, the training consisted of small group discussions and practice scenarios where participants were able to carry out conversations utilizing MI. Trainees were provided both general and individual feedback after all role-playing scenarios.

For the first hour of this training, we provided an overview of MI. The next two hours we covered the tools they would be using and the trainees were allowed to practice those tools in a small group setting through: role playing exercises, opened ended questions, affirmations, reflective listening, and summarizing. Educators then spend about an hour learning and practicing conducting change talk as well as applying all the skills they learned earlier that day as a part of case scenarios. In the last hour, the educator spent time going over heart failure and walking through documentation in EPIC, which is our method of electronic health record. The following day, each educator was observed providing motivational interviewing in person before being allowed to perform interviews on their own.

Inclusion Criteria

Patients meeting all of the following criteria were included in the study.

- Hospitalized patient at LBJ with a documented diagnosis of heart failure
- 18 years of age and older
- Received heart failure education
- Currently, on one or more of the following drug classes/drugs:
    - Angiotensin-Converting Enzyme inhibitors (ACEI)
    - Angiotensin II Receptor Blocker (ARB)

- Angiotensin-Receptor Neprilysin Inhibitors
- I_f Channel Blocker
- Beta Blocker
- Aldosterone Antagonists
- Diuretics
- Hydralazine
- Isosorbide dinitrate
- Digoxin
- Milrinone

Exclusion Criteria

Patients that have one of the following criteria were excluded from the study population.

- Pregnant
- Prisoner
- Not receiving outpatient prescriptions filled within the Harris Health system

Group I: Control group

The information technology (IT) department at Harris Health System ran a report that identified all patients from the months of October 2017 to March 2018 who had been admitted to LBJ and had heart failure (ICD 10 – CM code 150.0 – 150.9) documented as a comorbidity in their chart. Then, randomly we selected patients using a random number generator in excel. We then conducted a retrospective chart review to identify the patients that were admitted to the hospital for heart failure and were educated by pharmacists prior to discharge and met all of the inclusion criteria listed in previous section.

Group II: Intervention group

Trained pharmacy students provided heart failure education to patients who were admitted to LBJ with the primary diagnosis or the condition of heart failure as a document comorbidity during the month of November 2018 to February 2019. Pharmacists who completed the training supervised and provided counseling when students were not available. The students utilized MI techniques to provide the education to patients it being discharge from the hospital with heart failure.

Primary Endpoints

This study evaluated medication adherence as the primary endpoint. Patients were tracked prospectively in the MI group for a minimum of 48 hours to determine the number of prescriptions picked up from the pharmacy. The participants were considered adherent if they picked up at least one of their heart failure medications within 48 hours after discharge or if at least one of their medication was refilled and picked up within 48 hours after last pill is expected to be taken. Patients in the teach back method were evaluated retrospectively in the same manner via chart review.

Secondary Endpoints

This study evaluated 30-day hospital readmissions and the attendance to follow up visits as part of the secondary endpoints. All patients in the MI group were tracked daily for 30 days to determine if the patient attended their follow up appointment and/or was readmitted to the hospital. A retrospective chart review was conducted to assess 30-day readmission rates and hospital follow up visit appointment adherence for patients in the teach back group.

Statistical analysis

Initially, we planned to enroll 94 patients (47 in each group) to detect a 20% difference between the two groups. We conducted a small retrospective chart review of patients admitted to LBJ for heart failure during 2018 for the month of June. Twenty charts were reviewed, of which only 10 charts were from patients that filled their prescriptions at Harris Health System. Of the 10 charts, only 4 patients picked up their medication within 24 hours. Based on these results, we anticipated a 50% attrition rate. Therefore, to retain power, we determined that we needed to enroll a total of 188 patients (94 per group) to provide a power of 80% at a type I error rate of 0.05 in order to detect a difference of 20% between the MI and the teach back group.

Data Analysis Plan

Standard descriptive statistics were used to display demographic characteristics of participants such as frequency, central tendency, and dispersion for all baseline data. Continuous variables were reported as mean, standard deviation as well as median and interquartile range. Categorical variables were reported as frequency and percentage. Baseline characteristics were compared between the two groups. A t-test was used to compare continuous variables. A chi-square test, and a test of proportions was used to compare categorical variables.

For the primary and secondary endpoint, we used a chi-square test to determine the significance between the teach back method and MI. A p-value of less than to 0.05 was considered statistically significant. The data was subjected to a multivariate logistic regression analysis using IBM's SPSS statistical analysis software. Adequacy of model fitting was measured using the Hosmer-Lemeshow test.

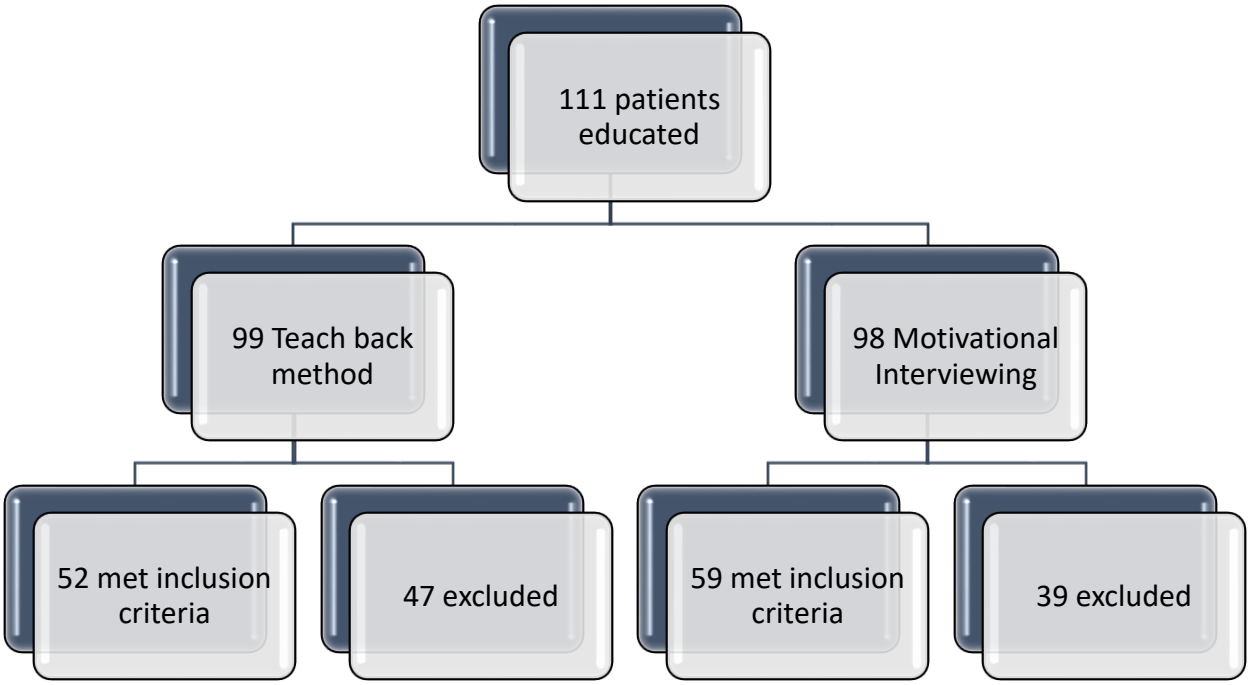
Results

From November 2018 through February 2019, a total of 101 patients with heart failure were educated by pharmacists and pharmacy students using the motivational interviewing techniques. Out of the 101 patients educated, 59 patients met the inclusion criteria for the motivational interviewing group. From October 2017 through February 2018, there were 99 patients who were educated and counseled using the teach back method, of which 52 patients met the inclusion criteria. Figure 1 shows details of both study groups.

Baseline characteristics

As shown in Table 1, only one characteristic, financial class was found to be statistically significant at baseline. Indigent, Medicare, Medicaid, and Pending groups were statistically significant with a p-value of 0.02, 0.03, 0.0001, 0.009 respectively. A patient that was homeless or who income was 150% below the poverty level was categorized as indigent. Any patient that was under review for eligibility criteria (i.e. Medicare, and Medicaid, etc.) was categorized as pending. All other baseline characteristics were not statistically significant.

Figure 1: Study Profile



Primary Endpoints

All patients were tracked for at least 30 days. In the analysis of the primary endpoint, a larger percentage of patients picked up their medication within 48 hours post-discharge in the motivational interviewing group compared to the teach back method group (38 patients [64.5%] vs 25 patients [48.1%]). This resulted in a 16.3 % increase in the number of patients that picked up their medications within 48 hours, which was not found to be statistically significant with a p-value of 0.08. Details of the primary endpoint are shown in Table 2.

Secondary Endpoints

For our secondary endpoints, we evaluated percentage of follow up patient visits and readmissions within 30 days post discharge. In the analysis of the secondary endpoints, a larger number of patients attended their follow up visits in the motivational interviewing group compared to the teach back method group (40 patients [97.6%] vs 30 patients [100%]). This

resulted in a non-statistically significant increase in the number of patients that attended their follow up visit with a p-value 0.39. There was a decrease in the percentage of patients that were readmitted (all causes) within 30 days post discharge in the motivational interviewing group compared to the teach back method group (22 patients [37.3%] vs. 20 patients [38.5%]). This resulted in a non-statistically significant decrease of 1.2% in the number of readmissions within 30-days with a p-value of 0.90. Details of the secondary endpoints are shown in Table 2.

Table 1: Baseline Characteristics of Patients

Characteristics	Motivational Interviewing (N=59)	Teach Back (N=52)	P-value
Gender – no. (%)			
Male	33 (55.9)	23 (44.2)	0.152
Age – yr			
Mean**	55.3 ± 11.2	60.3 ± 16.6	0.065
Median (range)	57 (29 – 86)	59 (30 – 91)	
Race – no. (%)			0.619
African American	21 (35.6)	15 (28.8)	0.448
Chinese	0 (0)	1 (1.9)	0.285
Hispanic	35 (59.3)	34 (65.4)	0.509
Caucasian	3 (5.1)	2 (3.8)	0.757
Language – no. (%)			0.464
English	30 (50.8)	23 (44.2)	0.484
Mandarin	0 (0)	1 (1.9)	0.285
Russian	0 (0)	1 (1.9)	0.285
Spanish	29 (49.2)	27 (51.9)	0.772
Employment – no. (%)			0.078
Employed	7 (11.9)	4 (7.7)	0.465
Unemployed	50 (84.7)	43 (82.7)	0.772
Retired	2 (3.4)	5 (9.6)	0.177
Financial class – no. (%)			**<0.001**
Commercial	9 (15.3)	3 (5.8)	0.107
Indigent*	22 (37.3)	9 (17.3)	**0.019**
Medicaid*	6 (10.2)	22 (42.3)	**0.0001**
Medicare*	4 (6.8)	11 (21.2)	**0.027**
Pending*	14 (23.7)	3 (5.8)	**0.009**
Self-pay	4 (6.8)	4 (7.7)	0.859

**All of the baseline characteristics are not statistically significant except Indigent, Medicare Medicaid and pending with a p-value of 0.02, 0.03, 0.0001, and 0.009 respectively.*

***Plus-minus values are means ± SD.*

Table 2: Primary and Secondary Endpoints			
Endpoints	**Motivational Interviewing (N=59)**	**Teach Back (N=52)**	**P-value**
Primary Endpoints			
Medication picked up within 48 hours post-discharge, no. (%)	38 (64.5)	25 (48.1)	0.08
Secondary Endpoints			
Patients attendance to follow up visit	40 (97.6)	30 (100)	0.39
Patient readmission (all cause) within 30 days post-discharge	22 (37.3)	20 (38.5)	0.9

All endpoints are not statistically significant.

Logistic Regression Multivariable Analysis Results

As shown in Table 3, only two predictive variables were found to have statistically significance. These were financial class indigent versus government and language, English vs Other. Individuals that are indigent are less likely to pick up their medication 48 hours post discharge compared to individuals with government insurance like Medicare and Medicaid. There is no difference between government insurance and other. The group label other included individuals with commercial insurance, pending, and self-pay. In our logistical regression analysis, there was a statistically significant difference seen in individuals who don't speak English, as they are less likely to pick up their medication 48 hours post discharge compared to a patient that speaks English. The majority of the individuals that did not speak English spoke Spanish. While there was no statistically difference between the MI and TB counseling method group it does appear to trend positively in the direction of motivational interviewing. Patients who were counseled with motivational interviews were more likely to pick up their medication 48 hours post discharge; however, it is not statistically significant. The same trend was seen between when pharmacists counseling using motivational interview compared to pharmacy students.

Table 3: Logistic Regression Multivariable Analysis Results (N=111)					
Variable	**Characteristics**	**P-value**	**Odds Ratio**	**95% Confidence Interval**	
				Lower	**Upper**
Financial class	Indigent vs Government	**0.043**	0.314	0.102	0.966
Financial class	Other vs Government	0.877	0.918	0.309	2.724
Age	Age	0.558	0.99	0.958	1.023
Sex	Female vs Male	0.117	0.498	0.209	1.191
Race	Hispanic vs Other	0.466	0.628	0.180	2.194
Language	English vs Other	**0.009**	0.182	0.051	0.651
Employment status	Unemployed vs Employed/Retired	0.506	1.578	0.412	6.045
Educator	Pharmacist vs Student	0.32	2.019	0.506	8.057
Counseling method	Motivational Interviewing vs Teach Back	0.280	2.097	0.547	8.043

P<0.05 are in bolded. All variables are not statistically significant except financial class indigent vs government and language English vs Other (Spanish, Russian, and Mandarin).

Discussion

In practice, there is not an established method of counseling to use when educating patients with heart failure who have challenges adhering to medication regimens. Therefore, identifying and establishing the best counseling method of delivering education to patients would be a useful tool. Several authors have reported success with the use of motivational interviewing in other disease states, such as substance abuse, hypertension, diabetes, and other comorbidities.[16 – 19]

In this study, we showed that motivational interviewing was a beneficial technique to use when assisting patients in overcoming their ambivalence regarding medication adherence. We observed an increase in the number of patients who picked up their medications within 48 hours post-discharge. It was, however, not superior to teach back method. We were able to see a trend that showed patients who were counseled using motivational interviewing were more likely to pick up their medication compared to patients who are counseled using the teach back method. In our logistic regression analysis, we saw that patients who are counseled by pharmacists compared to students tended to pick up their prescriptions more often, however there was no statistically significant difference between the counseling done by a pharmacist compared to student. Additionally, we did not see a statistically significant difference in attendance to follow up visits post discharge or 30 day all cause readmission. These observations could have been due to in part to the duration of the study design.

The study design had many strengths that increased the external and internal validity of the study. The location of the study provided a great strength that most locations don't have. Harris Health System is a closed system. Harris Health System is set up as a medical home model. When a patient enters the Harris Health System, they can receive all their care from acute to preventive care needs. This provides us with a unique ability to access all their information and follow the patient as they transition and move through the health care system. While patients do have the ability to go outside of our system, many patients choose to remain due to lack of financial support elsewhere. Therefore, Harris Health System is a perfect location to study the transition of care process.

Another strength in our study design is the study population and inclusion and exclusion criteria set. In this study, we randomly selected our control group allowing us to minimize selection bias and increase internal validity. As for the motivational interviewing group, we included all patients who met the inclusion criteria in the order they entered our hospital system. This increased our external validity. The patient population is also a large strength. Many of the patients we have in the system have many patient and healthcare related factors that pose as a barrier. Therefore, if we can see a benefit in this population which is not only the most vulnerable but also faces the largest challenges. Then we can anticipate seeing the same or even larger beneficial effect on patients that do not face as difficult challenges. Lastly, another strength in the design is the ability to counsel enough patients to meet the power for our analysis based on our sample size calculation. While the study design provided many strengths and confidence in our results, there are several factors that affected our ability to see the full effect of the motivational interviewing on medication pick up for patients with heart failure.

Limitations

There could be several reasons that the study did not result in statistically significant changes. This trend could have not reached statistical significance possibly due to duration of student rotations, small sample size for the anticipated effect size, patient factors, or health system related factors.

Most of the educators who provided the motivational interviewing in our study were pharmacy students. The decrease in effectiveness could be due to the short duration of the pharmacy student rotation. Every six weeks, we had a new group of students who were trained in motivational interviewing which could have played a role in reducing the effectiveness of the education. The students who were used for the study were asked to dedicate one hour of their week to counseling patients. This was an additional responsibility that was added to their normal rotational requirement. Additionally, the comfort level with the use of MI of each student varied, and the technique requires practice, which was limited due to the structure of the student rotation. This could have limited the student's effectiveness in the counseling provided to the patient.

In 2017, Abughosh et al. conducted a study that utilized students to provide motivational interviewing calls.[20] The students were integrated and expected to call patients as a major part of their rotation as opposed to an added component.[20] Having students who are dedicated to conducting MI might increase the effectiveness of delivery by increasing the practice the student has with the MI method. Additionally, the students in Abughosh's study received 3 days of training compared to 6 hours of training.[20] Longer training sessions could have increased the students' and other educators' level of comfort with the MI technique.

Another factor which could have affected the outcomes could have been due to a small sample size for the anticipated effect size. In 2017, Abughosh et al. conducted a study using motivational interviewing to look at adherence to ACEs and ARBs in patients with hypertension or diabetes. In this study, the intervention was done by students and it was found to be effective in improving adherence, but it included a larger sample size of 500 patients.[20] The Abughosh study required 491 patients to provide a 90% power to detect a 17% difference.[20] In our study we calculated that we would need 98 patients to provide 80% power to detect a 20% difference between the two groups. The 20% difference was an estimate of the effect that we believed we could see with the use of MI compared to teach back on medication pick up. In our study, we saw a 16.3% increase in medication pick up in the MI group compared to teach back, instead of the estimated 20%. In future studies, a larger sample might be useful to explore.

Studies have also shown that there are several patient related factors which can affect the patients medication adherence.[22] Factors such as health literacy can play a large role in patients adherence to medication and only gets more complex when you add in a difference in primary language spoken.[22] Based on our logistical regression analysis, we identified that individuals who don't speak English are less likely to pick up their medication within 48 hours post discharge compared to patients who speak English. This is an important factor to consider, since half of the population in this study spoke Spanish as their primary language; therefore, pharmacists and pharmacy students used a translator service to communicate with non-English

speakers. The interpretation of information across the translator service could have potentially reduced the effectiveness of the counseling. Given that a larger percentage of our patient population spoke a language other than English, this confounder could have affected our outcomes.

Healthcare system factors such as a patient's ability to pay also plays a large role in medication adherence.[22] Based on our logistic regression analysis, we identified that individuals who were indigent were less likely to pick up their medication compared to individuals who had government insurance, such as Medicare and Medicaid. Additionally, we saw no difference between individuals who had other forms of financial support, such as commercial insurance, compared to government (Medicare and Medicaid) insurance. A larger portion of our patient population are patients who have financial limitations. Indigent patients can enroll into our system and receive care for a reduced cost which Harris Health System provides to patients in order to minimize cost as barrier for adherence.

While this service is assisting many patients in overcoming their financial barriers, it is hard to say how many patients exclude themselves from this service due to personal reasons. There are many patients who are undocumented and are afraid to complete the necessary paperwork for fear they will be reported to the government. Also, our patients face several other challenges such as transportation and literacy barriers. Patients have a hard time getting to our facilities due to transportation. Many times, a patient's paperwork is started and left incomplete preventing them from obtaining the available financial assistance. There are also patients who have lower reading comprehension and completing the forms can pose a challenge for them. Additionally, our study utilized historical data as the control group, which could have affected the outcomes. In October 2017, Harris Health System implemented the cash and carry system. This meant we would no longer wave co-payments for patients.

We also found that there was no difference in follow up visit attendance or 30-day readmission rates. A possible reason we were not able to show with statistical significance can be due in part to how the study was carried out. Our patients were only counseled a single time compared to other studies where motivational interviewing was provided multiple times to the same patient over a set period of time and their behavior observed over a longer time frame. Other studies that looked at the use of MI had longer sessions, such as 30 minutes – 1 hour and scheduled follow up visits.[18 - 20] For example, in a study conducted by Abughosh et al. (2017) the intervention was carried out over 6 months and students followed up with the patients with monthly calls.[20] The outcome evaluated in the study was also looking at a longer time frame of 6-month adherence measured by refill portion days covered (PDC).[20] In another study done by Ogedegbe G, et al. (2008), patients were counseled for 30 minutes and with quarterly follow ups for 1 year.[19] A longer follow up time frame would be useful in order to see longer term effects, such a decrease in 30 day readmission rate.

All these factors could have impacted the final outcomes of our study. Not to mention that there were several confounding factors outside our control which could have affected the overall outcome of the study such as comorbidities, patient's education level, and marriage. In the future, studies that control for other confounders should be done.

In summary, this study found that the use of motivational interviewing showed a 16.3% increase in the percentage of patients who picked up their medications within 48 hours post discharge. This trend did not reach statistical significance possibly due to the small sample size, duration of study, and confounding factors. Future studies that study the use of motivational interviewing techniques over a longer period should be done with larger sample sizes to determine the effectiveness of motivational interviewing on medication adherence for heart failure patients.

References

1. VL., R. (2013). Epidemiology of Heart Failure. *Circulation Research, 113*(6), 646-659. doi:10.1161/CIRCRESAHA.113.300268
2. Merkley, K. (2014). Leveraging Healthcare Analytics to Reduce Heart Failure Readmission Rates. Retrieved from http://www.healthcatalyst.com/reduce-heart-failure-readmission-with-healthcare-analytics/
3. *Heart Failure Fact Sheet*. (2016, June 16). Retrieved from Centers for Disease Control and Prevention: https://www.cdc.gov/dhdsp/data_statistics/facts_sheets/fs_heart_failure.htm
4. *Heart Failure: Medicare Population*. (2015). Retrieved from Centers for Medicare & Medicaid Services: http://www.houstonstateofhealth.com/indicators/index/view?indicatorId=2060&localeId
5. Casillas, B. a. (2017, March 10). *Aiming for fewer Hospital U-turns: The Medicare Hospital Readmission Reduction Program*. Retrieved from https://www.kff.org/medicare/issue-brief/aiming-for-fewer-hospital-u-turns-the-meidcare-hospital-readmission-reduction-program/
6. *Readmission Rates at Harris Heath System: Acute Care Hospital in Houston TX 77054*. (2018). Retrieved from https://hospitalcaredata.com/facility/harris-health-system-houston-tx-77054/readmission-rates
7. Naylor, A. K. (2011). The Care Span: The Importance of Transitional Care in Achieving Health Reform. *Health Affairs, 30*(4), 746 - 754. doi:10.1377/hlthaff.2011.0041
8. Ranji, R. a. (2015). Transitional Care Strategies from Hospital to Home: A Review for the Neurohospitalist. *Neurohospitalist, 5*(1), 35 - 42. doi:10.1177/1941874414540683
9. Joint Commission Resources. (2012). *Transition of Care: The Need for a More Effective Approach to Continuing Patien.*
10. Naylor, B. C. (2004). Transitional Care of Older Adults Hospitalized with Heart Failure: A Randomized Controlled Trial. *Journal of American Geriatric Society, 52*(7), 675 - 684. doi:10.1111/j.1532-5415.2004.52202.x
11. Naylor, N. et al. (1999). Comprehensive Discharge Planning and Home Follow-Up of Hospitalized Elders: A Randomized Clinical C+. *JAMA, 281*(7), 613 - 620. doi:10.1001/jama281.7.613
12. Cannon-Breland, S. a. (2015). Motivational Interviewing for Medications adherence. *Pharm Today, 21*(6), 81 - 89.
13. National Community Pharmacist Association. (2013) Medication Adherence in America: A National Report. NCPA. 1 - 20. https://www.ncpanet.org/pdf/reportcard/AdherenceReportCard_Abridged.pdf

14. Zolnierek and DiMatteo. (2009). Physician Communication and Patient Adherence to Treatment: A Meta-Analysis. *Med Care, 47*(8), 826 - 834. doi:10.1097/MRL.0b013e31819a5acc
15. Using Motivational Interviewing to Create Change. (n.d.). *Pharmacist Letter*, *212*(243).
16. Motivational Interviewing. (2011). https. Retrieved from https://www.centerforebp.case.edu/practices/mi
17. Kleber, K. et al. (2010). Practice guidelines for the treatment fo Patients with Substance Use Disorder. *American Psychiatric Association*, 1 - 275. Retrieved from https://psychiatryonline.org/pb/assests/raw/sitewide/practice+
18. Creber, P. D. (2015). Motivational Interviewing Tailored Interventions for Heart Failure (MITI-HF): Study design and methods. *Contemporary Clinical Trials, 41*, 62 - 68. doi:10.1016/j.cct.2014.12.019
19. Ogedegbe G, et al. (2008). Practice-Based Trial of Motivational Interviewing and Adherence in Hypertensive African Americans, American Journal of Hypertension, 21(10), 1137 - 1143. https://doi.org/10.1038/ajh.2008.240.
20. Abughosh S, et al. (2017). A Motivational Interviewing Intervention by Pharmacy Students to Improve Medication Adherence. J Manag Care Spec Pharm. 23(5), 549 - 60. doi: 10.18553/jmcp.2017.23.5.549.
21. About Us. (2017). Retrieved from Harris Health System: https://www.harrishealth.org/about-us/harris-health
22. Brown, M. T., & Bussell, J. K. (2011). Medication adherence: WHO cares?. Mayo Clinic proceedings, 86(4), 304-14.