Assessing the Relationship between Patient-Provider Communication Behaviors and Amount of Heart Failure Self-Care Discussion

By

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An Abbreviated Systematic Review of Studies Examining Potential Mediators between Patient-Provider Communication and Patient Self-Care in Chronic Illness

Introduction

The dynamics of the patient-provider relationship have been an increasing area of study over the last few decades, and understanding these dynamics has become a central focus when discussing the improvement of patient-centered care. Many current studies highlight the importance of effective communication between patients and providers, and emphasize the favorable effects communication has on patient outcomes, such as decreased hospital recidivism rates and improved quality of life.\(^1\) These outcomes have been noted to be of particular importance in chronic diseases like diabetes, HIV, heart failure (HF) and chronic obstructive pulmonary disease (COPD), all of which require extensive treatment over a number of years. In chronic disease, self-care is an outcome hypothesized to be most proximally influenced by effective patient-provider communication, as research confirms that patient self-care in chronic illness is an essential cornerstone to improved outcomes.\(^2\) Conceptually, self-care involves the ability to act and make choices, is driven by autonomy and individual responsibility for one’s own health, and is influenced by knowledge, efficacy, and motivation.\(^3,4\) While there is a sizeable body of literature detailing positive correlations between effective patient-provider communication and improved self-care behaviors in patients with chronic disease, there is a relative paucity of data examining the exact mechanisms of this communication and the possible mediating factors which in fact lead to improved self-care.\(^5\) Currently, knowledge, information sharing, self-efficacy, and social support are
several hypothesized mediators between patient-provider communication and improved self-care.6

To better understand research that exists on this topic, the aim of this review is to explore the prevailing mediating factors between patient-provider communication and self-care behaviors in individuals with chronic illnesses.

**Methods**

*Inclusion Criteria*

This abbreviated systematic review was conducted in June 2016 by one reviewer, and searched articles from Embase, Web of Science, and MEDLINE. The following eligibility criteria were employed when assessing papers to be included in the final review:

1. Studies written in English conducted in the US or abroad from 1995-2016.
2. Patient-provider communication (assessed via survey, audio recording, or video recording of patient encounters) was at least one of the independent variables in the study.
3. Patient self-care was at least one dependent variable/outcome of interest in the study.
4. Authors must state in the paper that they were examining potential mediators between patient-provider communication and patient self-care.
5. Study must include patients with chronic illnesses (examples include diabetes, HF, COPD, and HIV).
6. Restricted to adult patients without cognitive dysfunction.
7. Required to be quantitative and empirical in study design and analysis.

*Procedures*

The search terms used were various combinations of the following: “patient”, “physician”, “communication”, “influence”, “self”, “management”, “efficacy”, “chronic”, “illness”, and “self-care”. All-field searches were conducted in each database and a MeSH term search within MEDLINE in order to ensure that all possible studies were included. Each individual search was cross-matched with the others to eliminate any duplicate studies.

Relevant study selection began with a review of all titles returned in the searches. Seemingly relevant titles then underwent an abstract review and subsequent full text review of the article if
the abstract appeared to fit the objectives for this review. Final studies that were included met the aforementioned criteria. The quality of these articles was assessed using the 22-item “Strengthening the Reporting of Observational Studies in Epidemiology” (STROBE) guidelines. These guidelines rate the quality of studies based on how well authors: present key elements of the study design, detail how participants were chosen, describe processes which address potential biases, describe statistical methods, provide descriptive data and outcome data, adjust for confounders and report key results, limitations, interpretations, and study generalizability. Using these criteria, the included studies were critically appraised and received final quality ratings of “Good”, “Fair”, or “Poor”. Studies which met 21-22 criteria were rated “Good”; Studies which met 20 criteria were rated “Fair”; studies only meeting 19 criteria or below were rated “Poor”.

**Search Results**

The search returned 471 unique titles, of which 460 were eventually excluded after title and abstract review (Figure 1). Eleven papers were reviewed in full, and six were ultimately excluded from the final review. Two were excluded because they did not measure the relevant outcomes in question, two were excluded because they did not examine or mention possible mediators between patient-physician communication and self-care behaviors, and two were excluded because they were qualitative in nature without appropriate statistical analyses.

All of the selected studies were cross-sectional in design and data collection was survey based (self or interviewer administered). Four studies enrolled participants from the United States, and one study was composed of participants living in Shanghai, China. Four of the five studies recruited participants from large, metropolitan cities. Three of the five studies comprised majority male participants, and all study participants suffered from at least one of the following chronic illnesses:
type II diabetes, HF, COPD, or HIV positivity. Four of the five studies were rated “Fair” or “Good”, and one study was rated “Poor” upon review with the STROBE guidelines.

**Social Support as a Mediator**

Two of the studies asserted that social support (or a certain aspect of social support) by the provider for the patient acted as a possible mediating factor between patient-provider communication and self-care behavior outcomes. For example, Cené et al. (2015) examined the association between frequency of family member accompaniment to visits on HF self-care maintenance (ability to maintain physiologic stability) and management (decision making in response to symptoms) behaviors, and examined whether satisfaction with provider communication was a mediator of these relationships in 150 HF patients. This study used the 22-item Self-Care of Heart Failure Index (Cronbach’s α= 0.46 and 0.65 for self-maintenance and self-management, respectively) to determine patients’ self-rating of heart failure maintenance and management behaviors. One adapted question from the American Board of Internal Medicine Patient Satisfaction Questionnaire was used to assess patient satisfaction with provider communication. Results demonstrated that most patients who were accompanied to some/most/every visit had a self-maintenance score that was, on average, 6.4 points higher than those patients accompanied never or rarely (adjusted model p=0.01). Patients who reported being accompanied to some/most/every visit, on average, scored 12.7 points in self-management than those patients who were never or rarely accompanied (adjusted model p= 0.01). For the mediation analysis, results demonstrated that increased family accompaniment to appointments was significantly positively correlated with increased satisfaction with provider communication (p=0.05), and that greater satisfaction with provider communication was in turn significantly associated with increased execution of self-
maintenance behaviors (p= 0.02), but not with self-management behaviors (p= 0.09). Investigators conducted standard mediation analyses using the MacKinnon method and found marginal statistical significance for satisfaction with provider communication as a mediator of the relationship between accompaniment and HF self-care maintenance (p=0.06), but did not find a statistically significant mediation effect on HF self-care management (p= 0.13). The authors concluded that their study was likely not able to demonstrate statistically significant correlations at the p<0.05 level due to the study being underpowered, but that the relationship between patient provider communication and increased self-care behaviors in patients with HF could very well still be mediated by patient satisfaction with provider communication.

The second study was conducted by Gao et al. (2013) at one primary care clinic located in Shanghai, China on 222 patients diagnosed with type II diabetes. This study examined how self-efficacy, social support, and patient-provider communication influenced glycemic index through patient self-care. Investigators measured self-care behaviors using the Chinese-translated 11-item Revised Summary of Diabetes Self-Care Activities (SDSCA) survey (Cronbach’s α= 0.82). Social support and patient-provider communication were measured using a Chinese-adapted version of The Health Education Impact Questionnaire. Cronbach’s alpha for patient-provider communication in this measure was 0.92, and the value for social support was 0.93. The results of the study demonstrated that patient-provider communication and social support were each significantly correlated with increased self-care behaviors (β= 0.14, p=0.029 and β= 0.17, p=0.009, respectively), and that patient-provider communication and social support were also significantly correlated with one another (γ= 0.32, p<0.001). While the statistical significance of social support as mediator between patient-provider communication and self-care behaviors was not examined using formal mediation analyses, the authors highlighted the fact that the association between patient-provider communication and support in this study signaled that many patients drew social support from their
physicians, and that this was a significant and clinically important factor in their communication. As such, social support could be inferred as a possible mediator between communication and self-care, but a formal statistical analysis on this relationship would be necessary before a definitive correlation could be assessed.

**Information Sharing as a Mediator**

Two of the papers in this review examined the possible effect that information sharing by the provider had on the relationship between patient-provider communication and self-care behaviors. Shea and Chamoff (2012) examined the effect that in-home “telestations” and communication with telehomecare nurses (THNs) had on patients’ execution of self-care behaviors. All patients were men over 50, were members of one of three possible Veteran’s Health Administration sites, and suffered from at least one of the following: type II diabetes, HF, or COPD. The telestations collect patients’ daily vital signs and record current symptoms (sleep, edema, shortness of breath, pain, etc.). Once these data are collected, they are transmitted to a remote THN, who reviews the data and follows up with the patient if necessary. The investigators of this study conducted a secondary cross-sectional analysis on 43 patient-THN dyads using round-robin survey data to evaluate the frequency of use of the stations, perceived quality of communication between THNs and patients, and the perceived integration by the patients of the information garnered from the stations in the form of increased self-care behaviors. The 3-item Communication Scale was used to evaluate the frequency, timeliness, and understanding of communication interactions. The scale was reliable and valid for both THNs evaluating interactions with patients (Cronbach’s α= 0.82), and for patients evaluating interactions with THNs (Cronbach’s α= 0.75). Integration of data from the telestation was measured on a 0-100 scale, asking reciprocal questions like “I use the home telestation information to guide my daily efforts to manage my health care.” Results of the study
demonstrated that a weak, but significant, positive correlation between THN perception of frequent and timely communication with the patient and THN perception of patient integration of telestation information into self-care behaviors. Statistical results are as follows: THN perception of frequent communication with patient correlated with THN perception of patient integration yielded $r= 0.365$, $p= 0.016$; THN perception of timely communication with patient correlated with THN perception of integration yielded $r= 0.499$, $p<0.001$. Paradoxically, an insignificant but negative correlation was found between THNs’ and patients’ perceptions about the integration of the telestation information into the daily self-care behaviors by the patients ($r= -0.25$, $p= 0.10$). This suggests that the patients who the THNs believe are integrating the information are stating that they in fact do not integrate the telestation information as readily. The authors attribute this phenomenon to the “halo effect”, whereby one belief affects the perception of another belief. That is to say, THNs who believed they were communicating more with certain patients also believed that these patients were integrating the information more readily; however, these very same patients reported that this perception of the THN was not necessarily true. Given this paradoxical data outcome, the authors could not conclude that information provision via the telestation was a potential mediator between patient-provider communication and self-care behaviors in chronically ill patients.

The second paper which evaluated information giving and understanding as a possible mediator was conducted by Heisler et al. (2002). This study aimed to understand if patients’ ratings of their provider’s communication (PCOM) and participatory decision-making style (PDMStyle) correlated with variations in their self-care, and if understanding of diabetes self-care acted as a potential mediator between these two. The study was conducted through the National Institute on Aging, and comprises survey data from 1,314 patients with type II diabetes treated at one of 25 selected Veterans Affairs medical centers throughout the country (98% male). Overall self-management of diabetes was the main outcome of interest. The 150 survey questions were part of a questionnaire
originally developed for the Diabetes Quality Improvement Project, which created and implemented a set of national measures for evaluation and quality improvement of diabetes care. The survey addressed the following areas: general health, diabetes severity, satisfaction and understanding of diabetes care, self-management behavior, utilization of medical services, and demographics. The results of the study demonstrated that, in a combined regression model (PCOM and PDMStyle as the independent variables, overall self-management as the outcome variable), PCOM was significantly predictive of diabetes self-management ($\beta= 0.175$, $p<0.001$), but PDMStyle was not ($p>0.2$). When “understanding” was added as an independent variable to the model, the significance of PCOM dropped, but remained significant ($\beta= 0.10$, $p= 0.004$). Understanding was strongly predictive of self-management, with $\beta= 0.025$ and $p <0.001$. Given this model, the authors suggest that at least some of the association between adequate patient-provider communication and improved self-care is possibly mediated by understanding of appropriate self-care behaviors by the patient.

**Self-Efficacy as a Mediator**

The final study in this review examined self-efficacy as a possible mediator. Johnson et al. (2006) surveyed 2,765 HIV positive individuals recruited from four large cities in the US to evaluate whether or not self-efficacy (confidence in one’s ability to adhere to the treatment prescribed regimen) mediates the relationship between patient-provider communication and anti-retroviral (ARV) medication adherence, defined as greater than or equal to 90% ARV adherence over the previous 3 days before the survey was taken. The following survey measures were used: Beck’s Depression Inventory (Cronbach’s $\alpha= 0.85$); Social Provisions Scale to measure social support (Cronbach’s $\alpha=0.82$); an adapted 8-item scale to rate patient’s perceptions of provider interactions (Cronbach’s $\alpha= 0.81$); a 12-item scale to assess adherence self-efficacy (Cronbach’s $\alpha= 0.91$); and a computerized survey was administered to rate ARV medication adherence over the previous three
days. Univariate analyses demonstrated that both positive provider interaction and adherence self-efficacy were predictive of medication adherence (provider interaction: unadjusted OR= 0.704, p<0.001; adherence self-efficacy: unadjusted OR= 0.666, p<0.001.). When both were entered into the same regression model, positive provider interaction was no longer significant, but medication adherence self-efficacy remained significant. The results of these models would suggest that medication adherence self-efficacy is a potential mediator between positive patient-provider communication and the self-care behavior of medication adherence, as the authors originally hypothesized.

**Discussion**

**Overall Risk of Bias Within the Studies**

Because all of the studies reviewed were cross-sectional, they all had several areas in common for potential biases of the data. Four of the five studies were rated “Good” or “Fair” in part because of a low to moderate risk for measurement bias. All reviewed studies included Cronbach’s alpha values in order to address the validity and reliability of the measures used. Cené et al. was the only study where alpha values for the survey which measured self-management and maintenance of HF (the SCHFI) were below the “adequate” threshold of 0.70; however this was likely due to the small sample size analyzed in this study. All studies were also at risk for reporting bias, as there could be some desire on the part of the patients to suppress information that is stigmatized or sensitive in nature. Specifically, Johnson et al. is at a moderate to high risk for this, given the sensitive nature of HIV status and sexual/drug history.

Because all of the studies were survey-based, they all had some unavoidable level of risk of recall bias. Three of the five studies were at moderate risk for recall bias, and two of the five were at high risk. In the studies which received moderate ratings, investigators used a cognitive screening
tool and excluded those who exceeded a certain threshold of cognitive dysfunction. While the remaining two studies (Heisler et al., Shea et al.) presumably only enrolled cognitively competent participants, there is no true way to be sure of this without a formal, documented measure, which was lacking in these studies. Because this measure was absent, these two studies were deemed to be at high risk for recall bias.

Four of the five studies were moderate in their risk for confounding because, while none of them were blinded (increasing the risk for measurement bias and confounding), they did adjust for potentially confounding covariates in their statistical analyses. However, Shea et al. was considered to be at high risk for confounding due to the lack of adjustment for potential confounders in regression analyses. This study only completed Pearson’s coefficient analyses to compare patient and THN survey data, and discussed predictability with only this value. This is not the most appropriate test for this data, as the Pearson’s coefficient is helpful in understanding the magnitude of the relationships compared, but cannot predict linearity and possible outcomes given the magnitude of the independent variables as would regression. It was for this reason, in addition to the lack of screening for cognitive dysfunction, that Shea et al. was given an overall “Poor” rating, versus the other four studies which received “Fair” to “Good” ratings.

**Study Limitations**

The primary drawback for all five studies was the fact that they were cross-sectional in design. Because the data is reflective of a single point in time, directionality of the associations cannot be determined, nor can causality be assessed. Future studies which aim to better understand the potential relationships between patient-provider communication and improved self-care behaviors should be longitudinal in nature to better understand these associations. Finally, generalizability was an issue with several of the studies. Gao et al. only enrolled participants from one primary care clinic
in Shanghai, China. This one clinic population may not necessarily be representative of all metropolitan cities in China, nor may it be representative of the large rural population in this country. Heisler et al. and Shea et al. were composed of almost 100% male participants who were veterans of the United States military. This is a very specific population with sometimes distinct psychosocial challenges, and may not be applicable to the larger US population, nor could these results necessarily be generalized to women.

There are several limitations of this review. First, although the search for relevant articles was extensive, it is possible that relevant material was missed. Next, only five studies are included in this review, making it difficult to draw any definitive conclusions about this limited area of study. Future analyses in this area should expand the search to more databases, and should ideally be full systematic reviews with more than one reader to ensure that all target articles are captured and reviewed for inclusion.

**Conclusion**

While a series of studies have established that there is a positive correlation between effective patient-provider communication and increased self-care behaviors among patients who suffer from chronic illnesses, this review has demonstrated that several potential mediators of this relationship exist. Taking the results of the three highest rated studies in this review, it would appear that patient understanding of self-care behaviors, satisfaction with provider interactions, and perceived social support by the patient in their relationship with their provider are all possible mediators in this complex interaction. Identification of these potential mediators in this study is consistent with potential mediators identified in other systematic reviews examining the outcomes of the effective patient-provider relationship.\textsuperscript{14-15} Specifically, other forms of social support from the provider, like trust, empathy, and reassurance of the patient have been associated with positive intermediate
patient outcomes, like increased self-care, commitment to treatment, and access to care.\textsuperscript{14-15}

Additionally, provision of information to the patient and ensuring patient understanding were also confirmed through other studies to likely be potential mediators in this relationship.\textsuperscript{15} Future studies should examine these and other potential mediators using longitudinal designs and specific mediation statistical analyses to better determine causality in this relationship between communication and self-care behaviors.
References


<table>
<thead>
<tr>
<th>Author and Year</th>
<th>Study Design</th>
<th>Objectives</th>
<th>Mediator(s) of Interest</th>
<th>Population</th>
<th>Comments</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cené et al., 2015</td>
<td>Cross-sectional</td>
<td>To examine the association between family accompaniment of HF pts to appointments and HF self-care behaviors, and to determine if associations are mediated by satisfaction with provider communication.</td>
<td>Satisfaction with provider communication</td>
<td>N=150 patients from the UNC Health Care outpatient cardiology clinic; 51% female</td>
<td>-Cronbach’s α&lt;0.7 for SCHFI, likely due to underpowered study -Used Blessed Test to screen for adequate cognition -Adjusted for confounders</td>
<td>Good</td>
</tr>
<tr>
<td>Gao et al., 2013</td>
<td>Cross-sectional</td>
<td>To examine how self-efficacy, social support, and patient-provider communication affect glycemic control through self-care in type II DM</td>
<td>Social support in the patient-physician relationship</td>
<td>N= 222 Chinese adults in 1 primary care center in Shanghai, China; 61.7% female</td>
<td>-Cronbach’s α&gt; 0.7 for all study survey measures -Exclusion of those with cognitive impairment -Adjusted for confounders</td>
<td>Good</td>
</tr>
<tr>
<td>Heisler et al., 2002</td>
<td>Cross-sectional</td>
<td>To examine the influence of patients’ ratings of providers’ communication and decision-making style, and how this relates to their understanding of type II DM self-care.</td>
<td>Understanding of proper self-care behaviors</td>
<td>N= 1,314 patients from 25 VA centers around the US; 98% men; mean age of 67</td>
<td>- Cronbach’s α&gt; 0.7 for all study survey measures -No screening for cognitive impairment -Adjustment for confounders</td>
<td>Fair; lack of cog. screen increases risk of recall bias</td>
</tr>
<tr>
<td>Study</td>
<td>Study Design</td>
<td>Objective</td>
<td>Independent Variable</td>
<td>Dependent Variable</td>
<td>Sample Size</td>
<td>Methodology</td>
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<tr>
<td>Johnson et al., 2006</td>
<td>Cross-sectional</td>
<td>To examine if the relationship between positive patient-provider interactions and medication adherence is mediated by patient self-efficacy in HIV+ patients</td>
<td>Positive patient-provider interactions</td>
<td>Medication adherence self-efficacy</td>
<td>N= 2,765 HIV+ patients from 4 major US cities recruited from community agencies and clinics serving HIV+ individuals; 74% male</td>
<td>- Cronbach’s α&gt; 0.7 for all study survey measures -Several measures also validated by other studies, and medication adherence reporting was done via computer to ensure truthful reporting -Those with neuropsychiatric illnesses excluded -Adjusted for confounders</td>
</tr>
<tr>
<td>Shea and Chamoff, 2012</td>
<td>Cross-sectional</td>
<td>To examine the relationship between THN-patient communication and integration of information by patients and THNs from the “telestations” into self-care behaviors (of patients with chronic illnesses)</td>
<td>THN-patient communication and integration of information</td>
<td>Information provision via home telestations</td>
<td>N= 43 THN-patient dyads; patients had type II DM, COPD, or CHF; 100% male sample from 3 Veteran’s Health Association sites</td>
<td>- Cronbach’s α&gt; 0.7 for all study survey measures -Inappropriate analyses of data to determine predictive relationships (did Pearson’s coefficients rather than regression) -No adjustment for confounding -No screening for cognitive function</td>
</tr>
</tbody>
</table>
**Figure 1: Paper Selection Process**

**MEDLINE, Embase, World of Science**

- **Unique Articles**
  - N = 471

**Title Review**

- **Articles for Abstract Review**
  - N = 24

**Abstract Review**

- **Articles for Full Review**
  - N = 11

**Full Review**

- **Articles for Inclusion**
  - N = 5

**Eliminated**

- N = 447
  - Included article reviews, basic science papers, and unrelated articles of varying subjects.

**Eliminated**

- N = 13
  - 4 examined communication dyads other than the provider and patient
  - 2 studied children <18
  - 2 were proposals to build tools to assess patient-provider communication and patient self-efficacy
  - 2 had an outcome of quality of life rather than self-care behaviors
  - 1 was only a concordance study of provider/patient agreement in discussions
  - 1 was a review of another study
  - 1 had the outcome of patient perception of themselves as a result of patient provider communication rather than self-care behaviors.

**Eliminated**

- N = 6
  - 2 had inappropriate outcomes (satisfaction with provider interaction, psychosocial effects of self-care training program for diabetic patients)
  - 2 did not measure/discuss potential mediators in any way
  - 2 not quantitative studies with statistical analyses
Assessing the Relationship between Patient-Provider Communication Behaviors and Amount of Heart Failure Self-Care Discussion

ABSTRACT

Objective: The purpose of this study is to describe patient-provider reported frequency of discussion of key heart failure (HF) self-care behaviors in comparison to actual amount recorded from audiotaped data, to examine how specific communication behaviors (e.g., question-asking) affect the amount of subsequent discussion of HF self-care behaviors, and to assess whether the actual amount of discussion of HF self-care behaviors differs based on patient and provider ratings of the patients’ performance of HF self-care behaviors.

Methods: We collected survey data and audiotaped routine medical visits of 93 patients with heart failure. Of these patients, 36 were accompanied to their visits. Communication analysis was completed using the Roter Interaction Analysis System.

Results: There were statistically significant associations between total patient and family member question asking and amount of discussion of medication adherence (OR= 1.10, CI= 1.05-1.16, p<0.001), experience of symptoms (OR= 1.07, CI= 1.03-1.12, p= 0.001), and response to symptoms (OR= 1.03, CI= 1-1.05, p=0.026). There was one marginally significant value (p=0.06) in the relationship between patients’ and companions’ ratings of patient self-weighing. There were no statistically significant differences in amount of discussion about the key HF self-care behaviors between accompanied and unaccompanied patients.

Conclusions: Question asking by the patient and/or their family member is related to an increased amount of discussion regarding medication adherence, patient experience of HF symptoms, and patient
response to these symptoms. Question asking may be an important modifier in patient-provider communication and amount of discussion regarding HF self-care behaviors. Future studies regarding patient-provider communication and amount of HF self-care behavior discussion should examine the effects of other communication behaviors on this relationship (other than question asking), and should attempt to identify other factors which modify patient-provider discussions of HF self-care.

**Introduction**

Heart failure (HF) presents a significant public health burden in the United States, with approximately 550,000 new cases diagnosed every year.\(^1\) The majority of patients are over the age of 65, and this chronic illness represents a leading cause of hospitalizations, costing the medical system $39 billion annually in outpatient visits, hospitalizations, and readmissions.\(^1\) Adequate self-care has been linked to decreased hospital readmission rates and improved quality of life.\(^2-3\) For HF, self-care involves the following behaviors: limiting salt intake, exercising regularly, daily weighing, adhering to medications and appointments, recognizing HF exacerbation symptoms and appropriately responding to symptoms.\(^4\) Successfully adopting and maintaining HF self-care behaviors may require various forms of social support, including family support.

Family member involvement is critical in the support of HF patients, and has been shown to positively influence the performance of self-care behaviors.\(^5-9\) Cené et al. (2015) found that family member accompaniment to medical visits is positively associated with higher scores on validated measures of HF self-care behaviors, and satisfaction with provider communication was examined as a possible mediator of this association.\(^5\) Higher quality communication between patients and health care providers has been associated with better self-care behaviors and other outcomes for patients with HF and other chronic illness populations.\(^5,10-14\) Few studies have examined how the quality or content of communication between patients and providers is affected by the presence of family members during
the medical visit. In a recent analysis, Cené et al. (2016) audiotaped visits between HF patients, family members who accompanied them to visits, and HF providers and examined how specific communication behaviors, particularly those that are indicative of greater engagement in care (e.g., question asking) differ in accompanied (i.e., family member present in the examination room) versus unaccompanied visits. They also collected survey data from patients, family members, and providers to assess perceptions and ratings of patients’ HF self-care behaviors. The study data showed that there were 32% more positive rapport building statements (p<0.01) and almost three times as many social rapport building statements (p<0.01) social rapport building statements from patients and family members in accompanied visits versus unaccompanied visits, and that providers made 25% more biomedical information giving statements (p=0.04) and almost three times more social rapport building statements (p<0.01) in accompanied visits. However, in this analysis the authors did not investigate how communication behaviors that are indicative of engagement influence discussion about specific HF self-care behaviors. Question asking by patients and family members is a communication behavior that reflects information seeking, which can plausibly lead to more discussion and provider education about HF self-care, which in turn may result in better execution of HF self-care behaviors.

In addition, it is plausible that perceptions of the patients’ adherence to and level of skill with performing HF self-care behaviors may also influence the amount of discussion that occurs during the visits about HF self-care. However, to our knowledge, no studies have attempted to answer this question in HF patients. To address these gaps in the literature, the aims of this paper are to: 1) describe the amount of discussion about HF self-care behaviors (based on audiotaped data from a single visit) and compare how it differs in accompanied versus unaccompanied visits; 2) compare patients’, family members’, and providers’ ratings of patients’ performance on HF self-care behaviors; and 3) assess whether the odds of having more (vs. less) discussion of HF self-care behaviors differs based on the number of questions asked and accompaniment status; and 4) assess whether the odds of having more
(vs. less) discussion of HF self-care behaviors differs based on participants’ self-rated performance on HF self-care behaviors.

**Methods**

**Study Design and Eligibility Criteria**

This was a cross-sectional study conducted with patients from the outpatient cardiology clinic at The University of North Carolina at Chapel Hill School of Medicine. The study sample comprises data collected from HF patients, their family members, and cardiology providers. Potential patient participants were initially identified and screened using the General Internal Medicine’s clinic’s HF clinic registry and the Carolina Data Warehouse for Health (CDW-H), which is a large database containing clinical, research, and administrative data from more than 3 million patients who have received care in the UNC Health Care System. In addition to the initial list compiled using the CDW-H, more potential patients were identified through review of the daily clinic schedules and patient medical records. To establish accompanied visit status by a family member, investigators questioned the patients’ providers about how often a family member would typically accompany them into the examination (none of the time, rarely, some visits, most visits, every visit). Actual patient accompaniment was confirmed on the day of the appointment.

Eligibility criteria for the study patients were as follows: 21 to 85 years old; had a clinical diagnosis of HF (reduced or preserved ejection fraction) based on International Classification of Disease, Ninth Revision (ICD-9) codes and confirmed via radiographic procedures, bloodwork, and/or cardiac tests; were currently taking a loop diuretic; and could speak English. Exclusion criteria included: significant cognitive or psychiatric impairment; inability to perform activities of daily living; or residence in a nursing home or care facility. Eligibility criteria for accompanying family members were: 21 or older; able to speak English; and would accompany the patient into the exam room. Providers were
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eligible if they were an attending physician, nurse practitioner, physician assistant, or cardiology fellow practicing in the UNC-CH cardiology clinic. This study was approved by the Institutional Review Board at UNC.

Potentially patient participants were approached on the day of their appointment by a trained research assistant (RA) who confirmed eligibility, obtained informed consent, and administered HF surveys to patients and family members (if present) immediately prior to their appointment. For this study, “family members” were defined as “two or more persons related in any way—biologically, legally, or emotionally”. Providers completed a post-visit and socio-demographic survey after each participant patient encounter. Each enrolled patient’s visit was audio recorded in its entirety.

Data Collection and Measures

Demographics and HF Symptoms

The CDW-H and patient self-report was used to collect the following patient information: age, gender, self-identified race (black vs. white), highest educational level, health literacy (assessed with the single proxy question “how confident are you with filling out forms by yourself”), marital status, employment status, overall self-rated physical health (single proxy question) and mental health, New York Heart Association (NYHA) functional class, and ejection fraction (EF). NYHA class was determined through asking the patient what symptoms they experienced (shortness of breath, fatigue, and/or chest pain) when engaging in their usual physical activity: no difficulties (Class I), some difficulty (Class II), great difficulty (Class III), and symptoms present at rest (Class IV). Participant EF determination was made based on most recent echocardiogram reports. In addition, cardiology providers gave an overall rating of HF medical and social complexity using the following two questions: “how would you rate the medical complexity of this patient” and “how would you rate the social complexity of this patient” (simple, straight forward, average, somewhat complex, very complex).
The study questionnaires were distributed to patients, providers, and family companions. The survey questions regarding perceived family roles, utility, and influence on the medical visit were initially developed and pilot tested by Schilling and colleagues, and were originally used in the first study associated with this data with the express written permission of Dr. Schilling. These questions were asked specifically of patients and family members, with physicians only generally rating how helpful they felt the family member was during the visit. Next, single-item survey questions were given to patients, family companions, and providers to assess if they believed the provider had ever discussed what to expect with HF and how to self-manage HF. These responses were rated on a 3-point scale of “yes”, “no”, or “I don’t know”.

HF Self-Care Behaviors

HF self-care behaviors can be defined as the decision making process by which patients choose to engage in behaviors that ensure physiologic stability (self-maintenance), and are able to respond appropriately to symptoms when they arise (self-management). Patients, family members, and providers were asked to rate their perception of the patient’s performance of HF self-maintenance (e.g., weighing and salt restriction) and self-management (e.g., recognizing and responding to symptoms of HF exacerbations). The HF self-care behaviors we asked participants to rate patients on mapped directly to those behaviors queried in the validated Self-Care of Heart Failure Index (SCHFI) self-care maintenance and self-care management subscales.

Patients and providers also rated how often the provider discussed each of the six aforementioned HF self-care behaviors during visits. These questions were rated on a 4-point scale of “never/rarely”, “some visits”, “most visits”, or “all visits”. Providers were also asked to report if they discussed each of the six areas of HF self-care during that day’s visit (“yes” or “no”).
Communication behaviors

The Roter Interaction Analysis System (RIAS) was used to analyze the communication behaviors from the audiotaped visits. RIAS is a commonly used audio/video coding system which directly codes medical encounters without initial transcription, and has a high reliability and predictive validity.20 Trained RIAS coders define each speaker statement as one complete thought, and assign this statement to one of 38 mutually exclusive behavioral codes. In this study, the key communication behavior categories we examine in patients, family members, and providers are biomedical and lifestyle/psychosocial question asking. The RIAS software will provide a detailed content analysis of communication specifically about the following HF self-care behaviors: salt intake, regular exercise, weighing oneself, medication adherence, managing HF symptoms, and adherence to scheduled clinic visits. For each visit in which the topic of HF is raised, coders will mark this discussion as a HF block. Within HF blocks, coders will categorize content using the general RIAS coding rules, but will also code content specifically about the aforementioned HF self-care behaviors. For the purposes of this study, “amount of discussion” is defined as: none, minimal, moderate, or high. The frequency of statements in each of the general RIAS communication categories across the sample was correlated with the amount of discussion specific to the six areas of HF self-care. To assess inter-coder reliability, a random 10% sample of the recordings was double-coded. Reliability was assessed in terms of congruence of identification and categorization of utterances. The correlation coefficients across provider categories averaged 0.973, and patient categories averaged 0.951 (in categories with means >1 per encounter). For the ratings of emotional tone, reliability was calculated as agreement within one scale point, and these averaged 96.1% for both patients and providers (range 81.8-100%).
Statistical Analysis

We performed the analyses using R 3.3.0 (R Core Team). We calculated agreement between providers’ and patients’ and patients and companions’ ratings of performance of HF self-care behaviors was analyzed using Cohen’s kappa coefficient.

Each patient visit was the unit of analysis for the audiotaped communication data. The ordinal ratings (e.g., of self-care proficiency or amount of discussion of different self-care topics) had 4 or 5 response options. However, with only 93 patients, some response options were sparsely populated. Therefore, we dichotomized ratings for better interpretability. Amount of discussion about each HF self-care behavior was compared between accompanied and unaccompanied visits using the chi-squared test.

We fit logistic regression models to evaluate the association between amount of discussion of each HF self-care behavior, and total number of questions asked by the patient (and their family member, if present) and accompaniment status. A second set of logistic regression models evaluated the association between amount of discussion of each of HF self-care behavior and patient/provider ratings of patient performance HF self-care behaviors. We did not adjust for potential confounders in any of the models, as we had relatively few data and this is an exploratory study.

Results

Table 1 provides patient demographic information stratified by accompaniment. Characteristics of family members are also presented. A total of 93 patients participated in the study, and 36 of these were accompanied by family members. The average age of the sample was 60.7 years, 34% were African American, and 45% were female. A total of 32% reported a less than high school education, 22% reported “never/sometimes” being confident filling out forms (a proxy question for health literacy), and
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22.6% were employed at the time of the study. More than half of the patients were married. Half of the patients reported “poor/fair” physical health, while 65% of patients rated their mental health as “very good/excellent”. About 50% of the patients had NYHA class II HF, and 41% had an ejection fraction (EF) of less than 40%.

The mean age of the 36 visit companions was 55 years old, and most companions were female. African American companions comprised 13% of the sample, and most reported a greater than high school education level. Nine percent reported “never/sometimes” having confidence filling out forms, and 56% were employed at the time of the study. Most companions rated their physical and mental health as “good” or “very good/excellent”, and 89% reported that they were married.

Six HF providers participated in the study (4 men, 2 women). Four providers were cardiologists, and two were cardiology nurse practitioners. On average, each provider saw 15.5 patients (range 9-25 patients), and the mean number of years of clinical practice was 9.5.

Table 2 reports the RIAS data in determining the amount of discussion had about each HF self-care behavior during that day’s visit, and is stratified according to accompaniment. The amount variables for each behavior were dichotomized to “none/low” or “moderate/high” amount of discussion. Overall, salt limitation was not discussed very much during the visits (only 15% of visits discussed this in a “moderate/high” amount). Discussion of this topic in a “moderate/high” amount was lower in the unaccompanied group (14%) versus the accompanied group (19.4%). More than half of the visits discussed regular weight checks, but this topic was also discussed more with accompanied (61.1% “moderate/high” amount) than with unaccompanied (57.9% “moderate/high” amount) patients. The majority of visits (69%) discussed medication adherence in a “moderate/high” amount, and “moderate/high” discussion amounts were similar in accompanied (75%) versus unaccompanied (73.7%) patients. Exercise was the category which reported the lowest amount of discussion overall in
comparison to the other categories (74.2% of visits did not have substantive discussion about this behavior). However, this topic was discussed more in accompanied (33.3% discussed it in a “moderate/high” amount) than in unaccompanied (21.1% discussed it in a “moderate/high” amount) visits. 66% of the visits discussed symptom management in a “moderate/high” amount. Again, those in accompanied visits discussed this more than those who were unaccompanied (75% versus 68.4% of discussion in a “moderate/high” amount). In the last HF self-care category of response to symptoms, 54% of the visits overall discussed this topic in a “high/moderate” amount, with those in accompanied visits discussing this more than those in unaccompanied visits (61.1% versus 56.1% of “moderate/high” discussion amount). While there are percentage differences in each of these categories between accompanied versus unaccompanied patients, none of these differences was statistically significant (p>0.05).

Table 3 describes patient, companion, and provider ratings of performance of key HF self-care behaviors by the patient. This table also reports the results of accompanied patients. For ratings of how well the patient does with weighing themselves, the majority of providers (87.1%), patients (69.1%), and companions (81.8%) felt that patients were “good” or “excellent” at performing this. Most providers, patients, and companions also felt that patients performed at the “good” or “excellent” level when limiting their salt intake, and the same holds true for ratings of symptom management, medication adherence, and attending scheduled clinic appointments. Ratings for exercise were more equivocal, with only 46.2% of patients and 40.9% of companions rating patients well in this category. In contrast, 78.5% providers rated that they felt patients performed at the “good” or “excellent” level in exercise. For these ratings, Cohen’s kappa coefficients were calculated to measure agreement between all patient and provider ratings, and to measure agreement between accompanied patient and companion ratings. None of these coefficients was found to be statistically significant at the p<0.05 level. However, one
value demonstrated marginal significance (p= 0.062), and this was the value for the agreement between accompanied patient and companion ratings for patient performance in weighing themselves.

Table 4 presents the odds of having moderate/high (vs. minimal) discussion of each HF self-care behavior by total question asking by patient/visit companion and accompaniment. Questions included all biomedical and psychosocial questions. The mean number of questions asked by unaccompanied patients was 7, accompanied patients was 5.1, and companions was 4.3. There were statistically significant relationships between question asking and amount of discussion related to medication adherence (OR= 1.10, CI= 1.05-1.16, p<0.001), symptoms experienced (OR= 1.07, CI= 1.03-1.12, p= 0.001), and the response to symptoms (OR=1.03, CI= 1-1.05, p=0.026). The potential relationships with the discussion of salt limitation, weight checking, and regular exercise were not statistically significant (all p values >0.05). Likewise, accompaniment when adjusted for question asking showed no statistically significant association with moderate/high discussion of HF self-care behaviors.

Table 5 presents the odds of having moderate/high (vs. minimal) discussion of each HF self-care behavior by patient and provider rating of good/excellent (vs. fair/poor). No statistically significant relationship was found in the regression models between patient/provider ratings of patient performance of HF self-care behaviors and amount of discussion of HF self-care (all p values >0.05). It should be noted that there was complete separation of the rating of medication discussion as a function of the patient’s HF self-care rating. As a result, the analysis results are ambiguous. The model’s maximum likelihood estimate for the odds ratio of transitioning to a positive self-rating from a negative one is 0. The upper limit of the 95% confidence interval is 158, but the lower limit cannot be formed.

**Discussion**

In this study of 93 HF patients (36 of whom were accompanied to the visit), we noted several interesting findings. First, patient and companion question asking demonstrated a positive effect on the
amount of discussion regarding medication adherence, experience of symptoms, and response to those symptoms. A second finding was the marginally significant agreement between patients’ and companions’ ratings of patients’ performance in weighing themselves. It does not appear, given our results, that the odds of having more (vs. less) discussion about HF self-care behaviors differed based on patient and provider ratings of patient performance of HF self-care behaviors. Additionally, there were no demonstrated statistically significant differences between accompanied patients and unaccompanied patients in the amount of discussion that occurred about each HF self-care behavior during the visit.

The first finding of patient and family member question asking influencing HF self-care discussion is consistent with other studies that have identified the importance of patient engagement in communication with providers. As was seen here in the form of greater question asking prompting greater discussion about symptom experience/management and medication adherence, other studies have also demonstrated that greater patient engagement (asking questions, expressing concerns, etc) elicits greater information sharing by the provider. Other forms of communication engagement include shared decision making, relationship rapport, and patient assertiveness. Engagement in the patient-provider relationship has been linked to favorable intermediate outcomes (in illnesses outside of HF as well), such as improved self-efficacy, higher self-esteem, and fewer symptom exacerbations. Recognizing the salient connection between patient engagement in communication and improved outcomes is important, as providers can use this information as an impetus to encourage patient participation and decision making in their care.

As no significant association between provider and patient ratings of performance of HF self-care behaviors was observed, the weak relationship between patient and family member ratings of patient performance of regular weight checking is interesting, and could be indicative of an enhanced understanding on the part of the family member of the patients’ true ability to engage in self-care behaviors. This finding is consistent with literature that concludes patients and family members (who are often caregivers) often
demonstrate concordance with the patient in their interpretation of the patients’ feelings, behaviors, limitations, and quality of life. Support for this notion is important, because it suggests that family members who accompany patients (particularly if they help care for the patient) are a reliable source of information, and have the ability to accurately represent the issues and concerns of the patient and facilitate discussion with the provider.

There are several limitations in this study. First, the study is cross-sectional in design, and it is therefore not possible to determine the directionality of the relationships, nor is it possible to determine causality. Second, while many of the results analyzing the relationships between discussion of HF self-care behaviors and HF self-care ratings/question asking were not statistically significant, it should be noted that this study analyzed a small sample size, and therefore may not have adequate power meet statistical significance during analyses, even if such relationships may truly exist. Third, while all measures used are well validated, the RIAS coding system used to quantify amount of discussion per topic is completed by individual coders listening directly to the audio who give their overall impression of “minimal”, “moderate”, or “high” amount of discussion. Given that this is more of a subjective “gestalt” assigned by each coder, this could act as a potential source of measurement bias. Lastly, the survey data given by patients, family members, and providers is all self-reported, and therefore subject to recall bias.

The results of this study have important implications for both clinical medicine and research. Given the well-established connection between patient-provider communication and HF self-care, and between HF self-care and improved patient outcomes, it is necessary to investigate and understand the potential modifiers of the communication between the patient and provider when discussing HF self-care behaviors. Specifically, there are two areas of clinical communication implicated in this study. One is the frequency with which questions are asked during the visit, which is indicative of patient engagement. The other is the ability of family members to act as reliable sources of information with regards to the patients’ health and facilitate communication between the patient and provider. The
results of this study demonstrate that the communication behavior of patient-family member question asking likely modifies, not mediates, the relationship between patient-provider communication and discussion of HF self-care behaviors, and that family members are likely reliable sources of information when discussing the patient’s ability to perform key HF self-care behaviors with the provider. Understanding the complexities of the potential modifiers in the triangulated patient-family member-provider interaction will be essential to providers learning how to tailor HF self-care behavior conversations in such a way to maximize patient engagement with care both during the visit and at home. Given the demonstrated importance of these interactions, future designs of protocols and communication strategies to meet the needs of HF patients may need to be tailored to maximize patient engagement in care.
References


10. Schoenthaler A et al. provider communication effects medication adherence in hypertensive African Americans… *Patient Education and Counseling* 2008


# Table 1: Patient and Companion Demographic Information

<table>
<thead>
<tr>
<th></th>
<th>Unaccompanied</th>
<th>Accompanied</th>
<th>p-value (A vs. B)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total N</strong></td>
<td>57</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Mean age, yrs (SD)</td>
<td>59.2 (12.7)</td>
<td>63.1 (13.8)</td>
<td>55.0 (11.1)</td>
</tr>
<tr>
<td>Female, N (%)</td>
<td>29 (51%)</td>
<td>13 (36%)</td>
<td>30 (83%)</td>
</tr>
<tr>
<td>Race, N (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>26 (46%)</td>
<td>6 (17%)</td>
<td>5 (13%)</td>
</tr>
<tr>
<td>White</td>
<td>30 (53%)</td>
<td>30 (83%)</td>
<td>30 (83%)</td>
</tr>
<tr>
<td>Asian</td>
<td>1 (2%)</td>
<td>0 (0%)</td>
<td>1 (2.8)</td>
</tr>
<tr>
<td>Educational level, N (%)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>≤High school</td>
<td>20 (35%)</td>
<td>10 (28%)</td>
<td>4 (11%)</td>
</tr>
<tr>
<td>Confidence with filling out forms, N (%)</td>
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<td></td>
</tr>
<tr>
<td>Never/sometimes</td>
<td>12 (24%)</td>
<td>6 (18%)</td>
<td>3 (9%)</td>
</tr>
<tr>
<td>Mostly/always</td>
<td>39 (77%)</td>
<td>27 (82%)</td>
<td>30 (91%)</td>
</tr>
<tr>
<td>Employment, N (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently employed</td>
<td>7 (12%)</td>
<td>14 (39%)</td>
<td>20 (56%)</td>
</tr>
<tr>
<td>Other</td>
<td>50 (88%)</td>
<td>22 (61%)</td>
<td>16 (44%)</td>
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<td>Currently married, N (%)</td>
<td>34 (60%)</td>
<td>25 (70%)</td>
<td>31 (89%)</td>
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<td>Overall self-rated physical health, N (%)</td>
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<td></td>
</tr>
<tr>
<td>Poor/fair</td>
<td>33 (58%)</td>
<td>15 (42%)</td>
<td>5 (15%)</td>
</tr>
<tr>
<td>Good</td>
<td>15 (26%)</td>
<td>14 (39 %)</td>
<td>12 (33%)</td>
</tr>
<tr>
<td>Very good/excellent</td>
<td>9 (16%)</td>
<td>7 (20%)</td>
<td>19 (53%)</td>
</tr>
<tr>
<td>Overall self-rated mental health, N (%)</td>
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<td></td>
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<tr>
<td>Poor/fair</td>
<td>8 (14%)</td>
<td>1 (3%)</td>
<td>3 (9%)</td>
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<tr>
<td>Good</td>
<td>15 (26%)</td>
<td>9 (25%)</td>
<td>4 (12%)</td>
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<tr>
<td>Very good/excellent</td>
<td>34 (60%)</td>
<td>26 (72%)</td>
<td>27 (79%)</td>
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<td>New York Heart Association Class, N (%)</td>
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<td></td>
<td></td>
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<tr>
<td>I</td>
<td>11 (20%)</td>
<td>9 (26%)</td>
<td>N/A</td>
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<tr>
<td>II</td>
<td>33 (59%)</td>
<td>14 (40%)</td>
<td></td>
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<tr>
<td>III</td>
<td>10 (18%)</td>
<td>8 (23%)</td>
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<tr>
<td>IV</td>
<td>2 (4%)</td>
<td>4 (11%)</td>
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<tr>
<td>Ejection Fraction</td>
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<td>EF&lt;40%</td>
<td>25 (43.9)</td>
<td>16 (44.4)</td>
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<td>EF 40-54%</td>
<td>9 (15.8)</td>
<td>10 (27.8)</td>
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<tr>
<td>EF 55-70%</td>
<td>23 (40.4)</td>
<td>10 (27.8)</td>
<td></td>
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<tr>
<td>Medical complexity (Provider rating), N (%)</td>
<td></td>
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<tr>
<td>Simple/straightforward</td>
<td>2 (4%)</td>
<td>2 (6%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Average</td>
<td>23 (40%)</td>
<td>11 (31%)</td>
<td></td>
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<tr>
<td>Somewhat/very complex</td>
<td>32 (56%)</td>
<td>23 (64%)</td>
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<tr>
<td>Provider satisfaction with the visit, N (%)</td>
<td></td>
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<tr>
<td>Very unsatisfied/Unsatisfied</td>
<td>2 (4%)</td>
<td>1 (3%)</td>
<td>N/A</td>
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<tr>
<td>Neutral</td>
<td>6 (11%)</td>
<td>2 (6%)</td>
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<tr>
<td>Satisfied/Very satisfied</td>
<td>49 (86%)</td>
<td>33 (92%)</td>
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</table>
Table 2: Amount of Discussion* of Each of Key HF Self-Care Behaviors (Based on Audiotape Communication Data)

<table>
<thead>
<tr>
<th>HF Self-Care Behavior</th>
<th>Overall N=93</th>
<th>Accompanied visits N= 36</th>
<th>Unaccompanied visits N= 57</th>
<th>**p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt, N (%)(None/Low amount Moderate/High amount)</td>
<td>78 (83.9) 15 (16.1)</td>
<td>29 (80.6) 7 (19.4)</td>
<td>49 (86.0) 8 (14.0)</td>
<td>0.69</td>
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<tr>
<td>Weighing oneself (None/Low amount Moderate/High amount)</td>
<td>38 (40.9) 55 (59.1)</td>
<td>14 (38.9) 22 (61.1)</td>
<td>24 (42.1) 33 (57.9)</td>
<td>0.93</td>
</tr>
<tr>
<td>Taking medications as prescribed (None/Low amount Moderate/High amount)</td>
<td>24 (25.8) 69 (74.2)</td>
<td>9 (25.0) 27 (75.0)</td>
<td>15 (26.3) 42 (73.7)</td>
<td>1.0</td>
</tr>
<tr>
<td>Exercising (None/Low amount Moderate/High amount)</td>
<td>69 (74.2) 24 (25.8)</td>
<td>24 (66.7) 12 (33.3)</td>
<td>45 (78.9) 12 (21.1)</td>
<td>0.28</td>
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<tr>
<td>Managing symptoms (None/Low amount Moderate/High amount)</td>
<td>27 (29.0) 66 (71.0)</td>
<td>9 (25.0) 27 (75.0)</td>
<td>18 (31.6) 39 (68.4)</td>
<td>0.66</td>
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<tr>
<td>Response To Symptoms (None/Low amount Moderate/High amount)</td>
<td>39 (41.9) 54 (58.1)</td>
<td>14 (38.9) 22 (61.1)</td>
<td>25 (43.9) 32 (56.1)</td>
<td>0.80</td>
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</tbody>
</table>

*Amount of discussion includes statements made by any speaker during the visit

**p-value comparing accompanied versus unaccompanied visits using the chi-squared test
**Table 3: Patient, Provider, and Companions’ Ratings of Patients’ Performance of Key HF Self-Care Behaviors**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Providers (A; N=93)</th>
<th>Accompanied and Unaccompanied Patients (B; N=93)</th>
<th>Accompanied Patients (C; N=36)</th>
<th>Companions (D; N=36)</th>
<th>*p-value (A vs. B)</th>
<th>*p-value (C vs. D)</th>
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</thead>
<tbody>
<tr>
<td>Weighing yourself, N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Poor/Fair</td>
<td>12 (12.9)</td>
<td>21 (30.9)</td>
<td>7 (25.9)</td>
<td>4 (18.2)</td>
<td>0.10</td>
<td>0.06</td>
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<tr>
<td>Good/Excellent</td>
<td>81 (87.1)</td>
<td>47 (69.1)</td>
<td>20 (74.1)</td>
<td>18 (81.8)</td>
<td></td>
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<tr>
<td>Limiting salt in your diet, N (%)</td>
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<tr>
<td>Poor/Fair</td>
<td>7 (7.5)</td>
<td>19 (29.2)</td>
<td>6 (26.2)</td>
<td>9 (40.9)</td>
<td>0.11</td>
<td>0.15</td>
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<tr>
<td>Good/Excellent</td>
<td>86 (92.5)</td>
<td>46 (70.8)</td>
<td>17 (73.9)</td>
<td>13 (59.1)</td>
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<td>Exercising, N (%)</td>
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<tr>
<td>Poor/Fair</td>
<td>20 (21.5)</td>
<td>42 (53.8)</td>
<td>13 (44.8)</td>
<td>13 (59.1)</td>
<td>0.61</td>
<td>0.45</td>
</tr>
<tr>
<td>Good/Excellent</td>
<td>73 (78.5)</td>
<td>36 (46.2)</td>
<td>16 (55.2)</td>
<td>9 (40.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing your symptoms, N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor/Fair</td>
<td>7 (7.5)</td>
<td>3 (5.3)</td>
<td>2 (9.1)</td>
<td>2 (10.0)</td>
<td>0.44</td>
<td>0.67</td>
</tr>
<tr>
<td>Good/Excellent</td>
<td>86 (92.5)</td>
<td>54 (94.7)</td>
<td>20 (90.9)</td>
<td>18 (90.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking medications as directed, N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor/Fair</td>
<td>6 (6.5)</td>
<td>3 (4.6)</td>
<td>0 (0.0)</td>
<td>1 (3.7)</td>
<td>0.153</td>
<td>0.68</td>
</tr>
<tr>
<td>Good/Excellent</td>
<td>87 (93.5)</td>
<td>62 (95.4)</td>
<td>25 (100.0)</td>
<td>26 (96.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attending scheduled clinic visits, N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor/Fair</td>
<td>2 (2.2)</td>
<td>2 (2.6)</td>
<td>1 (3.2)</td>
<td>0 (0.0)</td>
<td>0.11</td>
<td>0.77</td>
</tr>
<tr>
<td>Good/Excellent</td>
<td>91 (97.8)</td>
<td>74 (97.4)</td>
<td>30 (96.8)</td>
<td>29 (100.0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Cohen’s kappa for agreement p-value calculated
### Table 4: Odds of Having Moderate/High (vs. Minimal) Discussion of each HF Self-Care Behavior by Total Question Asking of Patient/Companion and Accompaniment (OR, p-value, 95% CI)

<table>
<thead>
<tr>
<th>Communication behavior</th>
<th>Salt</th>
<th>Weighing</th>
<th>Taking medications</th>
<th>Exercising</th>
<th>Symptoms Experienced</th>
<th>Managing (Response To) Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Question Asking on Patient Side (Biomedical+Lifestyle/ Psychosocial)</td>
<td>0.99 (0.43) (0.96, 1.02)</td>
<td>1.01 (0.30) (0.99, 1.03)</td>
<td>1.10 (p&lt;0.001) (1.05, 1.16)</td>
<td>1.0 (0.71) (0.98, 1.02)</td>
<td>1.07 (0.001) (1.03, 1.12)</td>
<td>1.03 (0.03) (1, 1.05)</td>
</tr>
<tr>
<td>Accompaniment</td>
<td>1.43 (0.53) (0.47, 4.38)</td>
<td>1.19 (0.69) (0.5, 2.8)</td>
<td>1.21 (0.74) (0.41, 3.58)</td>
<td>1.85 (0.20) (0.72, 4.75)</td>
<td>1.61 (0.36) (0.58, 4.48)</td>
<td>1.34 (0.51) (0.56, 3.21)</td>
</tr>
</tbody>
</table>

*Statistically significant values highlighted

### Table 5: Odds of Having Moderate/High (vs. Minimal) Discussion of each HF Self-Care Behavior by Patient and Provider Rating of Good/Excellent (vs. Fair/Poor) of Patient HF Self-Care Performance (OR, p-value)

<table>
<thead>
<tr>
<th>Rating of Patient Performance of HF Self-Care Behaviors</th>
<th>Salt</th>
<th>Weighing</th>
<th>Taking Medications</th>
<th>Exercising</th>
<th>Symptoms Experienced</th>
<th>Managing (Response To) Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients’ Rating of Good/Excellent (vs. Poor/Fair)</td>
<td>0.52 (0.38) (0.12, 2.27)</td>
<td>0.53 (0.30) (0.16, 1.76)</td>
<td>*0 (0.11) (NA, 158)</td>
<td>1.0 (1.0) (0.34, 2.95)</td>
<td>1.25 (0.86) (0.1, 14.91)</td>
<td>0.61 (0.70) (0.05, 7.22)</td>
</tr>
<tr>
<td>Providers’ Rating of Good/Excellent (vs. Poor/Fair)</td>
<td>0.31 (0.22) (0.05, 2.08)</td>
<td>2.21 (0.30) (0.5, 9.76)</td>
<td>2.16 (0.59) (0.13, 36.37)</td>
<td>0.50 (0.25) (0.15, 1.63)</td>
<td>3.75 (1.71) (0.56, 24.91)</td>
<td>0.82 (0.83) (0.13, 5.34)</td>
</tr>
</tbody>
</table>

*Complete separation of patient rating of good/excellent for taking medications. The model’s maximum likelihood estimate for the odds ratio of transitioning to a positive self-rating from a negative one is zero.
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