Patient Satisfaction with Discharge Information and 30-Day All Cause Readmissions

By

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Abstract

The purpose of this retrospective, correlation analysis was to evaluate the association between Colorado hospitals' performance on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey discharge information and care transition composites and 30-day all cause readmission rates. Hospitals were included if they reported at least 100 HCAHPS survey responses for the 2013 calendar year. To be included in the analysis, hospitals also had readmission rates available in the Colorado All-Payer Claims Database for the same time period. Payers included in the database were commercial insurance, Medicaid, Medicare fee-for-service, and Medicare Advantage. Of the 79 hospitals with 30-day all cause readmission rates available, 49 facilities were included in the study. Pearson correlation analyses revealed that a greater percentage of top-box responses on the HCAHPS discharge information and care transition composites was associated with lower 30-day all cause readmission rates. The strength of the negative association for the care transition composite (r = -.482, n = 49, $p \leq .01$) was stronger than for the discharge information composite (r = -.289, n = 49, $p \leq .05$). Teaching, urban, rural, and small hospitals demonstrated a significant negative correlation between top-box performance on the care transition composite and 30-day readmission rates. None of the correlation analyses conducted by hospital demographic characteristics showed a relationship between the discharge information composite and 30-day all cause readmission rates. The correlation analyses conducted based on Centers for Medicare and Medicaid Services Hospital Readmission Reduction Program diagnoses showed fewer associations between the discharge information composite and readmission rates than the care transition composite.

Keywords: patient satisfaction, hospital readmission, HCAHPS, hospital discharge

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Chapter 1: Introduction

Unnecessary hospital readmissions negatively impact patient experiences, quality of care, and cost of healthcare. In 2011, in the United States, there were approximately 3.3 million 30-day all cause hospital readmissions resulting in $41 billion in healthcare costs (Hines, Barrett, Jiang, & Steiner, 2014). Of those readmissions, Medicare was the payer for over half, accounting for 58% of the readmission costs (Hines, et al., 2014). In this study, the readmission rate for the Medicare population was 17.2 per 100 admissions, and for private insurance, it was 8.7 per 100 admissions (Hines, et al., 2014). Hospital readmissions are frequent and costly events, especially for Medicare beneficiaries.

The Affordable Care Act established the Centers for Medicare and Medicaid Services (CMS) Hospital Value Based Purchasing (VBP) Program and the Hospital Readmissions Reduction Program (HRRP) to improve the quality of healthcare in the United States. The Hospital VBP Program is an initiative that provides incentives to over 3,000 acute care hospitals for the quality of care provided to Medicare beneficiaries (CMS, 2015a). The HRRP reduces payments from CMS to hospitals with excess 30-day readmissions for specified disease states (CMS, 2015b). The originally included diagnoses in the HRRP were acute myocardial infarction (AMI), pneumonia, and heart failure (HF). Starting in the 2015 fiscal year, acute exacerbation of chronic obstructive pulmonary disease (COPD) and elective total hip and total knee arthroplasty were added.

Federal reimbursement programs utilize results of hospitals' patient satisfaction surveys to calculate payments. The Hospital VBP Program started paying incentives during the 2013 fiscal year (CMS, 2012a). Hospitals' VBP total performance scores were the sum of the weighted Clinical Process of Care and Patient Experience of Care domain scores (CMS, 2012a).

The Clinical Process of Care domain comprised 70% of the total performance score, while the Patient Experience of Care domain contributed 30% (CMS, 2012a). Beginning in the 2017 fiscal year, the domains (percentage weight) that will be used to calculate the total performance score include Patient and Caregiver Centered Experience of Care/Care Coordination (25%), Efficiency and Cost Reduction (25%), Clinical Care – Outcomes (25%), Clinical Care – Process (5%), and Safety (20%) (Medicare Program, 2014). The Patient Experience of Care domain is calculated using the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey base score and the consistency score (CMS, 2012a). The HCAHPS survey is a standardized, national, publicly reported, 32-item survey of patients' satisfaction with hospital care (CMS, 2015c).

The Deficit Reduction Act of 2005 and the Patient Protection and Affordable Care Act of 2010 provided more incentive for hospitals to participate in the HCAHPS survey because both programs utilize HCAHPS performance to calculate payments. Since 2007, to receive full annual payment updates through the Inpatient Prospective Payment System (IPPS), participating hospitals must measure and publicly report HCAHPS survey results (CMS, 2015c). As previously described, the Hospital VBP program also uses HCAHPS survey scores to calculate payments. The HCAHPS survey has been widely adopted, at least in part because payments have been based on performance and reporting of results. Between March, 2008 and July, 2013, there was an approximately 70% increase in public reporting of HCAHPS scores (CMS, 2015c).

According to Kessels (2003), 40–80% of medical information is forgotten by patients immediately after it is provided by healthcare providers. In a study conducted by McGuire (1996), it was discovered that the percentage of correct recall was reduced as the amount of information that was shared increased. The provision of hospital discharge information in an

understandable format is particularly important because the amount of information shared with patients at hospital discharge can be considerable. The discharge information questions on the HCAHPS survey administered during the January 1, 2013 to December 31, 2013 collection period asked patients to rate hospitals based on information provided about what to do during recovery at home and on understanding of their care when they left the hospital (CMS, n.d.a.).

The Institute of Medicine (IOM) (2014) conducted a Roundtable on Health Literacy workshop on patient understanding of discharge instructions. The workshop identified that healthcare providers do not comprehend patients' lack of ability to understand discharge information, so patients may be provided with too much ambiguous information to assimilate (IOM, 2014). If possible, discharge information should be delivered to patients in their preferred language and format (IOM, 2014). For example, patients might like to have information made available in written or graphical form, or even as video clips to view on an electronic device. Another issue identified by the workshop participants was that electronic medical records do not create discharge instructions that are appropriate for patients with low literacy (IOM, 2014).

At discharge from an urban teaching hospital, 47 consecutive patients were surveyed on their knowledge of their treatment plan (e.g., medication names, purposes, and side effects) and discharge diagnosis (Makaryus & Friedman, 2005). Only 42% of patients knew their diagnosis, 37% could explain the purpose of their medications, 28% could list their medications, and 14% understood their medication side effects. The authors concluded that subjects' lack of understanding at hospital discharge contributes to an inability to adhere to treatment plans.

In a prospective observational cohort study, investigators enrolled patients 65 years of age or older who were admitted for HF, acute coronary syndrome, or pneumonia and discharged from an urban, academic medical center to home (Horwitz et al., 2013). The purpose of the

study was to analyze transitions of care from the patients' perspective. Patient satisfaction with and understanding of discharge instructions were two of the metrics evaluated. Even though subjects rated their understanding of the reason for hospital admission and self-care instructions at 90% and of why and who to contact with problems at 80%, patients' actual understanding was lower. The authors suggested that patients' perceptions may be useful in assessing the quality of discharge processes, but not patients' actual understanding. To determine actual patient understanding, it may be more appropriate to use questions that measure knowledge.

In a single-site study enrolling adults 55 years of age or older who were discharged from the hospital, a nurse provided a home visit following discharge to determine patient understanding of and ability to carry out discharge instructions (Coleman, Chugh, Williams, Grigsby, Glasheen, Mc Kenzie, & Min, 2013). The study revealed that health literacy ($p < 0.0001$), cognition ($p = 0.02$), and locus of control/self-efficacy ($p = 0.004$) were associated with discharge instruction understanding and execution scores. Factors that were not predictors in this study of discharge instruction understanding and execution included discharge diagnosis, discharge instruction complexity, and education.

Researchers conducted an analysis to explore the relationship between satisfaction with hospital personnel interactions and 30-day readmission rates for HF and pneumonia (Jha, Orav, & Epstein, 2009). The questions from the HCAHPS survey used to evaluate patient satisfaction with hospitals' discharge process were included in the discharge information composite. The questions were worded as, "Did the hospital staff ask you about whether you would have the help you needed when you left the hospital?" and "Did you receive written information about the symptoms or health problems to monitor after leaving the hospital?" The researchers also used a chart-based process measure that assessed if patients admitted to the hospital for HF had

documentation of receiving discharge instructions in the medical record. The investigators concluded that in patients with HF or pneumonia there was a weak association between patients' satisfaction with hospitals' discharge planning and 30-day all cause readmission rates.

Utilizing hospital readmission data from July 2005 through June 2008 and HCAHPS survey results from July 2007 through June 2008, an observational analysis was conducted to explore the relationship between satisfaction with hospital personnel interactions and 30-day readmission rates for AMI, HF, and pneumonia (Boulding, Glickman, Manary, Schulman, & Staelin, 2011). The study also investigated if there was an association between patients' discharge process experiences and 30-day readmission rates in patients with the previously specified disease states. The questions included in the HCAHPS discharge information composite to evaluate patient satisfaction with hospitals' discharge processes were, "During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?" and, "During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?" The investigators concluded that patient satisfaction with discharge planning processes was associated with lower adjusted 30-day readmission rates in patients with AMI, HF, and pneumonia.

Statement of purpose

The purpose of this study was to determine if there is an association between hospitals' performance on HCAHPS discharge information and care transition composites and 30-day all cause hospital readmission rate for hospitals.

Justification for study

Few studies have investigated the relationship between hospitals' performance on the HCAHPS discharge information survey composite and 30-day hospital readmissions. No published studies have researched the relationship between hospitals' HCAHPS care transition composite performance and 30-day hospital readmissions. In 2013, roughly 18% of hospitalized Medicare beneficiaries were re-hospitalized within 30 days of discharge, which is estimated to cost $26 billion (Rau, 2014). In the 2016 Medicare fiscal year (October 1, 2015 through September 30, 2016), over half of U.S. hospitals will receive penalized Medicare payments (Rau, 2015). For each penalized hospital, payments for Medicare hospital admissions for the 2016 fiscal year will be reduced by up to a 3% maximum for each payment, and the average reduction in payment is 0.61% per hospitalization (Rau, 2015). If understanding of discharge information is a factor that is related to 30-day hospital readmissions, health care organizations will be informed by this research to ensure that hospital discharge plan delivery and formats meet patients' needs.

To date, research published on the relationship between hospitals' performance on HCAHPS discharge information survey questions and 30-day hospital readmissions have been limited to specific diagnoses, including AMI, HF, and pneumonia. The top three 30-day all cause readmissions in Medicare patients were HF, septicemia, and pneumonia (Hines, et al., 2014). In Medicaid patients, the top diagnoses were mood disorders, schizophrenia, and diabetes (Hines, et al., 2014). For patients who were privately insured, the top three diagnoses were maintenance chemotherapy, mood disorders, and surgical complications (Hines, et al., 2014). Because the primary diagnoses associated most commonly with 30-day all cause readmissions include some medical problems other than HF, AMI, and pneumonia, it is important to investigate broader patient populations. Additionally, based on the results of the study conducted by Coleman et al. (2013), discharge diagnosis was not a predictor of discharge

instruction understanding and execution. Lastly, published research of 30-day readmission rates has not studied the relationship with performance on the HCAHPS care transition composite.

Research question

Is there an association between hospitals' scores on HCAHPS discharge information and care transition composites and all cause 30-day all cause hospital readmission rates for hospitals?

Null hypothesis

There is no association between hospitals' scores on HCAHPS discharge information and care transition composites and all cause 30-day all cause hospital readmission rates for hospitals.

Implications of the research problem for health care administrators

Patients need to understand discharge instructions to be able to execute them effectively. If patients do not understand follow-up instructions, they could be re-hospitalized within 30 days of discharge. CMS discharge planning regulations require educating patients about discharge plans and include requirements that discharging facilities evaluate patient and caregiver understanding of discharge plans, but specific recommendations on how to implement the assessments have not been provided by CMS (IOM, 2014).

If hospitals' scores on the HCAHPS discharge information and care transition composites are associated with hospital 30-day all cause readmissions, hospitals and health systems should ensure that discharge processes identify patients at high risk of not understanding discharge instructions, and written and verbal communication should be adjusted for those patients. Additionally, hospitals could utilize HCAHPS results to target and measure progress related to improvements aimed at increasing patient understanding of discharge information. Further study would be needed to determine if those actions actually reduce readmissions. It is important for health care administrators to recognize factors contributing to readmissions so they can be

targeted for improvement to reduce negative outcomes for patients and maximize reimbursement from Medicare and other payers.

Chapter 2: Literature Review

Unplanned hospital readmissions within 30 days of hospital discharge can cause significant negative effects. Readmissions are a signal that patients may not have received adequate care during the index hospitalization. Patients may experience lower satisfaction with the care they received during the initial hospital admission if they need to return for further unplanned care. Payers of healthcare, including the Centers for Medicare and Medicaid Services (CMS), are incentivizing hospitals to prevent unplanned readmissions by financially penalizing hospitals if they have higher 30-day readmission rates compared to other hospitals (CMS, 2015b). The financial implications of these payment penalties have increased attention on and efforts by hospitals to reduce readmission rates (Berenson, Paulus, & Kalman, 2012). The purpose of this study is to assess if there is an association between hospitals' patient satisfaction scores on questions related to discharge information and care transitions and 30-day all cause readmission measures.

The subsequent literature review will examine the aspects of hospital readmissions and patient satisfaction to understand why hospitals and healthcare payers are concerned with improving performance on these metrics. The first section will review hospital readmission prevalence, contributing factors, and payment penalties. The review will focus next on patient satisfaction measurements related to discharge information and transitions of care and how the metrics can change reimbursement. In the following section, influences of patients' understanding of discharge instructions and discharge planning effects on readmission rates and patient satisfaction will be discussed. Finally, the last portion will assess research that has been conducted on the relationship between patient satisfaction measurements and hospital readmission rates.

Hospital Readmissions

Significance of readmissions.

The definition of a hospital readmission can vary, depending on the program or setting. A commonly used definition of rehospitalization or readmission is a when a patient is discharged from an acute care hospital and readmitted to any acute care hospital within 30 days (Jencks, Williams, & Coleman, 2009). According to the CMS, the 30-day time frame is favored over a longer duration, such as 90 days, because over longer intervals, other factors related to patient behaviors, care provided after and unrelated to the reason for hospitalization, and complicating diseases can cause hospitalization (CMS, n.d.b). Some measures of readmissions are specific to conditions, like pneumonia and heart failure (HF), while others are hospital-wide and not dependent on diagnoses. Hospital readmissions may cause patients and their loved ones unnecessary suffering and can increase the cost of healthcare. Hospital readmissions may signify inadequate quality of care or poor care coordination (MedPac, 2007).

Readmission quality metrics.

There are several hospital readmission metrics reported by hospitals in the United States (U. S.). The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 authorized the Hospital Inpatient Quality Reporting (IQR) program, and it allowed the CMS to pay hospitals that reported quality metrics at a higher rate (CMS, 2013b). In addition to incentivizing hospitals to report quality metrics, the Hospital IQR program provides information to patients to make decisions about where to seek healthcare because the metrics are available to the public. The Hospital IQR program includes readmission quality measures reporting hospital-level, 30-day, all cause risk-standardized readmissions following hospitalization for HF, pneumonia, acute myocardial infarction (AMI), elective total hip and total knee arthroplasty, and acute exacerbation of chronic obstructive pulmonary disease (COPD) (CMS, 2014). Other readmission related metrics included in the Hospital IQR program are the Stroke 30-day Risk

Standardized Readmission measure and the Hospital-wide All-cause Unplanned Readmission (HWR) measure. The HWR measure includes patients who are 65 years of age and older, admitted to an acute care hospital, and enrolled in the Medicare fee-for-service program (AHRQ, 2013). Hospitalizations for a primary psychiatric disease and medical treatment of cancer are excluded from the HWR measure.

One of the programs established by the Affordable Care Act to improve healthcare quality in the U. S. is the CMS Hospital Readmission Reduction Program (HRRP). The HRRP reduces payments from CMS to hospitals that are paid under the CMS Inpatient Prospective Payment System (IPPS) for hospitals with excess 30-day readmissions for specific disease states (CMS, 2015b). The IPPS is the Medicare Part A payment system for acute care inpatient stays that covers operating costs for hospitals. The diagnoses included in the HRRP during the 2015 fiscal year are AMI, pneumonia, HF, acute exacerbation of COPD, and elective total hip and elective total knee arthroplasty were added. The program plans to add coronary artery bypass graft surgical procedures to the list of diagnoses in the HRRP in the Medicare 2017 fiscal year (CMS, 2014).

Over half of U. S. hospitals will receive penalized payments from the CMS in the 2016 Medicare fiscal year (Rau, 2015). Payments will be reduced for penalized hospitals for all Medicare hospital admissions, whether or not patients are readmitted, for the 2016 fiscal year on average by 0.61% and up to a 3% maximum for each payment (Rau, 2015). For hospitals penalized at the maximum rate, the economic consequences could be significant because the payment is reduced for all Medicare hospital admissions.

Readmission rate performance.

Hospital readmissions have been established as a common and expensive negative health outcome. In a study investigating adverse events that occurred in medicine patients following discharge from a Canadian hospital, 17% of the subjects experienced the adverse event of readmission, and 14% of the readmissions were considered to be preventable (Forster et al., 2004). Based on Medicare fee-for-service claims data from October 1, 2003, through December 31, 2004, 19.6% of Medicare patients who were discharged from a hospital were readmitted to an acute care hospital within 30 days, and 34.0% were readmitted within 90 days. (Jencks et al., 2009). In that same study, 90% of readmissions were unplanned. The total cost of the unplanned readmissions was estimated to be $17.4 billion in 2004. Another report suggested that 17.6 % of hospitalizations lead to readmissions within 30 days of hospital discharge, and the cost of these readmissions may cost $15 billion (MedPac, 2007). In a more recent estimate from 2013, about 18% of hospitalized Medicare beneficiaries were rehospitalized within 30 days of discharge, which is estimated to cost $26 billion (Rau, 2014). Modest decreases in hospital readmission rates have occurred, but rehospitalizations continue to be a significant outcome to target for improvement to benefit patients and the health system.

The readmission rate for patients with Medicare is higher than for patients with other or no health insurance coverage. Based on 2011 data, the total 30-day all cause hospital readmission rate was 17.2% for patients with Medicare, 14.6% for Medicaid, 10.6% for uninsured, and 8.7% for privately insured (Hines et al., 2014). Considering Colorado hospitals' readmission performance, from July 1, 2012, to June 30, 2013, 81% of hospitals in Colorado had the same 30-day all cause readmission rate as the national average and 19% had 30-day all cause readmission rates better than the national average (CMS, n.d.b). No Colorado hospitals reporting these data performed worse than the national average. Colorado hospitals appear to perform

either at or above the national level of performance related to unplanned 30-day all cause readmissions, yet improvement in performance could yield quality of care and financial benefits.

Diagnoses with most common 30-day hospital readmissions.

The ten most common conditions with the highest all cause 30-day readmission rates for patients 65 years of age and older with Medicare include non-hypertensive congestive HF (24.5%), acute and unspecified renal failure (21.8%), COPD and bronchiectasis (21.5%), septicemia (21.3%), AMI (19.8%), complication of device/implant/graft (19%), urinary tract infection (18.1%), pneumonia (17.9%), cardiac dysrhythmia (16.2%), and acute cerebrovascular disease (14.5%) (Hines et al., 2014). The top diagnoses with high readmission rates in Medicaid patients were mood disorders, schizophrenia, and diabetes (Hines, et al., 2014). For patients who were privately insured, the top three readmission diagnoses were maintenance chemotherapy, mood disorders, and surgical complications (Hines, et al., 2014). Because the primary diagnoses associated most commonly with 30-day all cause readmissions include some medical problems other than HF, AMI, and pneumonia, it is important to investigate broader patient populations than those limited to diagnoses included in the HRRP. In addition, Medicare is the major policy maker in creating readmission metrics and enforcing payment penalties, so it is important to know the diagnoses with the highest readmission rates for patients with Medicare. Hospitalization for a primary psychiatric disease and medical treatment of cancer are excluded from the HWR measure; therefore, some of the most common conditions associated with the highest readmission rates (e. g., mood disorders, schizophrenia, and maintenance chemotherapy) are not included in the HWR measure, a broadly recognized readmission metric.

Other contributors to hospital readmissions.

Social factors.

A systematic review of validated readmission risk prediction models presented characteristics like access to care, social support, functional status, and substance abuse may increase the risk of rehospitalization (Kansagara et al., 2011). In some studies included in the systematic review, functional and social variables improved readmission risk model discrimination. Only a few studies considered socioeconomic factors in readmission risk prediction models. Social factors need to be more widely studies as contributors to risk for readmission.

A prospective, observational cohort study in adult internal medicine patients who were discharged from the hospital to home investigated predictors of all cause readmissions within 30 days of discharge (Hasan, Meltzer, & Shaykevich, 2009). The study found that predictors of 30-day readmission included insurance status, marital status, having a regular physician, Charlson comorbidity index, 12-Item Short Form Health Survey physical component score, more than one hospital admission within the last year, and current length of stay of more than 2 days. Age and income were not found to be predictors. The results may not be valid, though, because the probability of repeated admissions survey tool used, had poor predictive ability (C-statistic 0.61).

According to an administrative data study conducted by Philbin, Dec, Jenkins, and DiSalvo (2001), low income is a positive predictor of readmission risk in patients with HF who reside in New York State. Income was estimated by using postal zip codes and census data instead of patients' actual income. It is possible that income is a predictor of readmission risk in patients with other medical problems, but results of this study may not be reliably applied to other patient populations and to residents of other geographic areas.

A study that was conducted to identify contributing factors to hospital readmissions found that provider communication, patient adherence, and health literacy may be associated

(DeCoster, Ehlman, & Conners, 2013). The researchers used data from the CMS, and they surveyed a convenience sample of elderly persons attending an exercise class at a senior center. Participants were 60 years of age or older and were hospitalized or cared for someone who was hospitalized within the past year. The survey asked respondents to report their level of agreement to 10 statements addressing communication and information issues related to hospital discharge and care plans for returning home. Study limitations include a small sample size (n=24), use of a convenience sampling methodology, chance of recall bias due to length of time that could have passed since hospitalization, and enrollment of either caregivers or patients who were hospitalized. Further research is needed to substantiate the results of this study.

Low self-rated health.

In a cohort study including 1,502 patients with coronary heart disease treated with percutaneous coronary intervention, investigators studied the relationship between self-rated physical and mental health with adverse events, including readmissions (Beiring, Bøtker, Niemann, & Hjollund, 2014). Poor self-rated health was related to hospital readmission for cardiac conditions. This study was conducted in patients with a history of percutaneous coronary intervention, so the results may not be applicable to patients with other health conditions.

Medication issues.

Patients who experienced a medication discrepancy had a higher hospital readmission rate within 30 days following hospital discharge than patients who did not experience a medication discrepancy (14.3% versus 6.1%, $p = .04$) (Coleman, Smith, Raha, & Min, 2005). In this study, a medication discrepancy occurred when there was a disagreement between prior-to-admission medication records, hospital discharge summary medication lists, and post hospital in-home medication supplies.

Patient Satisfaction

Hospital Consumer Assessment of Healthcare Providers and Systems overview.

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey is a standardized survey which allows for valid comparison between hospitals on the inpatient care experience. The first national survey occurred in 2006 (CMS, 2015c; Giordano, Elliott, Goldstein, Lehrman, & Spencer, 2010). HCAHPS survey results may be used to measure service and quality improvements. Goals of the HCAHPS survey are to produce data that can be used to compare patients' perceptions about aspects of care that are significant to patients, to build financial incentives for hospitals to improve service and quality of care, and to establish more public transparency about quality of care.

The HCAHPS survey includes 32 questions covering 21 patient perspectives about care received, screener questions to determine eligibility, and demographic information (CMS, 2015c). The survey can be delivered using four different methods, including mail only, telephone only, mixed (mail followed by telephone), and active interactive voice response (IVR). Hospitals may self-administer, contract with a vendor, or participate with a multisite group to conduct the survey. Eligible patients are adults upon hospital admission, have a medical, surgical or maternity-related primary diagnosis at discharge, and have an overnight stay as an inpatient status.

Before HCAHPS results are reported publicly, they are adjusted for the effects of the method of survey delivery and for patient-mix. The variables considered in the patient-mix adjustment for HCAHPS include age, education, self-reported health status, language other than English spoken at home, service line (medical, surgical, or maternity care), age by service line, emergency room admission, and lag time between discharge and survey completion (CMS, 2008). It was determined in a study using linear regression modeling that both patient-mix and

mode of survey administration should be adjusted in order to compare results between hospitals, but the mode of survey has more effect on responses (Elliott et al., 2009). Patients who respond via telephone or by active IVR tend to provide more positive responses than those participating by mail or mixed mode, which is mail followed by telephone (Elliott et al., 2009).

HCAHPS survey results are available on the internet to download as composites or summary measures that typically include two to three questions. By using composites, statistical reliability of the survey is increased. The categories or composites included in the survey results are communication with nurses, communication with doctors, responsiveness of hospital staff, pain management, communication about medicines, discharge information, and care transition. Two individual questions are asked about the cleanliness and quietness of the hospital. There are two additional global rating questions about the overall hospital rating and the willingness to recommend the hospital to others.

Discharge-related composites and questions.

The discharge information composite includes the following two questions, which are answered either "yes" or "no."

- During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?
- During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?

The care transition composite includes three questions, and respondents express their level of agreement by answering either strongly disagree, disagree, agree, or strongly agree.

- During this hospital stay, staff took my preferences and those of my family or caregiver into account in deciding what my health care needs would be when I left.

- When I left the hospital, I had a good understanding of the things I was responsible for in managing my health.
- When I left the hospital, I clearly understood the purpose for taking each of my medications.

For the last question, respondents may also indication that they were not given any medication when I left the hospital.

The care transition composite is the newest addition to the survey, as it became effective in January, 2013. The three questions included in the care transition composite validity were found by Parry, Mahoney, Chalmers, and Coleman (2008) to operate similarly to a longer 15-item survey. High reliability was established for the 15-item survey in this study, and the three items that accounted for 88% of the variance in the 15-item survey were identified. The 3-item survey questions performed similarly to the 15-item survey in detecting differences in transitions of care quality.

HCAHPS as a basis for reimbursement.

Even though participation in the HCAHPS survey was initially completely voluntary, since the 2008 fiscal year, hospitals must measure and publicly report HCAHPS survey results to receive full annual payment updates through IPPS (CMS, 2015c). If IPPS hospitals do not report all of the required quality metrics, they may receive up to a 2% reduction in the annual payment update, impacting the hospital's financial performance (Giordano et al., 2010). The effect of this payment incentive has been to encourage hospitals to participate and share the results publicly.

Hospital VBP program was created by the Affordable Care Act to support better patient care experiences and clinical outcomes for all patients and to link Medicare payments to enhanced quality, and it started paying incentives in the 2013 fiscal year (CMS, 2012a). The

Hospital VBP program uses eight patient care experience dimensions ascertained from the HCAHPS survey and 18 other Hospital IQR program quality metrics to calculate payments (QualityNet, n.d.). The measures from the HCAHPS survey included in the Patient Experience of Care domain of the Hospital VBP program include communication with nurses, communication with doctors, responsiveness of hospital staff, pain management, communication about medicines, cleanliness and quietness of the hospital environment, discharge information, and overall rating of the hospital. To calculate the score for the Patient Experience of Care domain, the percentage of patients who answer the most positive or "top box" response to HCAHPS questions is used (CMS, 2012b). The "top-box" response for the Discharge Information composite is "Yes," and for the Care Transition composite, it is "Strongly agree" (HCAHPS, n. d.). The care transition composite from the HCAHPS survey will be added to the Patient and Caregiver Centered Experience of Care/Care Coordination domain of the Fiscal Year 2018 Hospital VBP program, and the performance period will be January 1, 2016–December 31, 2016 (Medicare Program, 2015).

The Patient Experience of Care domain contributes 30% of the total performance score for the Hospital VBP program, while Clinical Process of Care measures are weighted 70% (CMS, 2012a). Beginning in the 2017 fiscal year, the weight placed on the patient experience will be reduced to 25% as a combined measure in the Patient and Caregiver Centered Experience of Care/Care Coordination domain. The Hospital VBP program compares hospitals' HCAHPS results in a performance period to a baseline period. In the 2015 fiscal year, the Hospital VBP program utilized the HCAHPS results from the 2013 calendar year as the performance period. The results from 2013 will be the baseline comparison for fiscal year 2017. To be eligible,

hospitals have to meet a minimum number of cases, measures, and surveys set by CMS to reduce the potential to bias the scoring for all participating hospitals.

Patient Understanding of Discharge Information

According to the Institutes of Medicine (IOM) (2014), even though the CMS discharge planning regulations require educating patients about discharge plans and evaluating patient and caregiver understanding of discharge plans, specific recommendations on how to implement the assessments have not been provided by CMS. The volume and complexity of information provided to patients and caregivers at the time of hospital discharge is extensive, making it difficult for patients to understand and follow discharge instructions.

If patients do not understand their medical conditions and medications, which are included in discharge information, they may not be able to adhere to discharge plans. In a survey of 47 consecutive patients who were discharged from a hospital in New York City, 41.9%, 95% CI [27.0, 57.9] of patients knew their diagnosis, 37.2%, 95% CI [23.0, 53.3] could explain the purpose of their medications, 27.9%, 95% CI [15.3, 43.7] could list their medications, and 14%, 95% CI [5.3, 28] understood their medication side effects (Makaryus & Friedman, 2005). Findings of this study suggest that hospitals may be able to improve discharge processes so patients understand their care better.

A prospective observational cohort study was conducted to evaluate patients' perspectives of transitions of care (Horwitz, et al., 2013). Patients hospitalized at an urban academic medical center for HF, acute coronary syndrome, or pneumonia and who were 65 years of age or older were enrolled. Participants had to be discharged from the hospital to home to be eligible. Outcomes measured were presence of patient-friendly discharge instructions and follow up appointment, patient satisfaction with and perceptions of discharge care, patient

understanding of diagnosis and follow up appointment, and understanding of discharge instructions. Of the 592 patients eligible for enrollment during the study period, 377 consented to medical review. The investigators used standardized, validated survey questions that are included in the HCAHPS survey, along with additional questions. Descriptive statistics were used to convey outcomes, including patient self-reported understanding and verified patient understanding. In general, patients reported satisfaction with discharge care. Even though 95.6% of subjects reported understanding the reason for hospital admission, patients' actual understanding was lower at 59.6%. At least 90% of the time, patients received written discharge instructions and those discharge instructions included necessary information in lay language. Discharge instructions were rated to be easy to understand by 86.2% of participants. According to the researchers, patients' perceptions may be useful in assessing discharge processes, but not patients' actual understanding. The results of this study suggest that use of HCAHPS survey results may not fully evaluate if patients actually understand their discharge information and how to care for themselves after discharge.

A single-site predictive correlational study investigated factors that predict patient understanding and execution of hospital discharge instructions (Coleman, et al., 2013). Through convenience sampling, the study enrolled adults 55 years of age or older who were discharged from the hospital. Following hospital discharge, a nurse provided a home visit to determine patient understanding of and the ability to carry out discharge instructions. The dependent variable in the study was the discharge instruction understanding and execution score. The investigators studied independent variables including demographic factors, health literacy measured by the Short Test of Functional Health Literacy in Adults (STOFHLA), cognition as measured by the Clock Drawing Test, locus of control/self-efficacy measured by two questions,

education, self-rated health status, and the discharge instruction complexity score, age, sex, ethnicity, marital status, living arrangement, and discharge diagnosis. The researchers evaluated predictors of understanding and execution of discharge instructions through descriptive statistics and stepwise linear regression.

Approximately 21% of the study population had inadequate or marginal health literacy as evidenced by a score of 22 or below on the STOFHLA, and 41% of the participants scored less than eight on the Clock Drawing Test, indicating possible cognitive deficits. Results of predictive regression modeling revealed that health literacy ($p < 0.0001$), cognition ($p = 0.02$), and locus of control/self-efficacy ($p = 0.004$) were associated with discharge instruction understanding and execution scores. Factors that were not predictors of discharge instruction understanding and execution included discharge diagnosis, discharge instruction complexity, and education.

A significant limitation of the study was the use of a non-validated tool to measure understanding and execution of discharge instructions, the dependent variable of the study. The discharge instruction complexity scoring method was also not validated. Additional studies should be performed using validated measurement tools for discharge instruction complexity scores and discharge instruction understanding and execution scores to determine if additional or different factors are predictors.

Health literacy.

According to the National Center for Education Statistics, the definition of literacy is "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (2006). From the National Assessment of Adult Literacy in 2003, 14% of American adults were categorized as having below basic prose literacy,

and 26% of people with below basic prose literacy were 65 years of age or older (NCES, 2006). Although there is not a consistent definition of health literacy, it may be described as, "the degree to which individuals can obtain, process, and understand the basic health information and services they need to make appropriate health decisions" (Ratzan & Parker, 2000). In 2003, 22% of American adults were estimated to have basic health literacy and 14% had below basic health literacy, while only 12% had proficient health literacy (Kunter, Greenberg, Jin, & Paulsen, 2006).

Various methods have been developed to detect low health literacy in healthcare environments. The Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA) are widely accepted validated tests of health literacy (Davis et al., 1991; Parker, Baker, Williams, & Nurss, 1995). Shortened versions of both tests that may be more practical to administer in clinical settings have been developed (Baker, Williams, Parker, Gazmararian, & Nurss, 1999; Davis et al., 1993). The Newest Vital Sign (NVS) was developed as an alternative to REALM and TOFHLA tests (Weiss et al., 2005). The NVS may serve as a clinical screening tool to detect low literacy, but it may not be an ideal test to use in research due to its limited precision. The NVS has historically been used in a clinic-based setting, so more research is needed to investigate its utility in the inpatient setting (Shealy & Threatt, 2015).

Health literacy and understanding of discharge instructions.

The IOM (2014) conducted a Roundtable on Health Literacy workshop on patient understanding of discharge instructions. The workshop identified that healthcare providers do not comprehend patients' inability to understand discharge information, so patients may be provided with too much ambiguous information to assimilate (IOM, 2014). The Roundtable also

recommended that patients should be able to receive discharge information in their preferred language and desired format. Different formats may include verbal, written, graphical, and computerized. Of primary concern, as hospitals strive to implement electronic medical records, is that electronic medical records do not create discharge instructions that are appropriate for patients with low literacy (IOM, 2014).

Through a cross-sectional survey administered at two urban hospitals in the U. S., it was discovered that English-speaking hospitalized patients had inadequate or marginal functional health literacy at a rate of 35%, and 62% of inpatient Spanish-speaking patients had inadequate or marginal functional health literacy (Williams et al., 1995). Health literacy was evaluated using the TOFHLA. Many of the study participants were indigent or minorities. In a multivariate analysis, it was found that age ($p < .001$) and years of education ($p < .001$) were independent predictors of TOFHLA scores. Results of the study also demonstrated that 42% of participants did not understand directions for taking a medication on an empty stomach, 26% did not understand when their next appointment was scheduled, and 60% did not understand a standard informed consent form.

Relationship between low health literacy and hospital readmissions.

Results of several studies of different design suggest that hospital readmissions are related to health literacy (Coleman et al., 2013; DeCoster et al., 2013; Mitchell, Sadikova, Jack & Paasche-Orlow, 2012). In a study that investigated health literacy and 30-day readmission rate in an urban safety net hospital, low health literacy was determined through regression analysis to be a risk factor for readmission (Mitchell et al., 2012). The association between health literacy and 30-day hospital readmission or emergency department visits was tested in a secondary analysis of 703 control subjects enrolled in two related trials. The REALM was used to measure

health literacy. In the study population, the low health literacy rate was 20%, the marginal health literacy rate was 29%, and the adequate health literacy rate was 51%. Following adjustment for potential confounders using multivariate Poisson regression analysis, it was found that patients with low health literacy were at 1.46 times higher risk of returning to the hospital or emergency department within 30 days. The results of this study suggest that patients with low health literacy may benefit from additional intervention to ensure understanding of their care to prevent 30-day inpatient or emergency department services.

A study using multivariate regression analysis was conducted to investigate factors related to states having higher than the nationwide rate of 30-day readmission rates for patients with HF (Schmeida & Savrin, 2012). The investigators considered speaking a language other than English at home to be a proxy of low health literacy. It was discovered that states with a higher percentage of people speaking a language other than English at home were less likely to have a 30-day readmission rate for HF worse than the U.S. rate (ß = –.0419891, p = .01). Another factor that was associated with a state having a readmission rate worse than the national average was higher median household income (ß = .0000428, p = .003). The results imply that low health literacy is not associated with higher readmission rates for HF. Perhaps primary language spoken in the home is not an appropriate proxy for health literacy. The results of these studies contradict the results found by Mitchell et al. (2012), in which low health literacy was associated with higher readmission rates. It is also notable that Schmeida and Savrin (2012) found that, on a state level, higher income was associated with worse readmission rates, while Philbin et al. (2001) found that low income was a predictor of readmission risk and Hasan et al. (2009) found that income was not a predictor of readmission. There is some controversy surrounding income as a predictor of readmissions.

Communication issues.

Through interviews and adapted HCAHPS surveys, researchers investigated the inpatient care experiences of caregivers of and patients with both HF and COPD in a hospital in England (Doos et al., 2014). Only 14 patients completed the mail survey. Results demonstrated that participants had issues with communication with healthcare providers and information provided about medications. Even though patients indicated that they prefer to receive both written and verbal discharge instructions, about 65% of participants did not receive written discharge information. The interviews revealed that patients and caregivers lacked understanding about medications and diagnoses. Subjects also had unmet needs due to communication about what to do and to expect following discharge. This study was small and did not perform statistical analysis on the quantitative survey portion of the investigation. It was also carried out in patients with a very specific set of diseases and was set in England, which has a different healthcare system structure than the U. S. It may not be appropriate to apply the results of this study to different settings, but it highlights the need to further investigate patients' communication needs at hospital discharge.

In Canada, investigators randomly and retrospectively reviewed and abstracted medical records (n = 2,355) of adult patients who were inpatients for treatment of non-obstetric and non-psychiatric conditions to determine if communication issues are associated with preventable adverse events (Bartlett, Blais, Tamblyn, Clermont, & MacGibbon, 2008). Communication problems included were language barriers, physical problems interfering with communication, blindness, and deafness. The authors also classified social distancing problems or psychiatric diagnoses as other possible factors that could affect communication. Patients who experienced

preventable adverse events in the hospital were more likely to have communication problems (odds ratio [OR] 3.00, 95% CI [1.43–6.27]) or a psychiatric condition (OR 2.35, 95% CI [1.09–5.05]). The study did not explore the quality of communication provided by the hospital or its staff because it was a data-only retrospective analysis. Of the 217 adverse events included in the analysis, 32% of patients were readmitted within 12 months. Several limitations of the study prevent wide generalization of results. Readmission within 12 months of index hospital discharge is not a widely accepted measure of healthcare quality; instead 30-day readmission is consistently used. In addition, the study did not evaluate an association between communication problems and readmissions; rather it explored communication problems and adverse events.

Healthcare provider and patient perceptions.

It has been reported that health care providers do not understand patients' limitations to understand information provided, and patients fail to remember details (IOM, 2014). Patients who were admitted for acute coronary syndrome were surveyed during and after hospital discharge about physician-patient communication (Kripalani et al., 2010). For health literacy assessment, the REALM was administered during hospitalization. Following discharge, patients were interviewed by telephone. Physician communication was rated in the eight domains, including General clarity, Responsiveness to patient concerns, Explanation of patients' problems, Explanation of processes of care, Explanation of self-care after discharge, Empowerment, Decision making, and Consideration of patients' desire and ability to comply with recommendations. Of the 100 patients who consented to participate, 84 people completed both interviews. The rate of inadequate health literacy was 44% in the study population. The domains that had the lowest ratings were related to "Consideration of patients' desire and ability to comply with recommendations." Worse ratings were given to "General clarity" (p = .02),

"Responsiveness to patient concerns" (p = .03), and "Explanation of processes of care" (p = .04) by patients with inadequate health literacy compared to those with marginal or adequate literacy. One could conclude from this study that patients have unmet needs related to information sharing from physicians during and after hospital discharge.

In another study, inpatients and house staff were surveyed to determine the differences between patient and physician perceptions about patient knowledge and care received (Olson & Windish, 2010). This cross-sectional study was conducted at a community teaching hospital in Connecticut. Inpatients and house staff were both surveyed. All 43 physicians who were asked to participate consented, and of the 89 eligible patients, 94% consented. Only 28% of physician participants were attending physicians, while the rest were interns or residents. The researchers utilized some questions from HCAHPS and the Picker Patient Experience Questionnaire in the survey. There were discrepancies found between patient and physician perceptions. Patients reported they knew their diagnosis 57% of the time, and physicians thought patient knew their diagnosis 77% of the time (p < .001). Nearly 60% of patients thought physicians explained things in an understandable way, and 21% of physicians thought they always provided explanations to patients (p < .001). In this study, direct patient-physician relationships were not evaluated because physicians were surveyed about the general care and patient experiences over a one month period.

Communication methods.

Results of a systematic review conducted to determine the effectiveness of written combined with verbal discharge information found that written and verbal instructions are better than verbal instructions only at hospital discharge to home (Johnson, Sandford, & Tyndall, 2003). Trials that were either controlled or randomized and controlled were included. Only two

studies were found that met criteria. The study participants were parents of children being discharged from the hospital. Providing both written and verbal discharge information increased satisfaction and knowledge compared to control groups which received only verbal information. Results from this study substantiate providing discharge information to patients and caregivers. It also supports discharge processes that include written information to take home and an adequate explanation of its contents.

Researchers administered a written survey to 200 inpatients at two teaching hospitals in Washington State to elicit patients' perceptions about "essential" hospital discharge planning aspects (Shoeb, Merel, Jackso, & Anawalt, 2012). Of the patients surveyed, 86.5% preferred verbal discharge instructions with or without written information, and 10.5% favored written discharge instructions only ($p < .0001$). The results of this study suggest that patients highly value verbal communication about discharge information. It is possible that verbal communication allows healthcare providers to highlight particularly important information. It may still be helpful for patients to have written instructions in case they forget important verbal information that was shared.

Discharge Planning

A systematic review of randomized controlled or quasi-experimental trials investigated discharge planning from hospital to home for patients aged 65 years or older (Preyde, Macaulay, & Dingwall, 2009). Studies were included if they measured hospital length of stay, readmission rate, costs, quality of life, patient well-being, or patient satisfaction. The systematic review included 25 trials, and all except four of the included studies were randomized controlled trials. Effect size was calculated for statistically significant results, and the d index was used to estimate the size of the intervention effect. Results of the research found large effects with

respect to discharge planning and patient satisfaction. Moderate effects of discharge planning were found for quality of life measures and readmission rates.

Another systematic review of discharge planning was conducted to determine the effectiveness of individualized discharge planning for patients transitioning from the hospital setting to home (Shepperd, et al., 2013). The systematic review included 24 randomized controlled trials (*n*=8,098) comparing individualized discharge plans with routine discharge care that was not customized. Medical conditions and psychiatric hospitalizations were included. For 12 trials, the readmission rate at 3 months was statistically significantly reduced for patients who were admitted to the hospital with a medical diagnosis and who received individualized discharge planning (RR 0.82, 95% CI [0.73, 0.92]). In three trials, provision of individualized discharge planning increased patient satisfaction. Results of this systematic review may suggest that for patients who receive customized discharge planning activities in the hospital, patient satisfaction may improve and readmission rates may be reduced.

McMartin (2013) conducted an evidence-based analysis to evaluate if discharge planning for patients with chronic medical conditions reduces healthcare utilization and clinical outcomes in comparison to standard care alone. The analysis included 11 studies that compared standard care to discharge planning for patients with chronic illnesses. Results of the analysis demonstrated that discharge planning reduced hospital length of stay for the index admission and readmissions. Mortality was not reduced by discharge planning, and an inference could not be made on discharge planning effects on health-related quality of life and patient satisfaction.

Hospital Readmission Rates and HCAHPS

Only two studies were identified that investigated the association between patient satisfaction, as measured by HCAHPS survey questions on discharge information, and 30-day all cause readmission rates in patients admitted to the hospital for any diagnosis.

The first study was published in 2009. Jha et al. (2009) conducted a correlation study that investigated the relationship between satisfaction with hospital personnel interactions and 30-day readmission rates for patients admitted for HF and pneumonia. Data were obtained from national data sources including HCAHPS survey results, the American Hospital Association annual survey, and Medicare. Questions from the HCAHPS survey were utilized to evaluate patient satisfaction with hospitals' discharge processes. The questions used were included in the discharge information composite of HCAHPS. The questions were, "Did the hospital staff ask you about whether you would have the help you needed when you left the hospital?" and "Did you receive written information about the symptoms or health problems to monitor after leaving the hospital?" Performance on the HCAHPS composite was categorized by quartiles. In addition to the HCAHPS questions, a chart-based process measure that assessed if patients admitted to the hospital for HF had documentation of receiving discharge instructions in the medical record was also recorded. There were 2,222 hospitals that reported both the patient-reported and chart-based discharge metrics. The researchers studied the characteristics of hospital size, hospital region, ownership status, teaching status, location (rural or urban), existence of dedicated coronary unit, and ratio of nurses to 1,000 patient days. Readmission rates 30 days after the index hospitalizations were reported for patients with HF and pneumonia diagnoses and Medicare fee-for-service plan enrollees.

The investigators found no association between 30-day all cause readmissions and the chart-based process measure in patients admitted for HF. For hospitals performing in the highest

quartile for the patient-reported HCAHPS discharge information composite, readmission rates were only 2.4% lower than for hospitals performing in the lowest quartile for patients admitted for HF (22.4% versus 24.7%, 95% CI [1.7, 3.0], $p < .0001$). For patients admitted for pneumonia, hospitals performing in the highest quartile for the patient-reported HCAHPS discharge information composite, readmission rates were only 2% lower than for hospitals performing in the lowest quartile (17.5% versus 19.5%, 95% CI [1.4, 2.6], $p < .001$). The authors concluded that in patients with HF or pneumonia, there was a slight association between patients' satisfaction with hospitals' discharge planning and 30-day all cause readmission rates.

The study published by Jha et al. (2009) added important information to the literature on the relationship between discharge information patient satisfaction and 30-day readmission rates. The study only included patients who were covered by Medicare fee-for-service and who were originally admitted for HF or pneumonia. It also included a chart documentation process metric that probably has no bearing on patients' actual experiences. Although the association was not substantial, the study provides some evidence that it might be possible to reduce readmissions in patients with HF or pneumonia by improving performance on the discharge information composite of HCAHPS. The study could not measure the impact of hospital performance on the care transition composite of the HCAHPS survey on readmissions because the questions were not included in the survey when the study was conducted.

The second study investigating HCAHPS survey performance and readmission rates was published by Boulding et al. (2011). In an observational analysis, the researchers utilized hospital readmission data from the CMS Hospital Compare database from July 2005 through June 2008 and HCAHPS survey results from July 2007 through June 2008. The study was conducted to investigate the relationship between patient satisfaction with hospital personnel

interactions and 30-day readmission rates for patients admitted for AMI, HF, and pneumonia. Boulding et al. (2011) used the same questions to evaluate patient satisfaction with hospitals' discharge processes as Jha et al. (2009). Because Hospital Compare provides overall scores for hospital performance on HCAHPS, and results are not divided by diagnosis, the patient satisfaction scores used in this study's analysis were not diagnosis-specific or patient-specific; rather they were hospital-wide. The study also included performance on clinical performance measures in its analysis. Hospital characteristics included bed size, presence of interventional cardiac catheterization service, medical school affiliation, intensive care unit services, and geographic region.

A multivariable, hospital-level logistic regression analysis was conducted to determine the relationship between 30-day readmission rates and patient satisfaction with the hospital experience. To be included in the analysis, hospitals had data available for all outcomes (n = 1798 for AMI; n = 2561 for HF, n = 2562 for pneumonia). In the multivariable logistic regression analysis, patient satisfaction with discharge planning was associated with lower 30-day risk-standardized readmission rates for HF (χ^2 =20.75, $p < .001$) and pneumonia (χ^2 =5.56, p = .02). Patient satisfaction with discharge planning for AMI was not associated with lower readmission rates in the multivariable logistic regression analysis. For AMI, HF, and pneumonia, higher overall patient satisfaction scores (not discharge-specific) were associated with lower 30-day risk-standardized readmission rates ($p < .001$). The researchers also conducted a correlation analysis, which showed statistically significant weak negative correlations between 30-day risk-standardized readmission rates and patient satisfaction with discharge planning for AMI (r = -.167, $p < .001$), HF (r = -.188, $p < .001$), and pneumonia (r = -.129, $p < .001$). The investigators concluded that patient satisfaction with discharge planning

processes was associated with lower adjusted 30-day readmission rates in patients with AMI, HF, and pneumonia.

The study published by Boulding et al. (2011) also added evidence to the body of literature exploring the relationship between patient satisfaction and 30-day readmission rates, as it included an additional diagnosis in the analysis. It reinforced the results of Jha et al. (2009) in showing that patient satisfaction for HF and pneumonia may be associated with lower readmission rates for hospitals. The results of the correlation analysis demonstrated weak, although statistically significant, negative correlations between hospital performance on the HCAHPS discharge information composite and 30-day readmission rates for all three diagnoses. Time frames for the data sources of HCAHPS and readmission rates were not the same, and study design would have been improved by matching the time frames to eliminate the risk that conditions in the hospital changed during the discrepant times. The study utilized HCAHPS results for hospitals, but it was not possible to analyze HCAHPS results for specific diagnoses. It would be more ideal to conduct an analysis on all cause admissions and readmissions, instead of specific diagnoses, if using HCAHPS data as the metric for patient satisfaction.

Conclusion/Summary

Readmissions are a significant concern for the healthcare system, both from financial and quality of care perspectives. Hospitals have the understandable goal of reducing readmission rates to increase reimbursement from CMS payment programs. Additionally, hospitals can enhance reimbursement from CMS by improving performance on the HCAHPS survey through the Hospital VBP program. If patients have higher satisfaction with the care provided in the hospital, patients may be more likely to recommend the hospital to others and to choose to return

for care in the future for care, if given the choice. For many reasons, hospitals are concerned with improving performance on both patient satisfaction and 30-day readmission rates.

There are several possible factors that can contribute to patients being satisfied with the discharge services provided by hospitals. Health literacy, communication methods, and discharge planning processes may all contribute to satisfaction and readmissions. Hospitals should be concerned with identifying patients who may not understand discharge and transition of care information so they are able to adhere to discharge instructions.

The available literature exploring the relationship between discharge information and care transition patient satisfaction and readmission rates is lacking. The HCAHPS care transition composite was added to the survey in 2013. No studies have been published to investigate the relationship between hospital performance on the care transition composite and readmission rates. The studies that have been published on patient satisfaction with discharge information are also limited to specific disease states and focus on the Medicare population. The HCAHPS metrics are reported for hospitals not based on disease states, and they include all patients and all payers. In addition, there are diseases outside of those studied that significantly contribute to high readmission rates. Future research is needed on expanded populations to include admissions for nearly all diagnoses and for all payers of care.

Chapter 3: Methodology

Approach to the problem

The purpose of this research project was to investigate the relationship between Colorado hospitals' patient satisfaction scores on questions related to discharge information and transitions of care and Colorado hospitals' 30-day all cause readmission rates. To carry out this research, results from patient satisfaction surveys and readmission rates were obtained. Data were available for each metric either on public websites or through publicly available databases.

Documentation of Seminal Works Relative to Research Method

The methods for this study resembled those used by Jha et al. (2009) and Boulding et al. (2011) by investigating the association of the variables. Jha et al. (2009) examined the relationship between performance on the HCAHPS discharge planning survey questions and all cause 30-day readmission rates for Medicare fee-for-service enrollees admitted for HF and pneumonia. In their analysis of discharge planning measure association with 30-day readmission rates, Jha et al. (2009) built a patient-based model with readmission as the outcome and discharge metrics as the primary predictor. They created a risk-adjusted model for readmission rates separately for HF and pneumonia patients. Each patient was assigned an HCAHPS score based on the hospital's performance for all survey respondents because HCAHPS responses are anonymous and therefore unknown for specific patients. A quartile of performance on the HCAHPS discharge instructions composite was assigned. The association between the HCAHPS quartiles and readmissions was examined using a global three-degree of freedom test across the four quartiles. In contrast to the study published by Jha et al. (2009), this research project did not conduct patient-level analyses; rather all analyses were completed on hospital-level data.

In the study published by Boulding et al. (2011), the associations between hospitals' clinical performance, patient satisfaction, and 30-day risk-standardized readmission rates for hospital admissions for pneumonia, HF, and AMI were evaluated. Hospitals' 30-day risk-standardized readmission rates, hospital-level clinical performance, overall hospital patient satisfaction, and patient satisfaction with hospitals' discharge processes were obtained from the Hospital Compare database (CMS, n.d.a). For each disease state, a hospital-level multivariable logistic regression analysis was performed. Hospital characteristics described and included in the analysis were hospital size, affiliation with a medical school, and types of services provided (e.g., presence of adult interventional cardiac catheterization, and medical and surgical intensive care units). Patients were assigned a score of one if they were readmitted and zero if they were not. Larger hospitals were weighted more heavily in the analysis. Boulding et al. (2011) also converted the percentages of responses to the HCAHPS discharge questions to numbers. Using the total number of respondents and the percentage of participants who responded "yes" and "no" to a question, the number of each response per hospital was calculated. The value of one was assigned for each of the respondents who answered "yes." For "no," the value of zero was assigned for those patients. Similar to Boulding et al. (2011), this research project analyzed hospital-level data instead of patient-level data.

Research Design

A quantitative, descriptive study was conducted to answer the research question. A retrospective correlational study design was carried out to study the relationship between hospital 30-day all cause readmission rates and hospital performance on HCAHPS survey composites for discharge information and care transitions. To evaluate the effect of hospital characteristics and

patient disease states, a series of correlation calculations were carried out by subdividing the sample by the different factors.

Sampling Strategy

Study participants were Colorado hospitals. Colorado hospitals that submitted HCAHPS survey data were included in the study. The HCAHPS survey protocol requires that all payer types, not just Medicare, be eligible for sampling (CMS, 2015c). Standardized administration of the HCAHPS survey is required. The sampling procedure for the HCAHPS survey requires a random sample of patients discharged from the hospital every month. Data are gathered each month over 12 months. Hospitals must submit 300 or more completed surveys over the year. A hospital may submit fewer than 300 surveys if the number of eligible discharges is less than 300 in the year.

Measurement Strategy

Colorado's All Payer Claims Database (APCD) is administered by the Center for Improving Value in Healthcare (Center for Improving Value in Healthcare, 2013). The Colorado APCD is a data warehouse containing health insurance claims for Colorado residents with health coverage through commercial health plans, Medicare Advantage, Medicare fee-for-service, and Medicaid. When the study was performed, the claims included in the APCD represented approximately 65% of the insured population in Colorado, and the database excluded self-funded commercial plans, government providers, such as the Veterans Health Administration and Indian Health Service, and uninsured patients. The APCD included hospital admission and readmission claims data for included health payers. Through the Colorado APCD, for each Colorado hospital, a 30-day all cause readmission rate was calculated for the 2013 calendar year. To calculate the all cause readmission rate, the numerator was the number of admissions with a discharge date within 30 days prior to the admission date of the immediate following admission

in the 2013 calendar year (initial admission), and the denominator was the number of admissions with a discharge date in the 2013 calendar year (index admissions). An all cause readmission occurred when a patient was readmitted to the hospital for any reason (related or unrelated to the index discharge diagnosis). General acute medicine and acute psychiatric hospital admissions for patients 18 years of age or older with an overnight inpatient stay who were discharged alive during 2013 were included in the readmission rate calculation. Patients included in the readmission calculation were continuously enrolled in the same insurance for 12 months. Hospitalizations for which the discharge status was categorized as expired, left against medical advice, transfer, or admitted and discharged on the same day were excluded from the readmission rate calculation. Other exclusion criteria for the readmission calculation were acute rehabilitation care admissions and non-acute hospital stays (e.g., hospice, extended care, skilled nursing, partial hospitalizations).

The HCAHPS survey is a standardized survey which allows for valid comparison between hospitals on the inpatient care experience (CMS, 2015c). For the 2013 calendar year, the HCAHPS survey composite results were reported to and can be downloaded from the Hospital Compare website (CMS, n.d.a). HCAHPS Quality Assurance Guidelines V8.0 includes descriptions of the questions and methods of the survey (CMS, 2013c). The survey may be administered by mail, telephone, mail followed by telephone, or interactive voice response. Inclusion criteria for HCAHPS survey participation are at least one overnight stay in the hospital, 18 years or older at the time of admission, non-psychiatric principal diagnosis at discharge, alive at the time of discharge, and discharged to settings other than nursing homes and skilled nursing facilities (CMS, 2013c). The HCAHPS survey results are adjusted for the effects of the method of survey delivery and for patient-mix before HCAHPS results are reported publicly to the Hospital Compare website (CMS, n.d.a). The HCAHPS scores from hospitals with fewer than 100 respondents may have too low of a response rate to allow reliable assessment of hospital

performance (CMS, 2015c). Hospitals that did not report results or that had fewer than 100 patients completing the survey for the 2013 reporting period were excluded from the analysis.

The HCAHPS discharge information survey composite results were displayed in two categories as the percentage of respondents who either indicated "Yes" or "No" that they were given information about what to do during their recovery at home. The HCAHPS care transition survey composite results were posted in three categories as the percentage of respondents who either "Strongly Agree," "Agree," or "Disagree/Strongly Disagree" that they understood their care when they left the hospital. The "top-box" response for the Discharge Information composite is "Yes," and for the Care Transition composite, it is "Strongly agree" (HCAHPS, n. d.).

The discharge information composite included the following questions:

1. During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital? (yes or no)
2. During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital? (yes or no)

The care transition composite included the following questions, and respondents express their level of agreement:

1. During this hospital stay, staff took my preferences and those of my family or caregiver into account in deciding what my health care needs would be when I left (strongly disagree, disagree, agree, or strongly agree)
2. When I left the hospital, I had a good understanding of the things I was responsible for in managing my health. (strongly disagree, disagree, agree, or strongly agree)

3. When I left the hospital, I clearly understood the purpose for taking each of my medications. (strongly disagree, disagree, agree, or strongly agree, not given any medication when I left the hospital)

Method of Analysis

This study investigated all cause readmission rates for Colorado hospitals obtained from the Colorado APCD, and it analyzed hospital performance on both the HCAHPS discharge information and the care transition composites. The study included Medicare fee-for-service, Medicare non-fee-for-service (i.e., Medicare Advantage), Medicaid, commercial, and undefined insurance payers. This research only investigated Colorado hospitals because the APCD includes only Colorado residents.

Hospital demographics including number of size (small, medium, or large), location (urban or rural), and teaching hospital status were collected. The number of licensed beds and zip codes were found through the Colorado Department of Public Health and Environment Health Facility Demographic Information internet site (Colorado Department of Public Health and Environment, 2015). Hospitals' zip codes were used to match a corresponding Rural Urban Commuting Area code to subsequently determine whether a hospital was located in an urban or rural area (Anonymous, 2014). Hospitals were categorized based on licensed number of beds as either small (less than or equal to 99 beds), medium (100-399), or large (400 or more beds) (Jha et al., 2009). Hospitals were categorized as a teaching hospital based on Open Payments program status in 2013 (CMS, 2013d).

All cause 30-day readmission rates and CMS HRRP index diagnosis readmission distributions (AMI, acute exacerbation of COPD, HF, pneumonia, and total knee and hip arthroplasty) were described for hospitals. Refer to Appendix A for a list of diagnosis codes that

were used to identify patients admitted for AMI, acute exacerbation of COPD, HF, pneumonia, and total knee and hip arthroplasty. An aggregate overall readmission rate was calculated for each hospital by adding the readmission counts for all Medicare, Medicaid, commercial and undefined lines of business and dividing by the total number of live discharges.

The dependent variable in the correlation analysis was the hospital 30-day all cause readmission rate. The independent variables included percentage of responses in the "top box" category on HCAHPS survey composites. A Pearson correlation coefficient was computed to assess the relationship between readmission rates (dependent variable) and percentage of responses in the "top box" category on HCAHPS survey composites (independent variable) related to discharge information for all diagnoses, AMI, COPD, HF, pneumonia, and hip and knee arthroplasty. For each of those diagnostic categories, a Pearson correlation was conducted to evaluate the relationship between 30-day all cause readmission rates and percentage of responses in the "top box" category on HCAHPS survey discharge information and care transition composites for the groups of teaching hospital or non-teaching hospital, urban or rural, and hospital size (small, medium, and large). Only hospitals with 25 or more discharges for the HRRP diagnoses were included in the disease-specific correlation analyses (CMS, 2015b). To evaluate the effect of hospital characteristics and patient disease states, a series of correlation calculations were carried out by subdividing the sample by the different factors. For example, correlations between HCAHPS performance and readmission rates were calculated for teaching hospitals and non-teaching hospitals. All analyses were performed using PASW Statistics 18 (Release 18.0.0, July 30, 2009). A $p \leq .05$ was considered statistically significant.

Chapter 4: Results

Summary of Methods

A retrospective, correlational study design was utilized to evaluate the association between hospital 30-day all cause readmission rates and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey performance as the percentage of top-box responses for the discharge information and care transition composites. A Pearson correlation was conducted, including all hospitals and all diagnoses. To evaluate the effect of hospital characteristics and patient disease states, a series of Pearson correlation calculations were carried out by subdividing the sample by the different factors. The factors considered were teaching status, geographic location, hospital size, and the Centers for Medicare and Medicaid Services (CMS) hospital readmission reduction program (HRRP) diagnoses.

Demographics

Of the 79 hospitals with 30-day all cause readmission rates available in the Colorado All-Payer Claims Database (APCD) for the dates January 2013 to December 2013, 49 facilities were included in the study. Hospitals with fewer than 100 HCAHPS survey responses in the 2013 calendar year were excluded. For analysis of CMS HRRP diagnoses, hospitals were included only if they had 25 or more discharge cases for the respective diagnosis during the 2013 calendar year. Hospital characteristics, displayed by diagnostic categories, are described in Table 1. An illustration of how hospitals were included in the analysis is depicted in Figure 1 (page 86).

Table 1

Hospital Characteristics

	Study Hospitals by Diagnoses					
Characteristic	All (n=49)	AMI (n=29)	COPD (n=39)	HF (n=37)	Pneumonia (n=40)	Hip and Knee Arthroplasty (n=42)
Size *no. (%)*						
Small	22 (44.90%)	5 (17.24%)	13 (33.33%)	13 (35.14%)	15 (37.5%)	16 (38.10%)
Medium	20 (40.82%)	18 (62.07%)	19 (48.72%)	18 (48.65%)	19 (47.5%)	19 (45.24%)
Large	7 (14.29%)	6 (20.69%)	7 (17.95%)	6 (16.22%)	7 (17.5%)	7 (16.67%)
Teaching hospital *no. (%)*	14 (28.57%)	13 (44.83%)	14 (35.90%)	13 (35.14%)	13 (32.5%)	14 (33.33%)
Urban location *no. (%)*	31 (63.27%)	27 (93.10%)	30 (76.92%)	28 (75.68%)	29 (72.5%)	31 (73.81%)
All-Payer Readmission Rate *M*	8.58%	8.75%	11.54%	13.68%	8.83%	2.71%

Note. AMI = acute myocardial infarction; COPD = chronic obstructive pulmonary disease; HF = heart failure.

Correlation Studies

Pearson correlation coefficients were computed to assess the relationship between the variable of 30-day all cause readmission rates and performance on the HCAHPS discharge information composite (i.e., percentage of respondents answering yes to “what to do during their recovery at home") and care transition composite (i.e., percentage of respondents strongly agreeing to "understood their care when they left the hospital"). To answer the primary study question, a correlation analysis was conducted including all eligible hospitals and all diagnoses. A secondary analysis was conducted to study the association between performance on the HCAHPS composites and 30-day all cause readmission rates for discharges for acute myocardial infarction (AMI), chronic obstructive pulmonary disease (COPD), heart failure (HF), pneumonia, and elective hip and knee arthroplasty. Sub-analyses were also conducted based on the variables of teaching/non-teaching, urban/rural, and size (small/medium/large).

For all diagnoses and all hospitals, there was a negative correlation between performance on both the discharge information composite (r = -.289, n = 49, $p \leq .05$) and the care transition composite (r = -.482, n = 49, $p \leq .01$) and 30-day all cause readmission rates (Table 2). Higher scores on the HCAHPS questions are associated with lower 30-day all cause readmission rates. A scatterplot summarizes the results (Figures 2 and 3; pages 87 and 88). For teaching (r = -.657, n = 14, $p \leq .05$), urban (r = -.558, n = 31, $p \leq .01$), rural (r = -.523, n = 18, $p \leq .05$), and small (r = -.526, n = 22, $p \leq .05$) hospitals, there was a negative correlation between the percentage of HCAHPS respondents who answered strongly agree to the care transition composite and 30-day all cause readmission rates (Table 2 and Figures 4, 5, 6, and 7; pages 89, 90, 91, and 92). The sub-analysis correlation calculations for non-teaching, medium, and large hospitals did not demonstrate a significant association between the care transition composite and 30-day all cause readmissions (Table 2). None of the sub-analysis correlation studies showed an association between the discharge information composite and 30-day all cause readmissions (Table 2).

Table 2

Correlations between All Cause 30-Day Hospital Readmission Rate and Scores on Discharge Information Composite and Care Transition Composite - All Diagnoses

Variable	n	% Yes to Discharge Information Composite	% Strongly Agree to Care Transition Composite
All hospitals	49	-.289*	-.482**
Teaching	14	-.381	-.657*
Non-Teaching	35	-.275	-.286
Urban	31	-.327	-.558**
Rural	18	-.331	-.523*
Small	22	-.358	-.526*
Medium	20	-.233	-.299
Large	7	-.349	-.754

*. Correlation is significant at the .05 level (2-tailed).
**. Correlation is significant at the .01 level (2-tailed).

For hospitals with a minimum of 25 AMI discharges, there was a negative correlation between the percentage of HCAHPS respondents who strongly agreed to the care transition

composite and 30-day all cause readmission rates (r = -.388, n = 29, $p \leq .05$) (Table 3). For non-teaching hospitals, there was a negative correlation between the percentage of HCAHPS respondents who strongly agreed to the care transition composite and 30-day all cause readmission rates (r = -.522, n = 16, $p \leq .05$) (Table 3). For urban hospitals, there was a negative correlation between the percentage of HCAHPS respondents who answered yes to the discharge information composite and 30-day all cause readmission rates (r = -.392, n = 27, $p \leq .05$) (Table 3). For rural hospitals, there was a perfect positive correlation between performance on both of the HCAHPS composites and 30-day all cause readmission rates (r = 1.000, n = 2, $p \leq .01$), suggesting that higher performance on each of the HCAHPS composites was associated with a higher readmission rate (Table 3). The remainder of sub-analysis correlation calculations did not demonstrate a significant association between performance on either of the HCAHPS composites and 30-day all cause readmission rates (Table 3).

Table 3

Correlations between All Cause 30-Day Hospital Readmission Rate and Scores on Discharge Information Composite and Care Transition Composite – Acute Myocardial Infarction

Variable	n	% Yes to to Discharge Information Composite	% Strongly Agree to Care Transition Composite
All hospitals	29	-.338	-.388*
Teaching	13	-.447	-.276
Non-Teaching	16	-.248	-.522*
Urban	27	-.392*	-.361
Rural	2	1.000**	1.000**
Small	5	.315	-.832
Medium	18	-.330	-.111
Large	6	-.517	-.485

*. Correlation is significant at the .05 level (2-tailed).
**. Correlation is significant at the .01 level (2-tailed).

For hospitals with a minimum of 25 COPD discharges (n=39), no correlation was found between performance on either of the HCAHPS composites and 30-day all cause readmission rates, even when testing based on the different hospital characteristics (Table 4).

Table 4

Correlations between All Cause 30-Day Hospital Readmission Rate and Scores on Discharge Information Composite and Care Transition Composite – Chronic Obstructive Pulmonary Disease

Variable	n	% Yes to Discharge Information Composite	% Strongly Agree to Care Transition Composite
All hospitals	39	-.162	-.179
Teaching	14	-.368	-.137
Non-Teaching	25	-.100	-.155
Urban	30	-.174	-.133
Rural	9	-.197	-.428
Small	13	-.245	-.397
Medium	19	.046	-.246
Large	7	-.501	.111

For hospitals with a minimum of 25 HF discharges, teaching hospitals demonstrated a positive correlation between the percentage of HCAHPS respondents who strongly agreed to the care transition composite and 30-day all cause readmission rates ($r = .650$, $n = 13$, $p \leq .05$) (Table 5). The positive correlation suggests that higher performance on the care transition composite was associated with a higher readmission rate. A scatterplot summarizes the results (Figure 8, page 93). The remainder of sub-analysis correlation calculations by hospital characteristics for HF discharges did not demonstrate an association between performance on either of the HCAHPS composites and 30-day all cause readmission rates (Table 5).

Table 5

Correlations between All Cause 30-Day Hospital Readmission Rate and Scores on Discharge Information Composite and Care Transition Composite – Heart Failure

Variable	n	% Yes to Discharge Information Composite	% Strongly Agree to Care Transition Composite
All hospitals	37	-.171	.050
Teaching	13	-.052	.650*
Non-Teaching	24	-.195	-.106
Urban	28	-.282	.155
Rural	9	-.130	-.284
Small	13	-.053	-.324
Medium	18	-.364	.046
Large	6	-.397	.587

*. Correlation is significant at the .05 level (2-tailed).

For hospitals with a minimum of 25 pneumonia discharges, there was a negative correlation between the percentage of HCAHPS respondents who strongly agreed to the care transition composite and 30-day all cause readmission rates for medium sized hospitals (r = -.633, n = 19, $p \leq .01$) (Table 6). The balance of sub-analysis correlation calculations by hospital characteristics for pneumonia discharges did not reveal an association between performance on either of the HCAHPS composites and 30-day all cause readmission rates (Table 6).

Table 6

Correlations between All Cause 30-Day Hospital Readmission Rate and Scores on Discharge Information Composite and Care Transition Composite - Pneumonia

Variable	n	% Yes to Discharge Information Composite	% Strongly Agree to Care Transition Composite
All hospitals	40	-.057	-.095
Teaching	13	-.086	.004
Non-Teaching	27	-.016	-.020
Urban	29	-.174	-.174
Rural	11	.089	.019
Small	15	.135	.001
Medium	19	-.368	-.633**
Large	6	.003	.773

**. Correlation is significant at the .01 level (2-tailed).

For hospitals with a minimum of 25 elective total hip or total knee arthroplasty discharges, there was a negative correlation between percentage of HCAHPS respondents who strongly agreed to the care transition composite and 30-day all cause readmission rates (r = -.323, n = 42, $p \leq .05$) (Table 7). There were negative correlations found between the percentage of HCAHPS respondents who strongly agreed to the care transition composite and 30-day all cause readmission rates for teaching hospitals (r = -.613, n = 14, $p \leq .05$) and medium sized hospitals (r = -.602, n = 19, $p \leq .01$) with a minimum of 25 hip or knee arthroplasty discharges (Table 7). The other sub-analysis correlation calculations by hospital characteristics for hip and knee arthroplasty discharges did not show an association between performance on either of the HCAHPS composites and 30-day all cause readmission rates (Table 7).

Table 7

Correlations between All Cause 30-Day Hospital Readmission Rate and Scores on Discharge Information Composite and Care Transition Composite – Elective Hip and Knee Arthroplasty

Variable	n	% Yes to Discharge Information Composite	% Strongly Agree to Care Transition Composite
All hospitals	42	-.164	-.323*
Teaching	14	-.519	-.613*
Non-Teaching	28	-.003	-.151
Urban	31	-.164	-.328
Rural	11	-.120	-.208
Small	16	-.038	-.162
Medium	19	-.132	-.602**
Large	7	-.735	-.478

*. Correlation is significant at the .05 level (2-tailed).
**. Correlation is significant at the .01 level (2-tailed).

The variable of the percentage of HCAHPS respondents who strongly agreed to the care transition composite demonstrated a negative correlation with 30-day all cause readmission rates in seven variable combinations analyzed. Higher performance on the same question was associated with higher readmission rates for patients with HF admitted to teaching hospitals and for patients hospitalized for AMI at rural hospitals. The variable of the percentage of patients surveyed who responded yes to the discharge information composite was negatively correlated with 30-day all cause readmission rates for all hospitals and all diseases and for patients admitted for AMI to urban hospitals. Performance on the same question was associated with higher readmission rates for patients with AMI admitted to rural hospitals.

Conclusion

The research question of this study was: Is there an association between hospitals' scores on HCAHPS discharge information and care transition composites and all cause 30-day hospital readmission rates for hospitals? The answer to the research question was yes, there is an association between the variables studied, without consideration of diagnosis or hospital characteristics. The null hypothesis of this study was: There is no association between hospitals'

scores on HCAHPS discharge information and care transition composites and all cause 30-day hospital readmission rates for hospitals. For the primary analysis in all hospitals and all diagnoses, the null hypothesis for this research project was rejected. The null hypothesis was not rejected for all of the variable combinations evaluated in the subanalyses.

The majority of study hospitals were small in size with less than 100 licensed beds. There were few (*n*=7) large hospitals with more than 400 beds included in the analysis. There were more non-teaching (*n*=35) hospitals included in the study than teaching hospitals (*n*=14). In 2013, there were only 21 Colorado teaching hospitals according to the Open Payments Programs, so two-thirds of Colorado teaching hospitals were included (CMS, 2013d). Most hospitals (*n*= 31) included in the analysis were located in geographic areas considered to be urban. Overall, the readmission rate for all payers was 8.58%. In comparison, the national 30-day all cause hospital readmission rate for all payers, including uninsured patients, was estimated to be 13.8% based on 2011 data (Hines et al., 2014). This thesis project did not include uninsured payers, so the actual overall readmission rate may differ from what was measured.

In conclusion, the results of this study showed an association between higher performance on the HCAHPS discharge information and care transition composites and lower 30-day all cause readmission rates. The strength of the association for the care transition composite was stronger than for the discharge information composite. Teaching, urban, rural, and small hospitals demonstrated a significant negative correlation between top-box performance on the care transition composite and 30-day readmission rates, suggesting that better performance on the composite was associated with lower readmission rates. None of the correlation analyses conducted by hospital demographic characteristics showed a statistically significant correlation between the discharge information composite and 30-day all cause

readmission rates. The subanalyses conducted by diagnosis showed fewer associations between the discharge information composite and readmission rates than the care transition composite.

Chapter 5: Discussion, Conclusions, and Recommendations

Answer to the Research Question

The research question for this study was: Is there an association between hospitals' scores on Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) discharge information and care transition composites and all cause 30-day hospital readmission rates for hospitals? The null hypothesis was: There is no association between hospitals' scores on HCAHPS discharge information and care transition composites and all cause 30-day hospital readmission rates for hospitals. The null hypothesis for this research project was rejected. For all included hospitals and all diagnoses, higher performance on the discharge information and care transition composites were both associated with lower all cause 30-day hospital readmission rates. When different hospital characteristics and diagnoses were considered in the subanalyses, several associations were found between higher performance on the discharge information composite and lower readmission rates, while the care transition composite demonstrated more significant negative associations with lower 30-day all cause readmission rates.

Discussion of Correlation Study Results

All hospitals and all diagnoses.

Higher performance on the HCAHPS discharge information and care transition composites, irrespective of a patient's discharge diagnosis, was associated with lower 30-day all cause readmission rates. The strength of the association for the discharge information composite was weaker than for the care transition composite. None of the subanalyses showed a correlation between top-box scores on the discharge information composite and 30-day all cause readmission rates. In contrast, significant correlations between top-box performance on the care transition composite and readmission rates were found in some of the subanalyses. If hospitals

should need to focus improvement efforts on only one of the composites, the care transition composite may be preferable.

Teaching hospitals demonstrated a significant, moderate negative correlation between top-box performance on the care transition composite and 30-day readmission rates, suggesting that better performance on the composite was associated with lower readmission rates. There are many possible reasons to explain this association. Teaching hospitals may have had more effective discharge processes to ensure that physician residents address all of the components of the care transition composite. Other explanations could be that physicians, residents, and staff at teaching hospitals were more aware of the importance of relaying information about care transitions or more effective discharge follow up was provided.

Both urban hospitals and rural hospitals showed a negative association between top-box care transition composite performance and 30-day all cause readmission rates. Perhaps the geographic location of a hospital has no bearing on this association considering that hospitals in both settings showed the association. Small hospitals, which comprised nearly 45% of all hospitals included in the study, demonstrated a significant negative correlation between top-box performance on the care transition composite and 30-day all cause readmission rates. It is possible that smaller hospitals are able to provide more personalized care to patients.

Large hospitals did not show a significant correlation between top-box performance on the discharge information composite or the care transition composite and 30-day all cause readmission rates, even though the correlation coefficient for the care transition composite was of the magnitude that would suggest an association existed. A type I or type II error may have occurred, so it is not possible to draw a conclusion from the analysis of the small (n = 7) sample of large hospitals.

Chronic obstructive pulmonary disease.

No relationship between variables was found for chronic obstructive pulmonary disease (COPD) discharges. For this disease, it is possible that education and ensuring understanding are not effective methods to prevent readmissions. Predictive factors of readmission for patients with COPD include having a previous hospital admission, experiencing dyspnea, and taking oral corticosteroids (Bahadori & FitzGerald, 2007). Variables associated with an increased risk of hospital admission and readmission include long term oxygen use, having low health status or poor health-related quality of life, and lacking routine physical activity (Bahadori & FitzGerald, 2007). Many of the predictive factors for COPD hospital readmissions are not amenable to educational efforts.

Heart failure.

Across all of the Centers for Medicare and Medicaid Services (CMS) Hospital Readmissions Reduction Program (HRRP) diagnoses, the mean all-payer readmission rate for heart failure (HF) was the highest at 13.68%. Teaching hospitals showed a positive correlation for top-box performance on the care transition composite and 30-day all cause readmission rates for HF discharges, but the sample size was small (n = 13). This correlation result is inconsistent with the analysis conducted on teaching hospitals irrespective of diagnosis, for which a negative correlation was found between top-box performance on the care transition composite and readmission rates. It is not possible to attribute a strong correlation with the small sample size.

Pneumonia and elective hip and knee arthroplasty.

Of the CMS HRRP diagnoses analyzed, the mean all-payer readmission rate for elective hip and knee arthroplasty was the lowest at 2.71%. The mean all-payer readmission rate for elective knee and hip arthroplasty was lower than would be expected for centers of excellence

for knee and hip replacement. Centers of excellence for knee and hip replacement had hospital readmission rates of 3.2% for knee arthroplasty and 3.13% for hip arthroplasty (Mehotra et al., 2013). In the same study, hospitals that were not centers of excellence had higher readmission rates of 3.31% for knee arthroplasty and 3.63% for hip arthroplasty. In Colorado, total hip and total knee replacement procedures occur at a higher rate than the national average (Fisher, Bell, Tomek, & Esty, 2010). It is possible that Colorado hospitals have developed practices and standards that are consistent with or better than hospitals possessing the centers of excellence distinction for knee and hip replacement due to the high volume of procedures performed in the state. In the subanalysis of hip and knee arthroplasty discharges, higher performance on the care transition composite was associated with lower readmission rates in all hospitals, teaching hospitals, and medium-size hospitals.

For pneumonia discharges, medium-size hospitals showed a negative correlation between higher performance on the care transition composite and lower readmission rates.

Contribution to Health Services Administration

Hospital readmissions are an important outcome for the healthcare system, as high readmission rates may have both financial and quality of care implications. If hospitals reduce 30-day readmission rates, then they can increase reimbursement from CMS payment programs. In addition, hospitals can increase reimbursement from CMS though the Hospital Value Based Purchasing (VBP) program by improving performance on the HCAHPS survey. This investigation demonstrated an association between higher performance on the HCAHPS discharge information and care transitions composites and lower 30-day all cause readmission rates.

In general, if a patient is readmitted to a hospital within 30 days of discharge, there may be concern that the patient did not receive adequate care on the initial hospital admission. Being readmitted, however, may not negatively affect patients' satisfaction with initial hospital care. A study conducted in a health system with five hospitals investigated the effect of hospital readmission on patient satisfaction, and the researchers found that there was no overall difference in patient satisfaction between patients who were readmitted and not readmitted (Siddiqui, 2014). Another study found that a higher hospital readmission rate did not influence patient satisfaction as measured by responses to the HCAHPS question, "Would you recommend this hospital to friends and family?" (Kennedy, 2014). Based on the results of these studies, being readmitted does not negatively impact overall patient satisfaction with the care experience as measured by the HCAHPS survey. In some situations, it is possible that patients have come to accept that hospital readmissions are a likely, depending on disease state and severity, even with adequate quality of care.

Patient satisfaction, independent of HCAHPS survey performance, may influence patients' decisions to use a certain hospital for care if provided a choice, as positive "word of mouth" may influence others' care choices. In a Kaiser Family Foundation Health Tracking Poll in the U.S., only 13% of respondents viewed information on hospital quality through public reporting sources, and only 4% actually used the information to make decisions (DiJulio, Firth, & Brodie, 2015). Even though patients do not currently use publicly reported quality measures to make care decisions, consumers are becoming increasingly aware of the data available to make decisions about where to receive healthcare.

Although a causal relationship cannot be concluded from this study, improvement on providing understandable discharge and care transition information to patients could reduce

hospital readmissions, in turn improving reimbursement and quality of care. Hospitals and payers might benefit from identifying patients who are at risk of not understanding transition of care information to improve adherence to discharge instructions.

Findings Related to Literature Review

The HCAHPS care transition composite was added to the survey in 2013. Other published research investigating the association between hospital performance on the HCAHPS care transition composite and 30-day all cause readmission rates did not exist at the time of this research. The studies that have been published on patient satisfaction with discharge information were limited to specific disease states and included only Medicare beneficiaries (Boulding et al, 2011; Jha et al., 2009). This project adds to the general fund of knowledge on the relationship between performance on the HCAHPS discharge information and care transition composites and 30-day all cause readmissions by including a broader mix of disease states and payer types.

Jha et al. (2009) explored the relationship between patient satisfaction with discharge information using performance on the HCAHPS discharge information composite and 30-day all cause readmission rates for only two diseases, pneumonia and HF. In the analysis, the researchers created a patient-level multivariable model that adjusted for patient factors and hospital characteristics, including size, location, region, nurse to patient-days ratio, profit status, teaching status, and the existence of a cardiac intensive care unit. The study by Jha et al. (2009) demonstrated a weak association between 30-day all cause readmission rates and performance on the HCAHPS discharge information composite for pneumonia and HF. In comparison, this study did not find any association between performance on the HCAHPS discharge information composite and 30-day all cause readmission rates for pneumonia or HF discharges. The data available for this study did not allow for patient level adjustments like those that were performed

by Jha et al. (2009). Unlike this study, the research conducted by Jha et al. (2009) did not investigate the HCAHPS care transition composite.

In contrast to the results of this study, the results of the correlation analysis by Boulding et al. (2011) demonstrated weak, although statistically significant, negative correlations between hospital performance on the HCAHPS discharge information composite and 30-day readmission rates for AMI, HF, and pneumonia. Through multivariable logistic regression analysis, Boulding et al. (2011) found that hospital performance on the HCAHPS discharge information composite was associated with lower 30-day risk-standardized readmission rates for HF and pneumonia, but not for AMI. Through correlation analysis, weak negative associations were found between better hospital performance on the HCAHPS discharge information composite and lower 30-day risk-standardized readmission rates for HF, pneumonia, and AMI. Similar to this investigation, the study conducted by Boulding et al. (2011) was limited by its utilization of HCAHPS results for hospitals because it was not possible to analyze the results for specific diagnoses. Unlike the study by Boulding, et al. (2011), this study did not find any association between the discharge information composite and readmission rates for AMI, HF, pneumonia, but Boulding's study was larger and consequently more likely to find an association, even if it was weak. This study included a broader patient population in the readmission rate calculation by including more payer types and more diagnoses than the study by Boulding et al. (2011). The research conducted by Bouldding et al. (2011) did not investigate the HCAHPS care transition composite like this study did.

Limitations to this Project

Using the Colorado All Payer Claims Database (APCD) limited the analysis to hospitals in a single U.S. state, Colorado. Results from this analysis may not be generalizable to the rest of

the country. Colorado hospitals tend to perform better than the national average in readmission rates (Rau, 2015). The proportion of hospitals penalized by Medicare for readmission rates in the CMS HRRP was 54% nationally, while only 32% of Colorado hospitals were penalized based on Medicare readmission rates.

Limitations related to the retrospective nature of this study exist. The Colorado APCD, from which readmission rates were obtained, included acute psychiatric inpatient hospitalizations, while hospitals are required to exclude psychiatric hospitalizations from participation in the HCAHPS survey. Therefore, the included patient populations in the Colorado APCD database and the HCAHPS survey database probably did not match according to diagnoses. In this study, the analysis was carried out at the hospital level rather than the patient level, so the study design did not allow for the discovery of patient factors affecting the outcomes. It was not possible to measure and match the HCAHPS survey responses and readmission status for individual patients.

The HCAHPS surveys are randomly administered to patients who meet inclusion criteria. The questionnaire responses do not allow for categorization of associated disease states, so it is not possible to compare the HCAHPS performance with readmission rates for specific disease states. In the subanalyses based on CMS HRRP diagnoses, the HCAHPS responses were for all patients, regardless of diagnosis, and they were used to study associations with disease-specific readmission rates. Strong conclusions cannot be drawn from this study based on the subanalyses for specific CMS HRRP disease states because the HCAHPS performance could not be isolated to include only patients with specific diagnoses.

For the 2013 calendar year, the Colorado APCD represented approximately 65% of the insured population in the state, and the database excluded self-funded commercial plans,

government providers (e.g., Veterans Health Administration and Indian Health Service), and uninsured patients. Despite the populations that were omitted, this study included a broader mix of payer types than previous studies which analyzed only Medicare beneficiaries. Analysis by payer type was beyond the scope of this study, but information gleaned from such an evaluation would likely be valuable to health services administrators to identify patient populations to target for improvement. One might argue that this study should only have considered Medicare beneficiaries because the CMS HRRP includes only Medicare patients. However, this project aimed to study a broader patient population in anticipation that other health payers will measure and reimburse based on 30-day all cause readmission rates in the future.

If the sample size would have been larger, an adjusted linear regression would have been a preferable method to evaluate the effect of hospital and patient factors on the relationship between hospital 30-day all cause readmission rates and hospital performance on HCAHPS survey composites for discharge information and care transitions. To compensate for the small sample size, a series of correlation calculations were conducted by subdividing the sample based on hospital characteristics and patient disease states. A causal relationship cannot be concluded from a correlation study because only the existence of and the strength of an association can be established between the two variables tested.

Recommendations

Recommendations for health services administrators.

Although this study cannot attribute a causal relationship, hospital and health system administrators may be concerned with providing information to patients about discharge care, as readmission rates were associated with top-box performance on two HCAHPS composites related to the discharge process. Healthcare payers are also concerned with reducing hospital

readmissions to improve affordability of healthcare. In the Fiscal Year 2016, CMS will reduce payments for Medicare Severity diagnostic related groups by 1.75% for all participating hospitals. Hospitals that perform well on quality measures, including patient satisfaction measured by HCAHPS performance, will have the opportunity to earn incentive payments (CMS, 2015b). Through these value-based incentive payments, the CMS targets to improve quality of care patient outcomes, safety, and the care experience. Beginning in Fiscal Year 2018, the Hospital VBP program will include hospitals' performance on the HCAHPS care transition composite during the 2016 calendar year to calculate incentive payments (Medicare Program…, 2015). Hospital administrators should aim to improve performance on the components of this new survey composite.

Patient satisfaction performance is publicly reported, so consumers may make decisions about where to seek healthcare based on the data. Although, as previously mentioned, only 4% of people polled used publicly reported quality measure results to make care decisions (DiJulio, Firth, & Brodie, 2015). According to an investigation that studied the relationship between publically reported performance measures and hospital admissions for AMI, hospitals having more patients who would recommend the hospital was associated with an increase in hospital admissions to treat AMI (McConnell, Lindrooth, Wholey, Maddox, & Bloom, 2015). The results of this investigation suggest that patients with AMI may consider publicly reported patient satisfaction measures to decide where to receive care. Over time, patients may become more aware of or more concerned with publicly reported quality measures, particularly patient satisfaction metrics.

Members of the Institute of Medicine Roundtable on Health Literacy published a 10-item list of attributes of a health literate organization (Brach et al., 2012). The group suggested that

an organization that is health literate will incorporate health literacy into high-risk situations, including transitions of care, medication teaching, and informed consent for procedures and surgeries. Additionally, the roundtable members suggested that healthcare providers confirm understanding of information provided at every interpersonal interaction. Examples of methods provided were Teach-Back, Show-Me, and Chunk-and-Check. Another important concept relayed was to limit educational sessions to two to three topics per interaction. To be aligned with this recommendation, hospitals should disperse information to prepare patients for discharge over several sessions, not just during the immediate time before hospital discharge.

Equity in healthcare requires that each person has the equal opportunity to be healthy (Braveman & Gruskin, 2003). Every patient who is being discharged from the hospital has the right to health equity and deserves to understand how to provide self-care and how to seek additional help. If patients do not know or understand, they will not have the opportunity to be as healthy as possible.

Health disparities are affected by social factors, like education, child care, income, housing, and neighborhoods (Robert Wood Johnson Foundation, 2008). Few readmission prediction models have included social determinants of health, so it is unknown which factors are associated with hospital readmissions (Kansagara et al., 2011). Socioeconomic status and sociodemographic factors are not adjusted for in quality measures, such as readmissions rates for the CMS HRRP (Nagasako, Reidhead, Waterman, & Dunagan, 2014). Arguments for and against the addition of socioeconomic adjustments for quality measures can be made. If they are included, it is proposed that hospitals with disproportionate numbers of patients from disadvantaged communities will not be financially penalized as heavily for poor outcomes, and less focus will be placed on social determinants of health. If adjustments for socioeconomic

factors are not added to quality measure calculations, then the differences in quality measures between hospitals will continue to highlight the need to address social determinants of health. The National Quality Forum plans to investigate if socioeconomic factors should be considered when measuring quality performance (National Quality Forum, 2014). Regardless of whether the CMS HRRP adjusts for socioeconomic factors in the future, health services administrators should consider their impact on health equity and take actions to reduce health disparities in transitions of care due to social determinants of health.

To provide health equity at transitions of care, there needs to be an evaluation of each person's needs related to social determinants of health to prepare for hospital discharge. Most transitions of care programs have a standardized process in place that provides the same services to every patient. Instead, perhaps hospitals should apply a standardized method to evaluate the needs of each person and then individualize the process based on the evaluation of patient needs.

Recommendations for additional research based on findings.

Future studies with larger sample sizes to include more payers than just Medicare should be conducted. A possible data source of hospital readmissions data including multiple payer types could be multiple APCD's. At the time of this writing, Colorado, Kansas, Minnesota, Tennessee, Maine, Maryland, Massachusetts, New Hampshire, Oregon, Rhode Island, Utah and Vermont all have existing APCD's (All-Payer Claims Database Council, 2015). Virginia also has an existing APCD with voluntary submission. States that are in the process of implementing APCD's include Washington, Arkansas, West Virginia, New York, and Connecticut. If readmission rates are obtained from multiple sources, researchers should ensure that the same readmission rate calculation is used by each APCD for consistency of data.

Future research should apply the same inclusion and exclusion criteria for patient satisfaction measures and readmission rate calculation. For example, in this study, psychiatric hospitalizations were excluded from HCAHPS survey participation but included in the readmission rate calculation by the Colorado APCD. Additionally, future investigators should expand study populations to include hospital admissions for nearly all diagnoses and for all payer types, and the same criteria should apply to all data sources.

To improve study design, researchers should use matching risk adjustments for all data sources. The HCAHPS survey risk adjusts for age, education, self-reported health status, language other than English spoken at home, service line (medical, surgical, or maternity care), age by service line, emergency room admission, and lag time between discharge and survey completion (CMS, 2008). Socioeconomic status and sociodemographic factors are not corrected for in rates for the HRRP, and these factors are not considered in recognized readmission rate calculation methods (Nagasako, Reidhead, Waterman, & Dunagan, 2014).

In prospective design studies, patient factors and survey responses could be investigated for causal relationships with readmission rates. It would be ideal to investigate patient-specific factors, like disease states, survey responses, and readmission status on the relationship between performance on the HCAHPS discharge information and care transition composite performance and 30-day all cause readmission rates.

Researchers should study interventions to improve performance on the HCAHPS discharge information and care transition composites and measure the interventions' effects on 30-day all cause readmission rates. An investigation of an interdisciplinary, multiple-component care transitions service provided to poor adult patients demonstrated improved top-box performance on the HCAHPS care transitions composite (also known as the CTM-3) compared

to a control group (Englander, 2014). Although performance on the HCAHPS care transition composite improved, there was no difference found between the intervention and control groups for readmission rates. Social determinants of health may have affected readmissions for the poor patients enrolled in the study. More individualized interventions may demonstrate different results on readmission rates.

Additional research is needed to develop and evaluate assessments or tools used to determine individuals' needs before discharge. Research has demonstrated that hospitalized patients preferred to receive different information than what was provided by healthcare providers, revealing that healthcare providers may not recognize the needs of patients (Suhonen, Nenonen, Laukka, & Välimäki, 2005). The investigators suggested that information shared with patients during hospitalization should be individualized based on patients' needs and concerns.

The Patient Learning Needs Scale (PLNS) can be used to measure patients' learning needs for home management before hospital discharge (Bubela at al., 1990a). In the PLNS, patients rate the importance of the elements for home management of care. Several studies have been conducted to evaluate the patient characteristics associated with responses to the PLNS (Bubela et al., 1990b; Jickling & Graydon, 1997; Polat, Celik, Erkan, & Kasali, 2014; Smith & Liles, 2007). Individualized education as determined by the PLNS provided prior to hospital discharge has been shown to decrease anxiety compared to standardized education in patients who underwent coronary artery bypass surgery (Yıldız et al., 2014). It is possible that patients with less anxiety might be more satisfied with information provided and may respond more positively to HCAHPS survey questions, but more research is needed to confirm this idea. Additional tools may need to be developed and tested to effectively determine individuals' needs before hospital discharge.

It has been demonstrated that nurses in the hospital setting overestimated patients' health literacy levels and concluded that 19% of their patients had a high likelihood of limited health literacy even though 63% of patients had a high likelihood of limited health literacy (Dickens, Lambert, Cromwell, & Piano, 2013). Because nurses usually provide most discharge teaching, it is important for them to know the health literacy levels of the patients they are educating. Health literacy experts recommend that healthcare providers assume that all patients have some degree of health literacy impairment, rather than conduct health literacy screening (Chugh, Williams, Grigsby, & Coleman, 2009). The Teach-Back method is a widely recognized technique of educating and evaluating patients' understanding of taught materials, and it is recommended as both a screening tool and intervention to ensure patient understanding of information (Chugh et al., 2009). The Joint Commission and the National Quality Forum recommend the use of the Teach-Back method to ensure patients understand their discharge instructions (National Quality Forum, 2009; The Joint Commission, 2007). Studies that demonstrate using the Teach-Back method to convey hospital discharge information reduces 30-day readmissions are lacking. More research is needed to investigate if using the Teach Back method both improves performance on the HCAHPS survey questions and decreases 30-day all cause readmissions.

Conclusions

For all included hospitals and all diagnoses, higher rates of top-box scores on the HCAHPS discharge information and care transition composites were associated with lower all cause 30-day hospital readmission rates. The association between the care transition composite and readmission rates was stronger than for the discharge information composite. Further prospective research is needed to determine if the relationships between the variables are causal. In the meantime, hospitals should strive to achieve higher rates of top-box performance on the

HCAHPS composites and reduce readmission rates to improve the quality of care provided and to maximize payments from CMS. Patients are likely to benefit from hospitals standardizing an evaluation of patients' discharge educational needs and individualizing the discharge process to meet each patient's requirements. If future research demonstrates a causal relationship between hospital performance on the studied HCAHPS composites, then hospitals would benefit from targeting efforts to achieve higher performance on the HCAHPS composites to reduce readmission rates.

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Figures

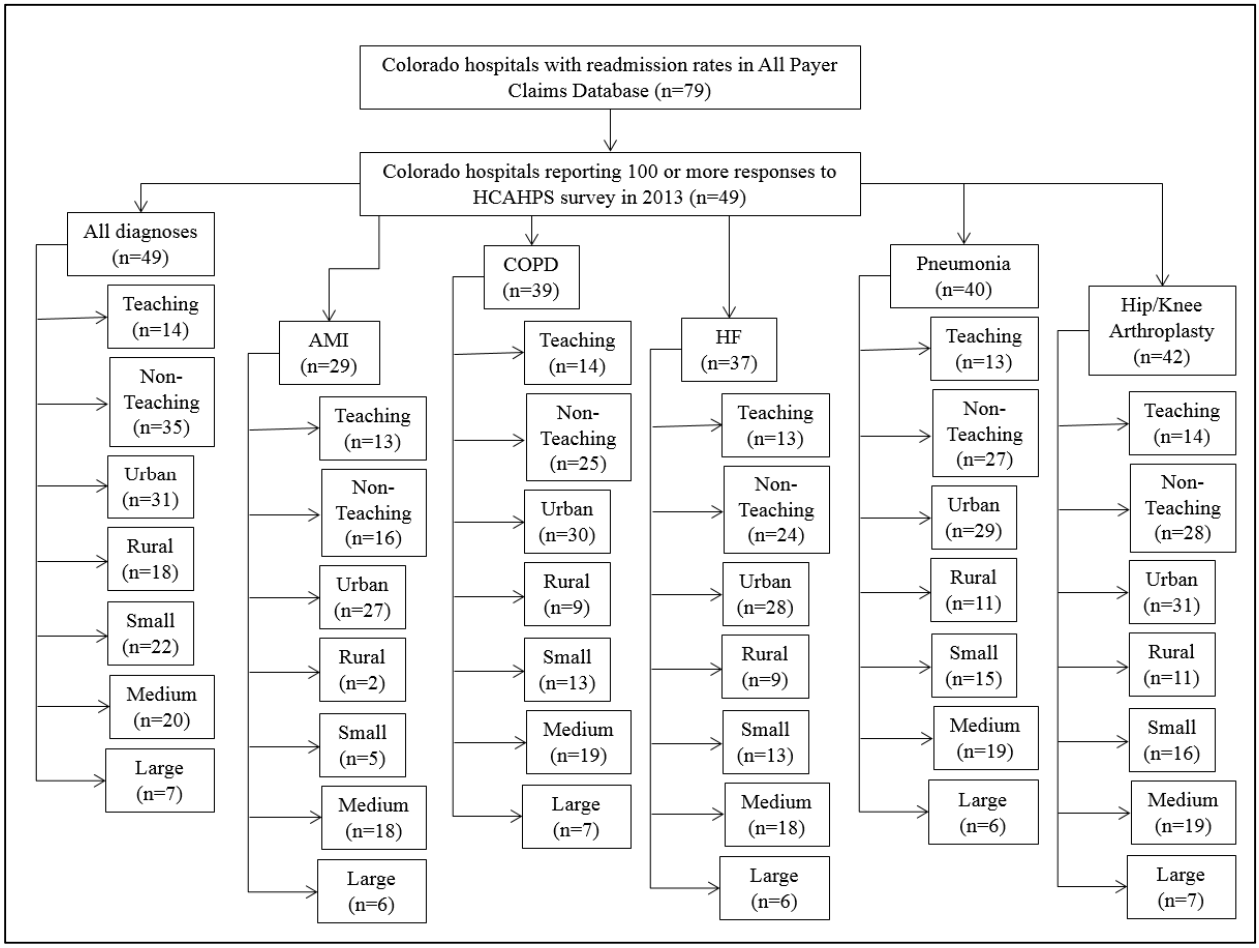

Figure 1. Flow chart describing hospital inclusion in the analysis. To be included in disease-specific analyses, hospitals had to discharge a minimum of 25 cases for the specific diagnosis during 2013 calendar year.

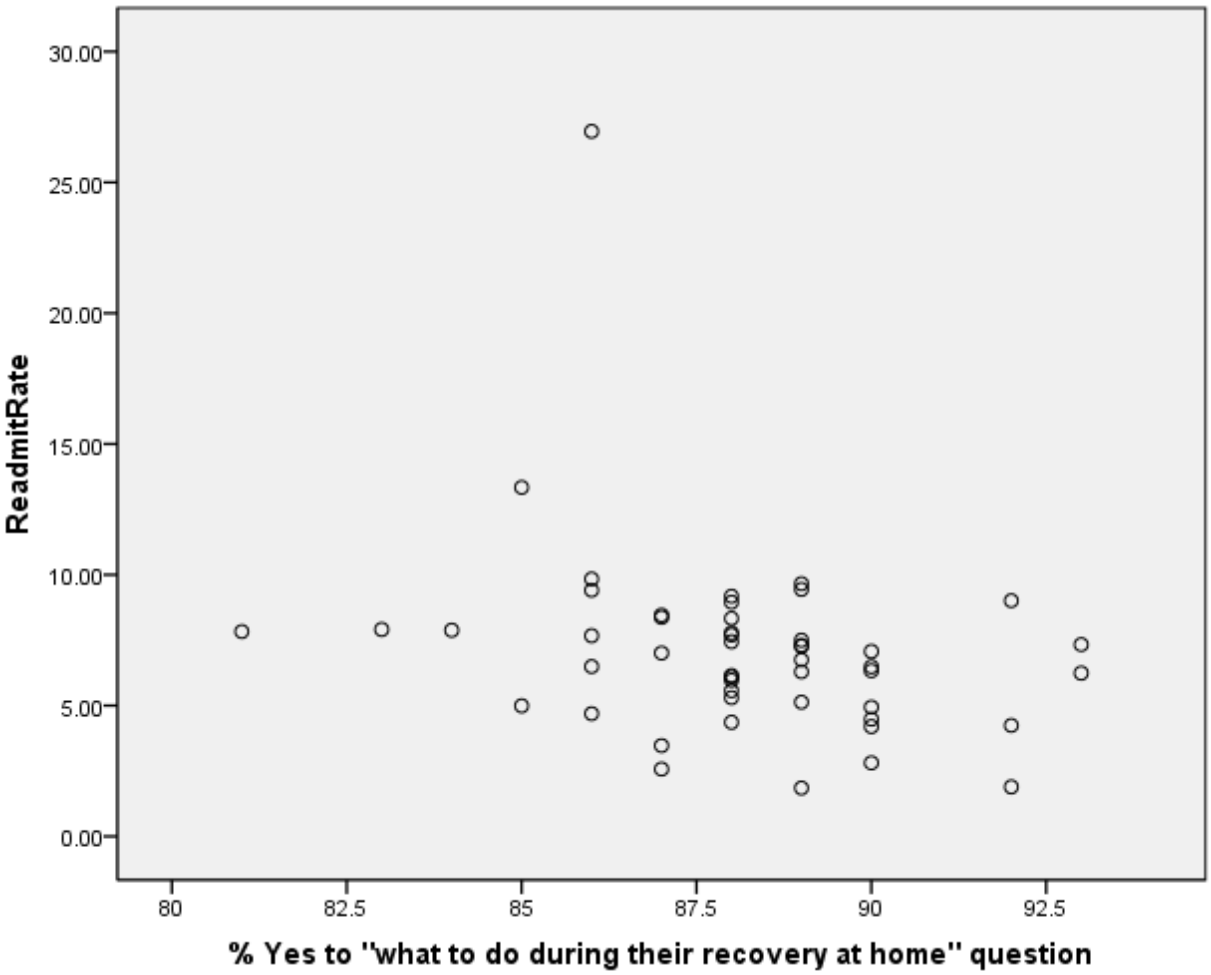

Figure 2. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for all included hospitals and all diagnoses.

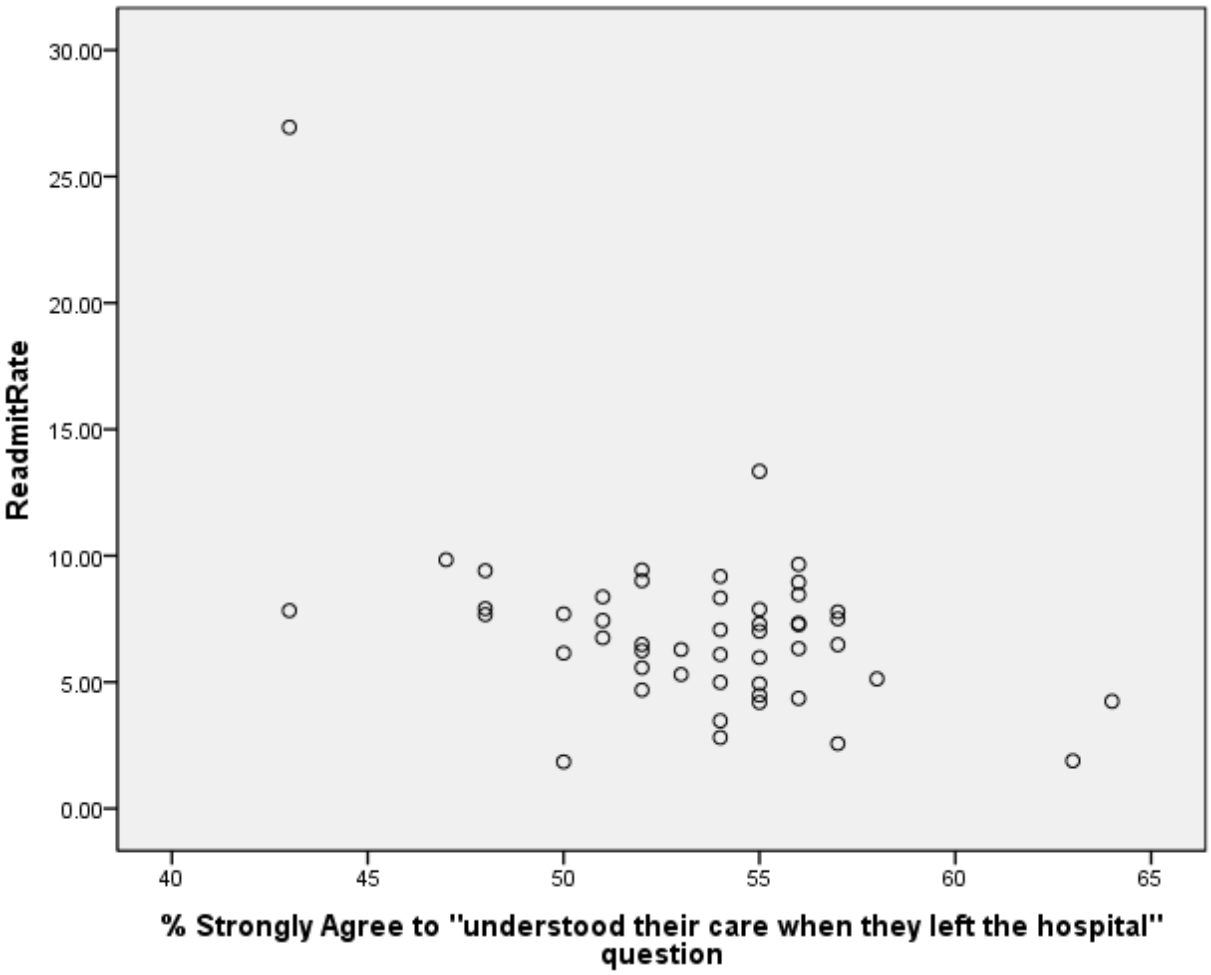

Figure 3. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all included hospitals and all diagnoses.

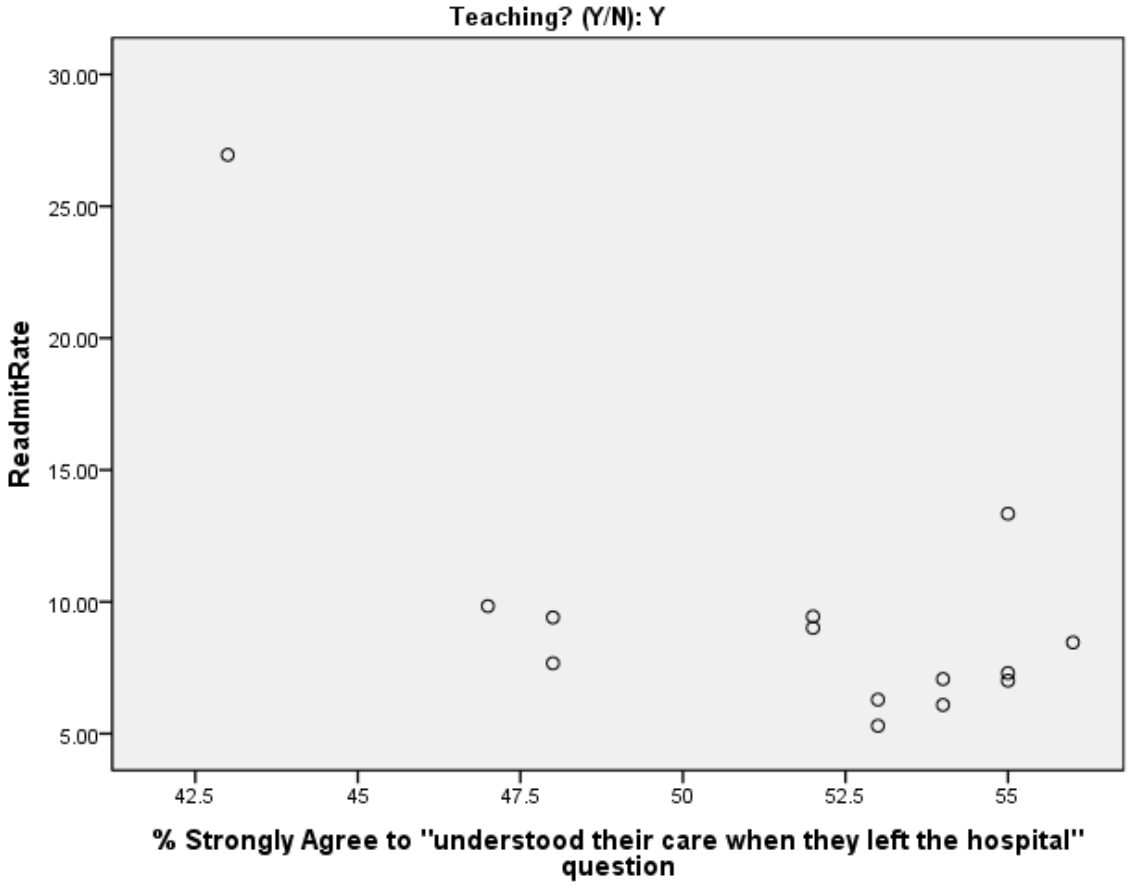

Figure 4. Scatterplot summarizing the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for teaching hospitals and all diagnoses.

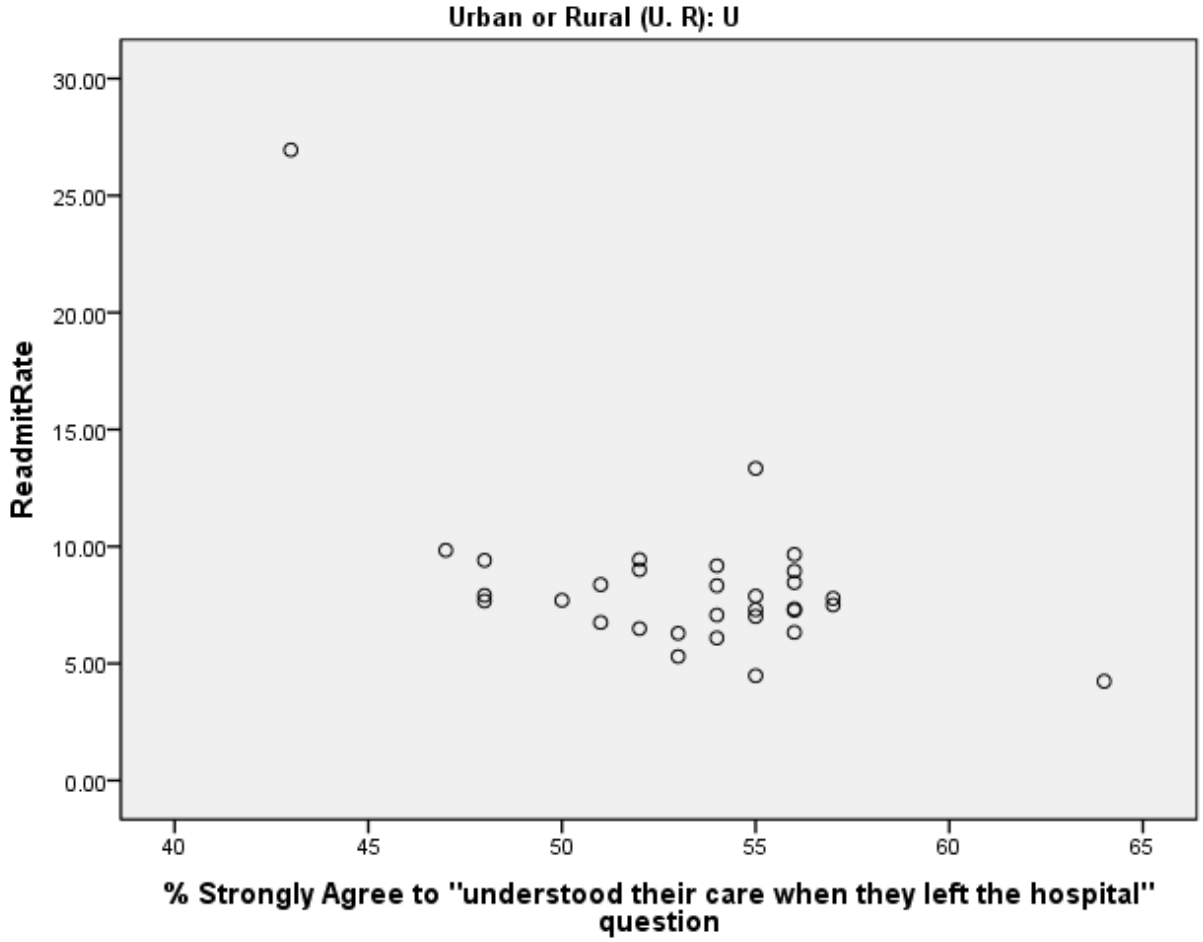

Figure 5. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for urban hospitals and all diagnoses.

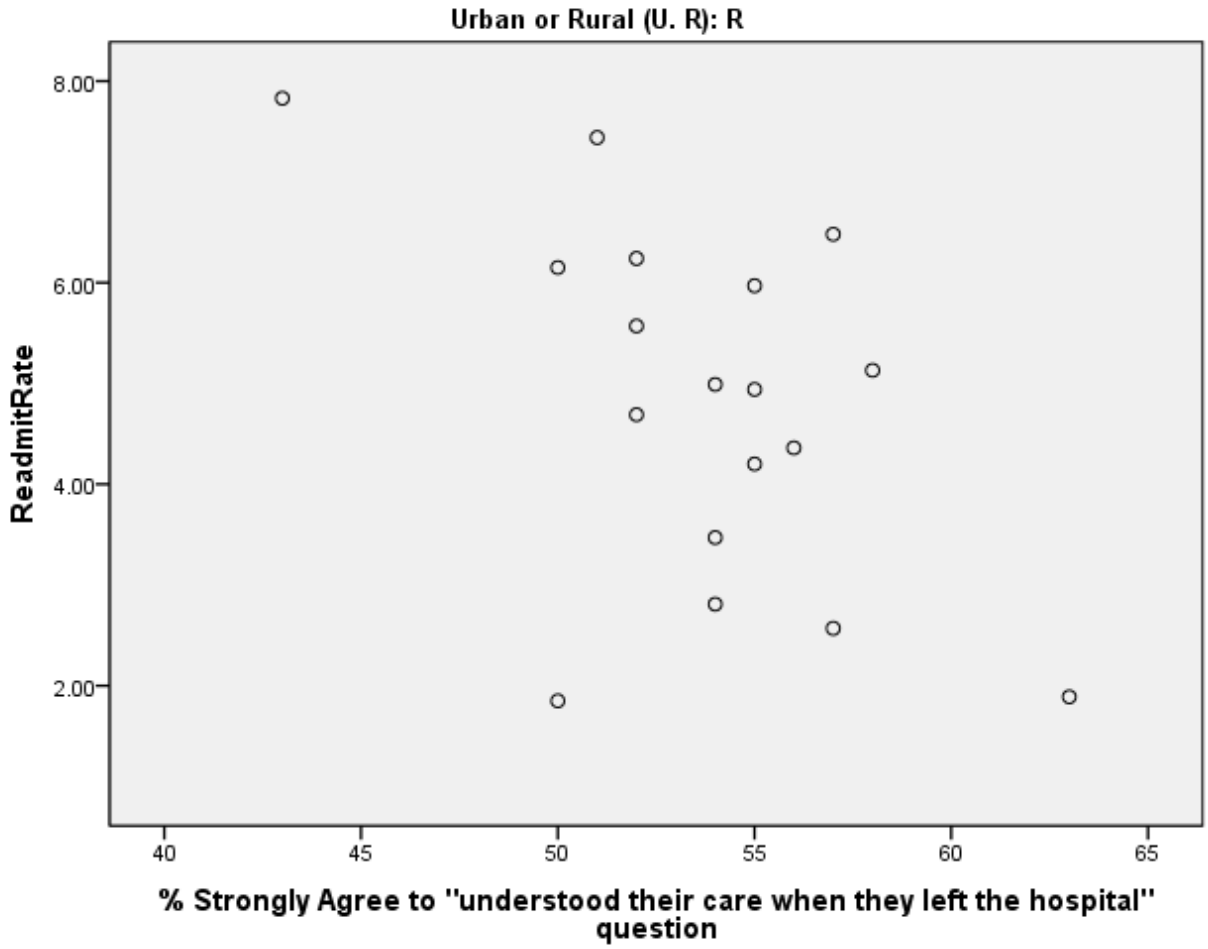

Figure 6. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for rural hospitals and all diagnoses

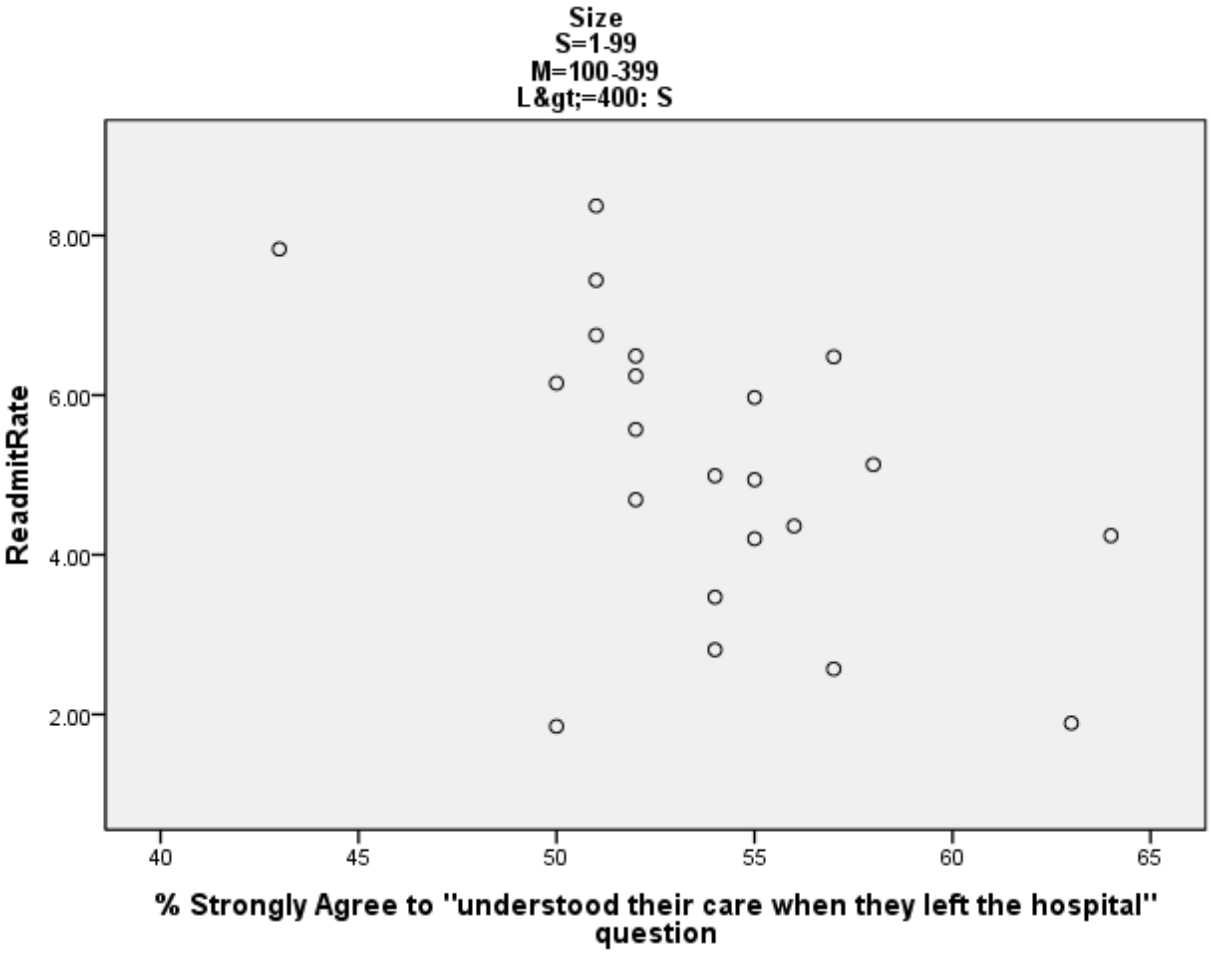

Figure 7. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for small hospitals and all diagnoses.

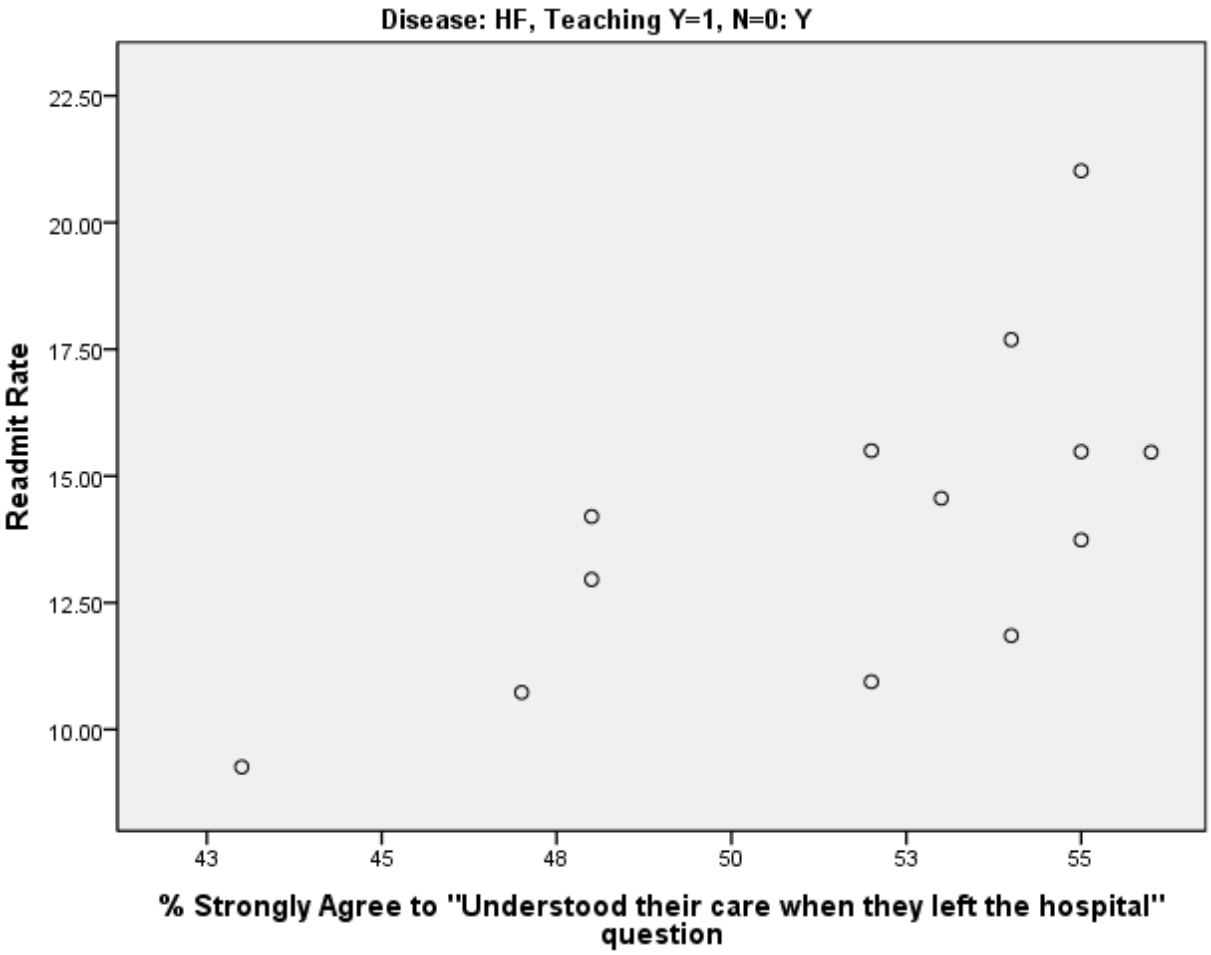

Figure 8. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for teaching hospitals with 25 or more heart failure discharges.

Appendix A: International Classification of Diseases, Ninth Revision, Clinical Modification Codes

International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes that define each patient cohorts for Hospital Readmission Reduction Program conditions

Acute myocardial infarction (AMI):

- 410.00: AMI (anterolateral wall) – episode of care unspecified
- 410.01: AMI (anterolateral wall) – initial episode of care
- 410.10: AMI (other anterior wall) – episode of care unspecified
- 410.11: AMI (other anterior wall) – initial episode of care
- 410.20: AMI (inferolateral wall) – episode of care unspecified
- 410.21: AMI (inferolateral wall) – initial episode of care
- 410.30: AMI (inferoposterior wall) – episode of care unspecified
- 410.31: AMI (inferoposterior wall) – initial episode of care
- 410.40: AMI (other inferior wall) – episode of care unspecified
- 410.41: AMI (other inferior wall) – initial episode of care
- 410.50: AMI (other lateral wall) – episode of care unspecified
- 410.51: AMI (other lateral wall) – initial episode of care
- 410.60: AMI (true posterior wall) – episode of care unspecified
- 410.61: AMI (true posterior wall) – initial episode of care
- 410.70: AMI (subendocardial) – episode of care unspecified
- 410.71: AMI (subendocardial) – initial episode of care
- 410.80: AMI (other specified site) – episode of care unspecified
- 410.81: AMI (other specified site) – initial episode of care

- 410.90: AMI (unspecified site) – episode of care unspecified
- 410.91: AMI (unspecified site) – initial episode of care

Acute exacerbation of chronic obstructive pulmonary disease (COPD):

- 491.21 Obstructive chronic bronchitis; With (acute) exacerbation; acute exacerbation of COPD, decompensated COPD, decompensated COPD with exacerbation
- 491.22 Obstructive chronic bronchitis; with acute bronchitis
- 491.8 Other chronic bronchitis. Chronic: tracheitis, tracheobronchitis
- 491.9 Unspecified chronic bronchitis
- 492.8 Other emphysema; emphysema (lung or pulmonary): Not Otherwise Specified (NOS), centriacinar, centrilobular, obstructive, panacinar, panlobular, unilateral, vesicular. MacLeod's syndrome; Swyer-James syndrome; unilateral hyperlucent lung
- 493.20 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, unspecified
- 493.21 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with status asthmaticus
- 493.22 Chronic obstructive asthma; asthma with COPD, chronic asthmatic bronchitis, with (acute) exacerbation
- 496 Chronic: nonspecific lung disease, obstructive lung disease, obstructive pulmonary disease (COPD) NOS. Note: This code is not to be used with any code from categories 491-493
- 518.81** Other diseases of lung; acute respiratory failure; respiratory failure NOS
- 518.82** Other diseases of lung; acute respiratory failure; other pulmonary insufficiency, acute respiratory distress

- 518.84** Other diseases of lung; acute respiratory failure; acute and chronic respiratory failure
- 799.1** Other ill-defined and unknown causes of morbidity and mortality; respiratory arrest, cardiorespiratory failure

Heart failure:

- 402.01: Hypertensive heart disease, malignant, with heart failure
- 402.11: Hypertensive heart disease, benign, with heart failure
- 402.91: Hypertensive heart disease, unspecified, with heart failure
- 404.01: Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified
- 404.03: Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease
- 404.11: Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified
- 404.13: Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease
- 404.91: Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified
- 404.93: Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease
- 428.0: Congestive heart failure, unspecified
- 428.1: Left heart failure
- 428.20: Systolic heart failure, unspecified

- 428.21: Systolic heart failure, acute
- 428.22: Systolic heart failure, chronic
- 428.23: Systolic heart failure, acute or chronic
- 428.30: Diastolic heart failure, unspecified
- 428.31: Diastolic heart failure, acute
- 428.32: Diastolic heart failure, chronic
- 428.33: Diastolic heart failure, acute or chronic
- 428.40: Combined systolic and diastolic heart failure, unspecified
- 428.41: Combined systolic and diastolic heart failure, acute
- 428.42: Combined systolic and diastolic heart failure, chronic
- 428.43: Combined systolic and diastolic heart failure, acute or chronic
- 428.9: Heart failure, unspecified

Pneumonia:

- 480.0: Pneumonia due to adenovirus
- 480.1: Pneumonia due to respiratory syncytial virus
- 480.2: Pneumonia due to parainfluenza virus
- 480.3: Pneumonia due to sudden acute respiratory syndrome (SARS)-associated coronavirus
- 480.8: Viral pneumonia: pneumonia due to other virus not elsewhere classified
- 480.9: Viral pneumonia unspecified
- 481: Pneumococcal pneumonia (streptococcus pneumoniae pneumonia)
- 482.0: Pneumonia due to klebsiella pneumoniae
- 482.1: Pneumonia due to pseudomonas
- 482.2: Pneumonia due to hemophilus influenzae (h. influenzae)

- 482.30: Pneumonia due to streptococcus unspecified
- 482.31: Pneumonia due to streptococcus group a
- 482.32: Pneumonia due to streptococcus group b
- 482.39: Pneumonia due to other streptococcus
- 482.40: Pneumonia due to staphylococcus unspecified
- 482.41: Pneumonia due to staphylococcus aureus
- 482.42: Methicillin resistant pneumonia due to staphylococcus aureus
- 482.49: Other staphylococcus pneumonia
- 482.81: Pneumonia due to anaerobes
- 482.82: Pneumonia due to escherichia coli (e. coli)
- 482.83: Pneumonia due to other gram-negative bacteria
- 482.84: Pneumonia due to Legionnaires' disease
- 482.89: Pneumonia due to other specified bacteria
- 482.9: Bacterial pneumonia unspecified
- 483.0: Pneumonia due to mycoplasma pneumoniae
- 483.1: Pneumonia due to chlamydia
- 483.8: Pneumonia due to other specified organism
- 485: Bronchopneumonia organism unspecified
- 486: Pneumonia organism unspecified
- 487.0: Influenza with pneumonia
- 488.11: Influenza due to identified novel H1N1 influenza virus with pneumonia

Total hip and knee arthroplasty:

- 81.51 Total Hip Arthroplasty

- 81.54 Total Knee Arthroplasty

Appendix B: Correlation Calculation Scatterplots

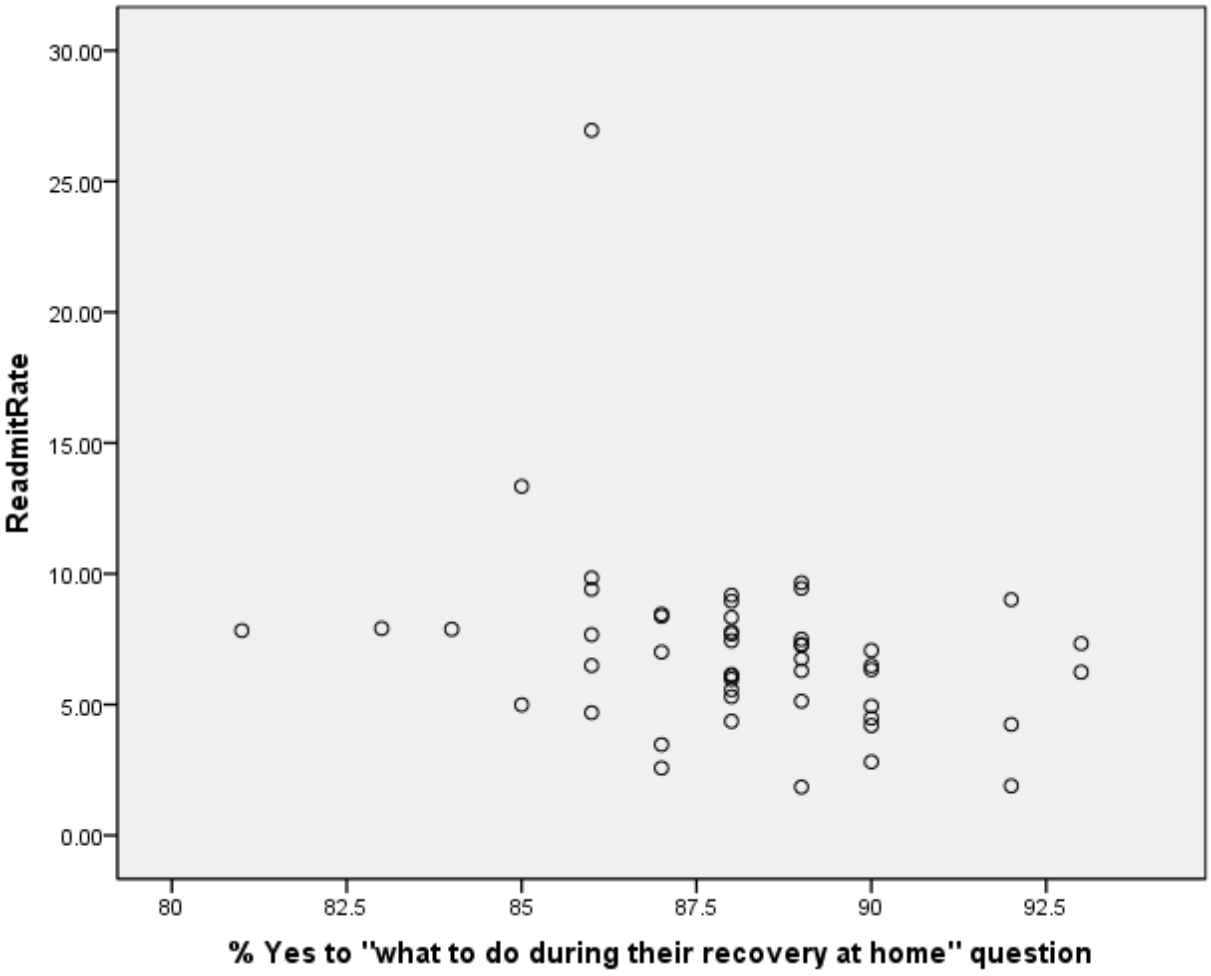

Figure B1. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for all included hospitals and all diagnoses.

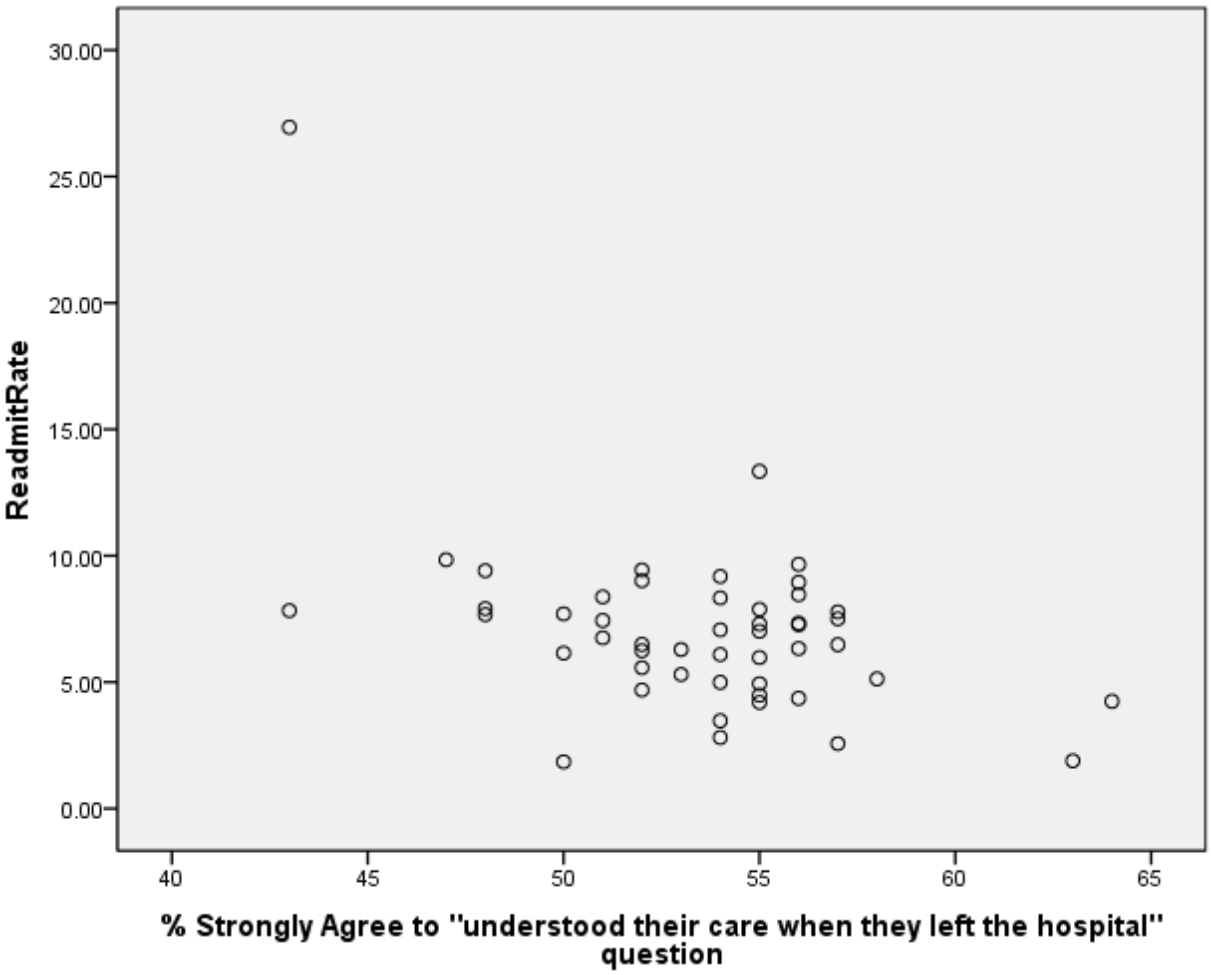

Figure B2. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all included hospitals and all diagnoses.

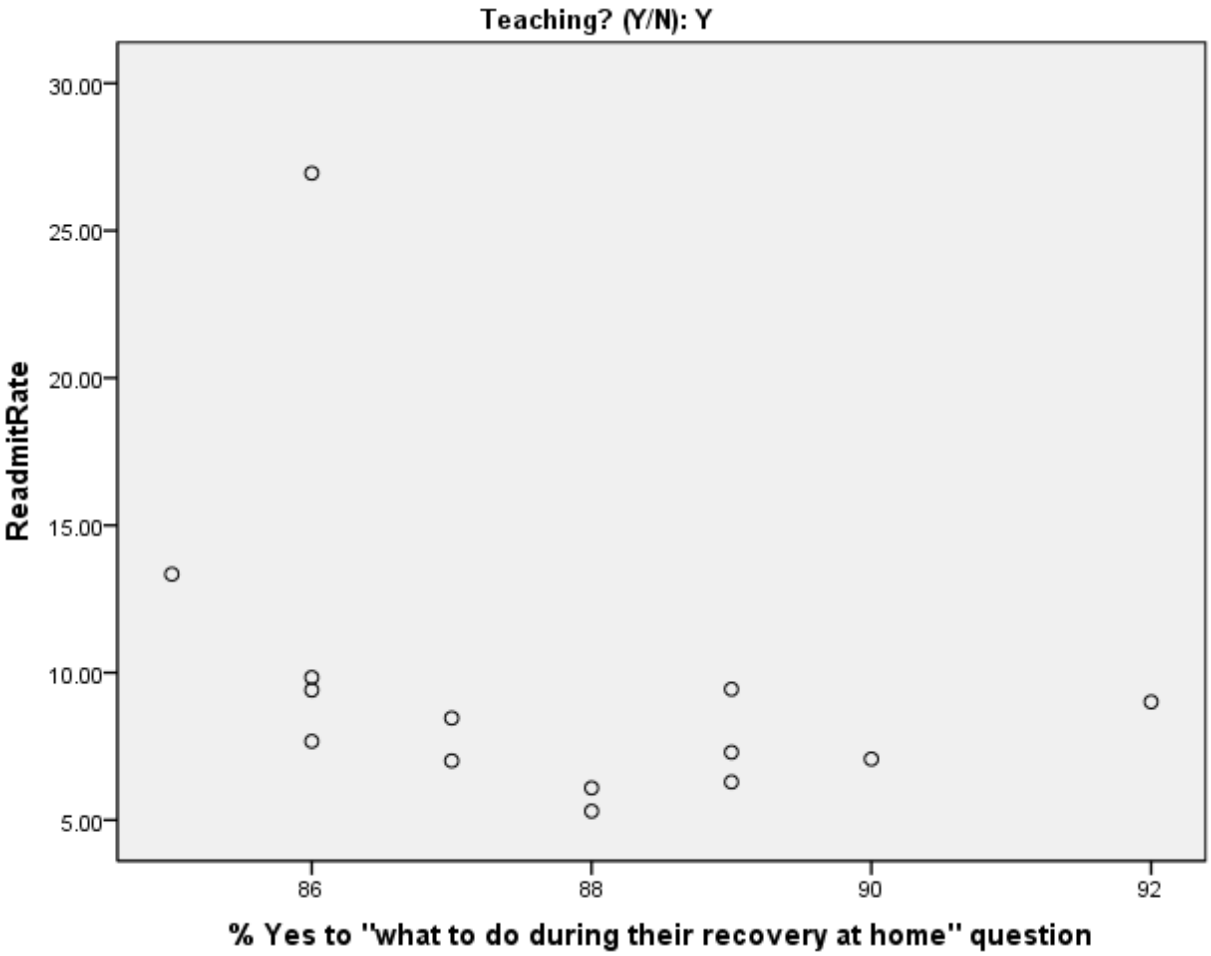

Figure B3. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for teaching hospitals and all diagnoses.

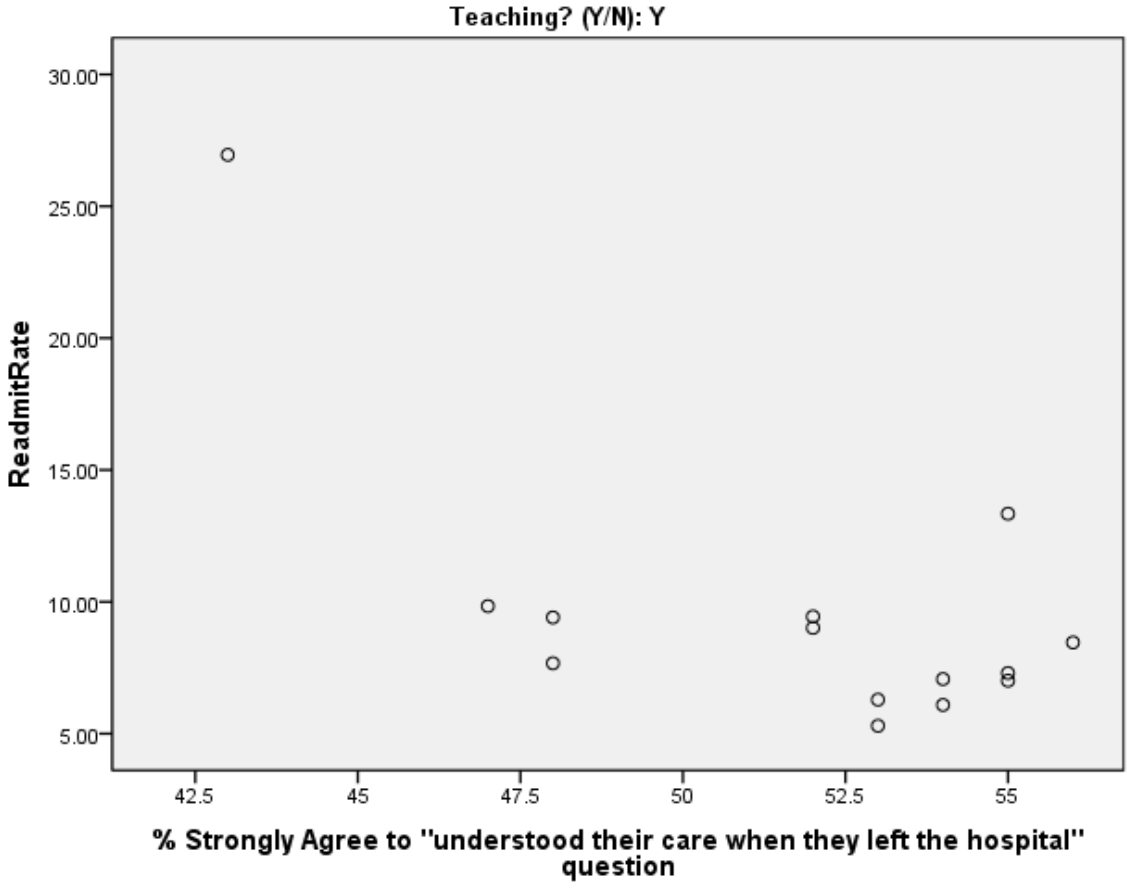

Figure B4. Scatterplot summarizing the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for teaching hospitals and all diagnoses.

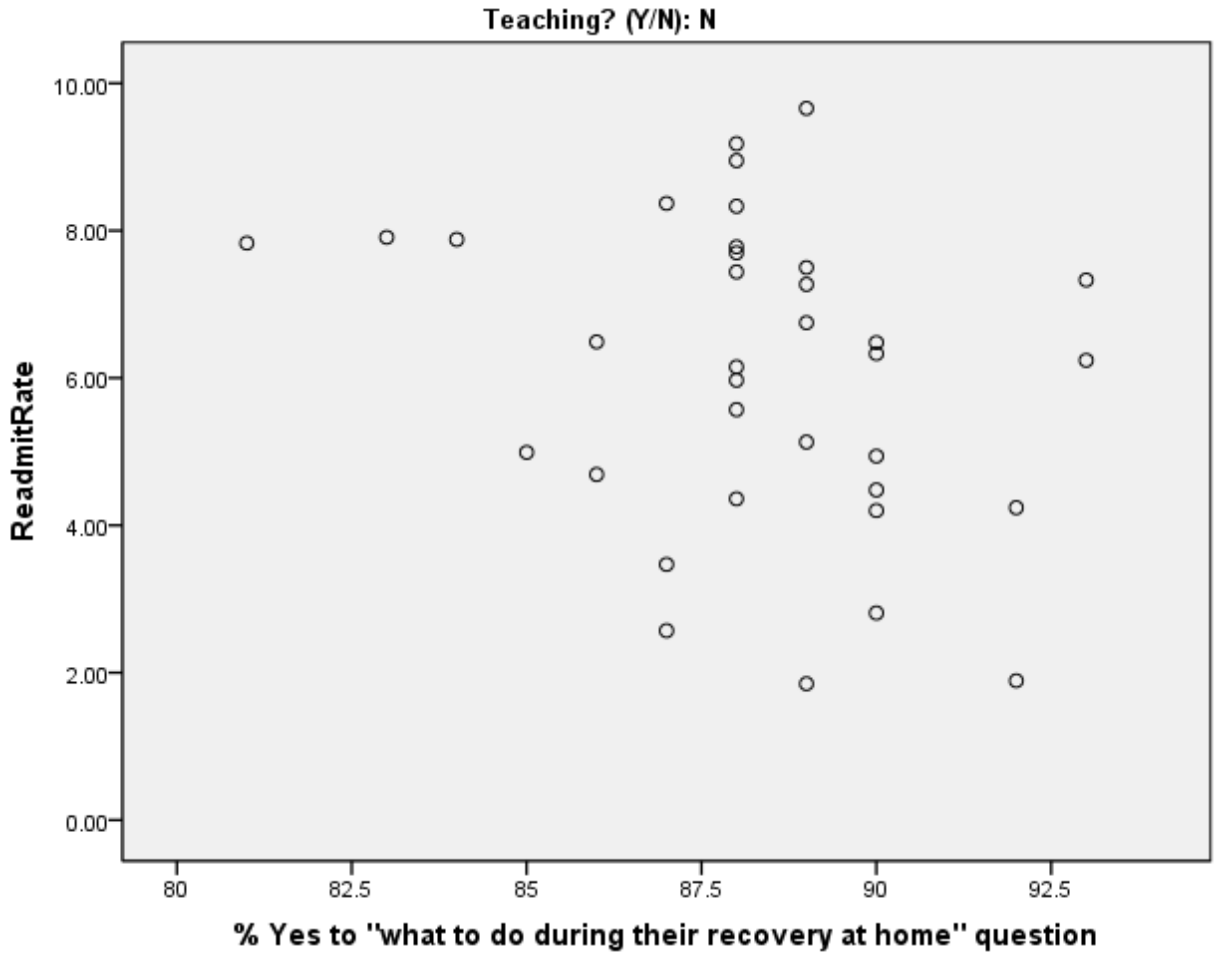

Figure B5. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for non-teaching hospitals and all diagnoses.

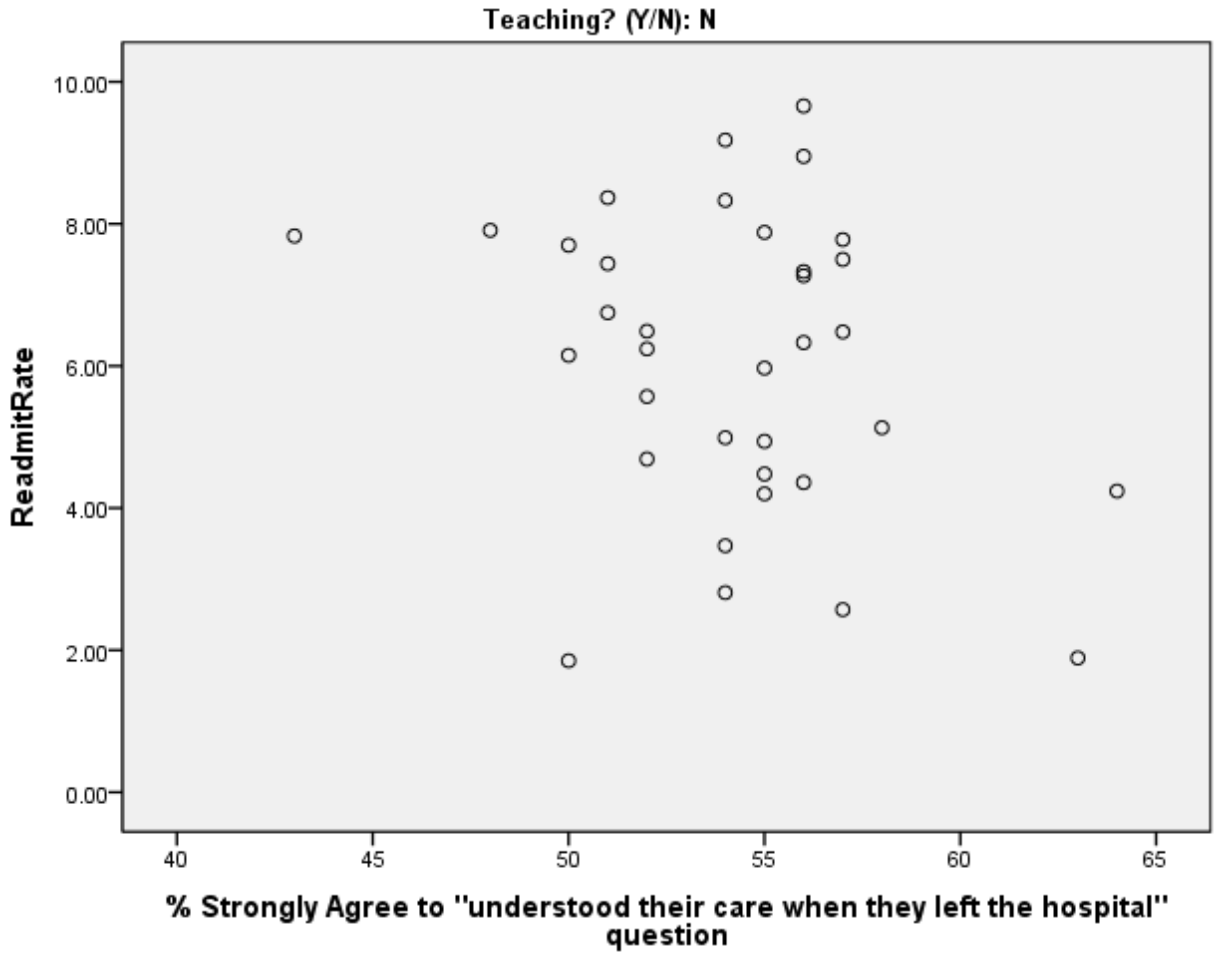

Figure B6. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for non-teaching hospitals and all diagnoses.

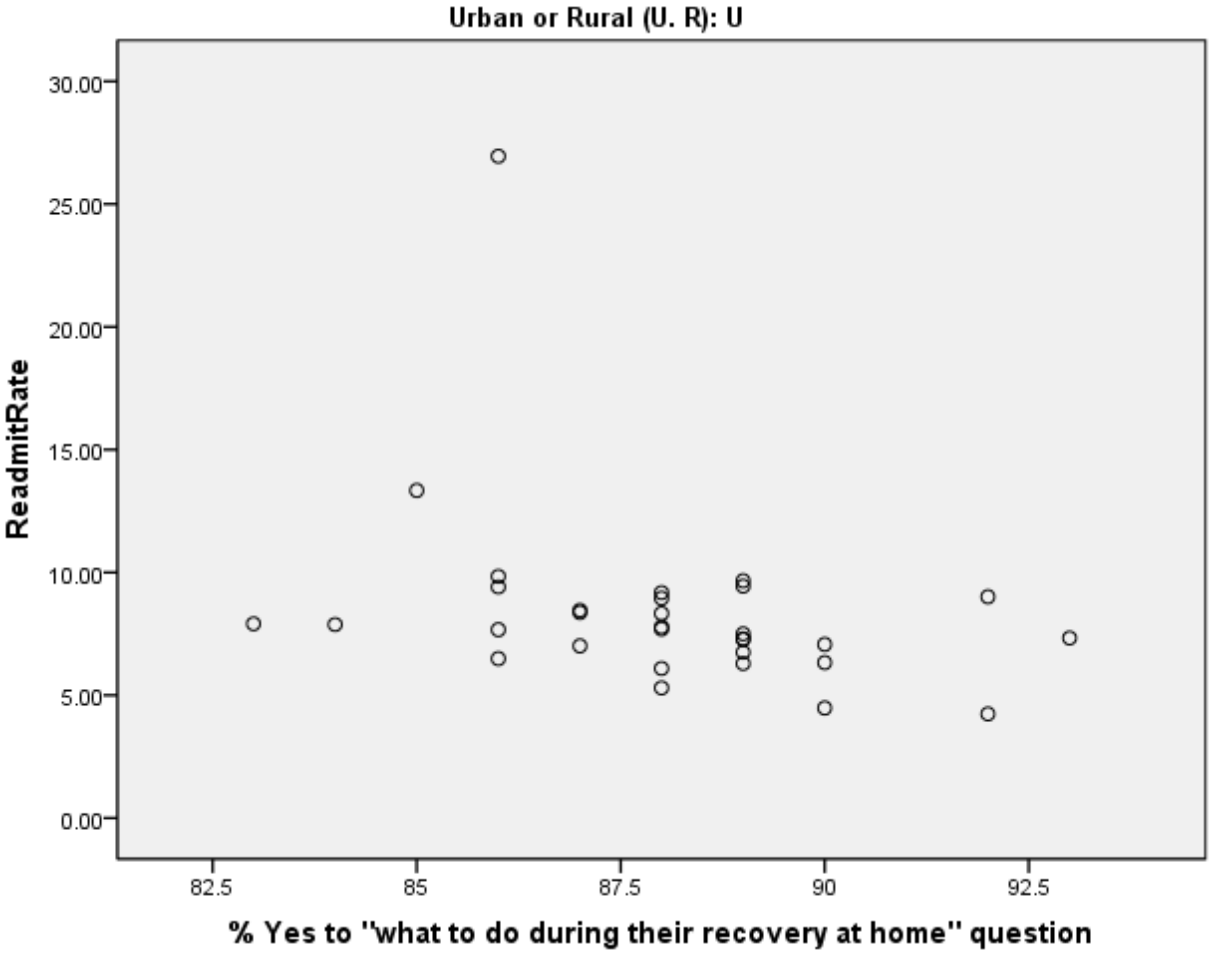

Figure B7. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for urban hospitals and all diagnoses.

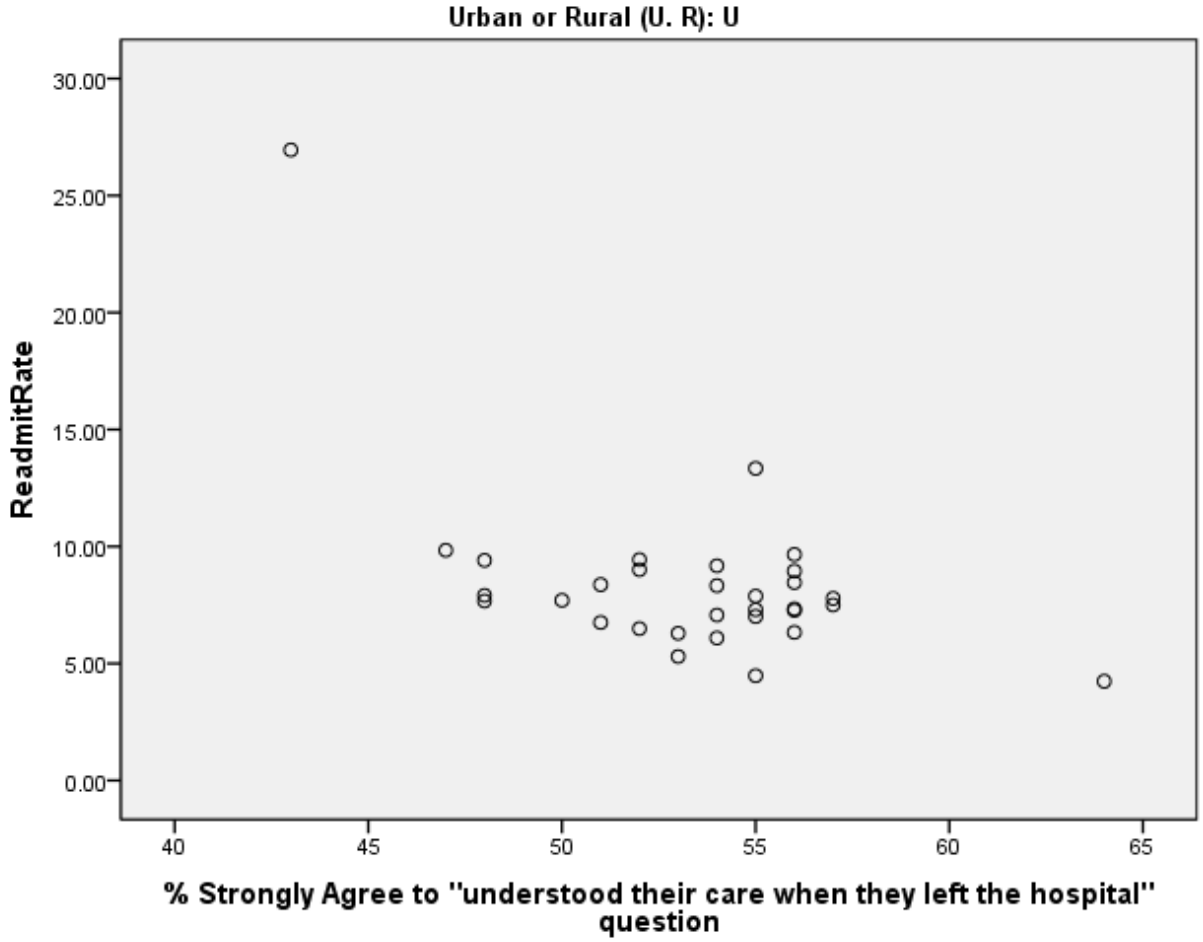

Figure B8. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for urban hospitals and all diagnoses.

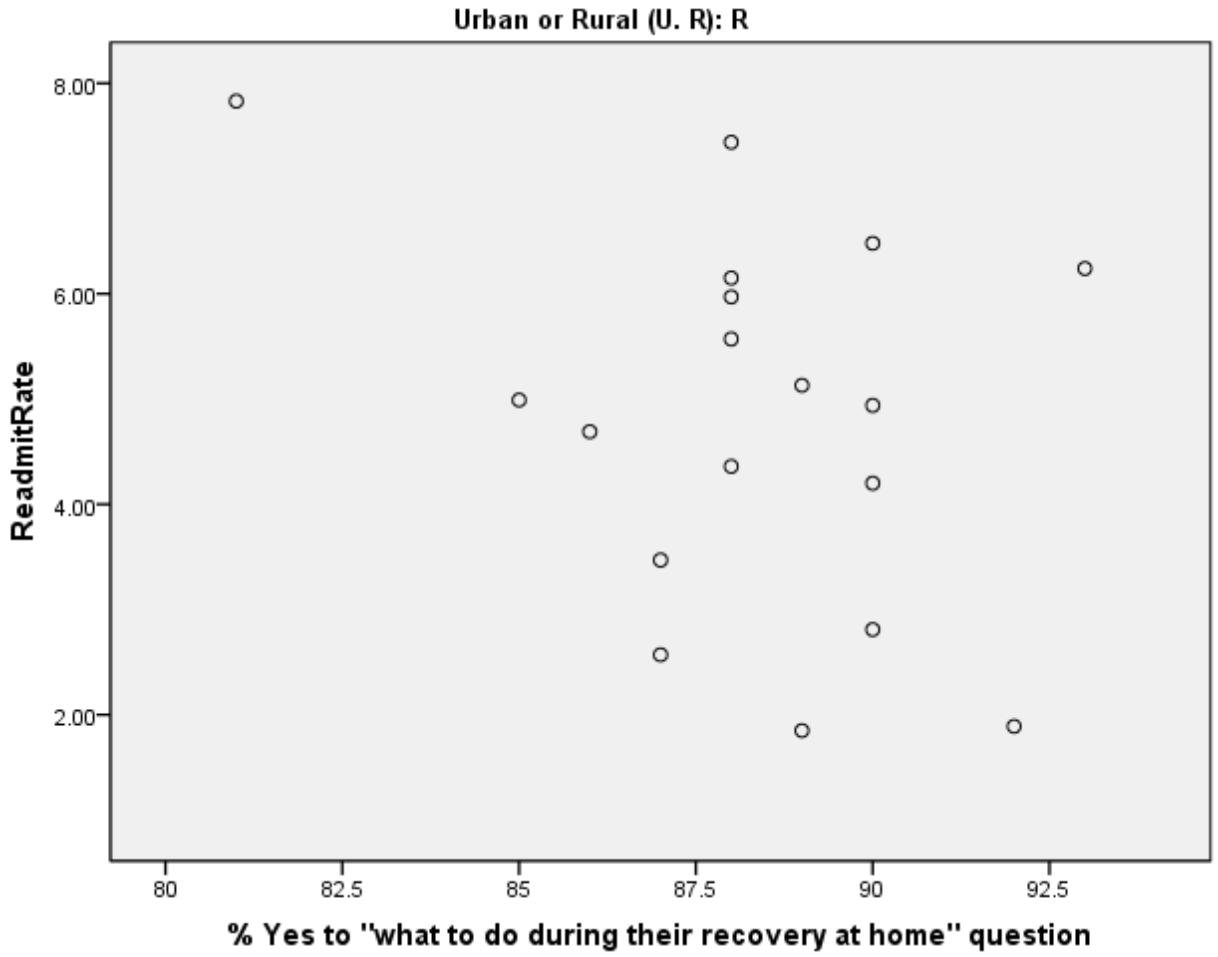

Figure B9. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for rural hospitals and all diagnoses.

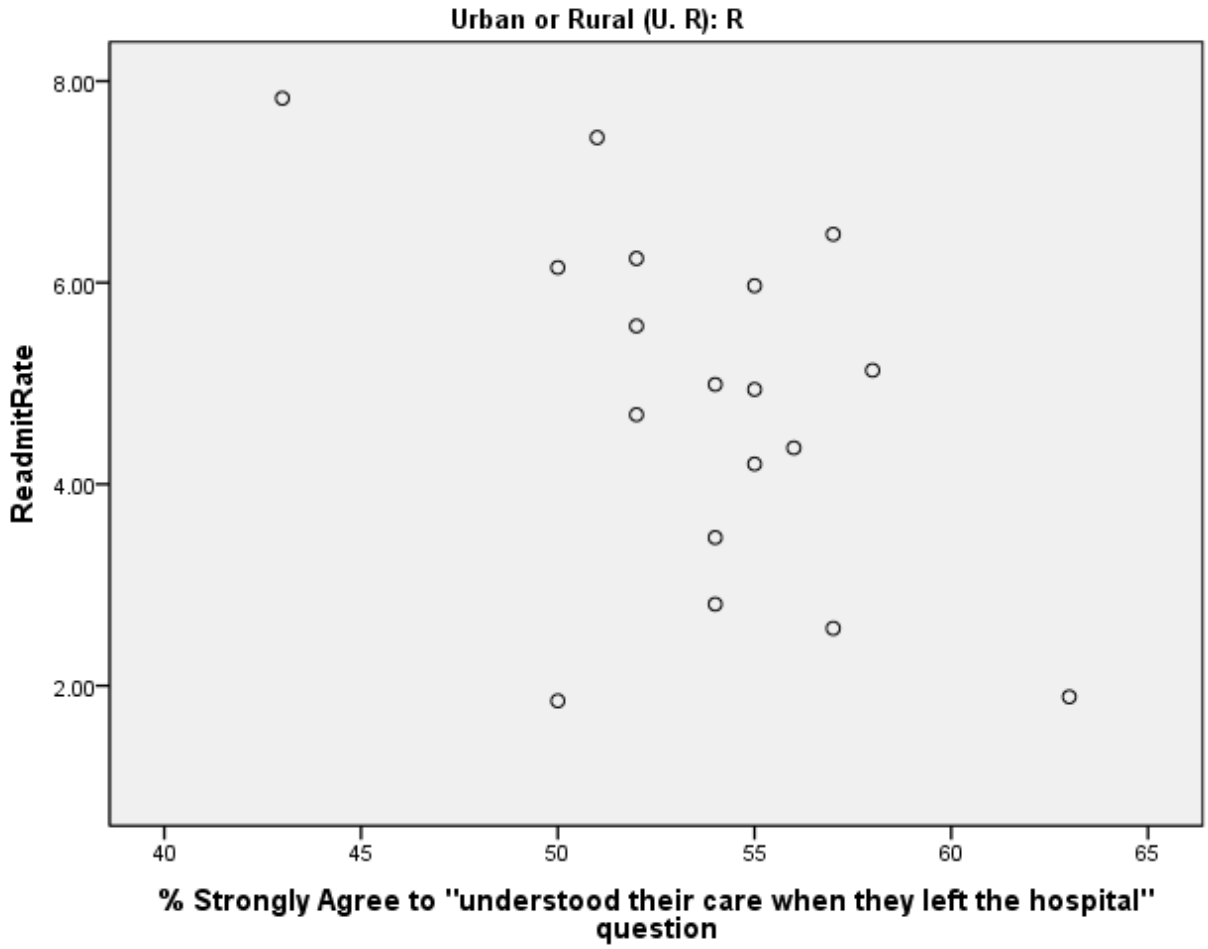

Figure B10. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for rural hospitals and all diagnoses.

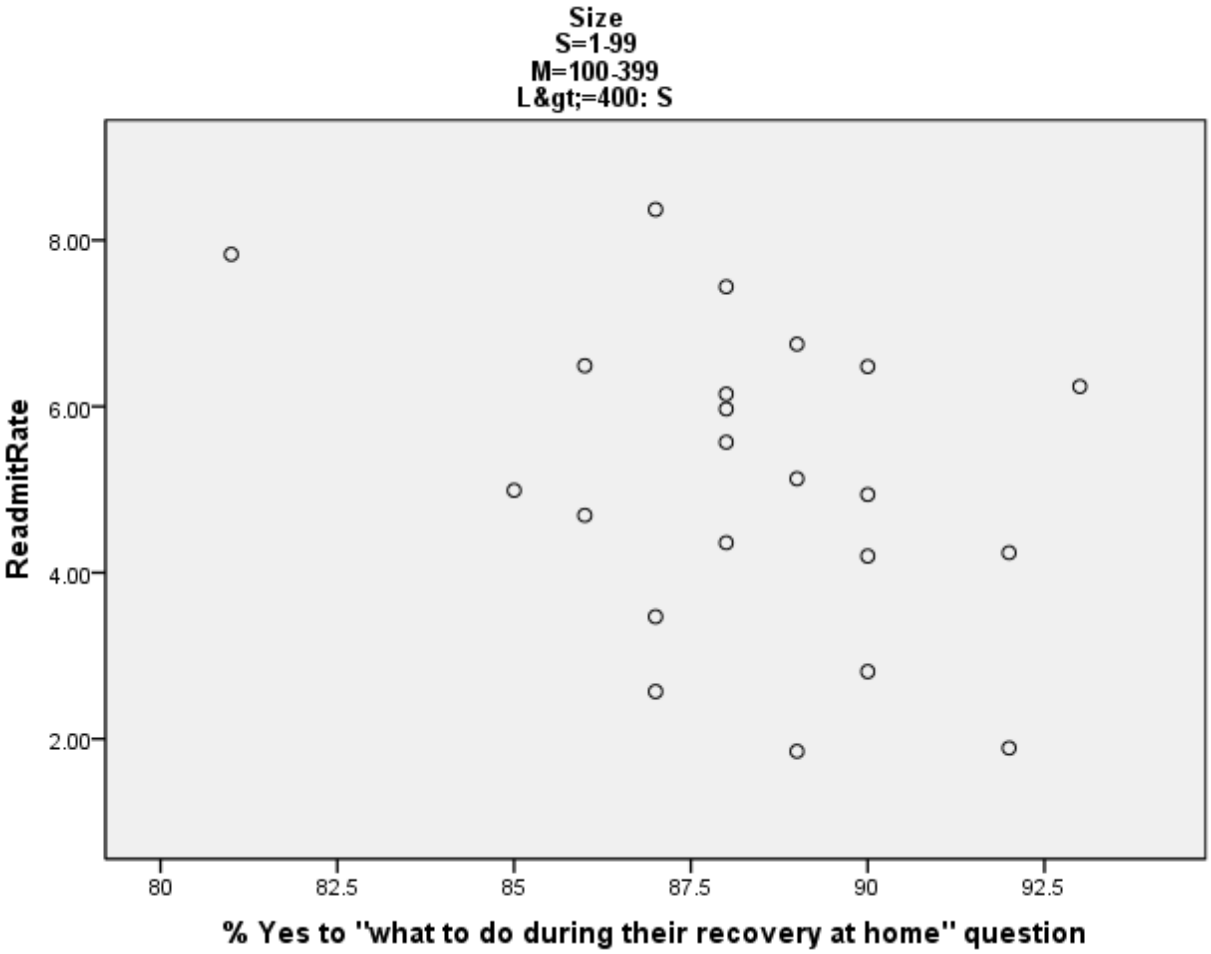

Figure B11. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for small hospitals and all diagnoses.

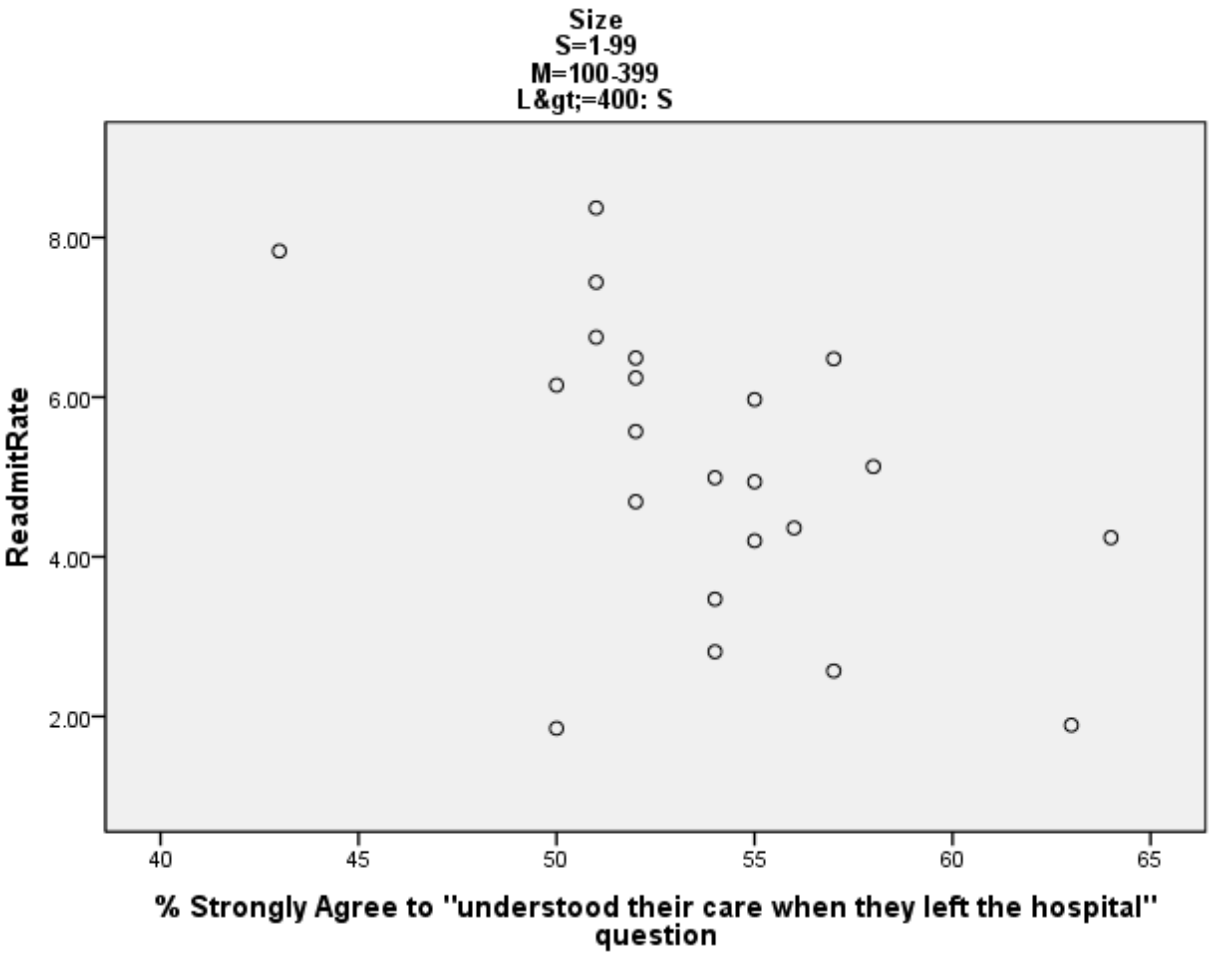

Figure B12. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for small hospitals and all diagnoses.

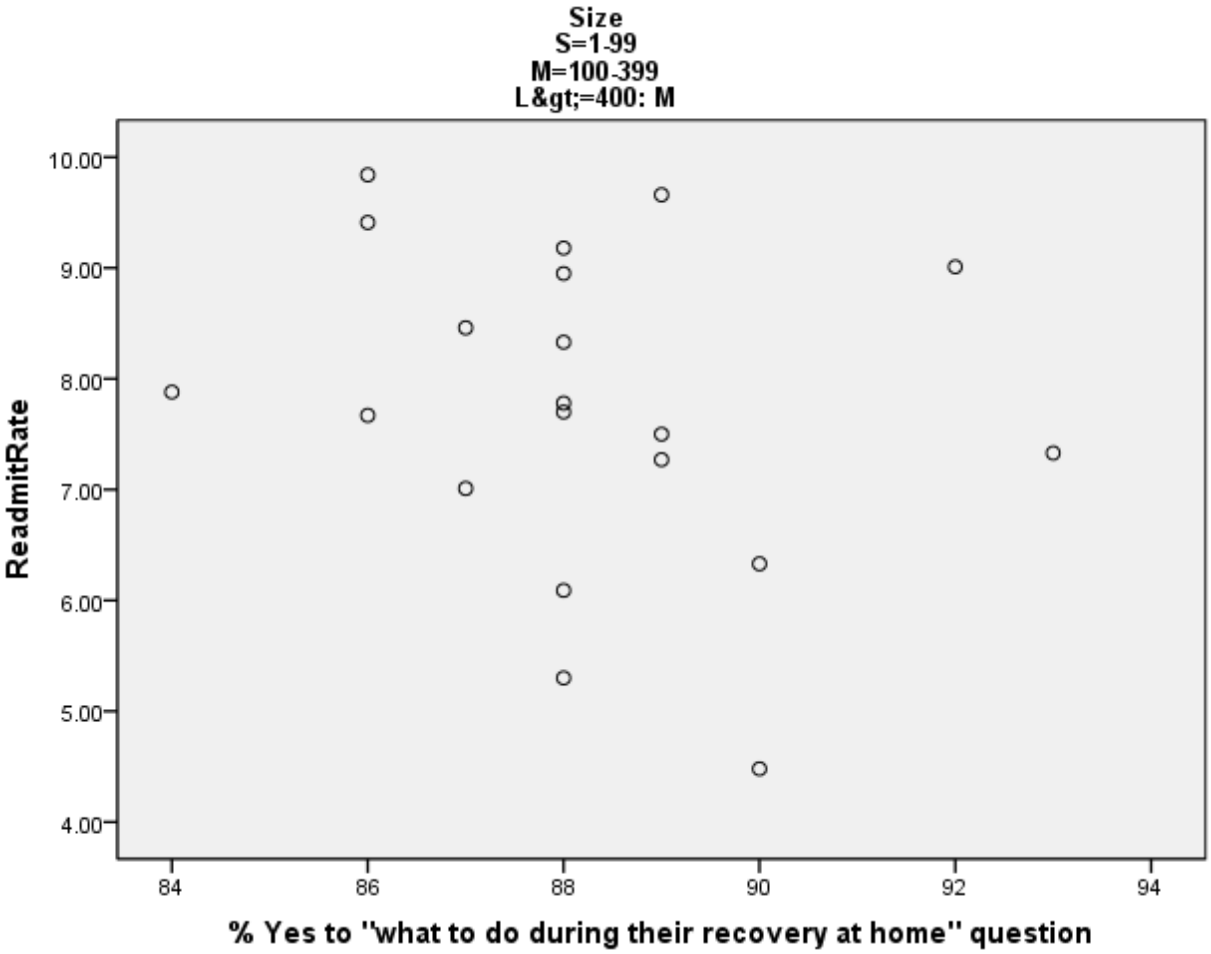

Figure B13. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for medium hospitals and all diagnoses.

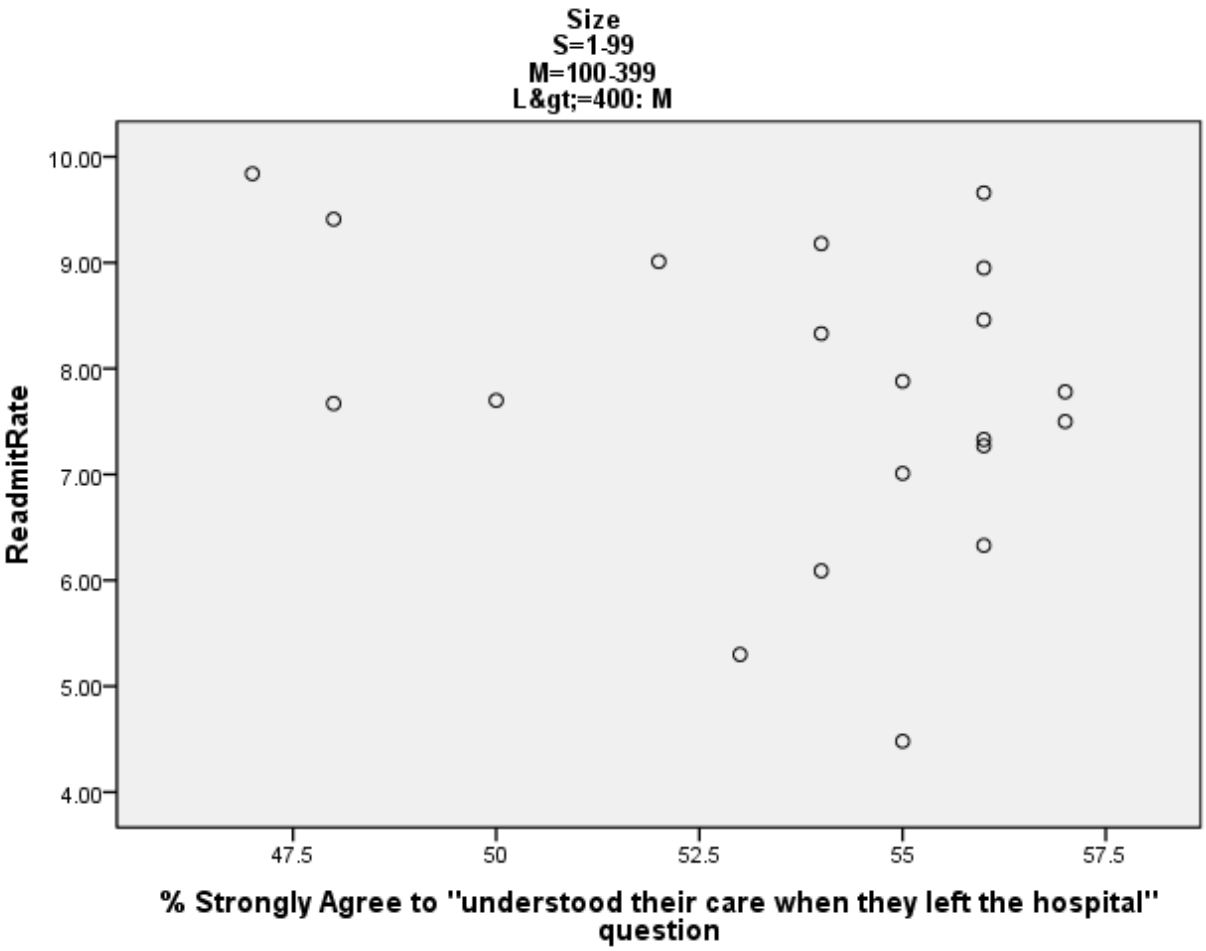

Figure B14. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for medium hospitals and all diagnoses.

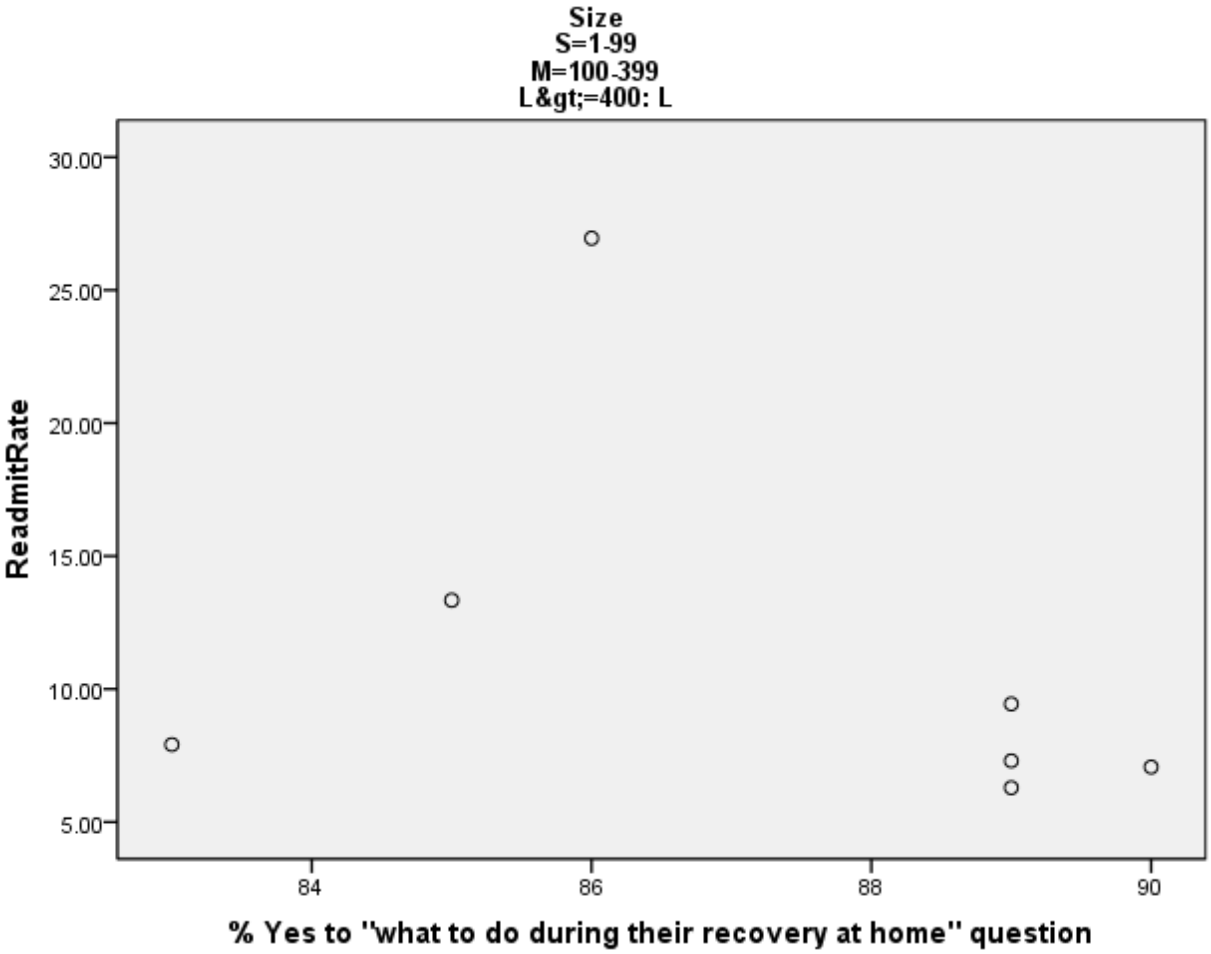

Figure B15. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for large hospitals and all diagnoses.

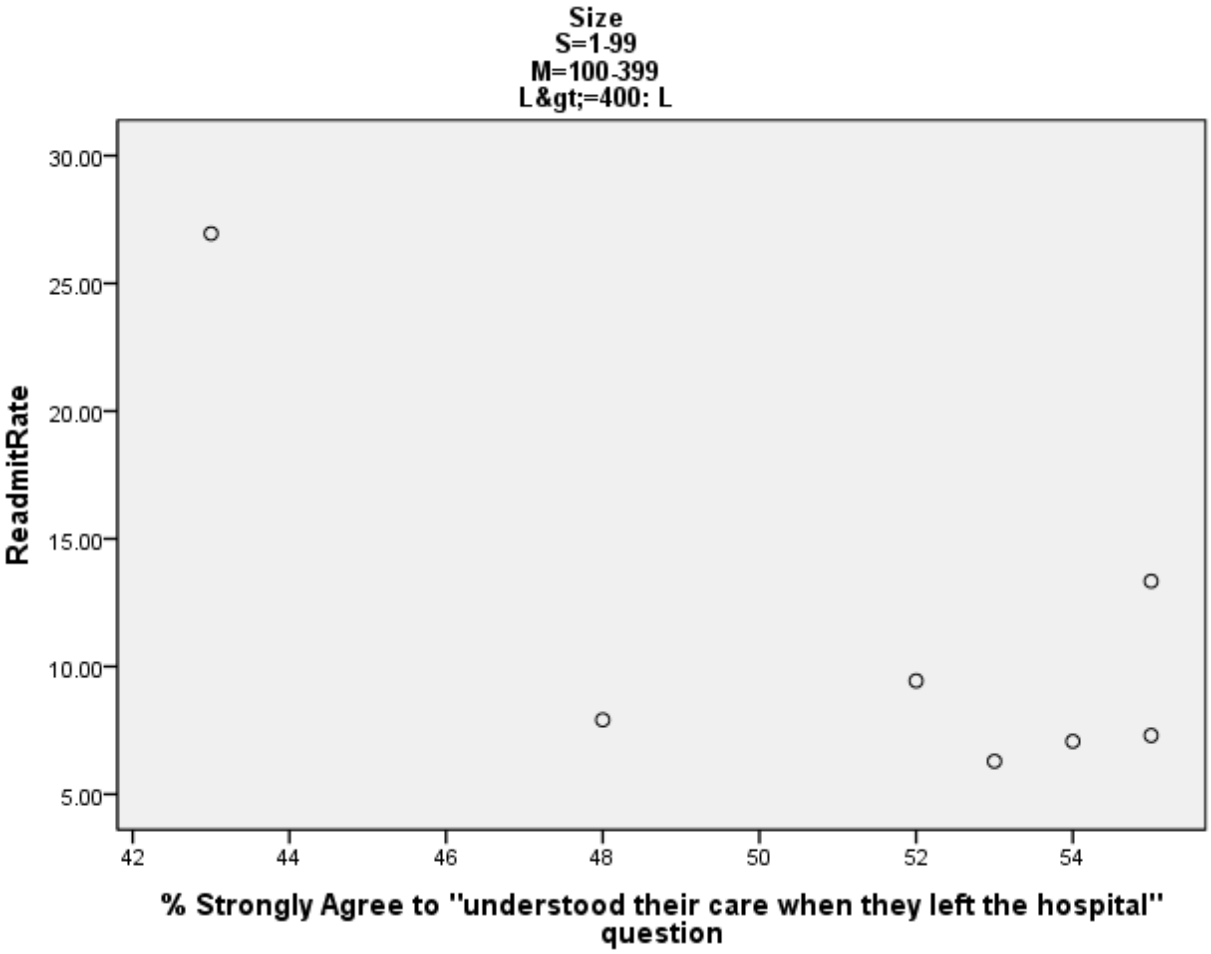

Figure B16. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for large hospitals and all diagnoses.

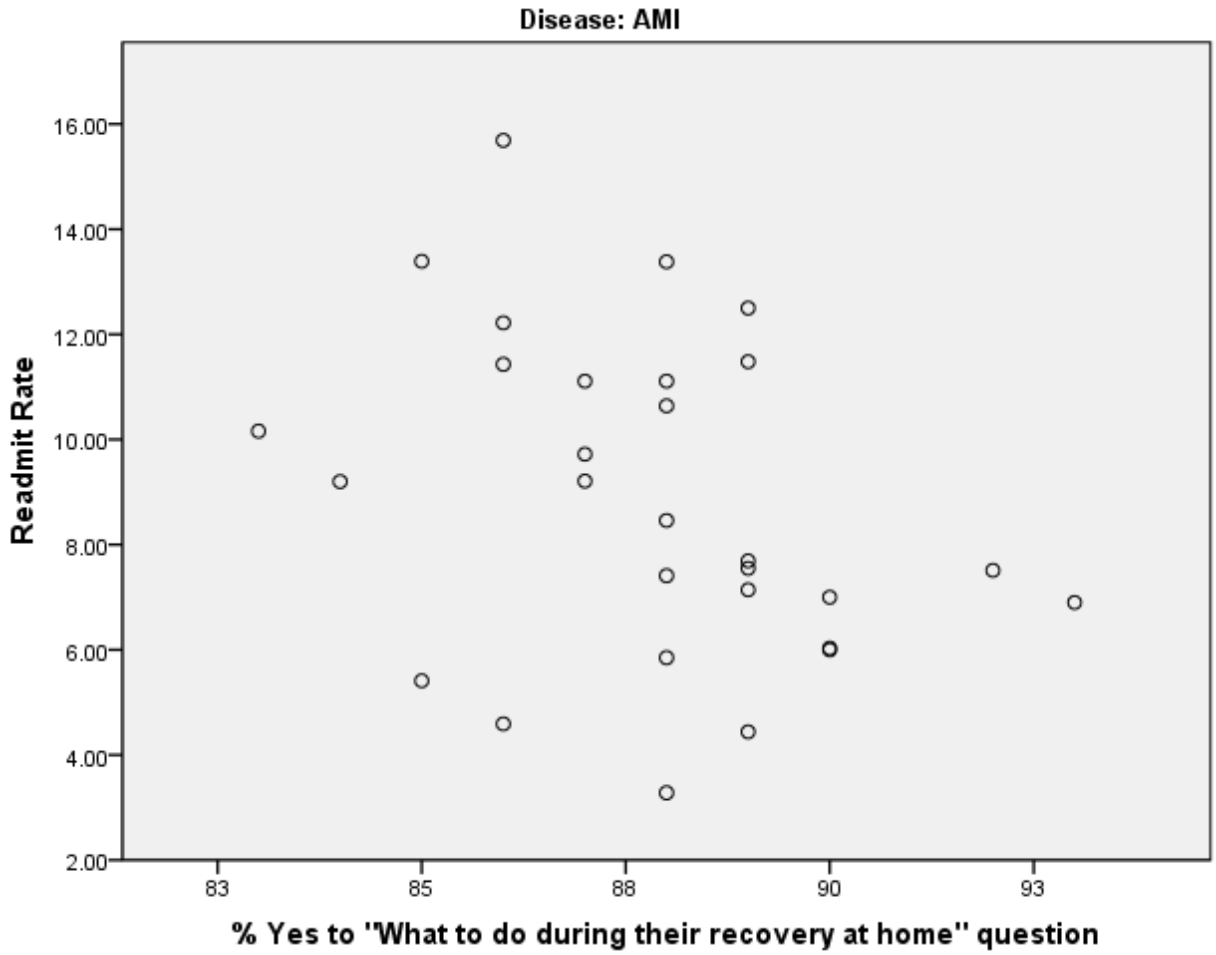

Figure B17. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for all hospitals with 25 or more AMI discharges.

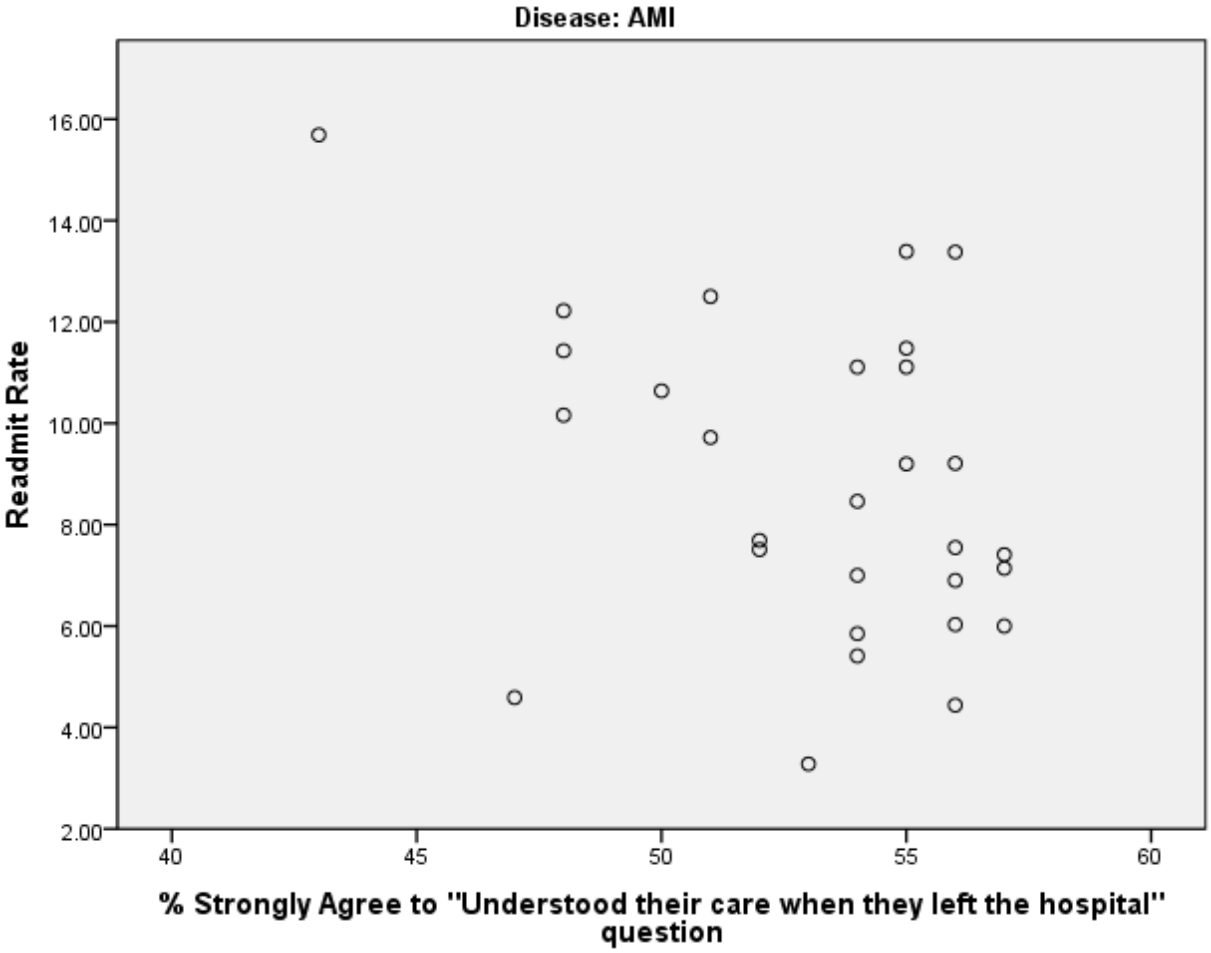

Figure B18. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all hospitals with 25 or more AMI discharges.

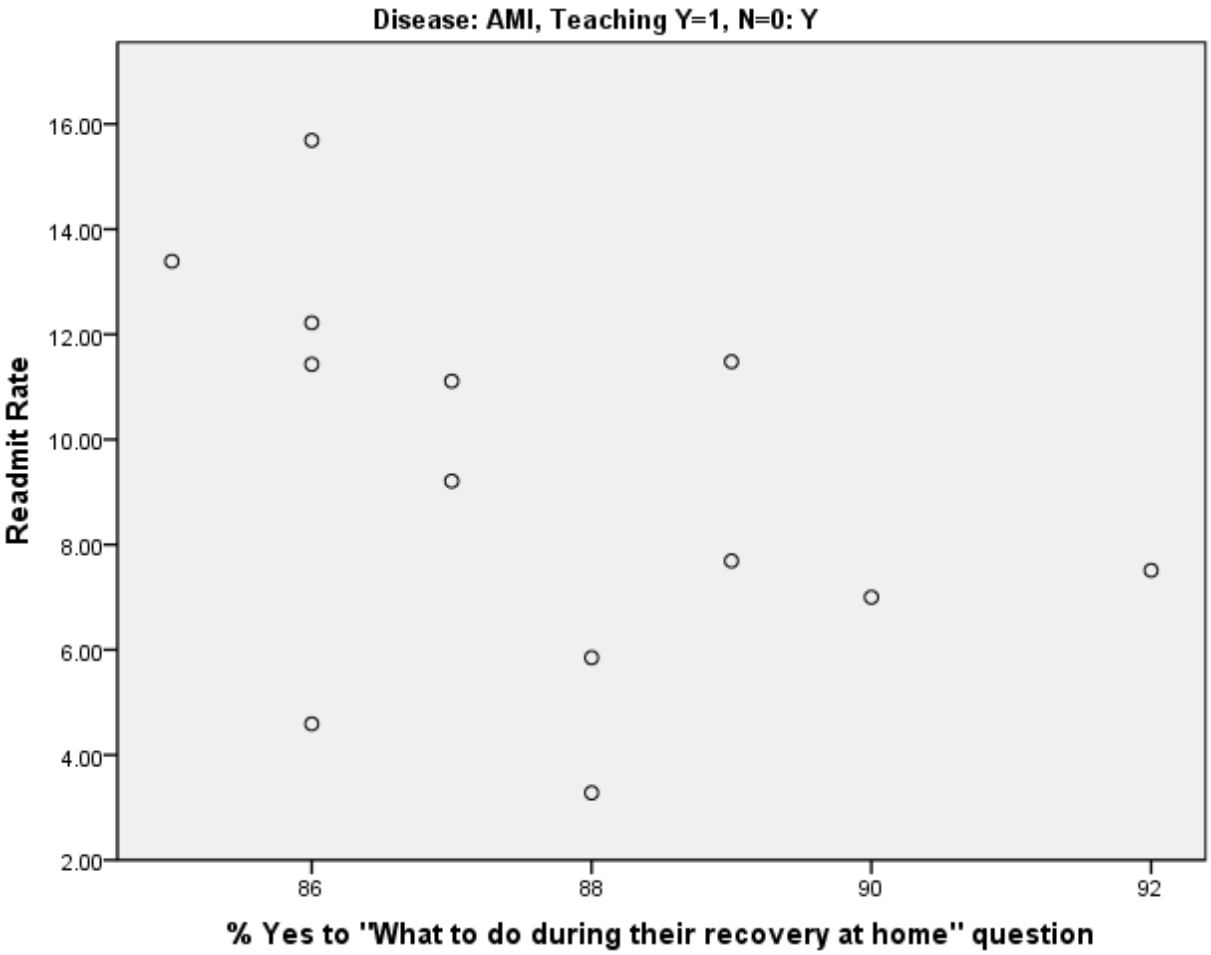

Figure B19. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for teaching hospitals with 25 or more AMI discharges.

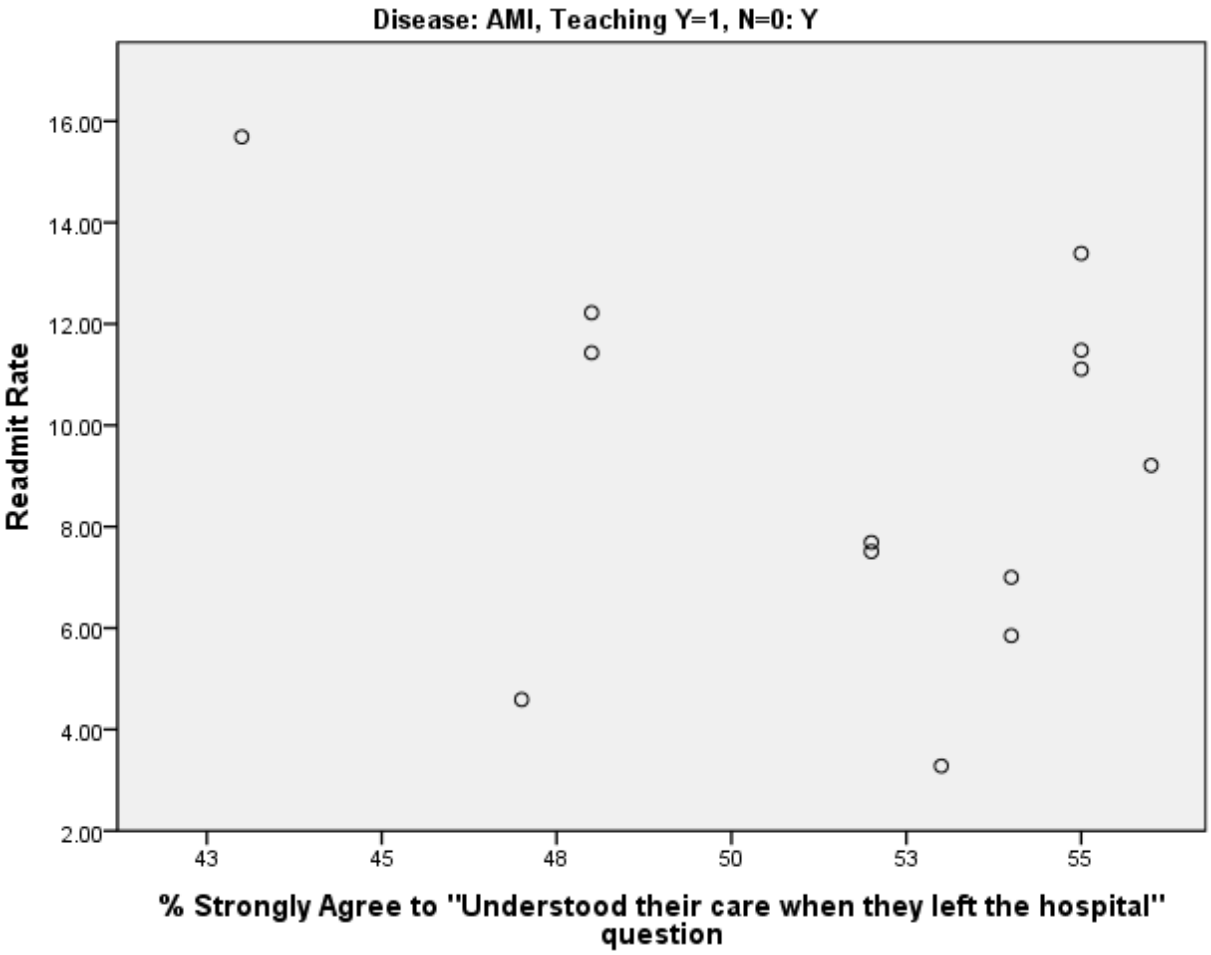

Figure B20. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for teaching hospitals with 25 or more AMI discharges.

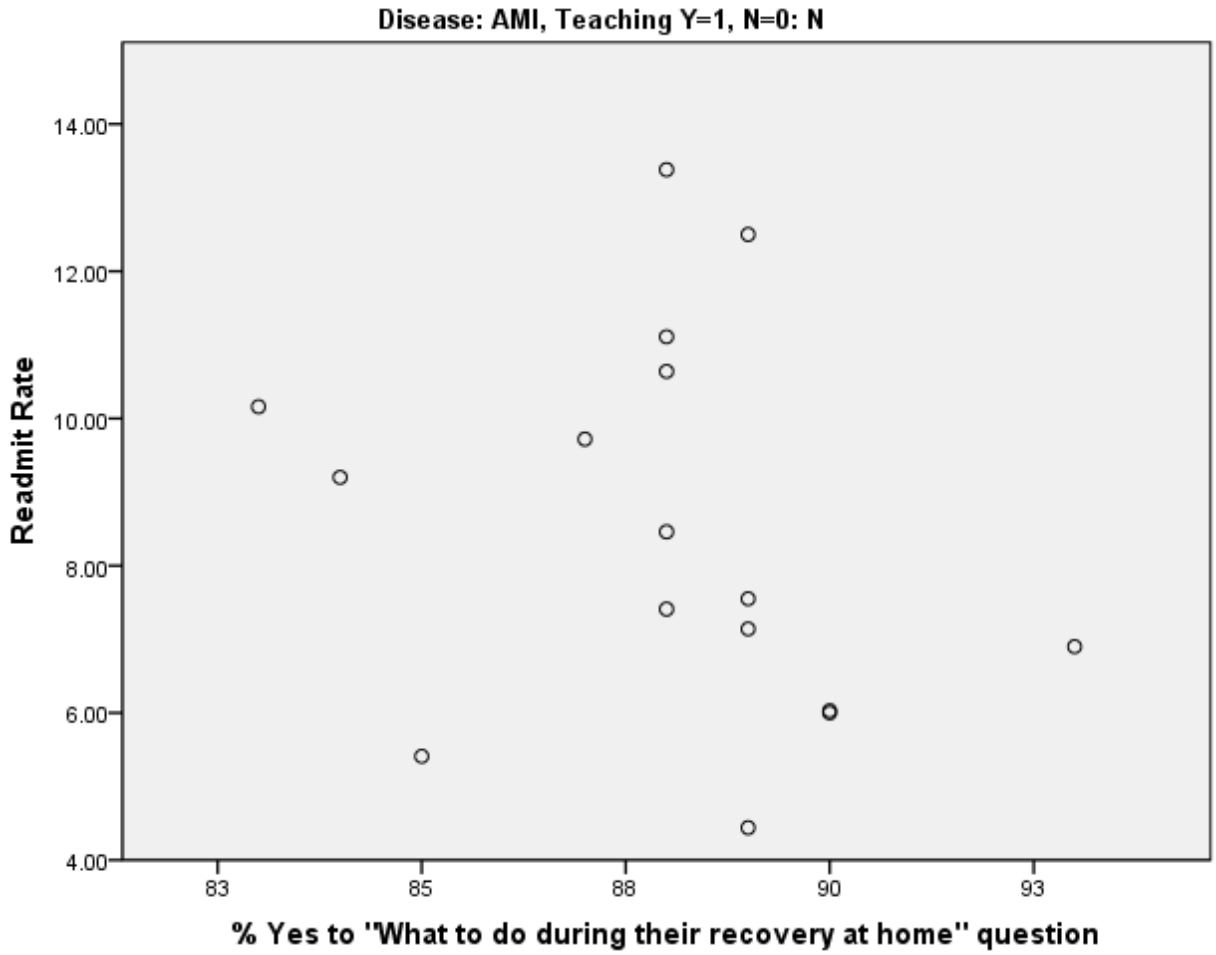

Figure B21. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more AMI discharges.

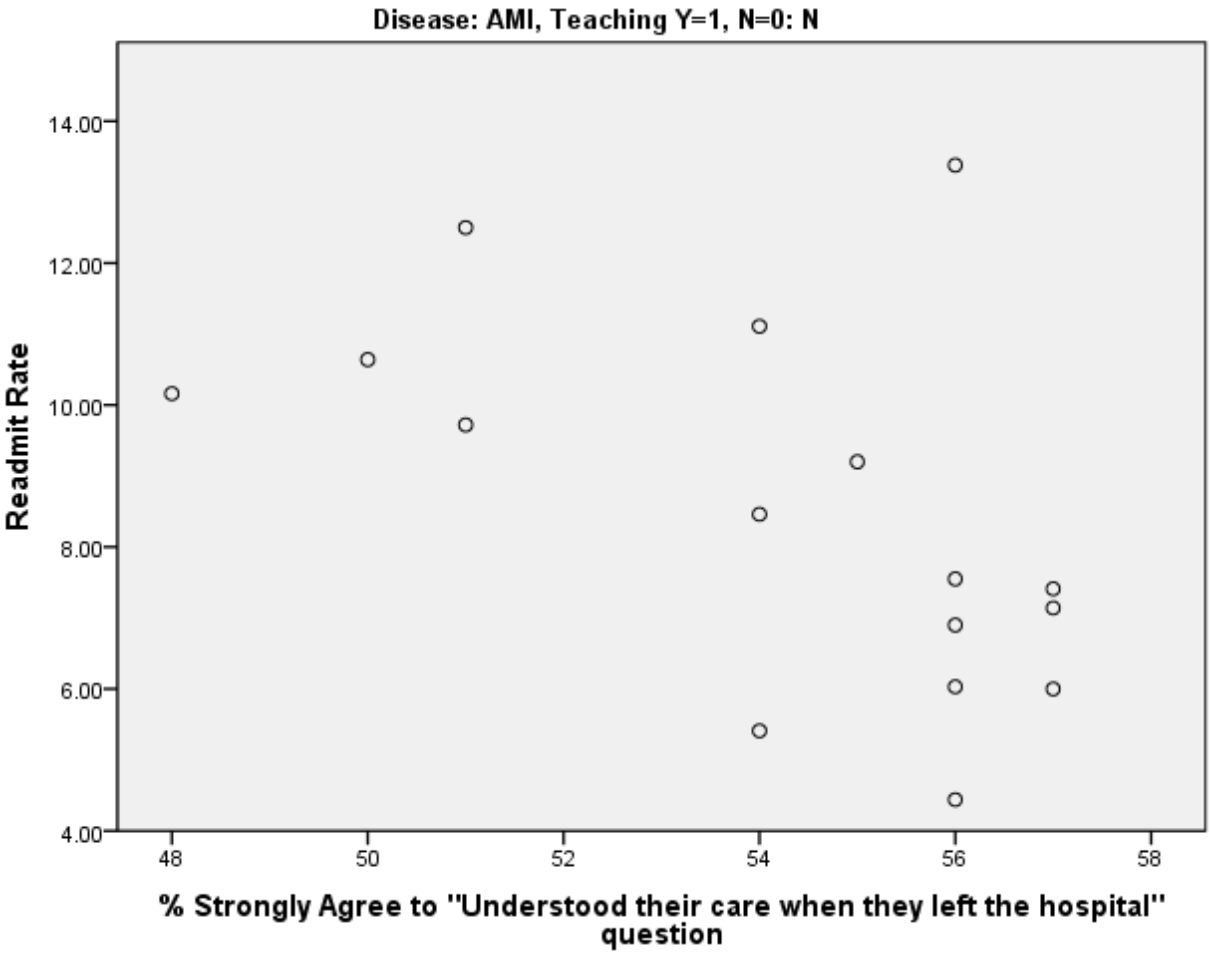

Figure B22. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more AMI discharges.

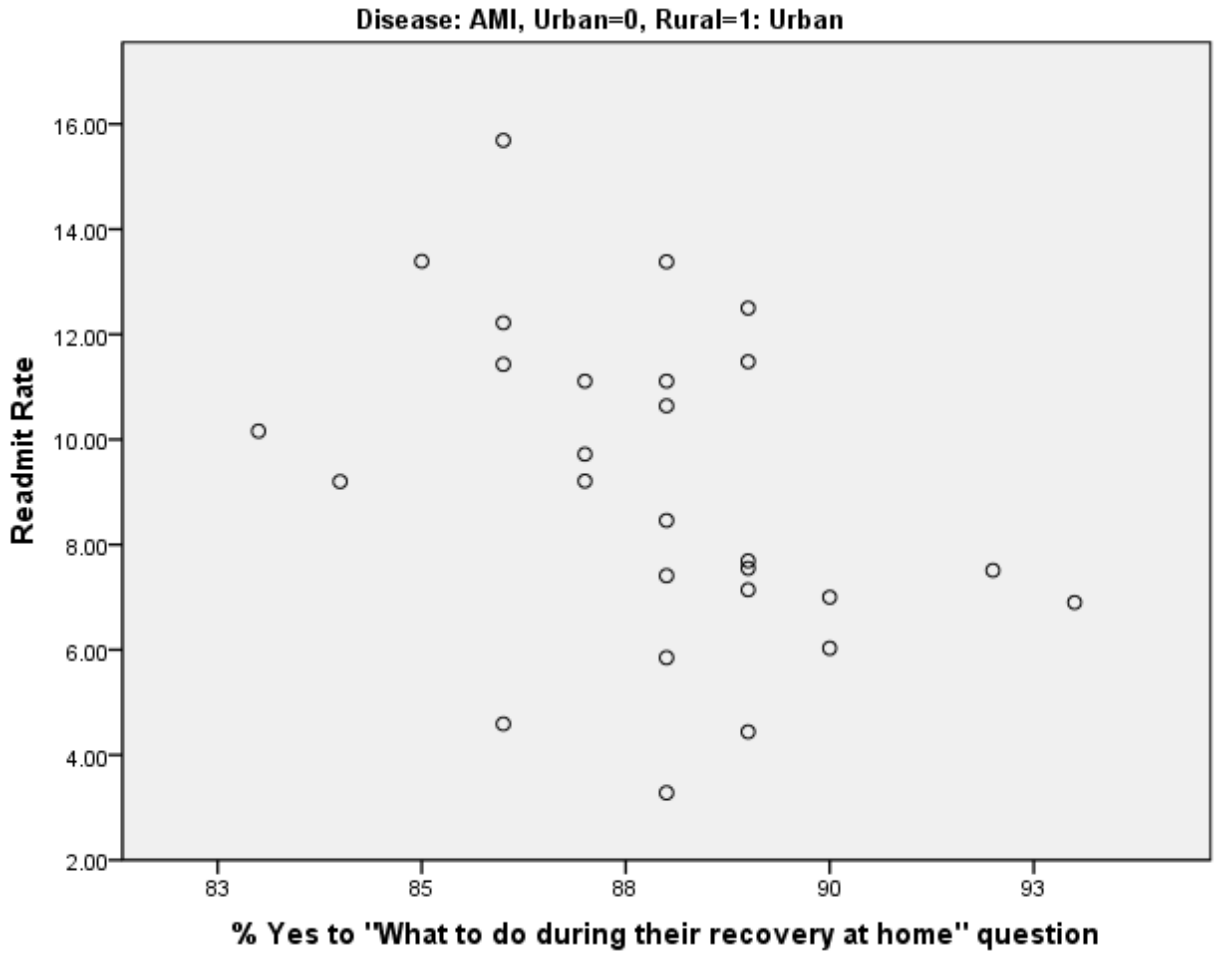

Figure B23. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for urban hospitals with 25 or more AMI discharges.

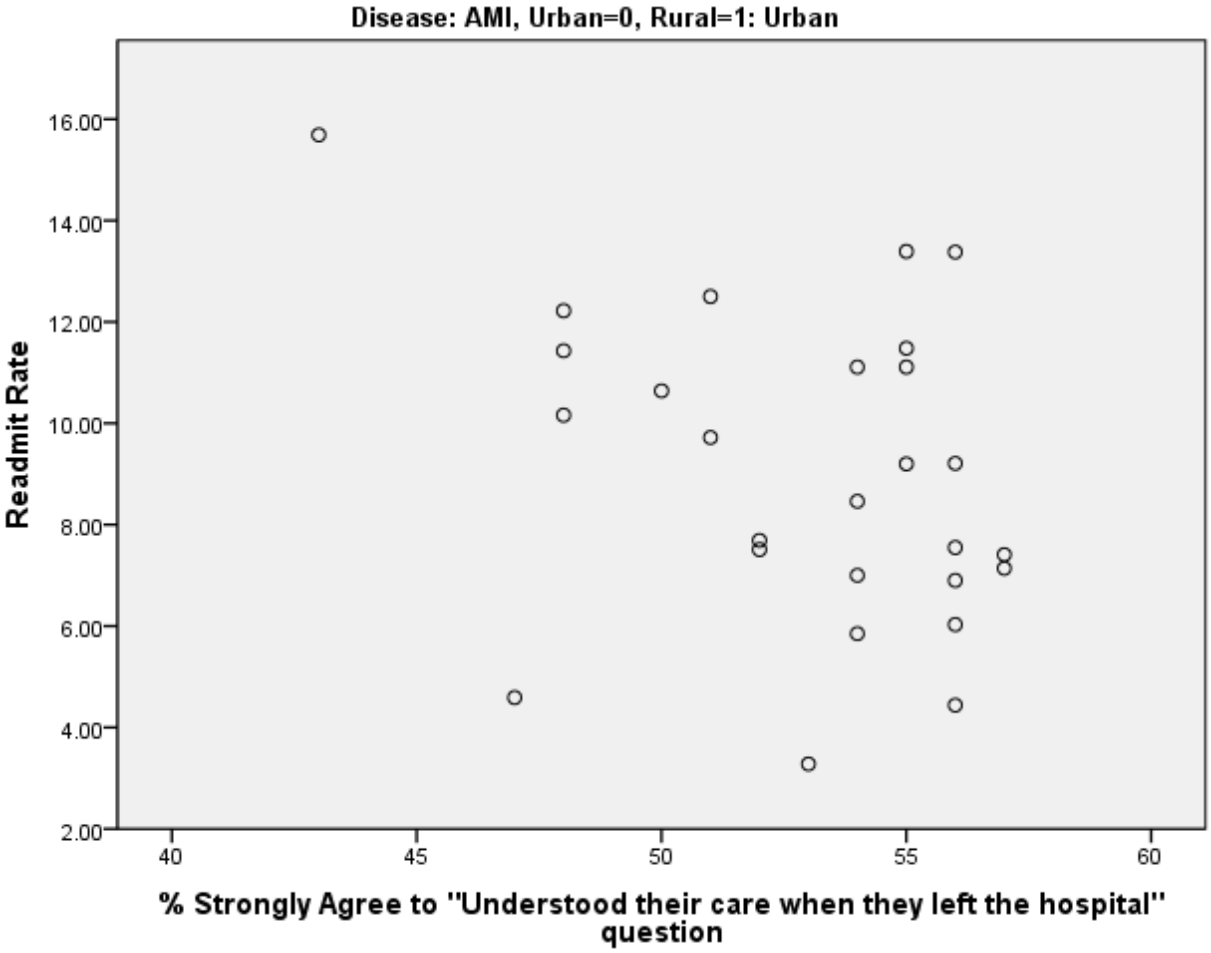

Figure B24. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for urban hospitals with 25 or more AMI discharges.

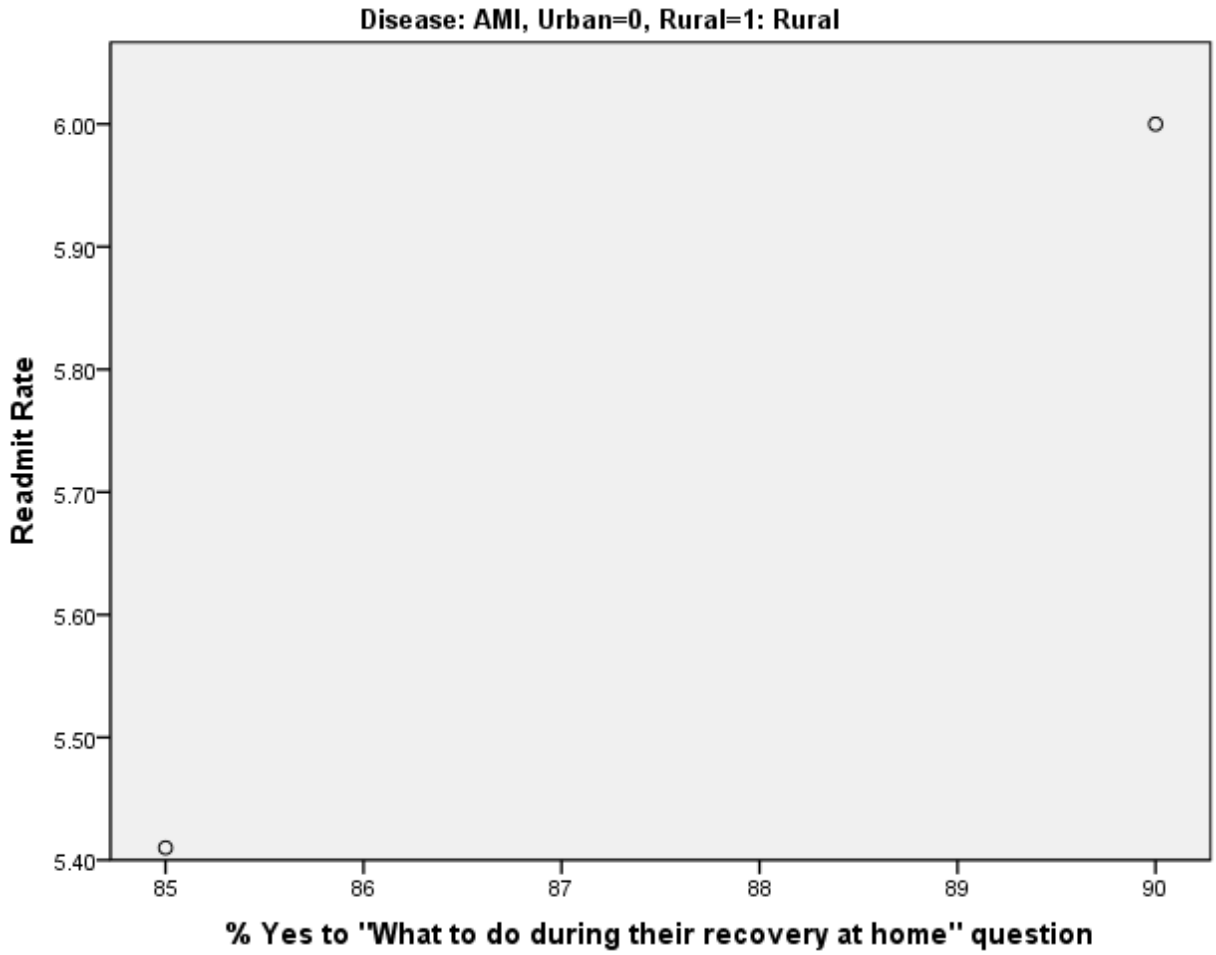

Figure B25. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for rural hospitals with 25 or more AMI discharges.

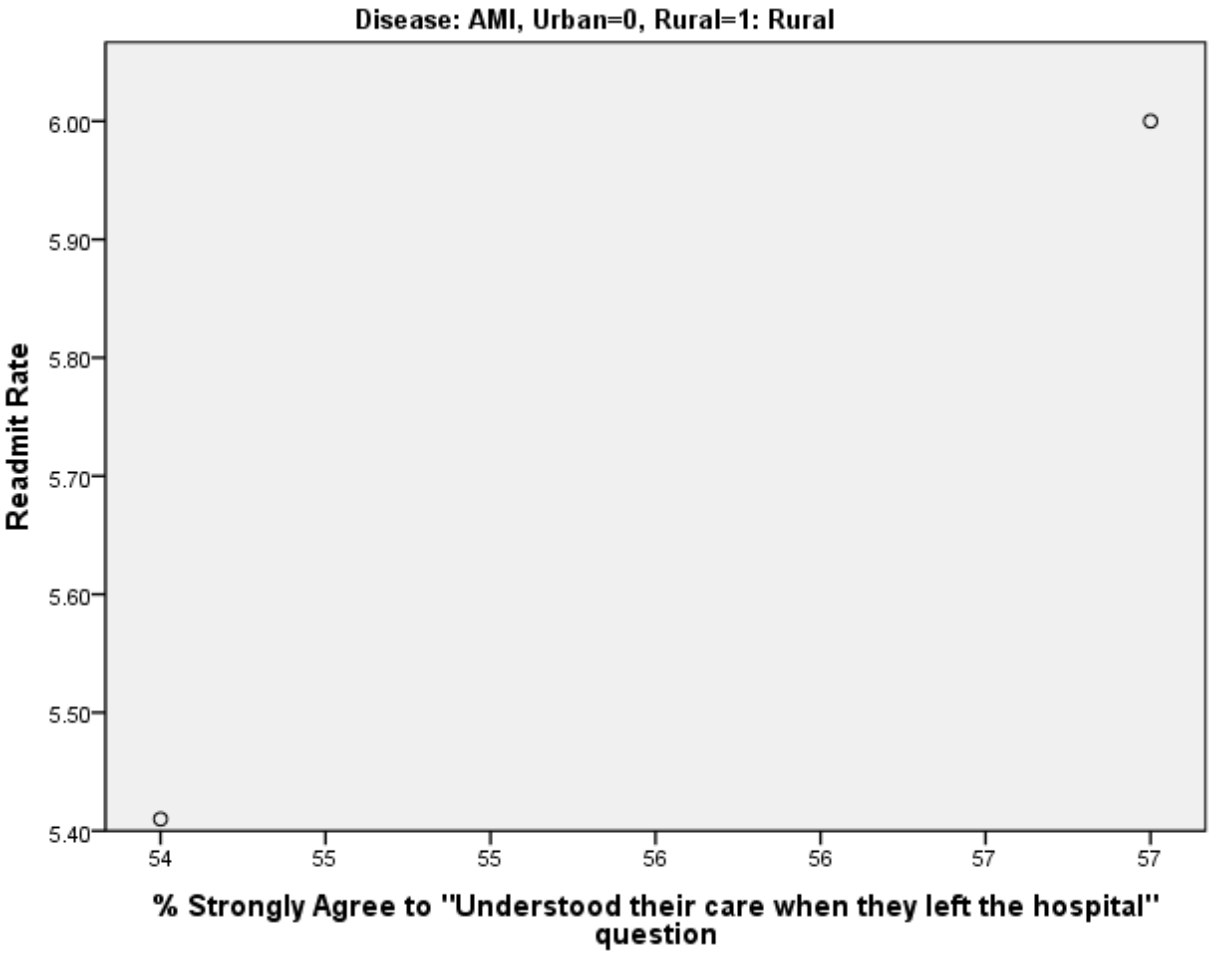

Figure B26. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for rural hospitals with 25 or more AMI discharges.

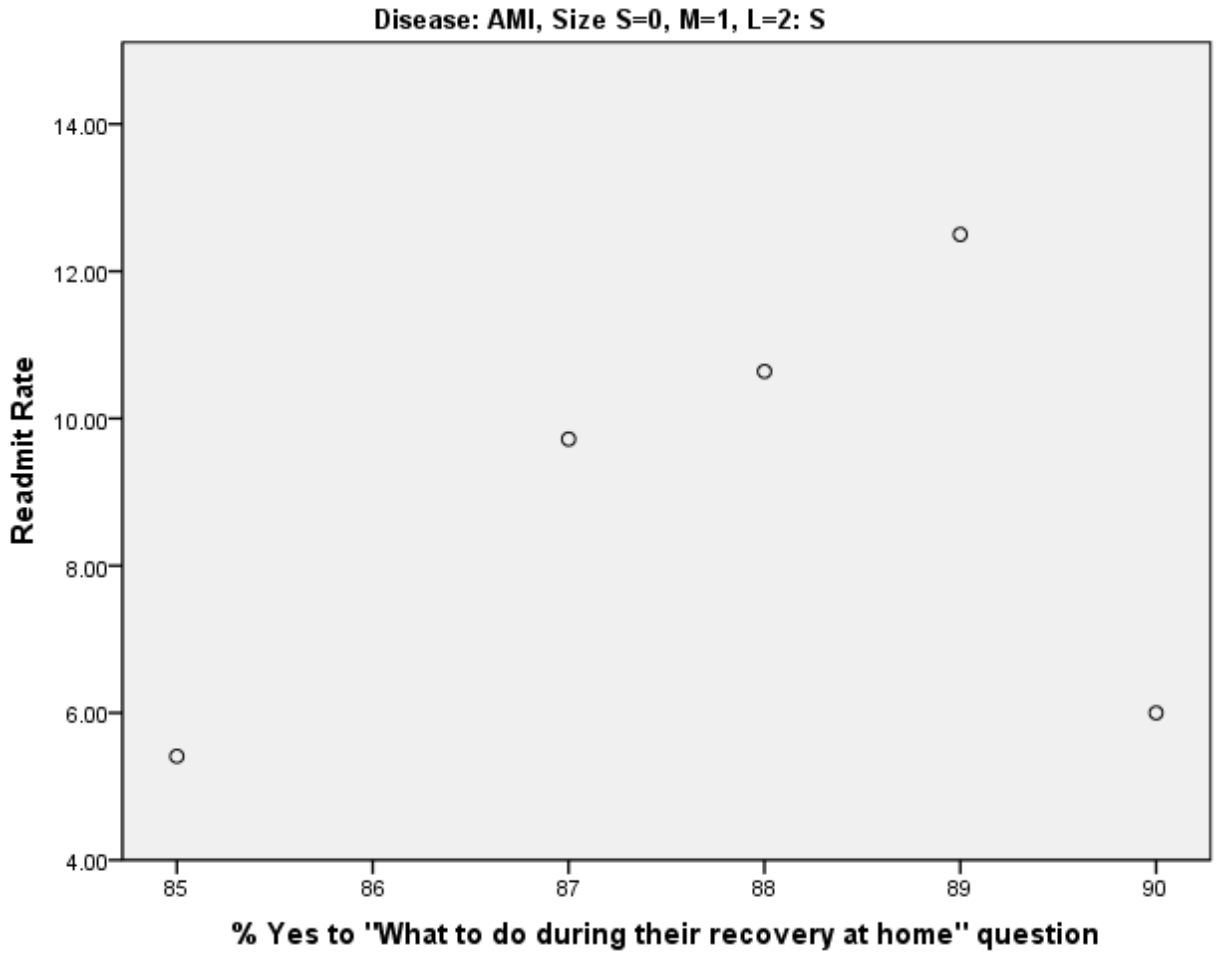

Figure B27. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for small hospitals with 25 or more AMI discharges.

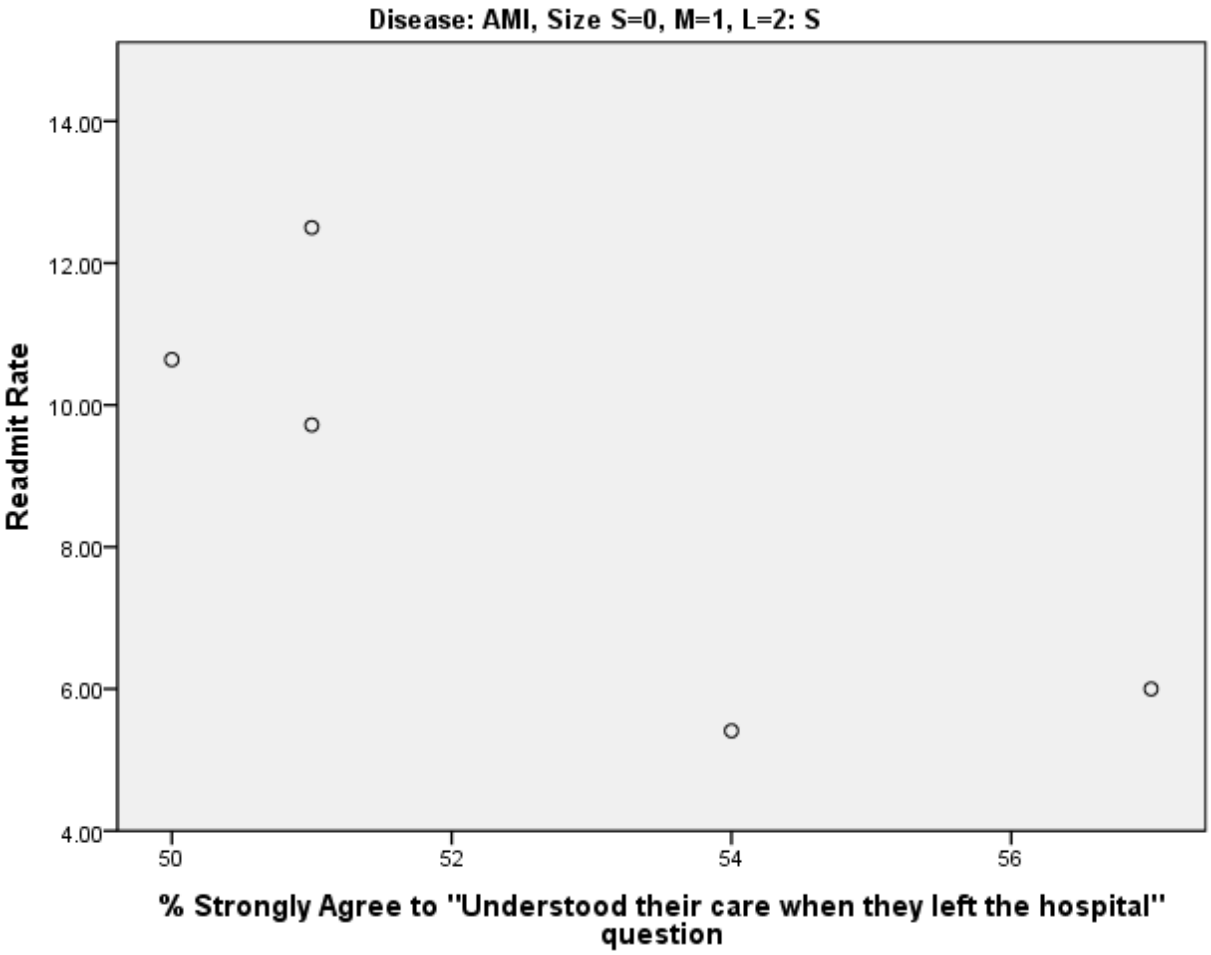

Figure B28. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for small hospitals with 25 or more AMI discharges.

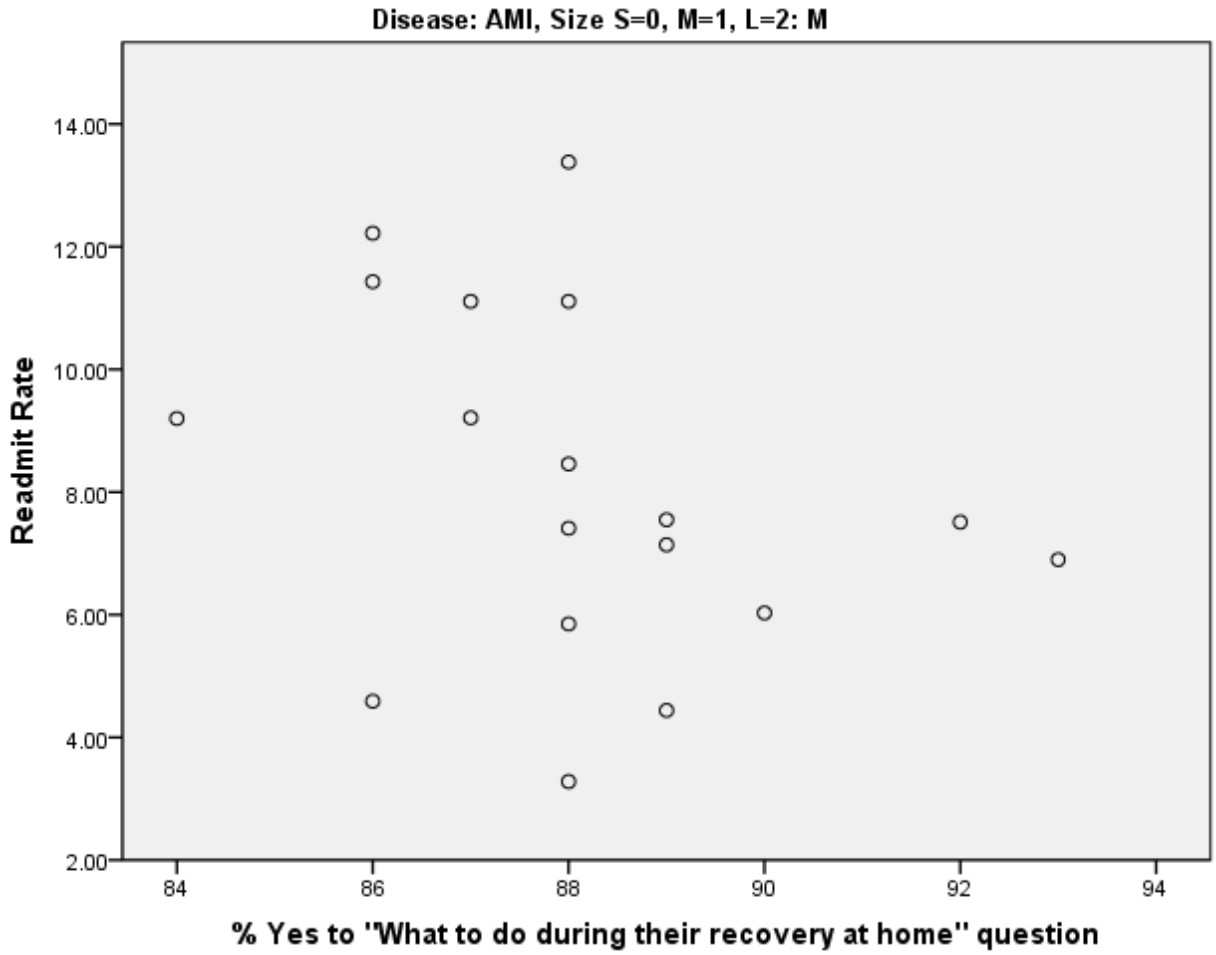

Figure B29. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for medium hospitals with 25 or more AMI discharges.

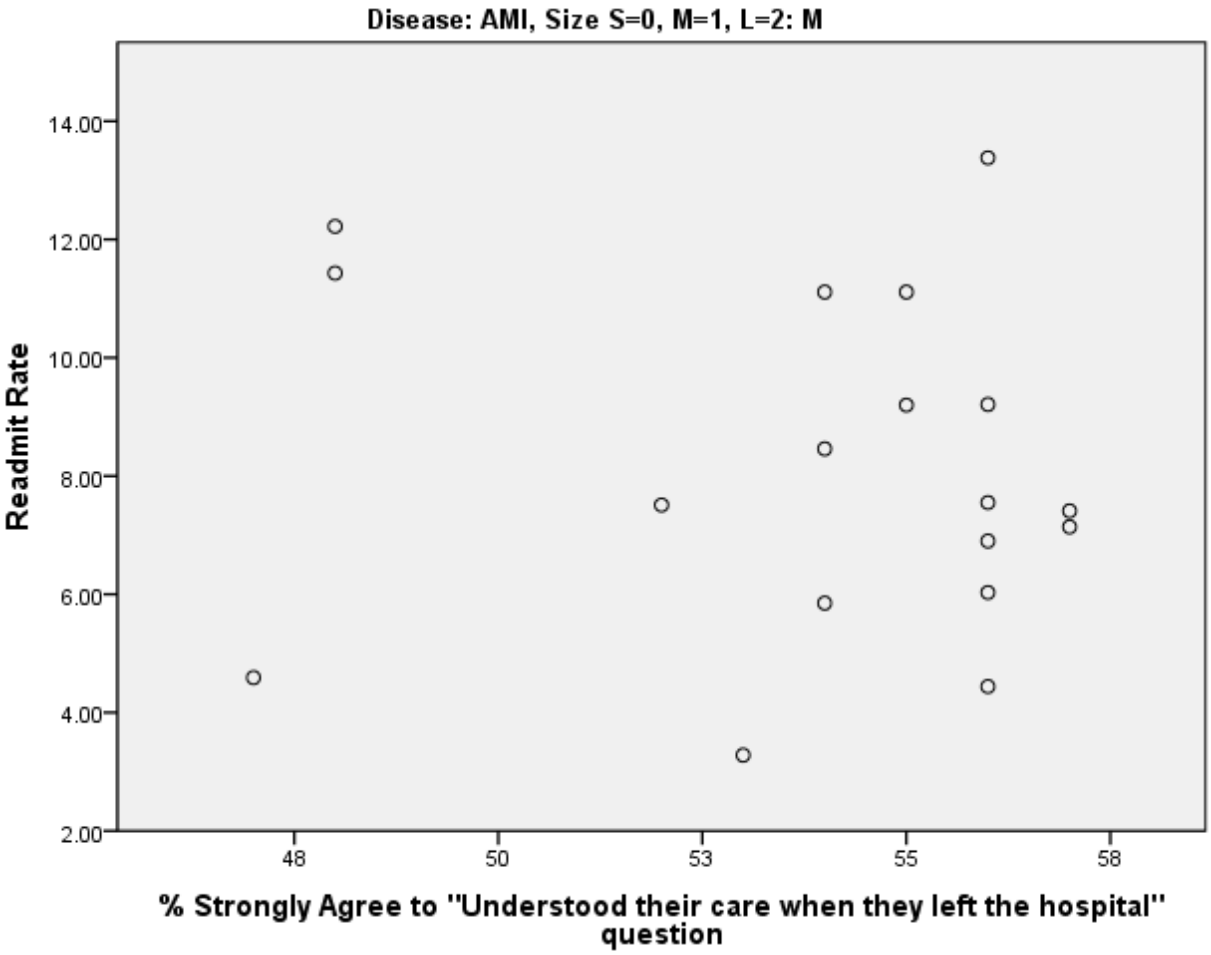

Figure B30. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for medium hospitals with 25 or more AMI discharges.

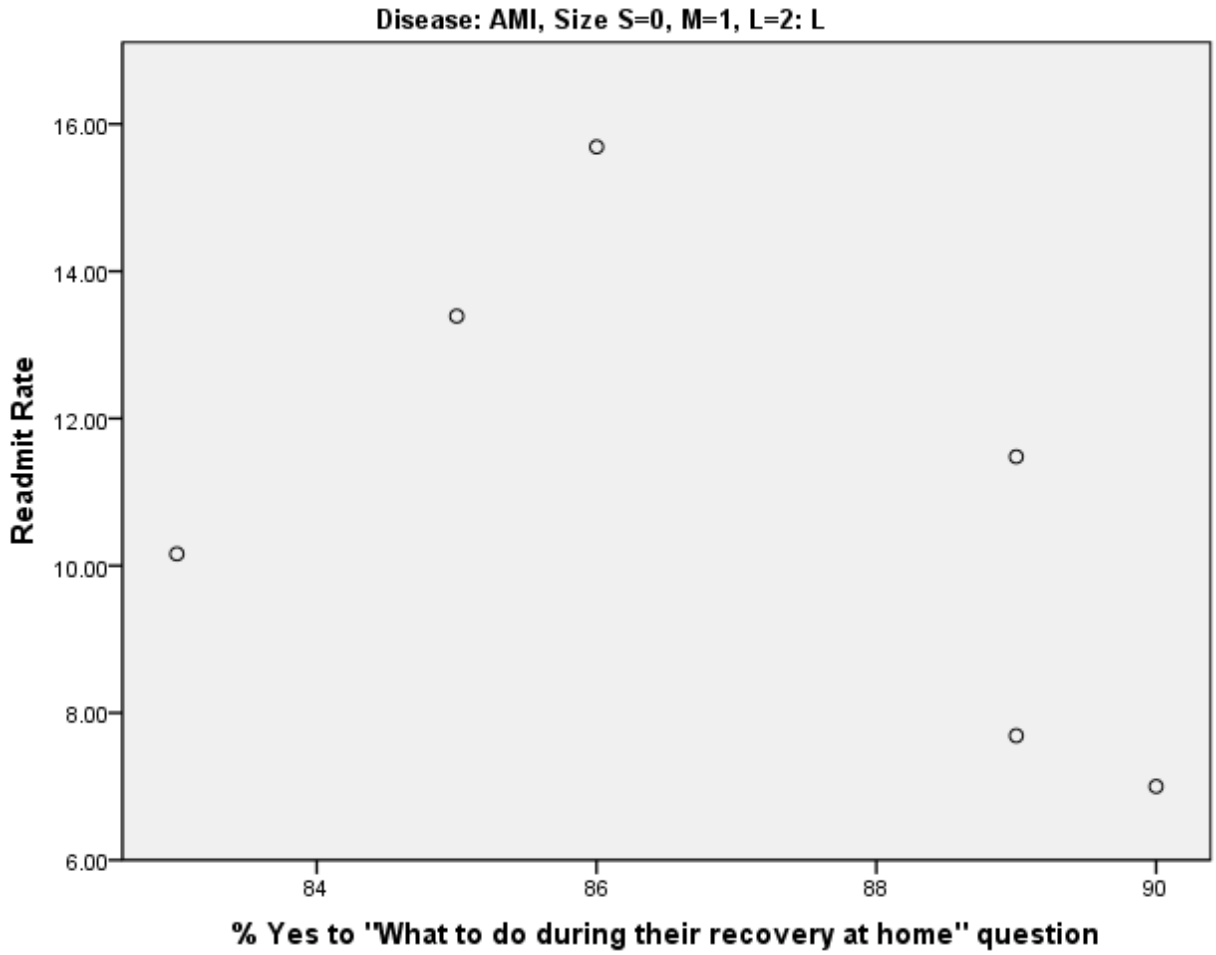

Figure B31. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for large hospitals with 25 or more AMI discharges.

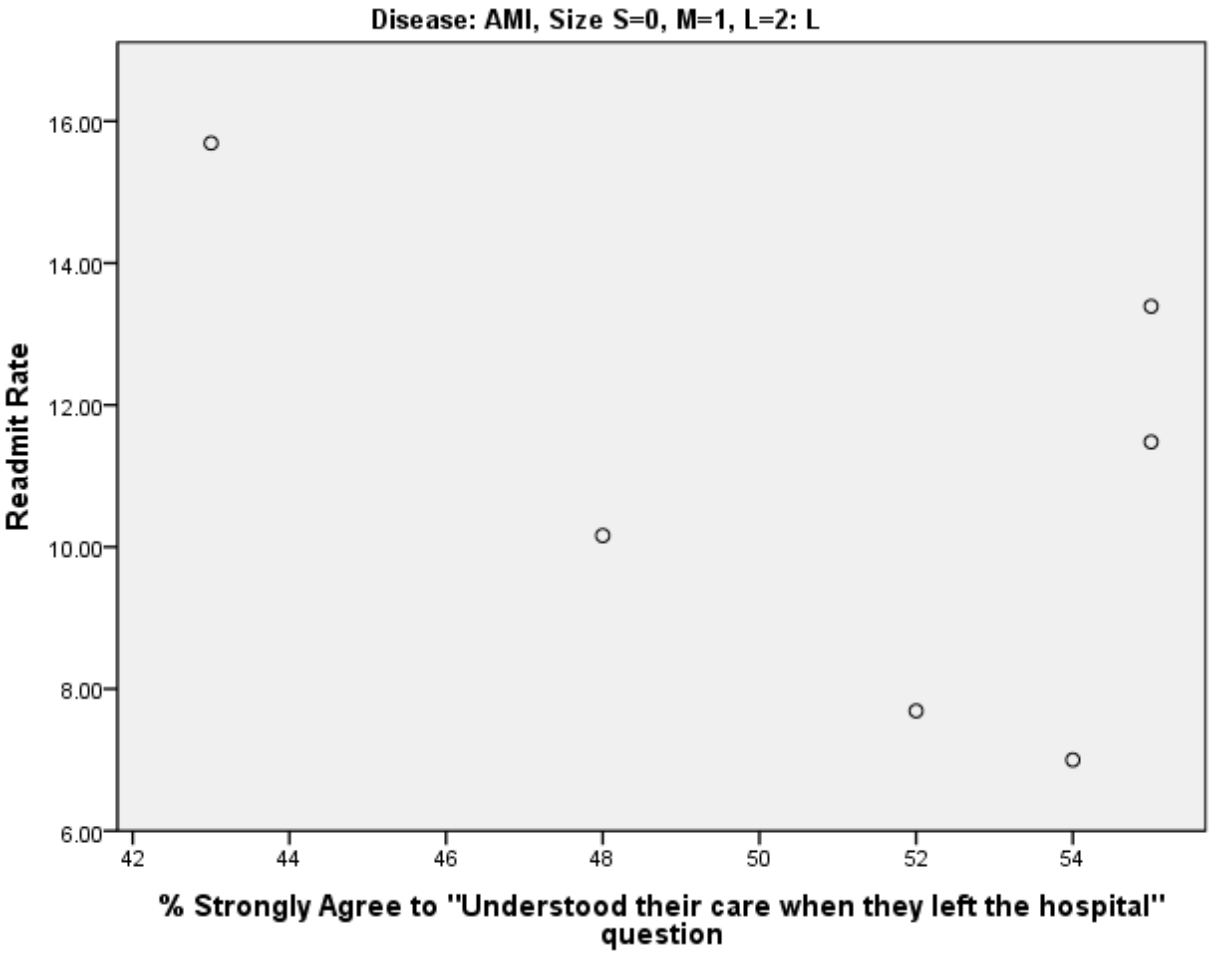

Figure B32. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for large hospitals with 25 or more AMI discharges.

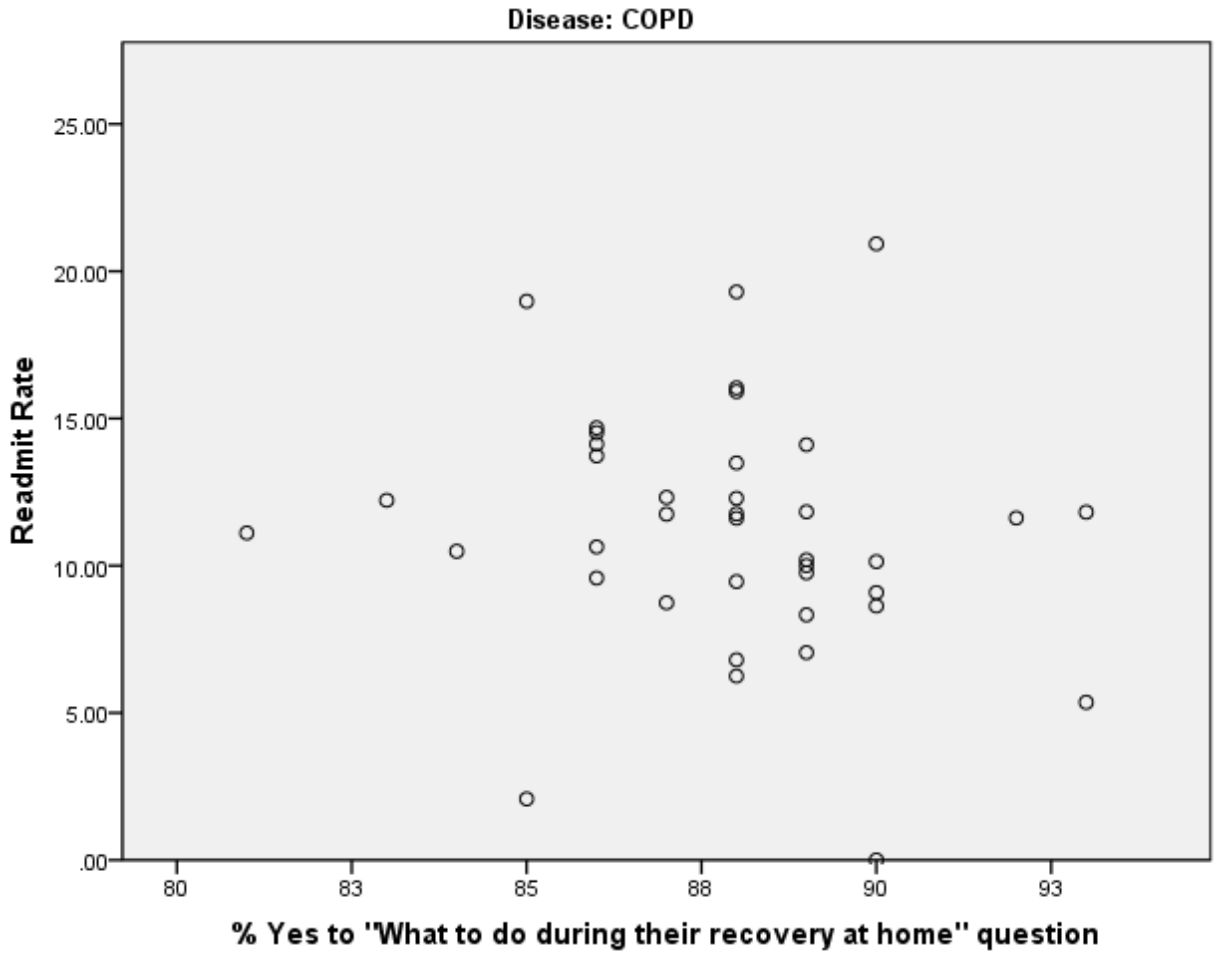

Figure B33. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for all hospitals with 25 or more COPD discharges.

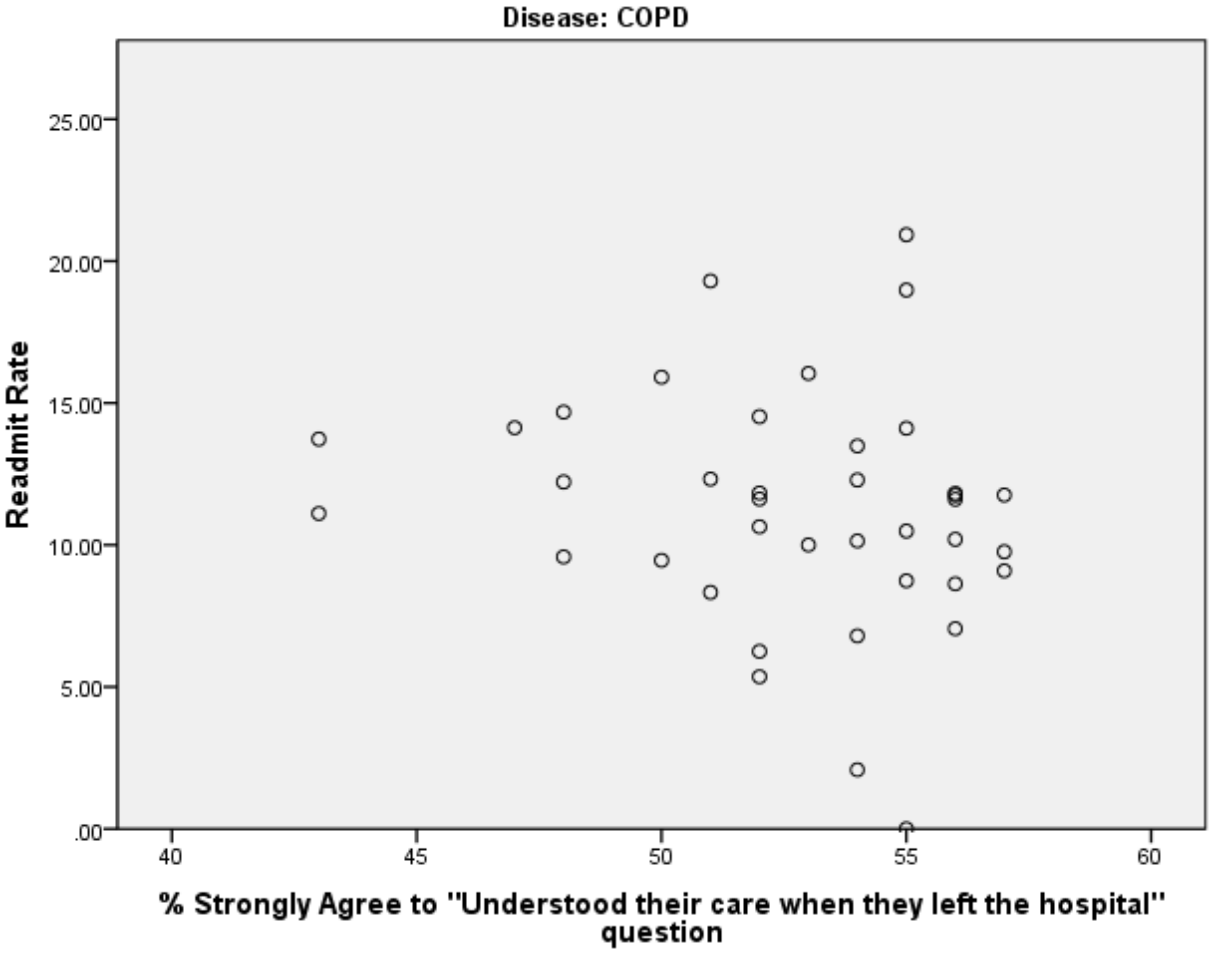

Figure B34. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all hospitals with 25 or more COPD discharges.

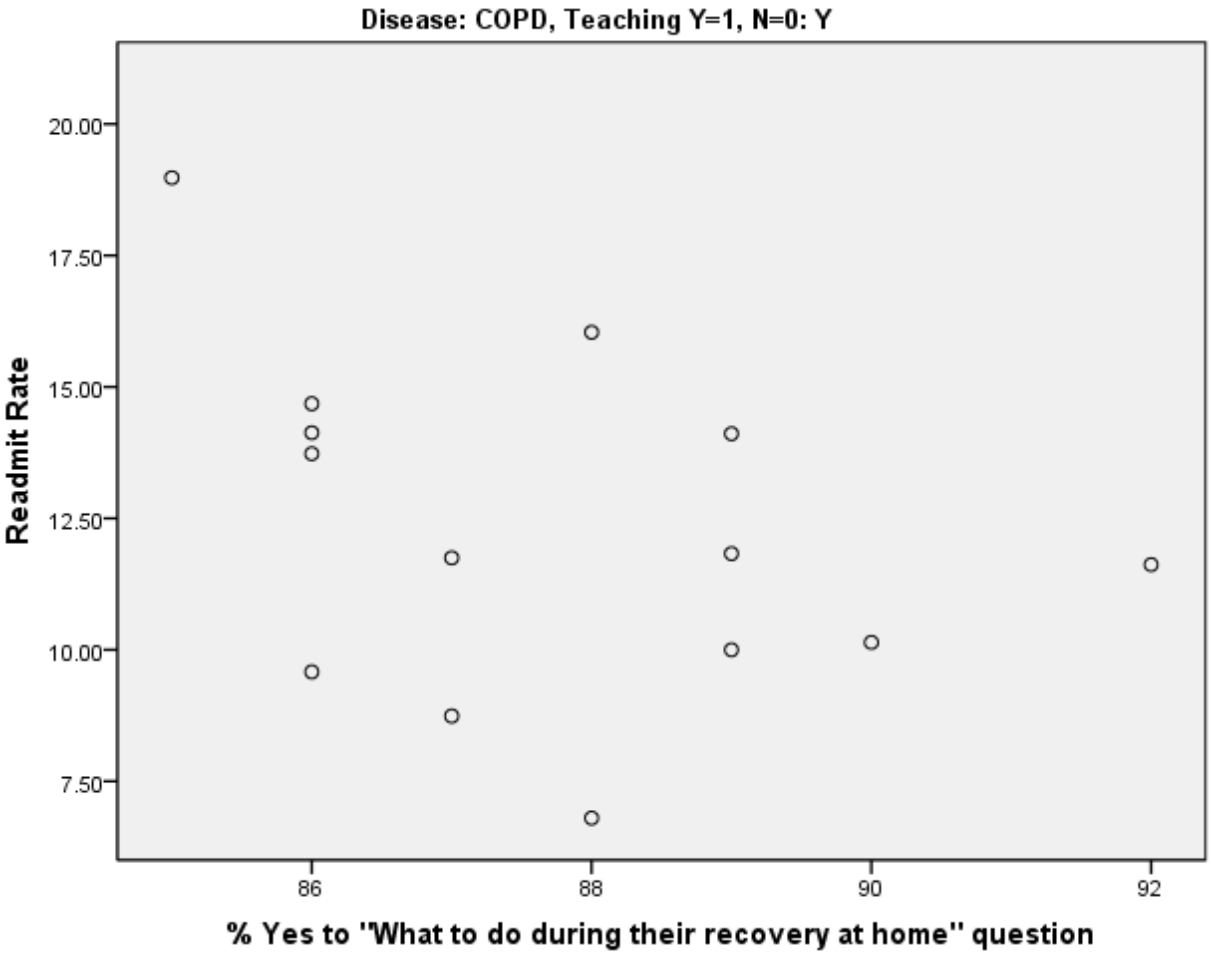

Figure B35. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for teaching hospitals with 25 or more COPD discharges.

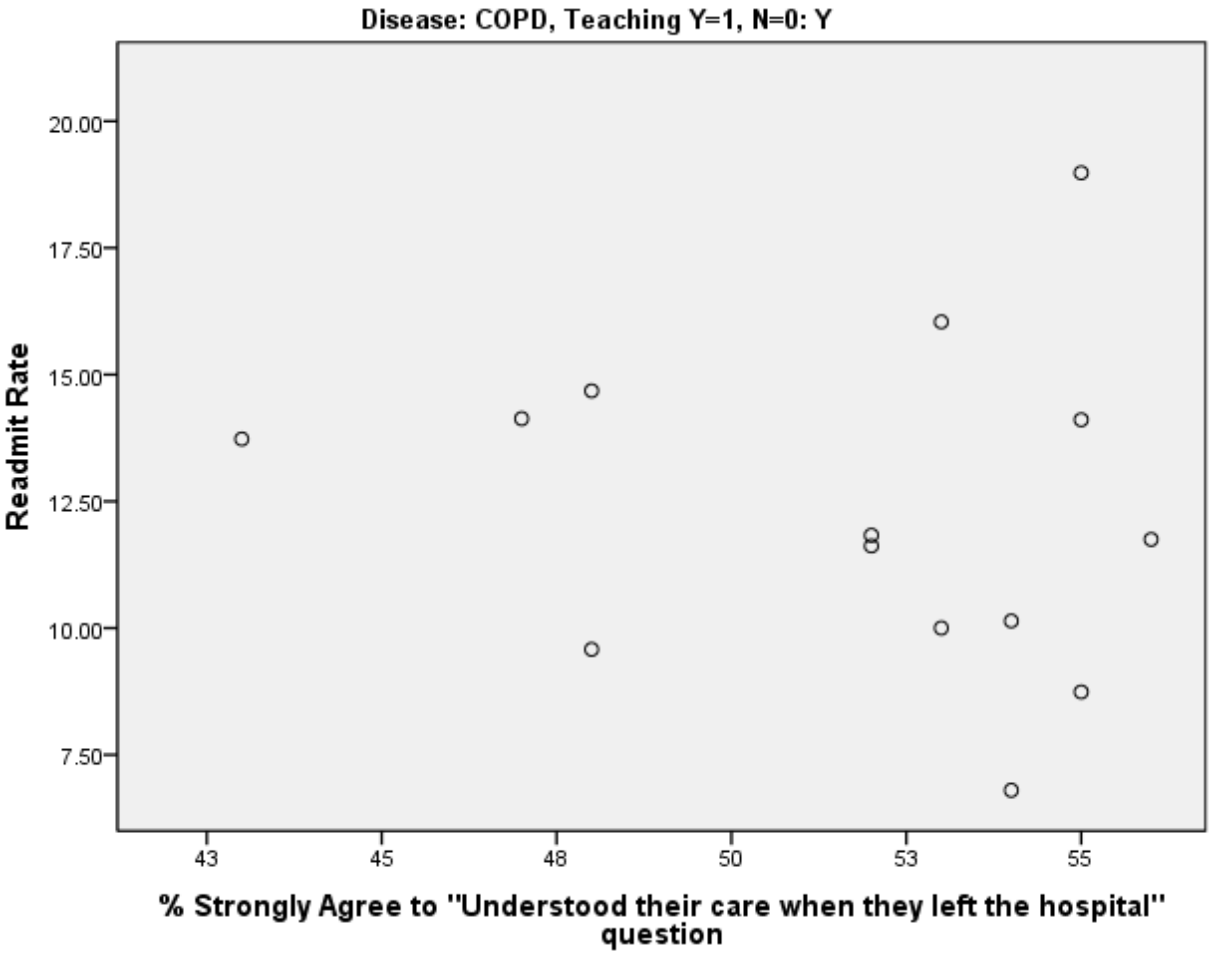

Figure B36. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for teaching hospitals with 25 or more COPD discharges.

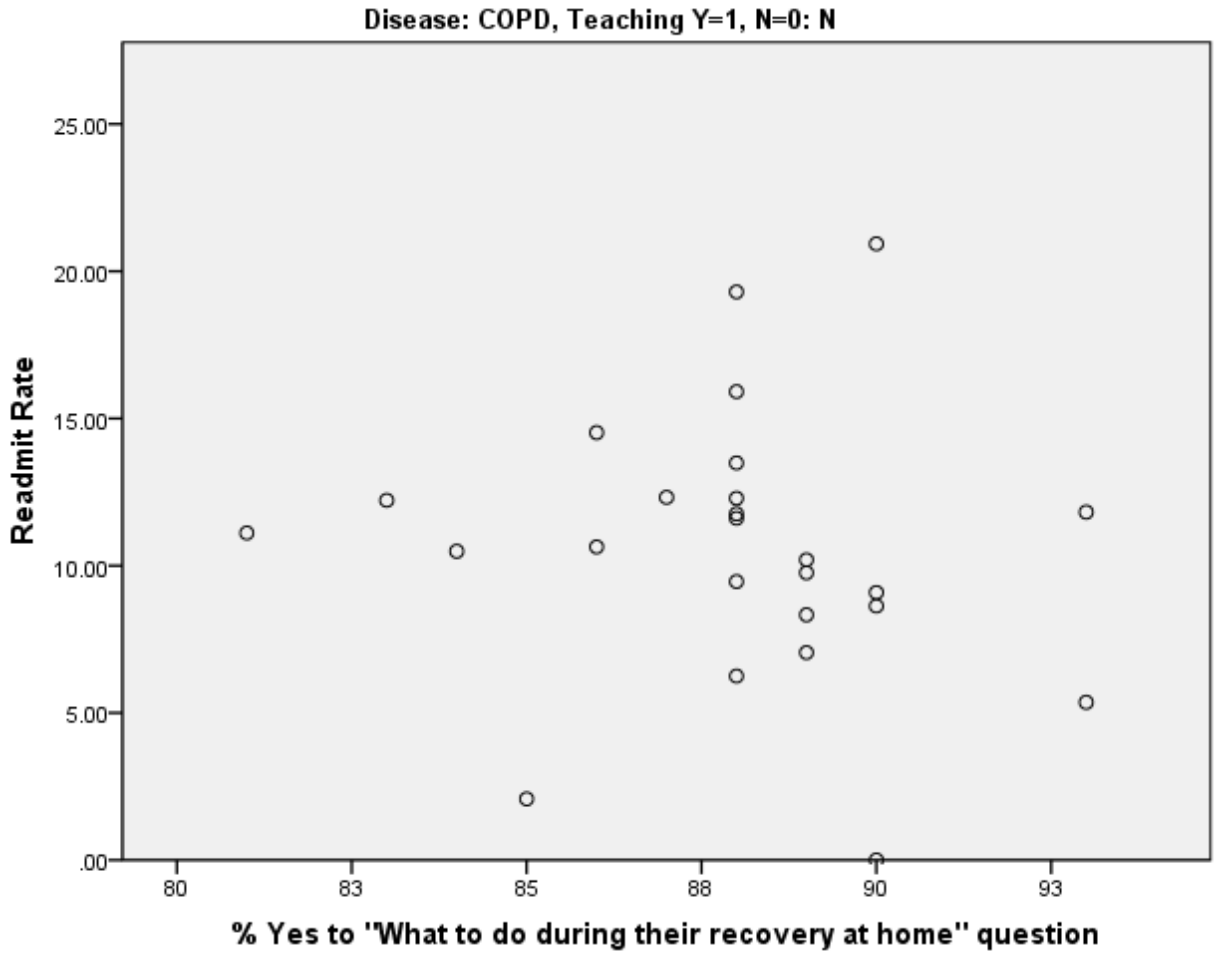

Figure B37. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more COPD discharges.

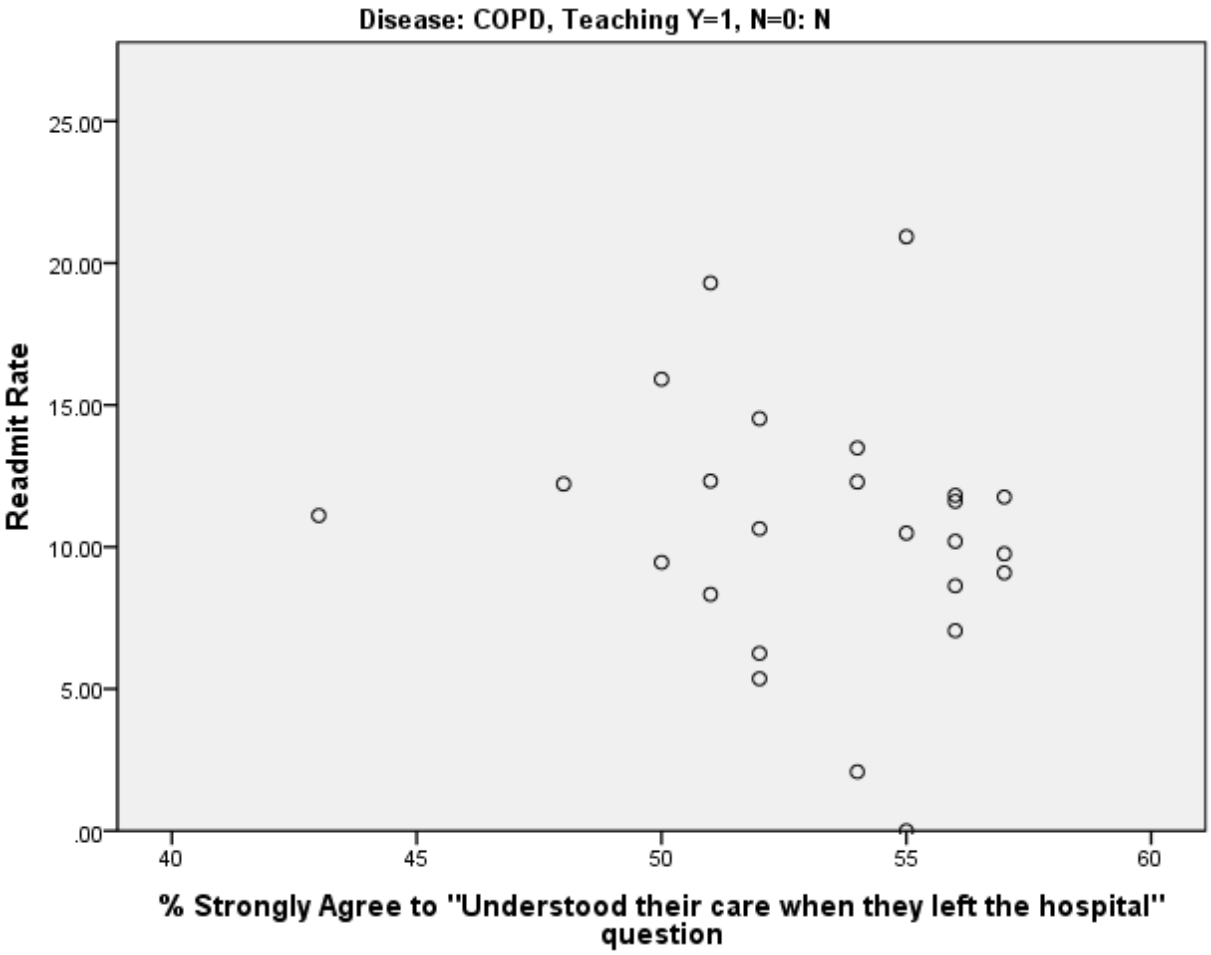

Figure B38. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more COPD discharges.

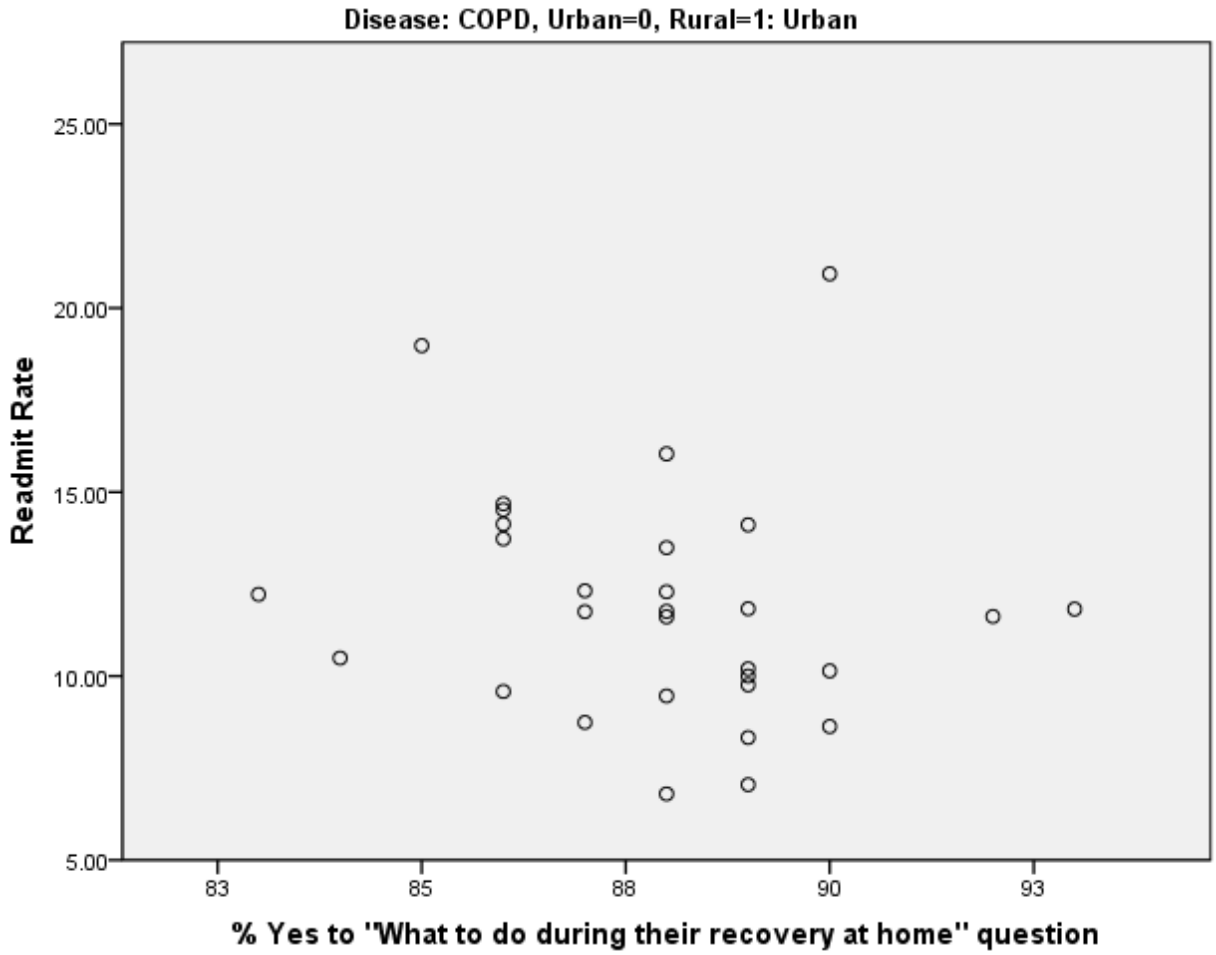

Figure B39. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for urban hospitals with 25 or more COPD discharges.

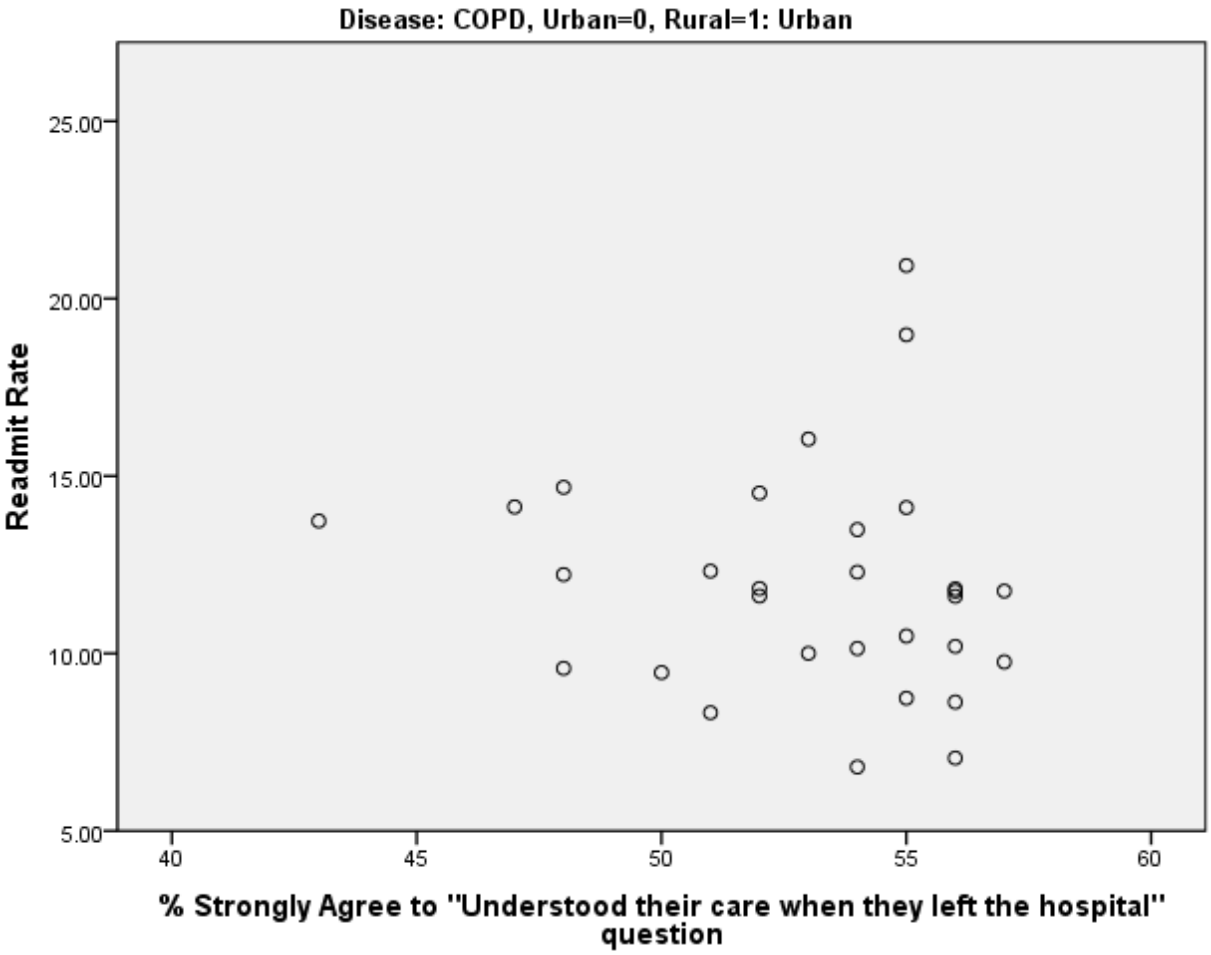

Figure B40. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for urban hospitals with 25 or more COPD discharges.

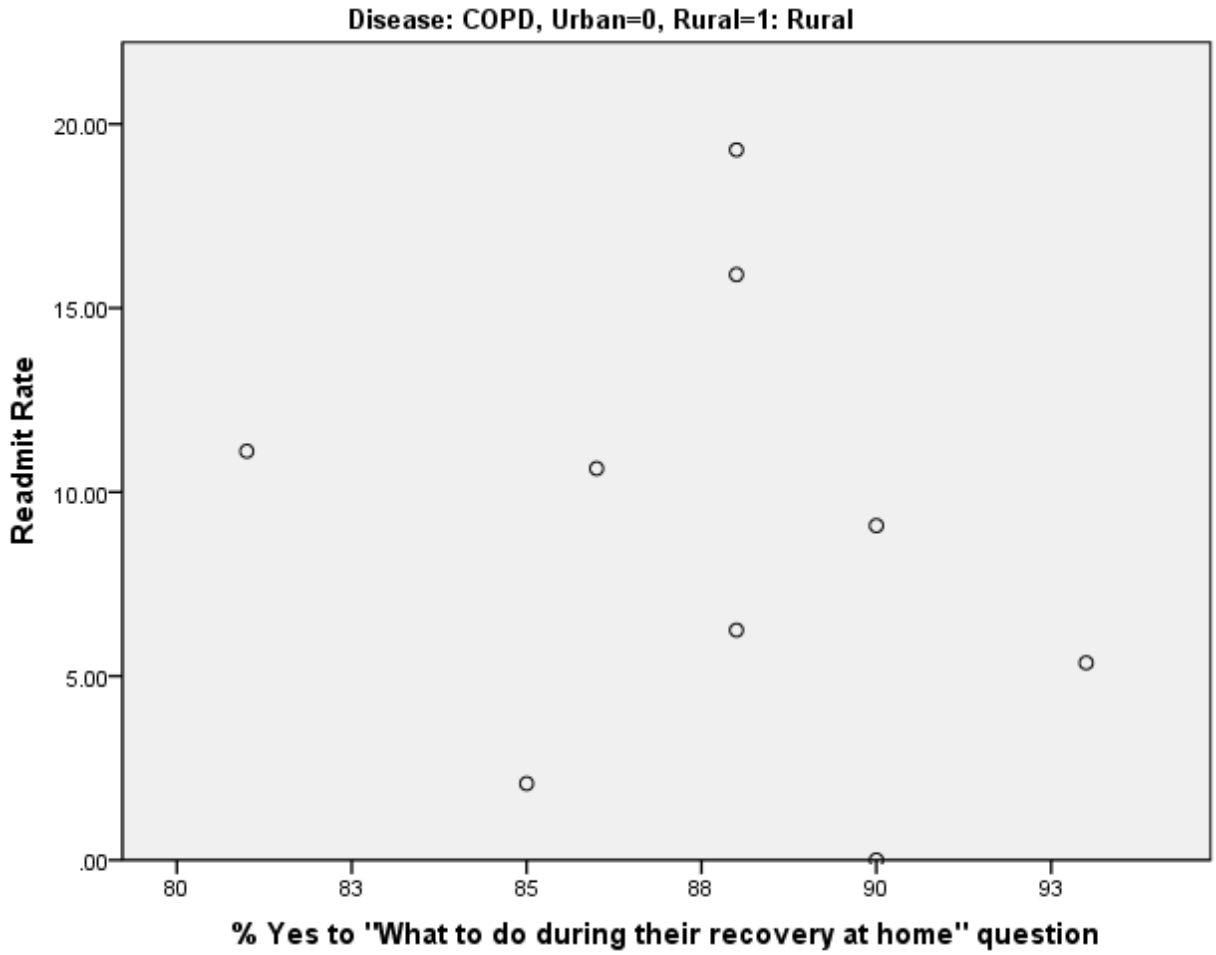

Figure B41. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for rural hospitals with 25 or more COPD discharges.

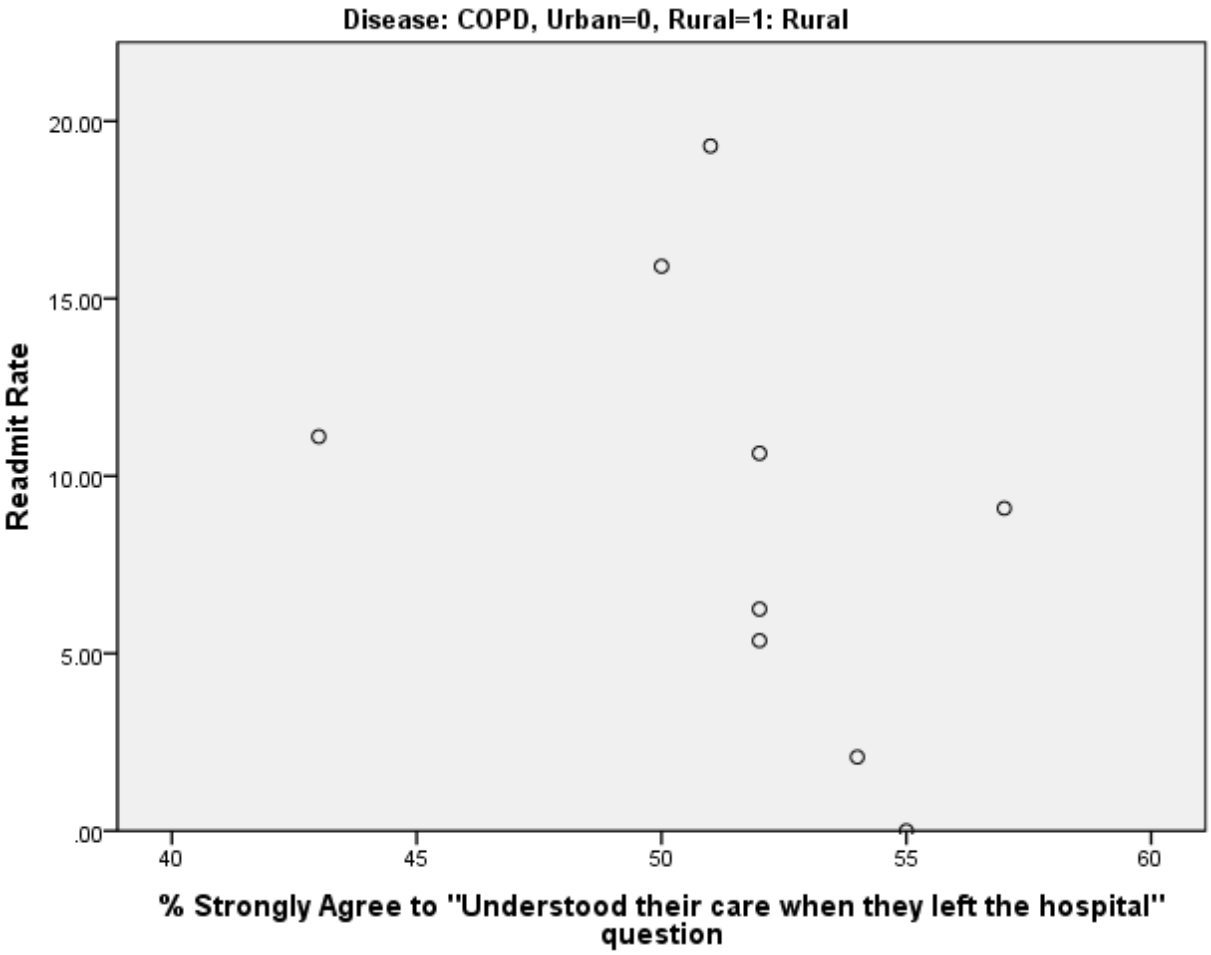

Figure 42. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for rural hospitals with 25 or more COPD discharges.

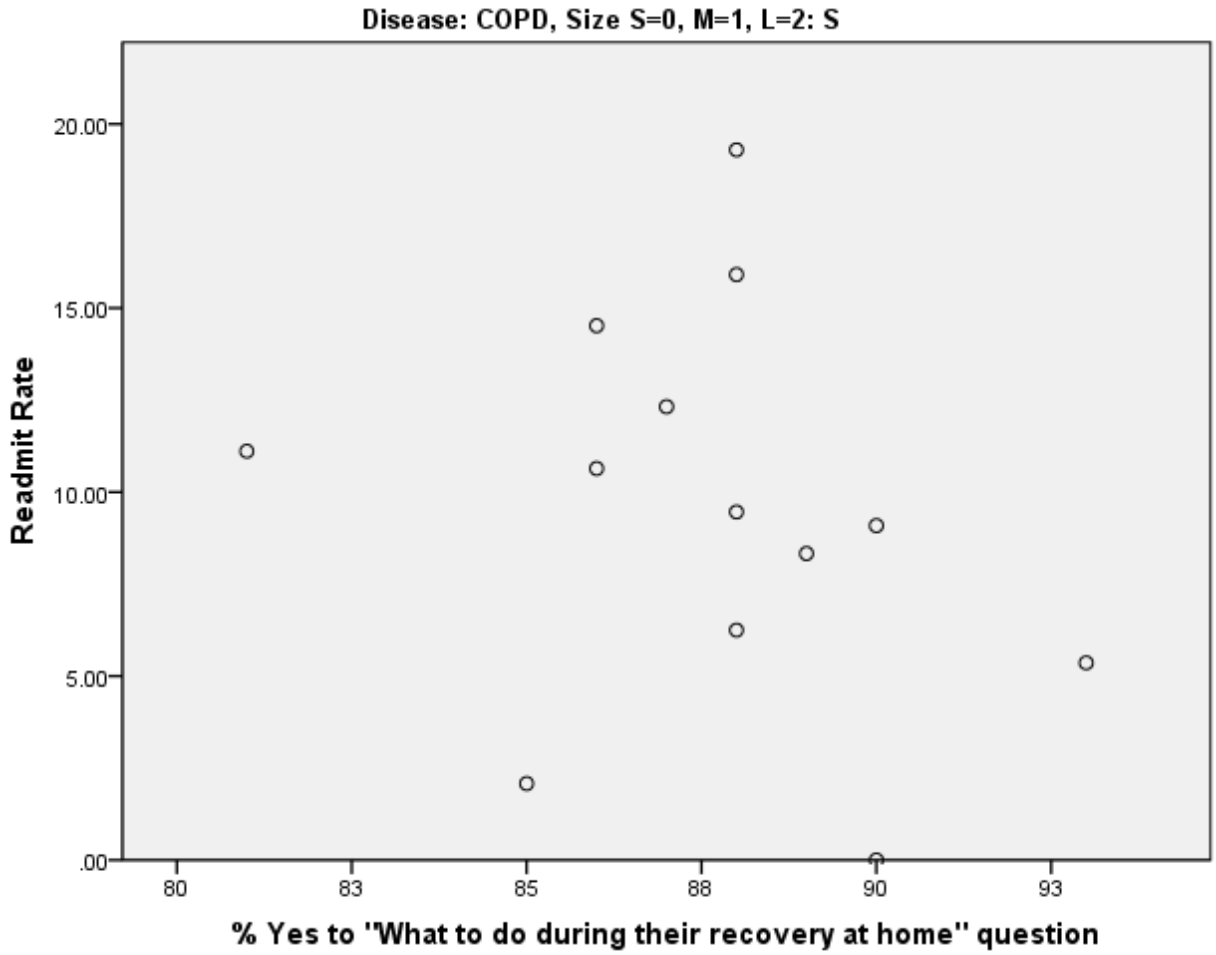

Figure B43. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for small hospitals with 25 or more COPD discharges.

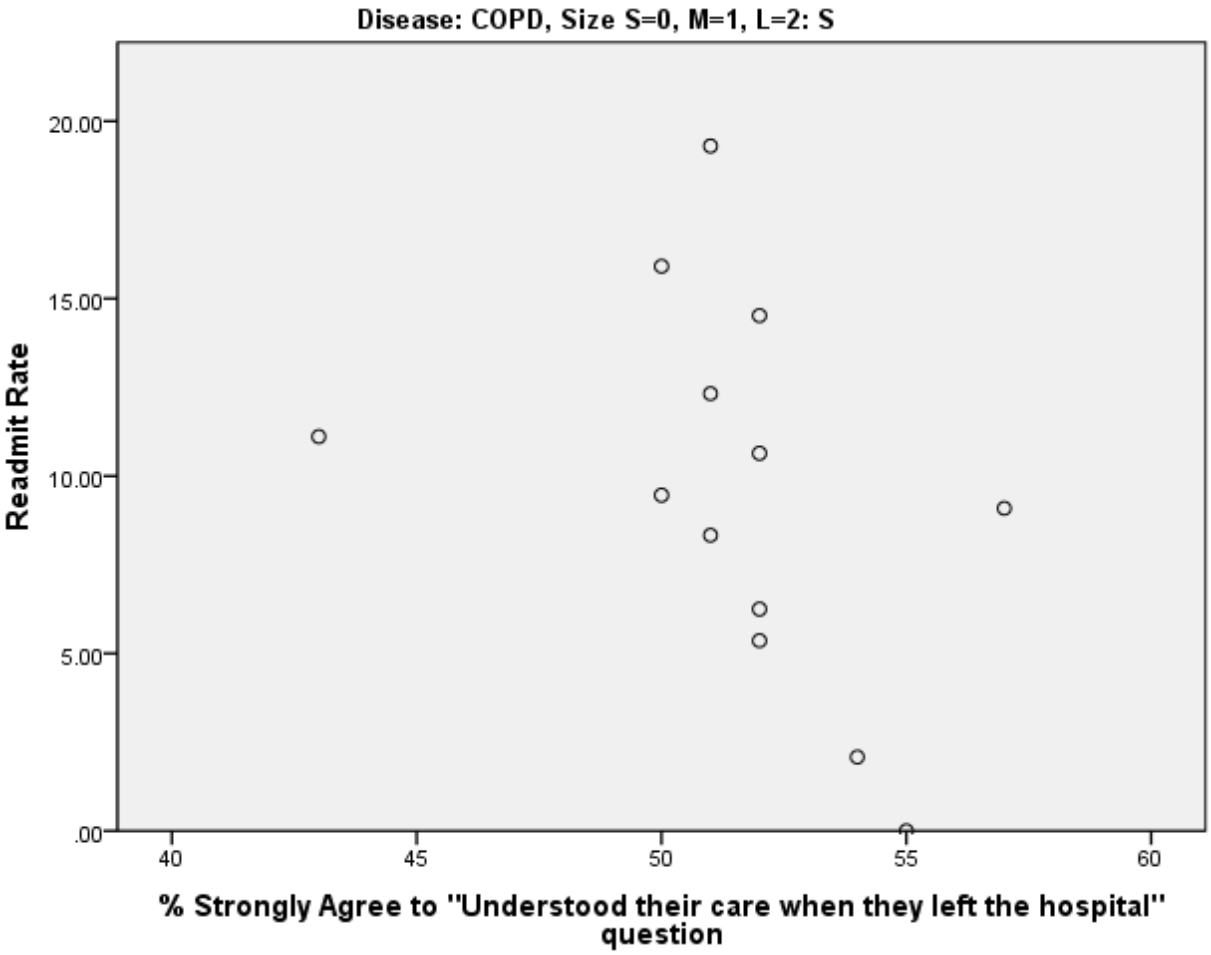

Figure B44. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for small hospitals with 25 or more COPD discharges.

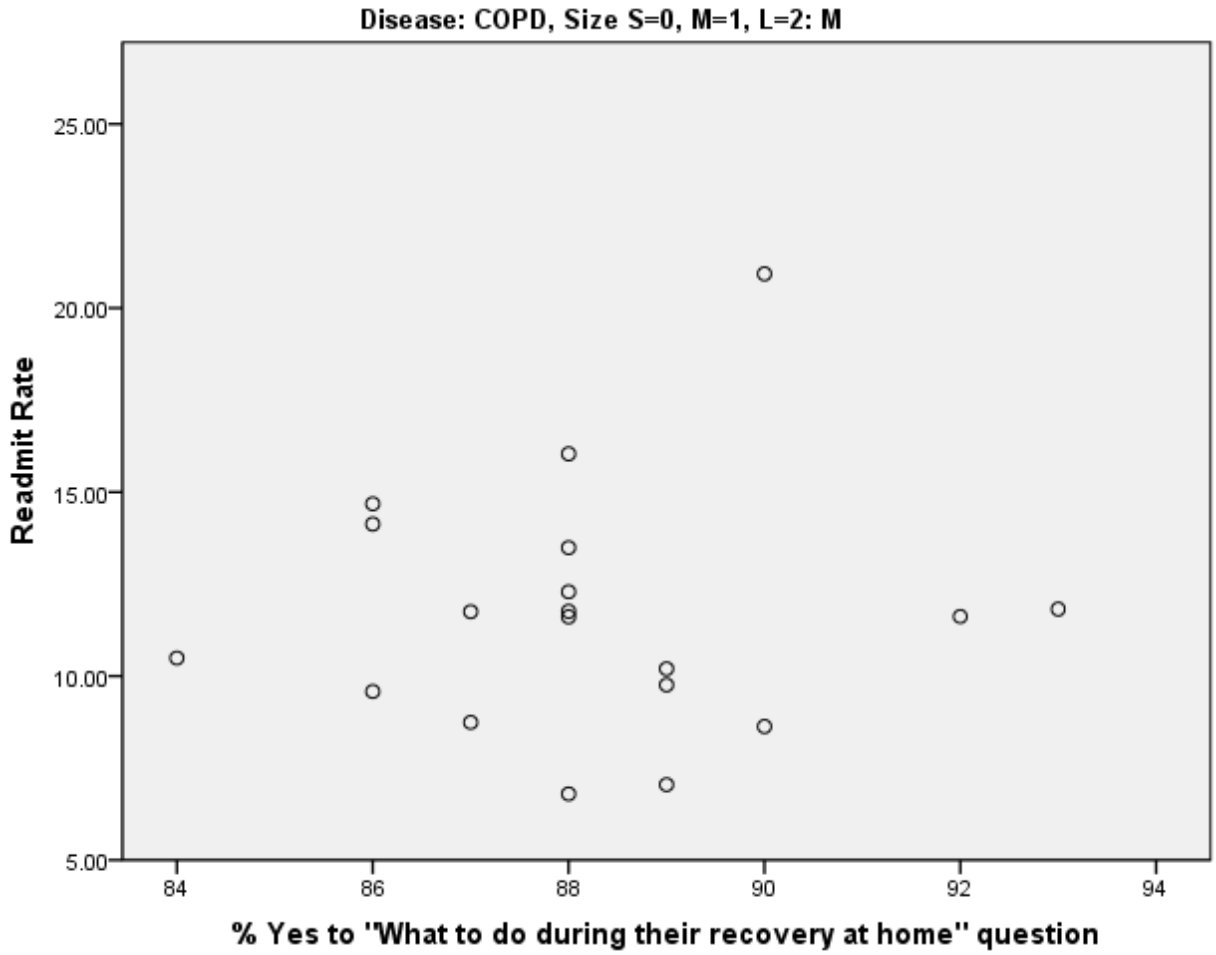

Figure B45. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for medium hospitals with 25 or more COPD discharges.

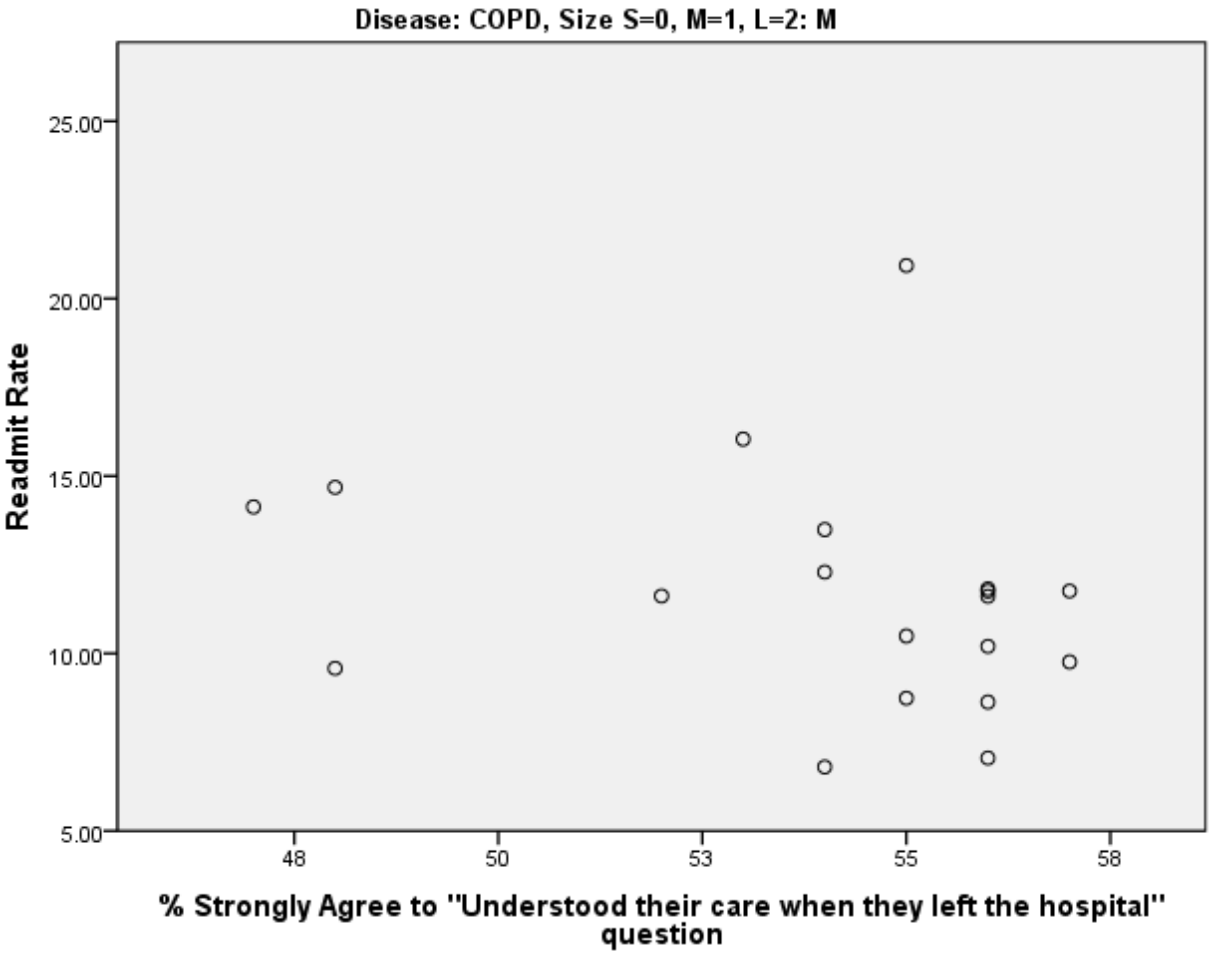

Figure B46. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for medium hospitals with 25 or more COPD discharges.

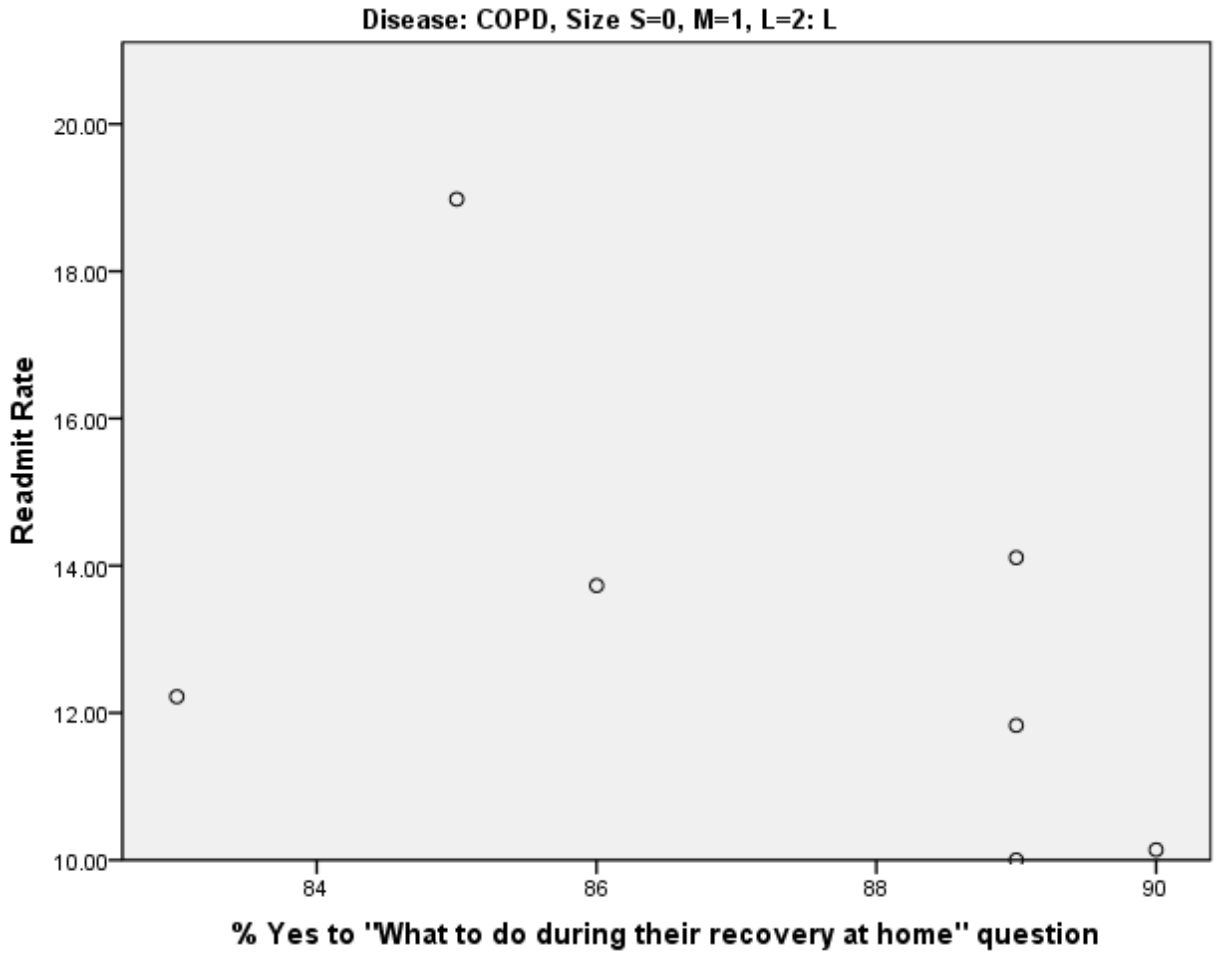

Figure B47. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for large hospitals with 25 or more COPD discharges.

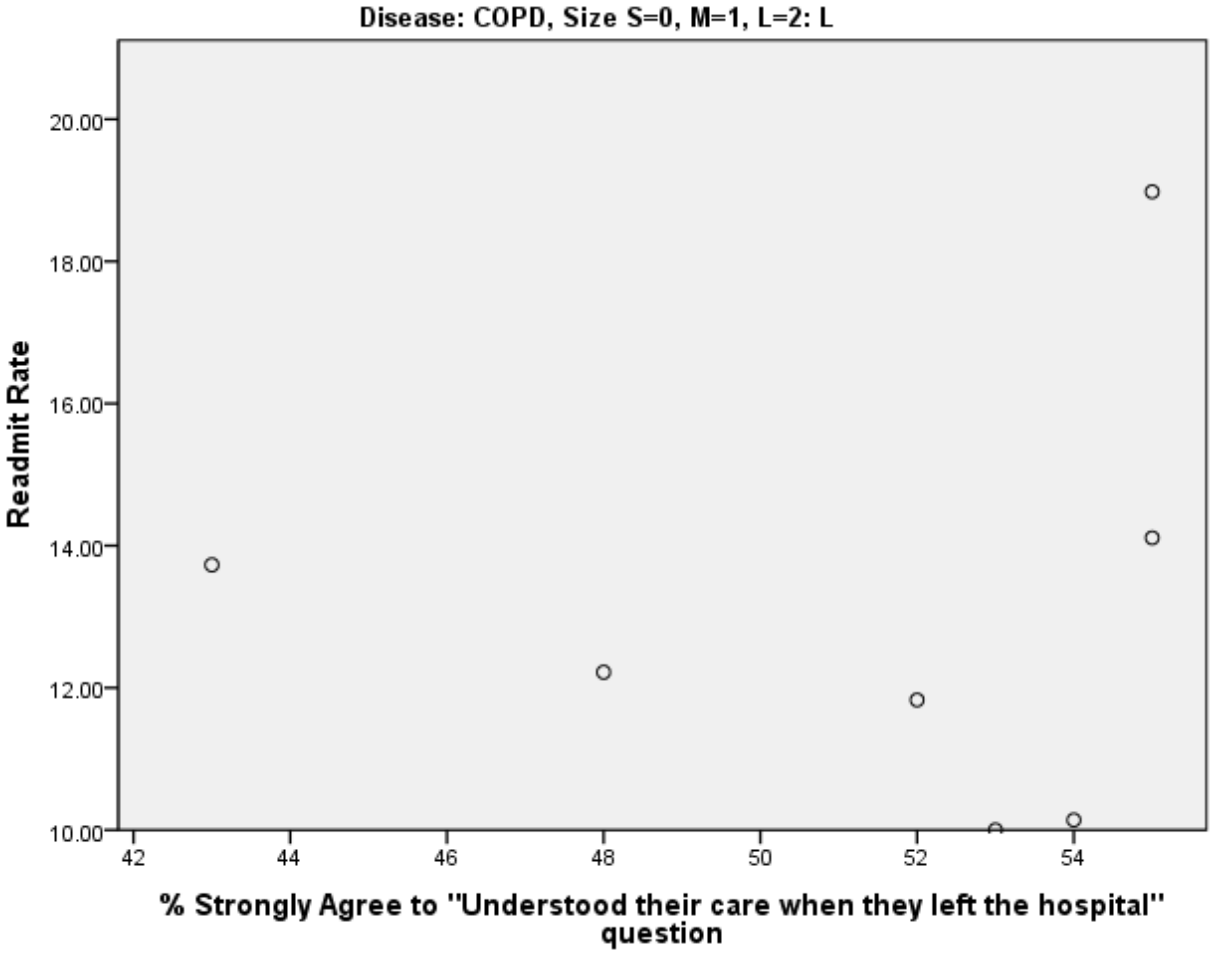

Figure B48. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for large hospitals with 25 or more COPD discharges.

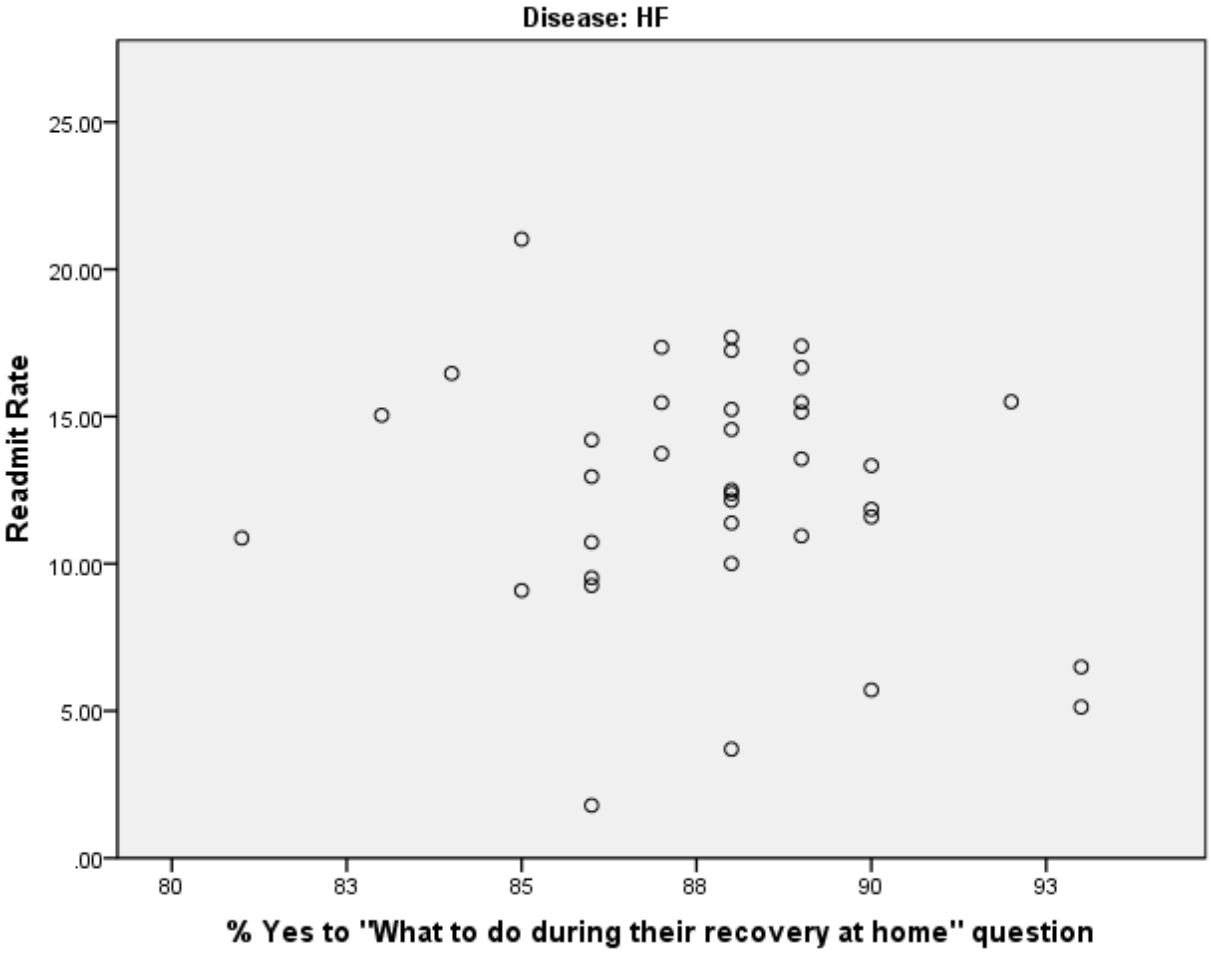

Figure B49. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for all hospitals with 25 or more heart failure discharges.

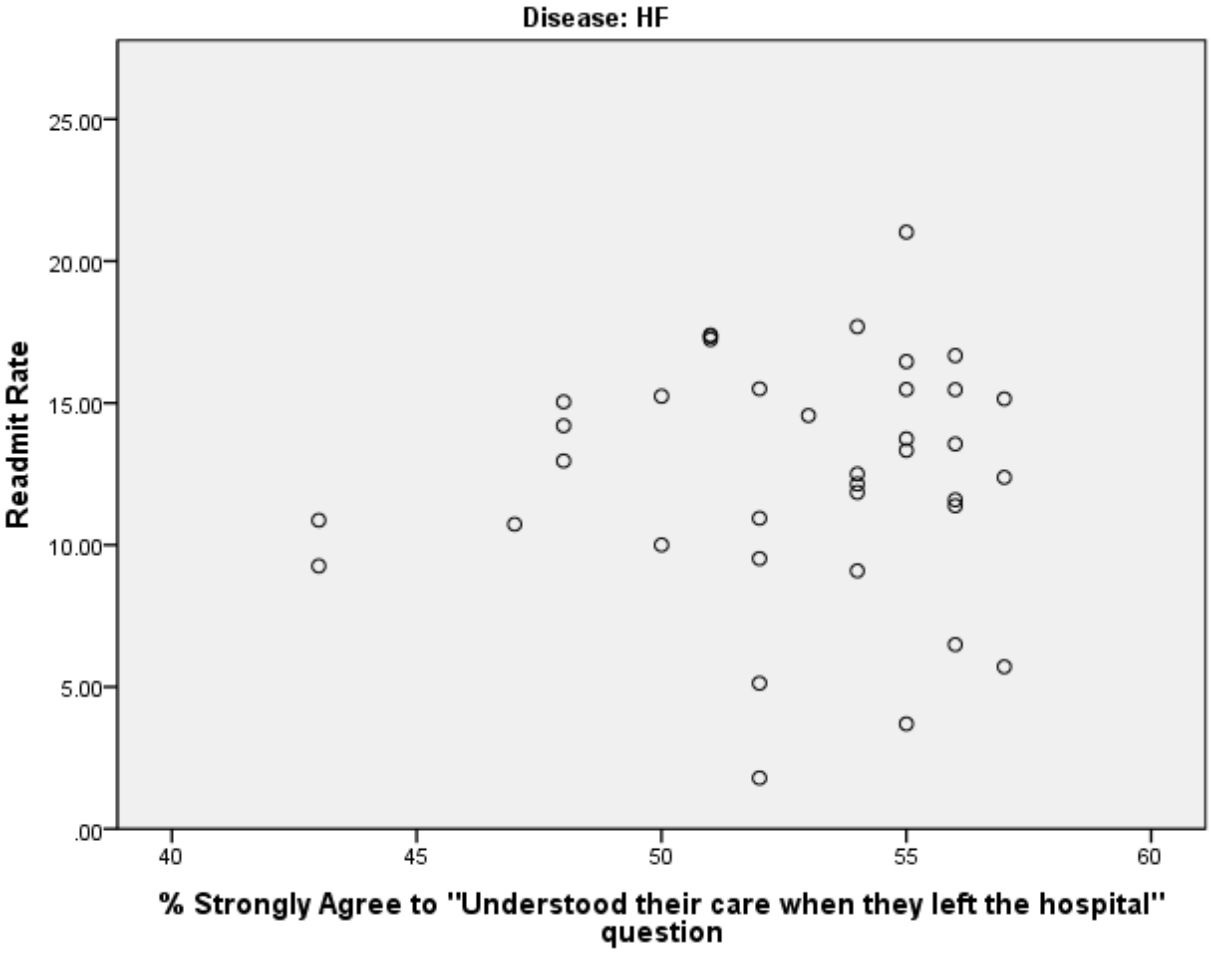

Figure B50. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all hospitals with 25 or more heart failure discharges.

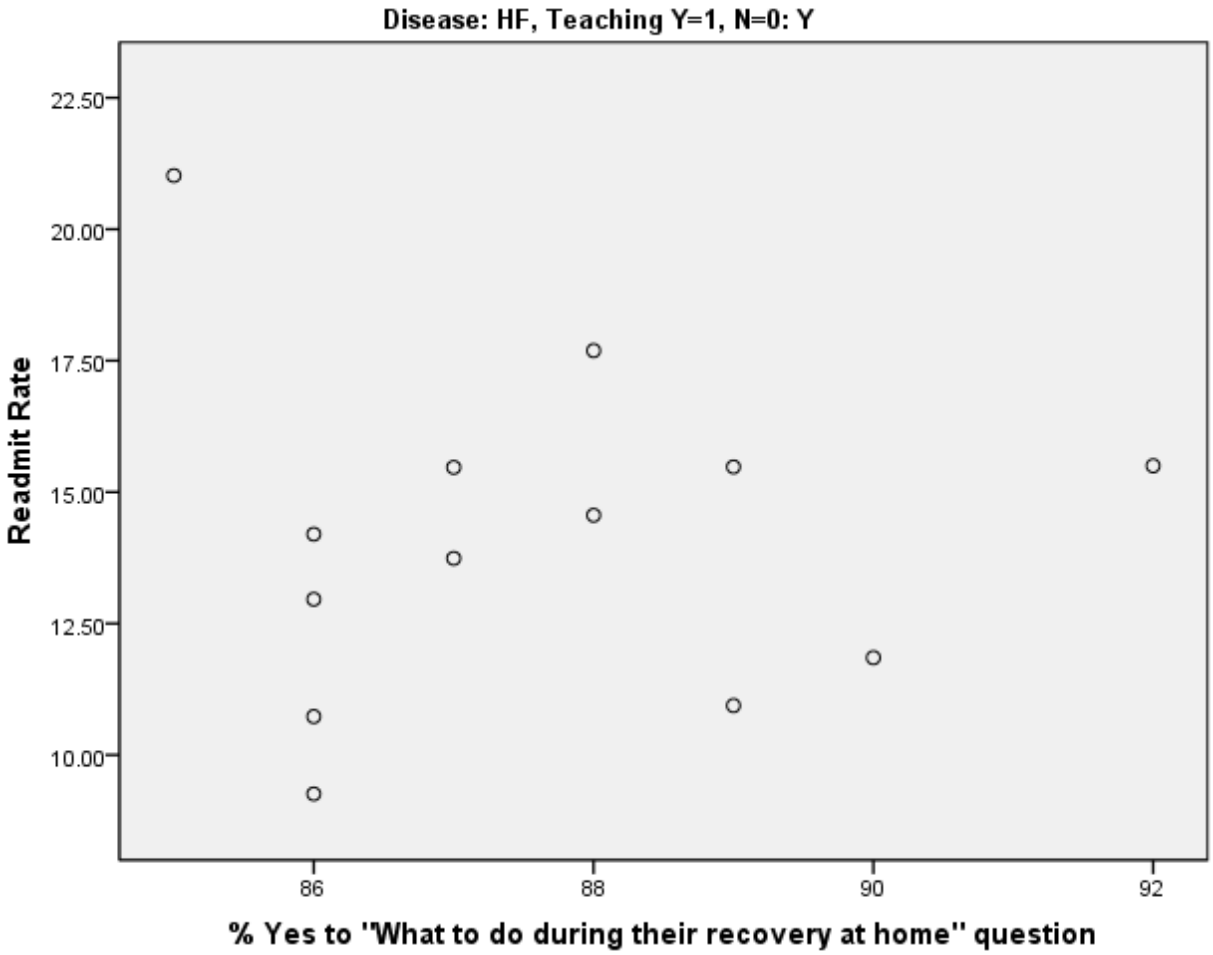

Figure B51. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for teaching hospitals with 25 or more heart failure discharges.

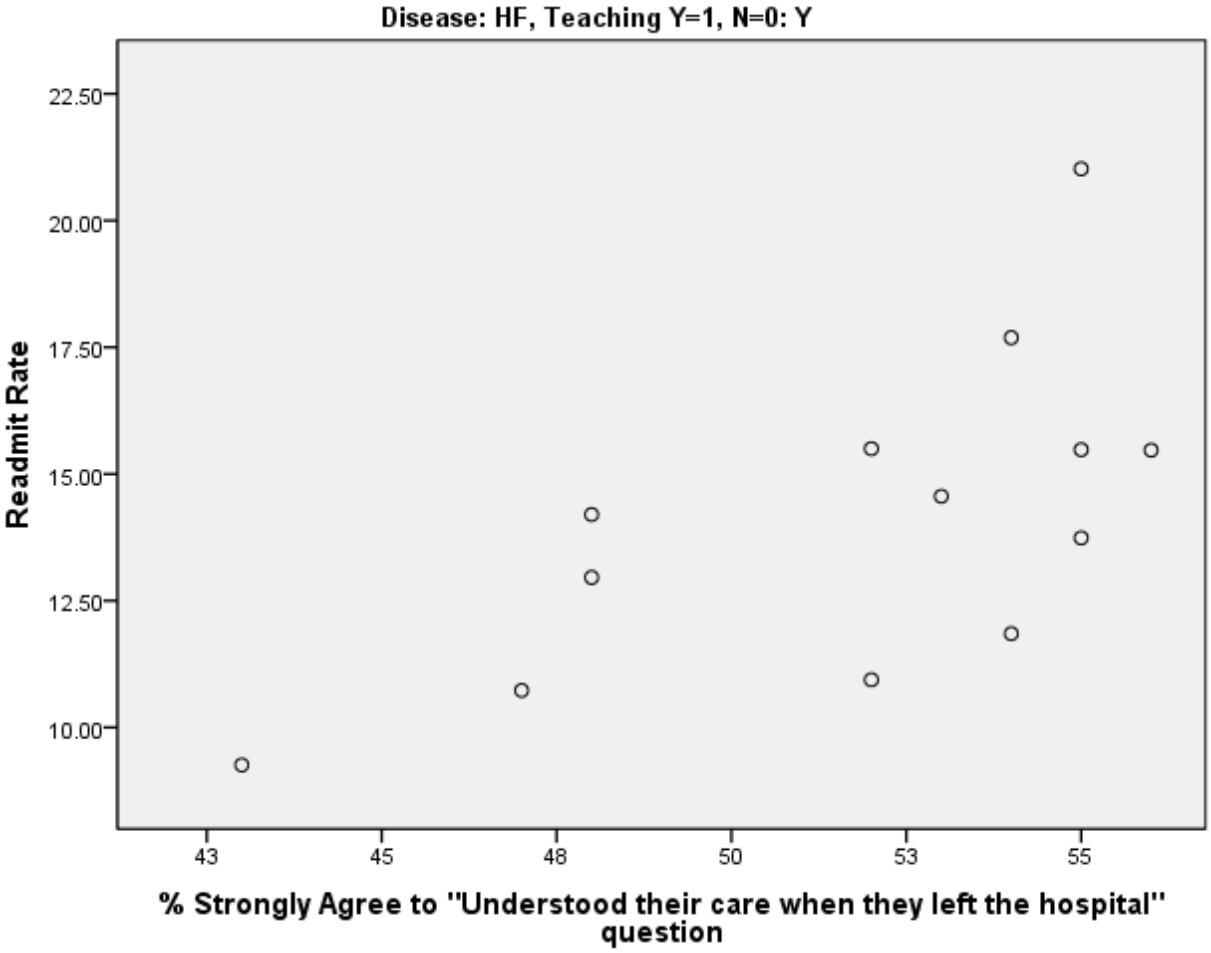

Figure B52. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for teaching hospitals with 25 or more heart failure discharges.

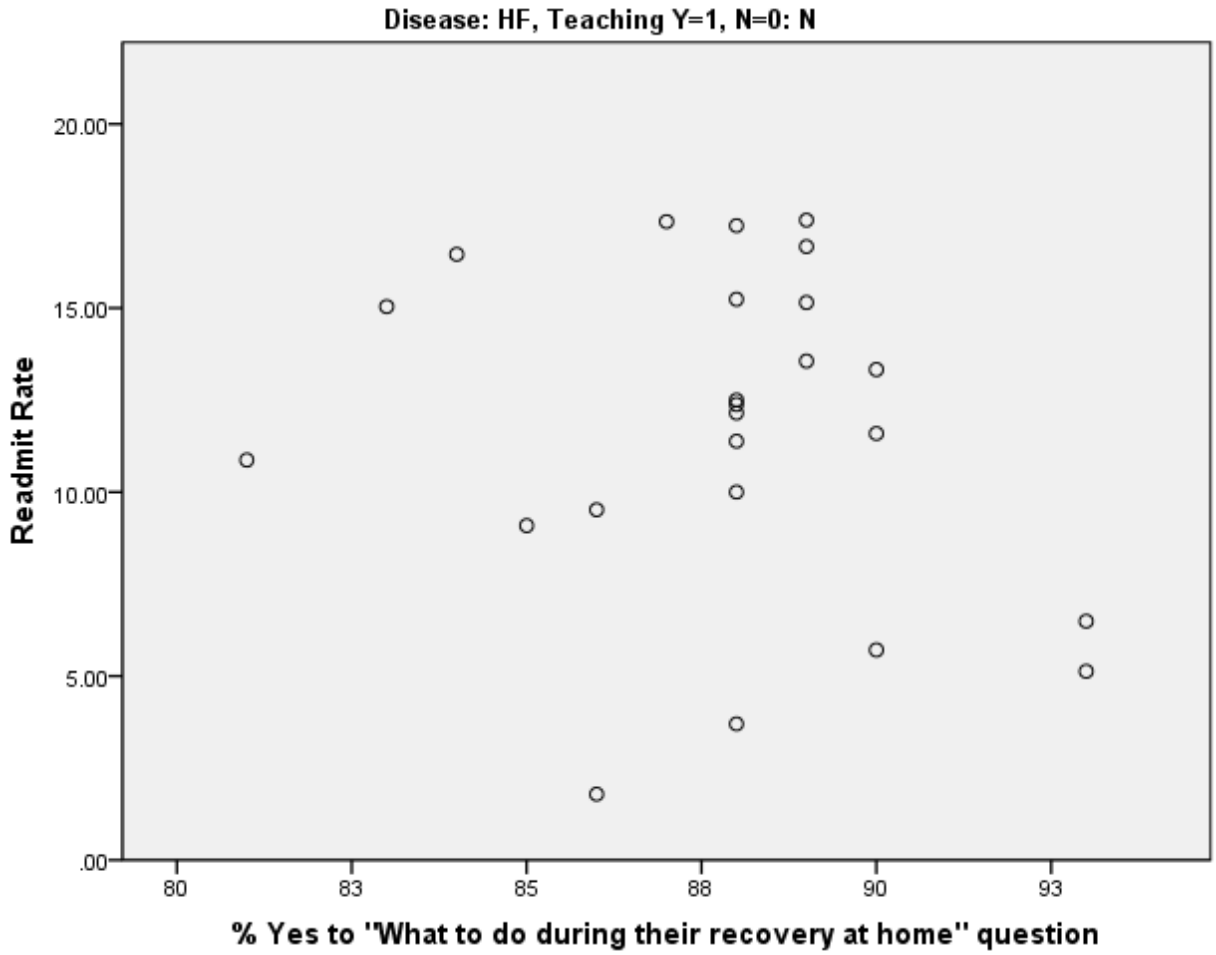

Figure B53. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more heart failure discharges.

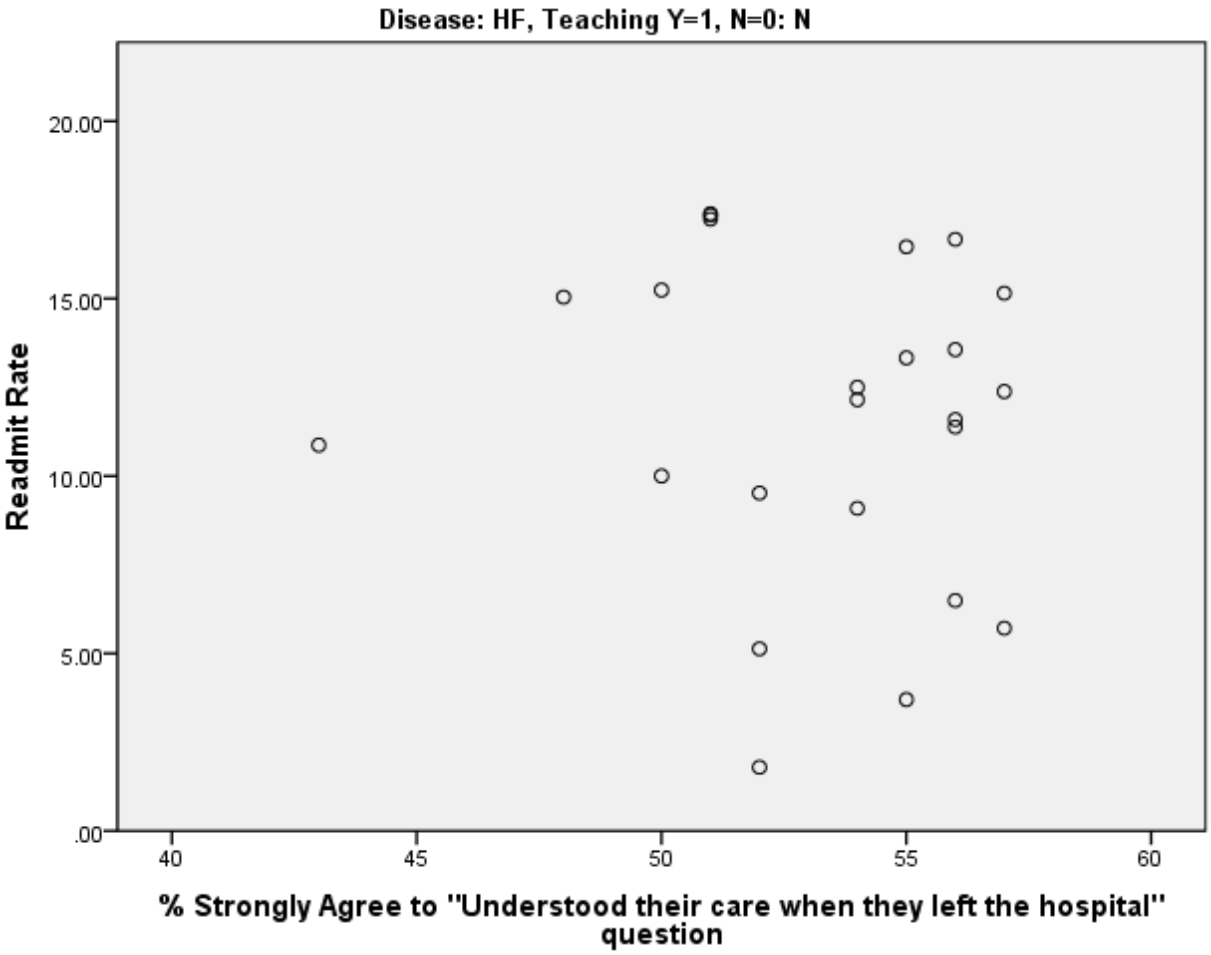

Figure B54. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more heart failure discharges.

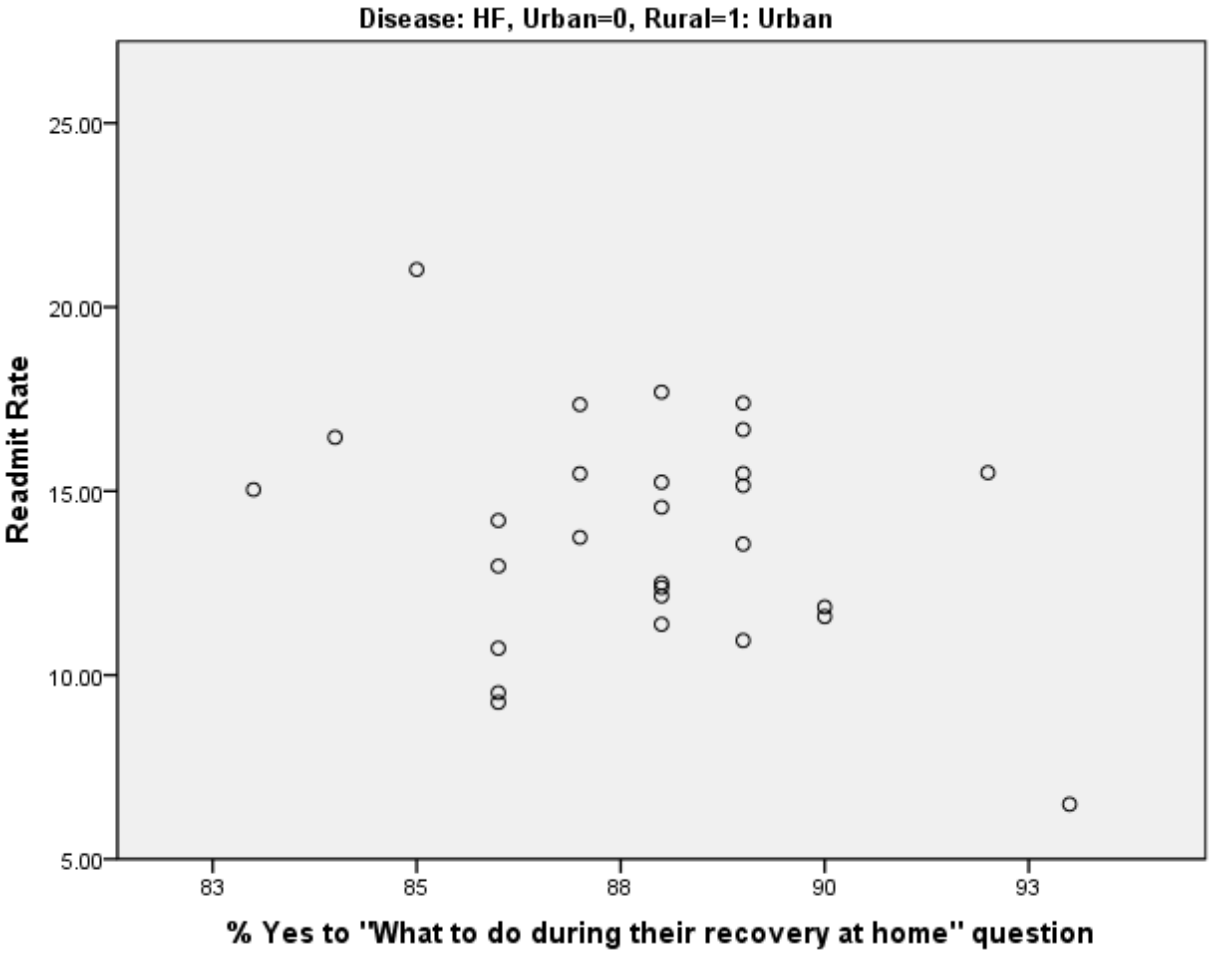

Figure B55. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for urban hospitals with 25 or more heart failure discharges.

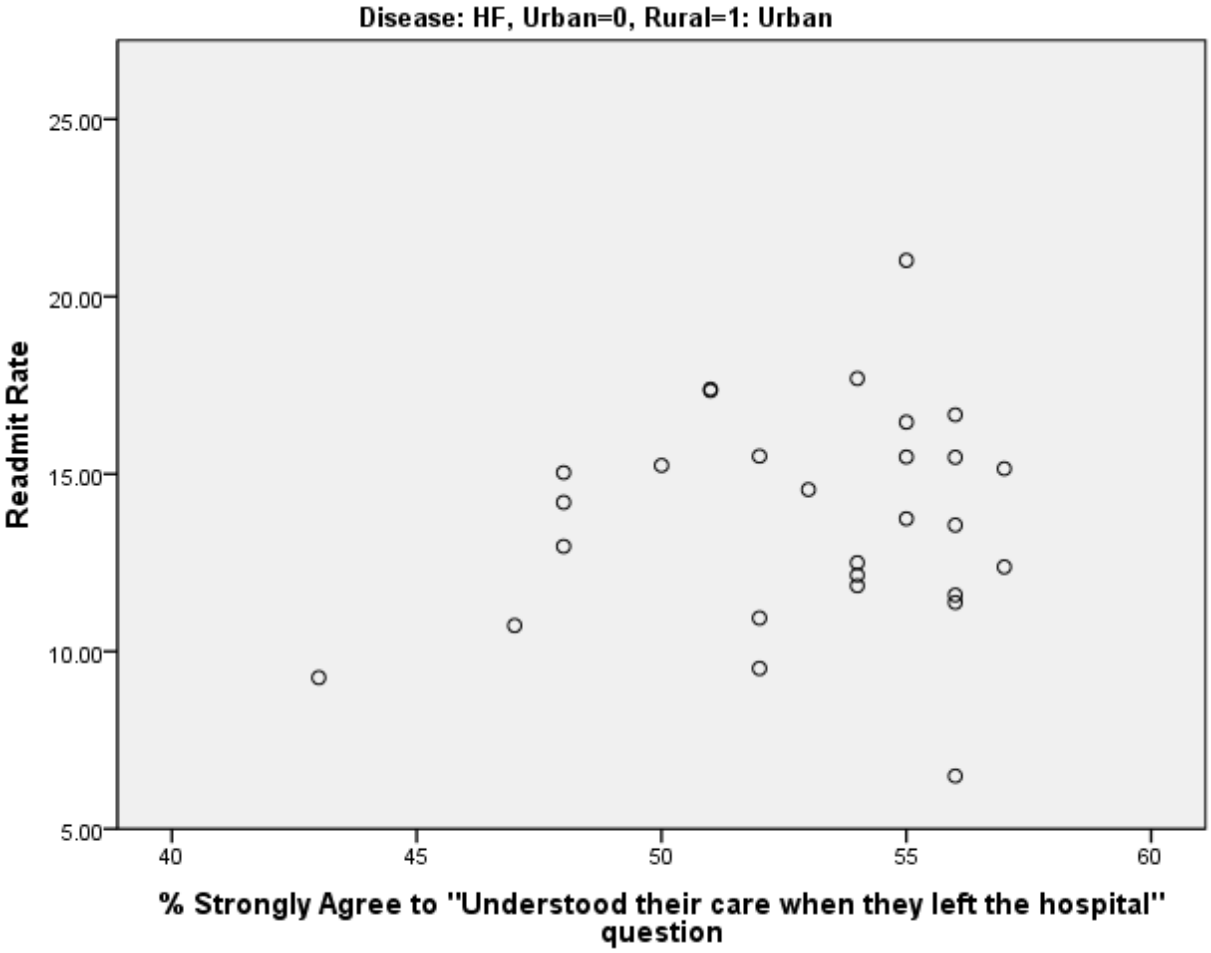

Figure B56. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for urban hospitals with 25 or more heart failure discharges.

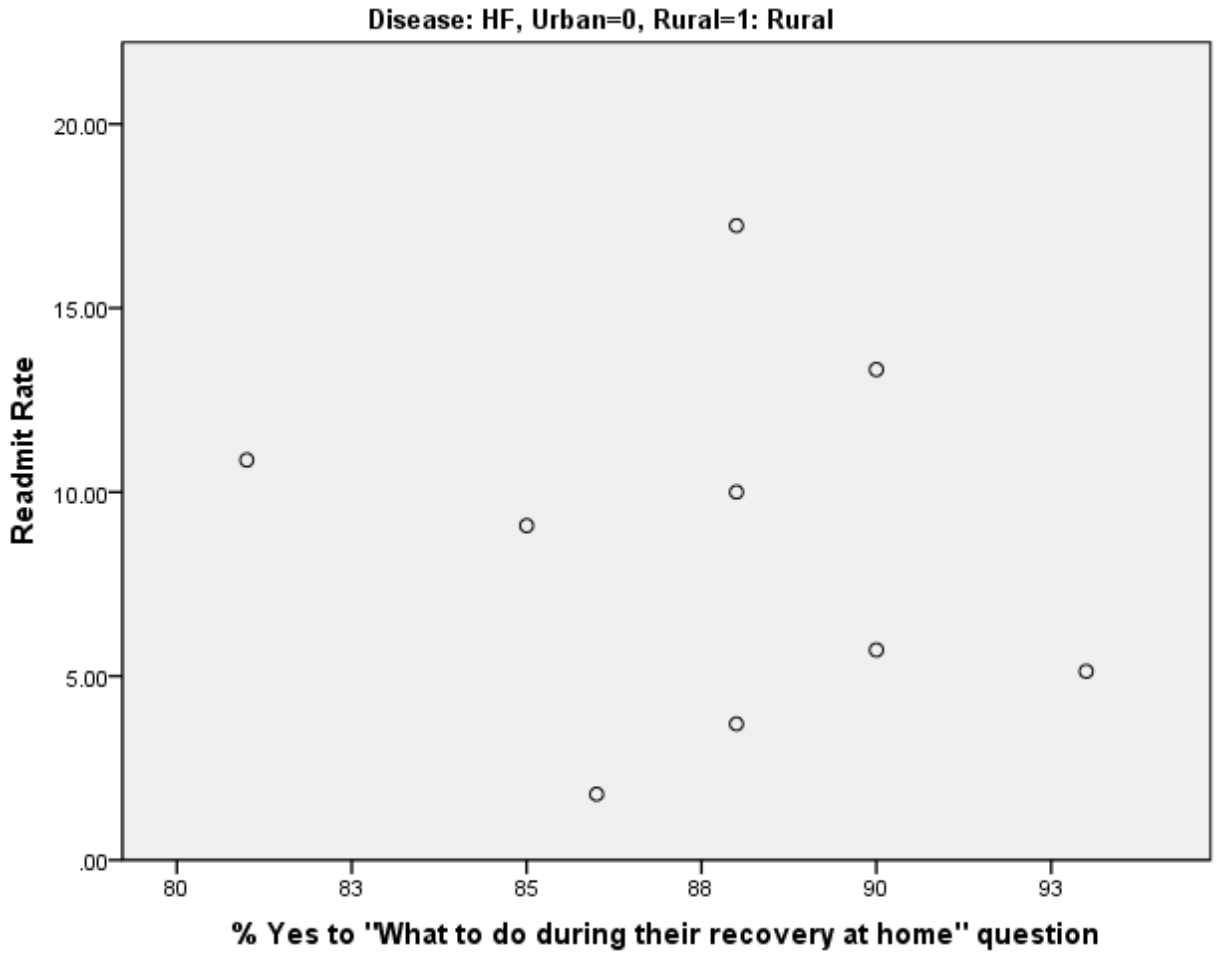

Figure B57. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for rural hospitals with 25 or more heart failure discharges.

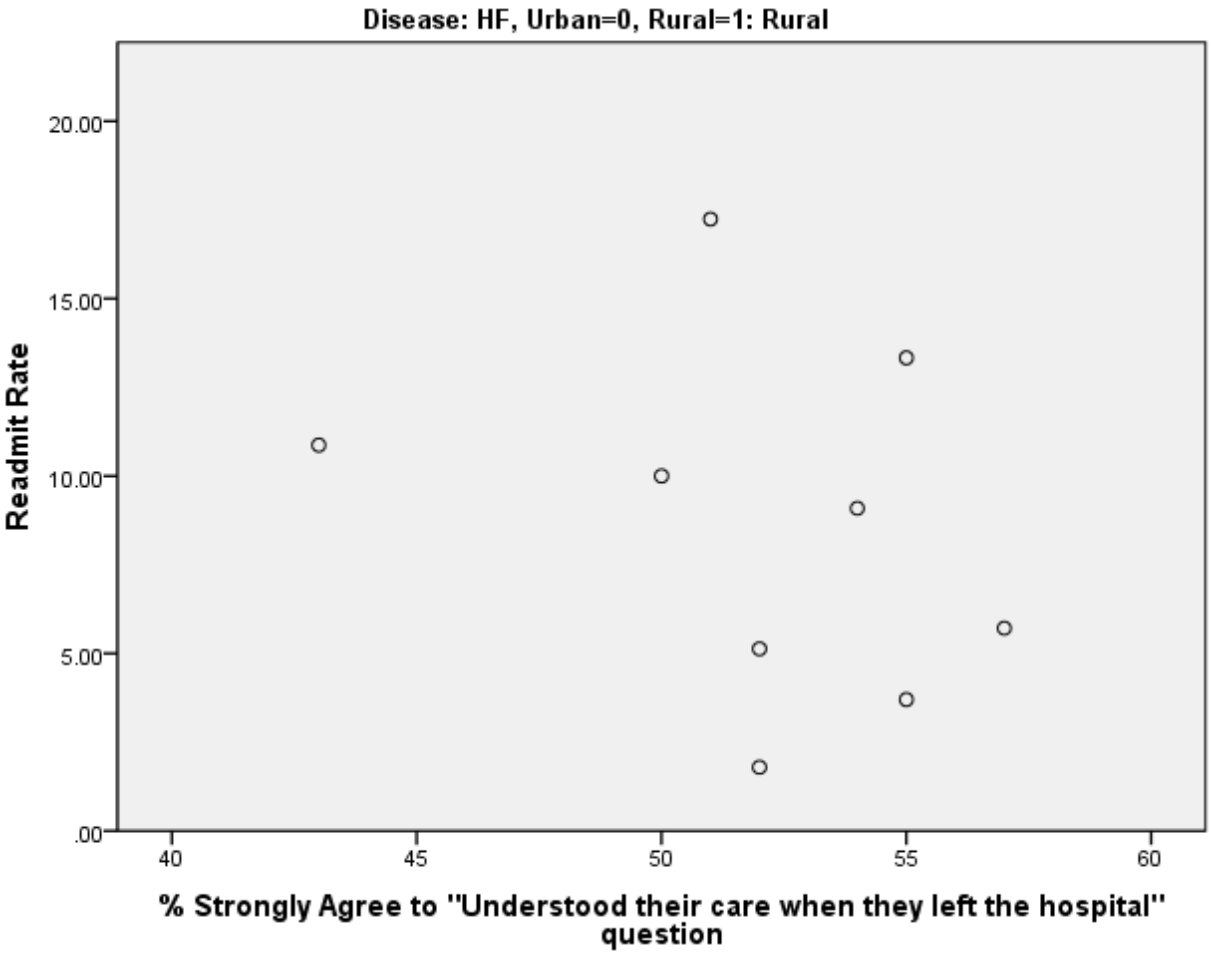

Figure B58. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for rural hospitals with 25 or more heart failure discharges.

Figure B59. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for small hospitals with 25 or more heart failure discharges.

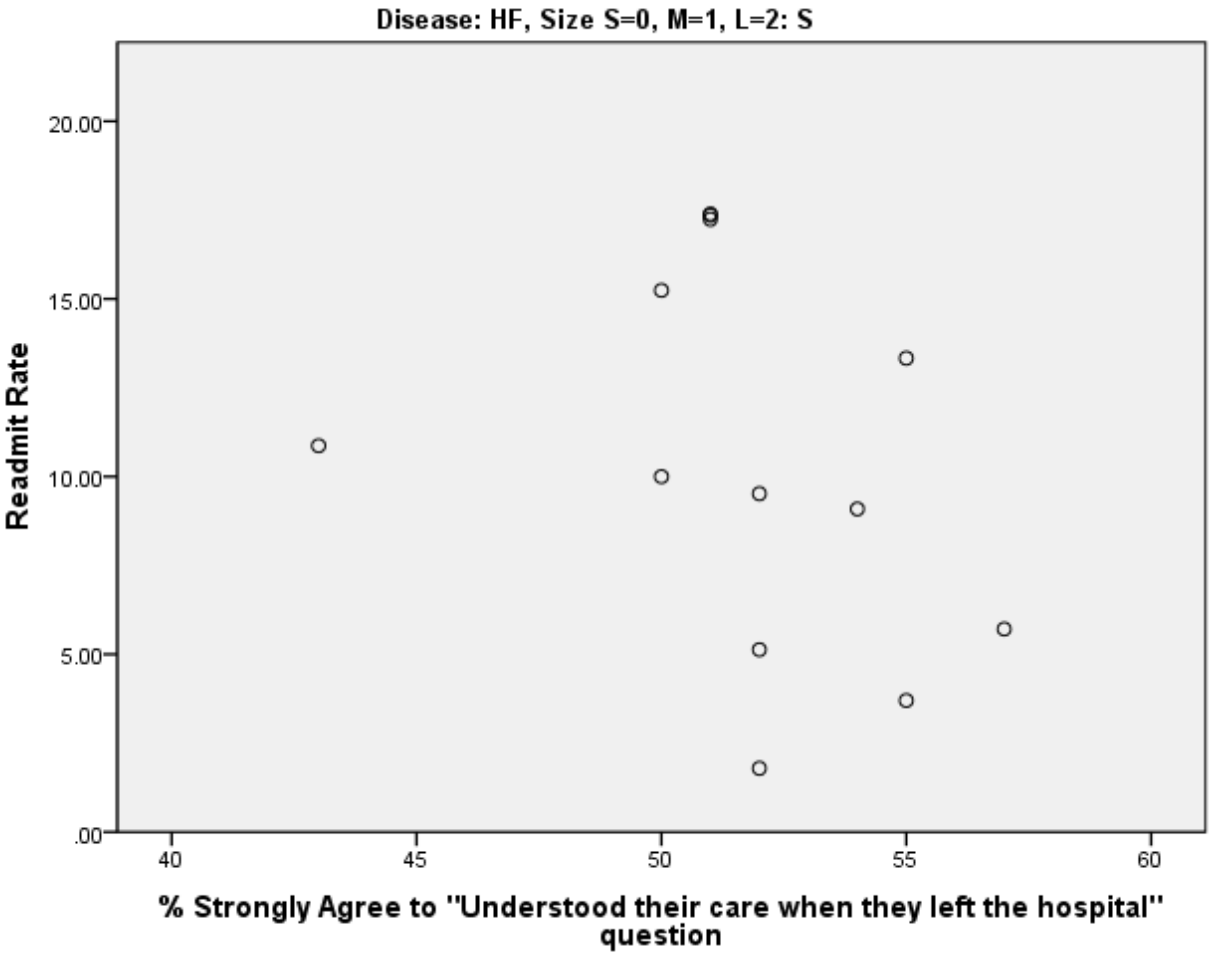

Figure B60. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for small hospitals with 25 or more heart failure discharges.

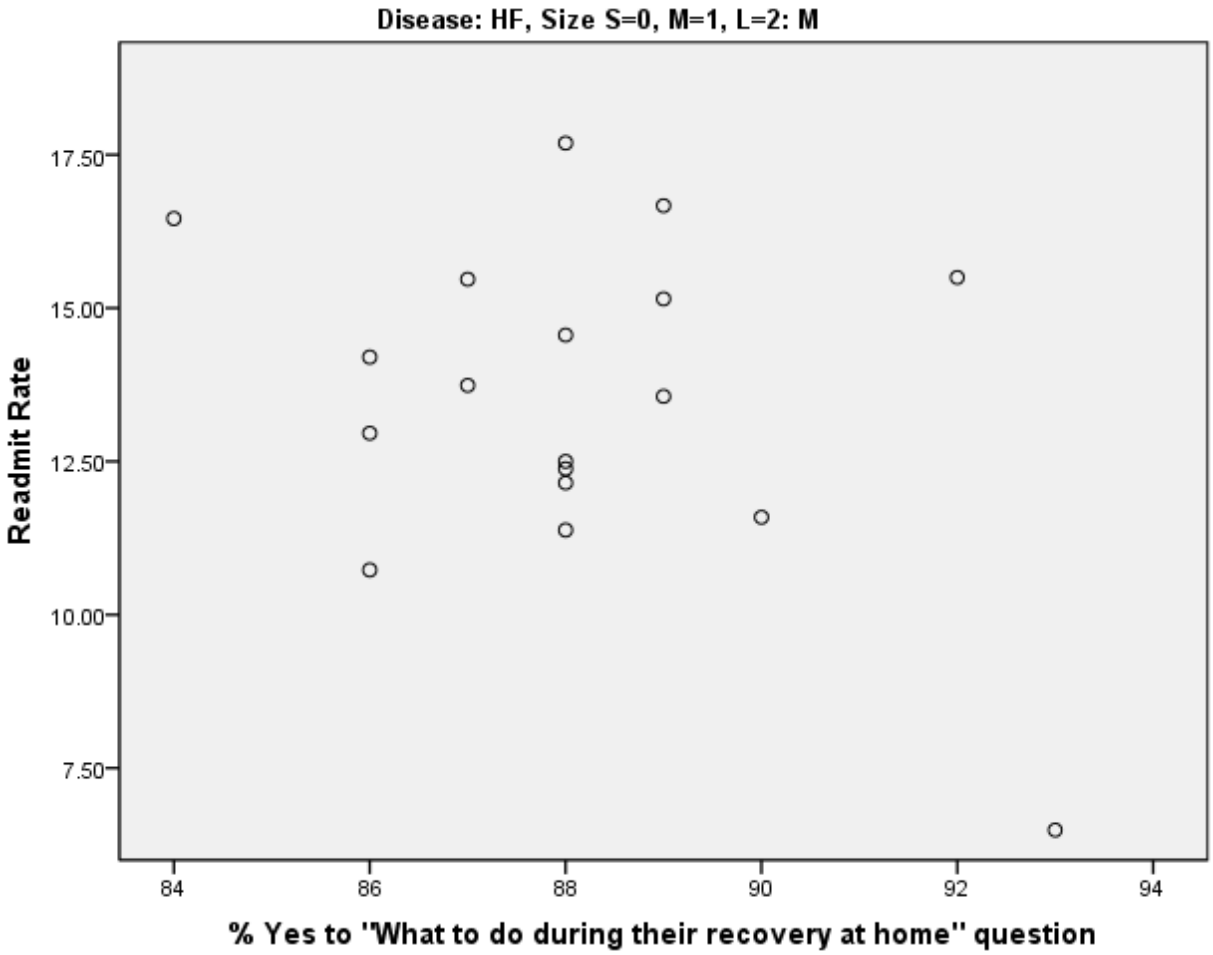

Figure B61. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for medium hospitals with 25 or more heart failure discharges.

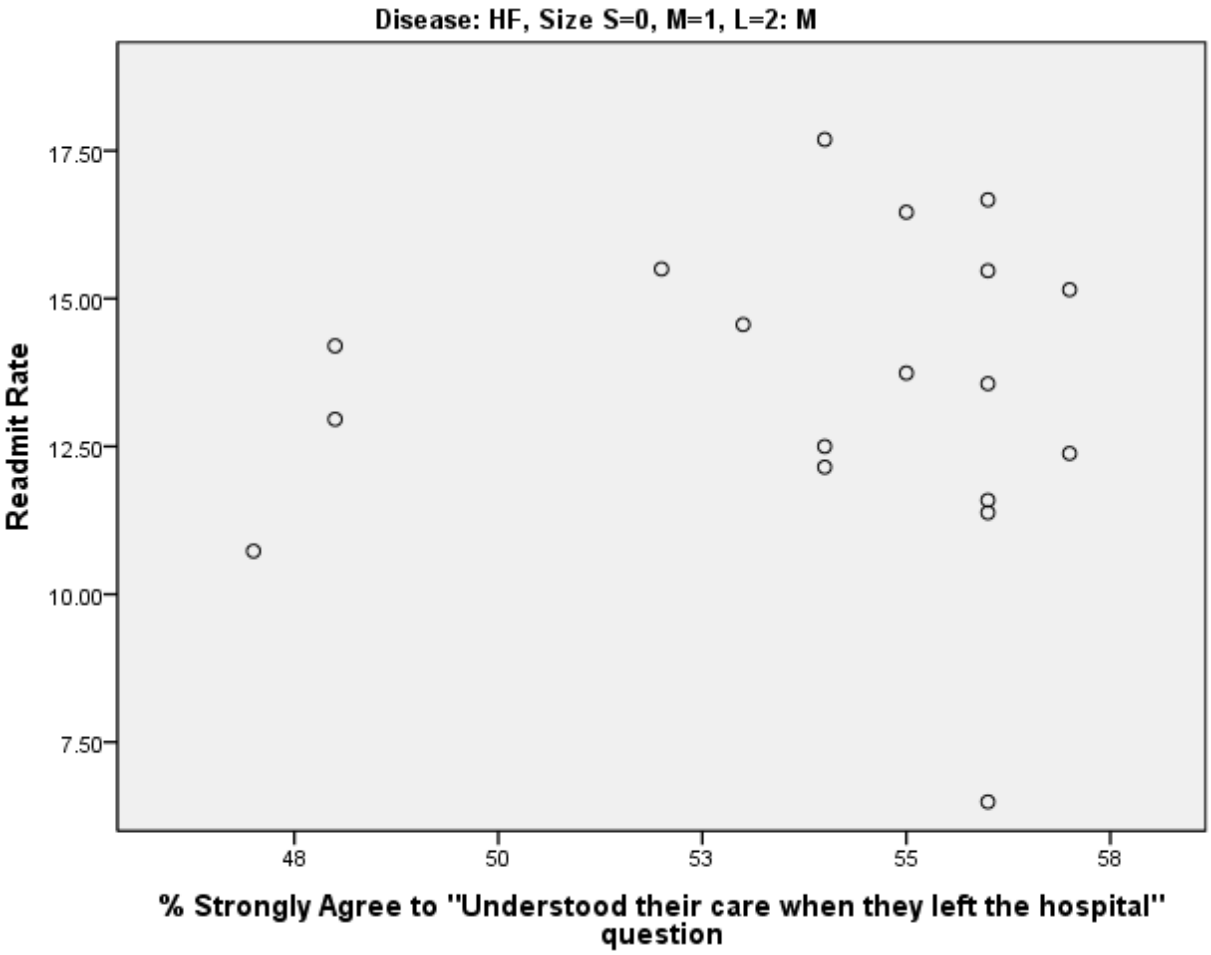

Figure B62. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for medium hospitals with 25 or more heart failure discharges.

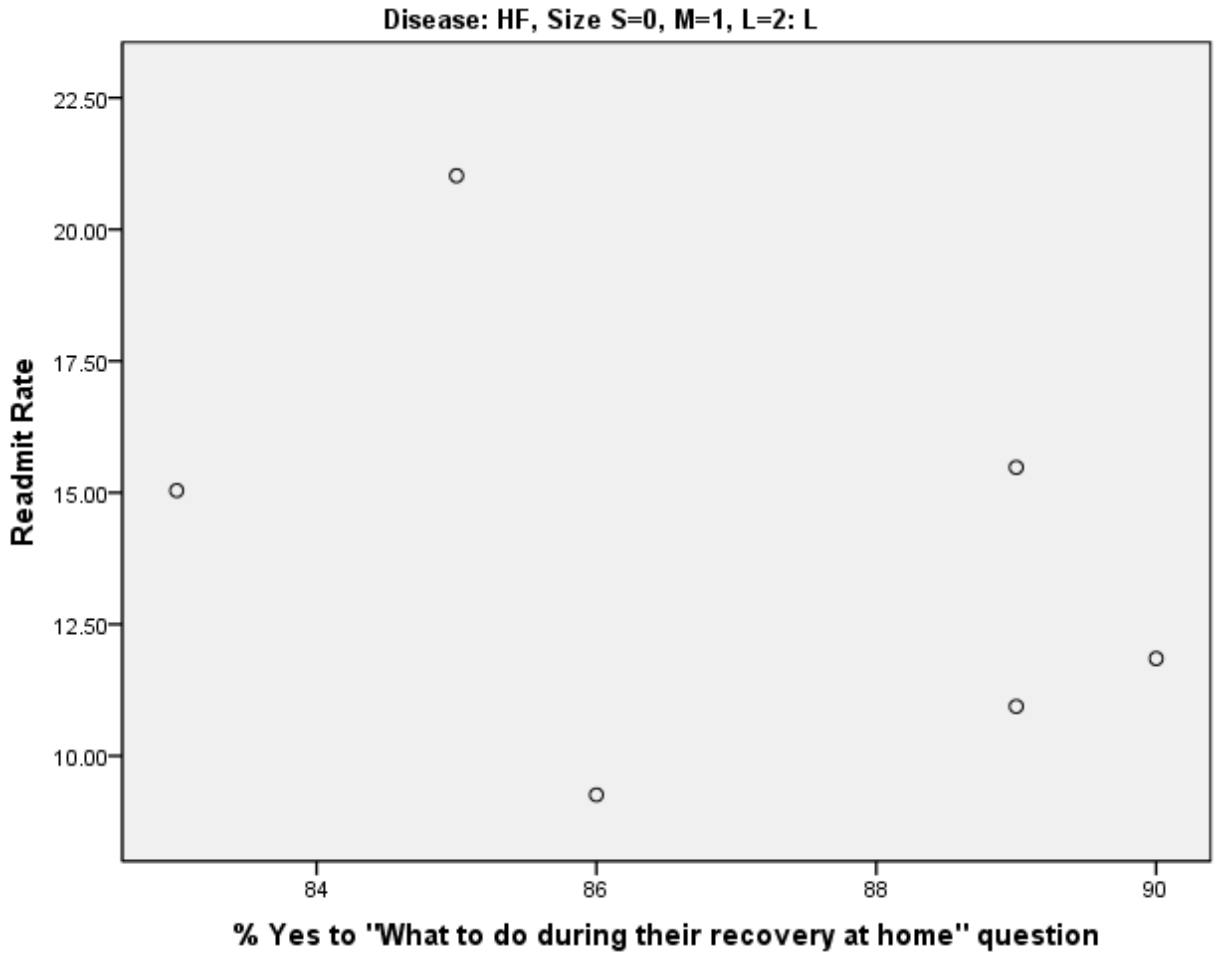

Figure B63. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for large hospitals with 25 or more heart failure discharges.

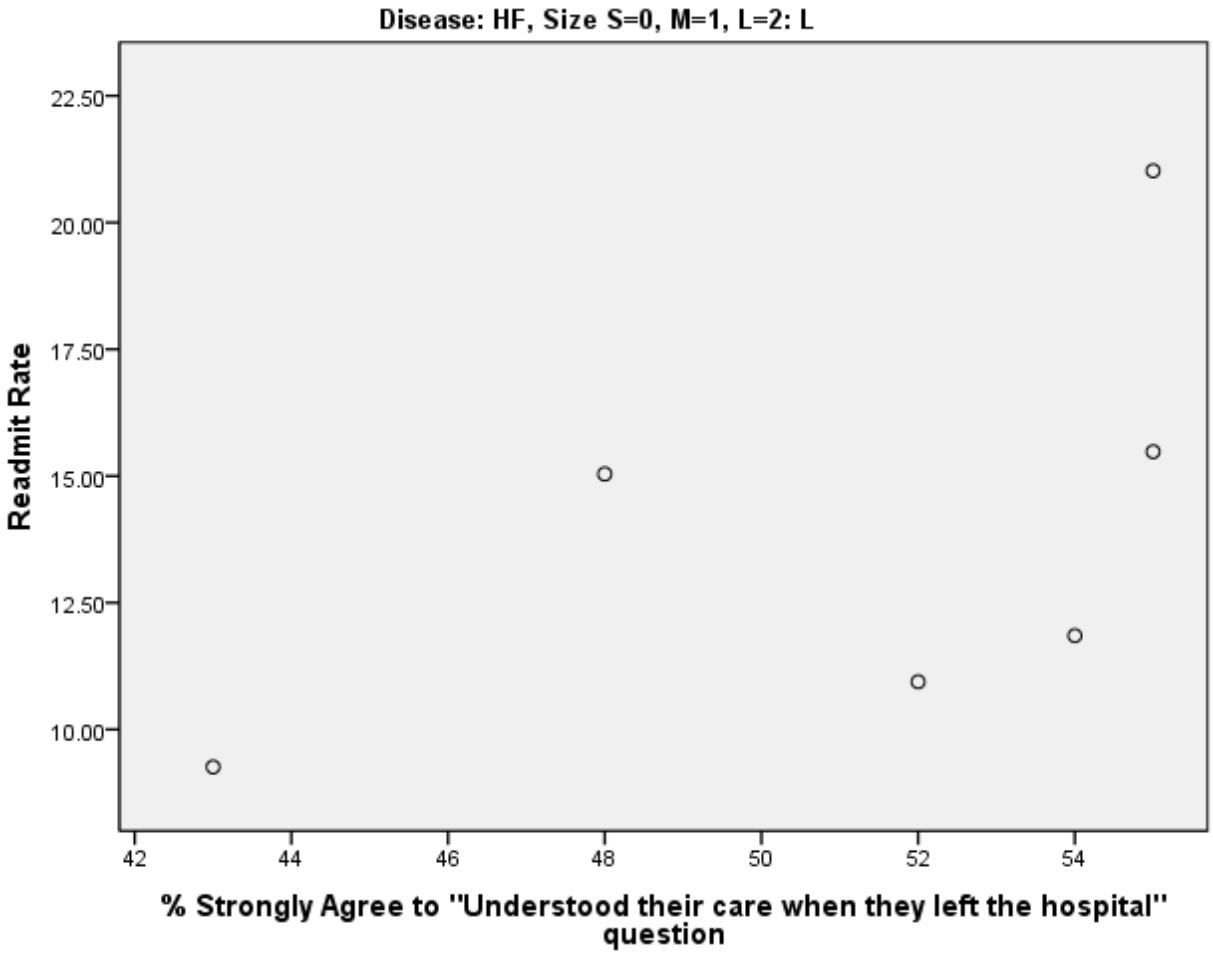

Figure B64. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for large hospitals with 25 or more heart failure discharges.

Figure B65. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for all hospitals with 25 or more pneumonia discharges.

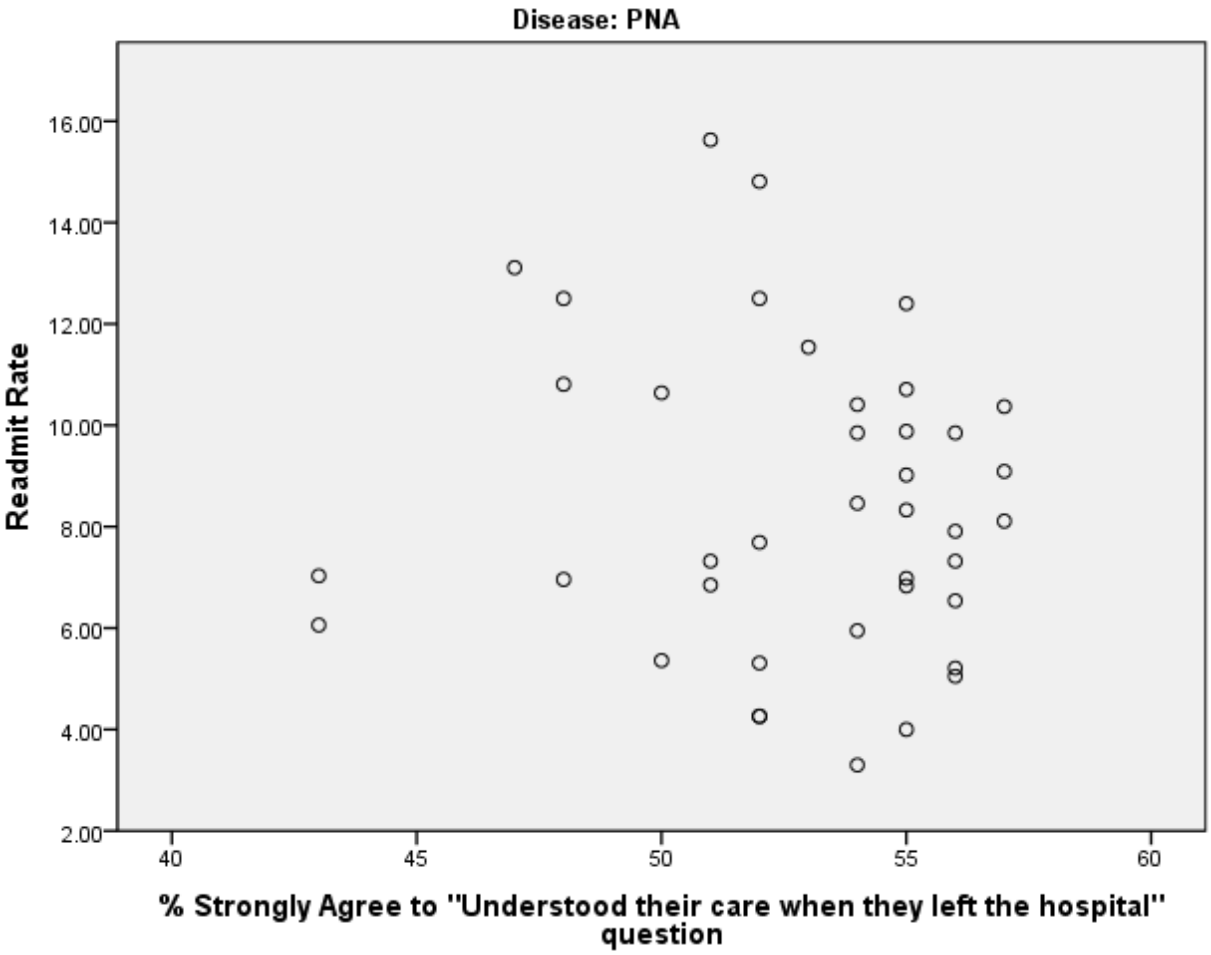

Figure B66. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all hospitals with 25 or more pneumonia discharges.

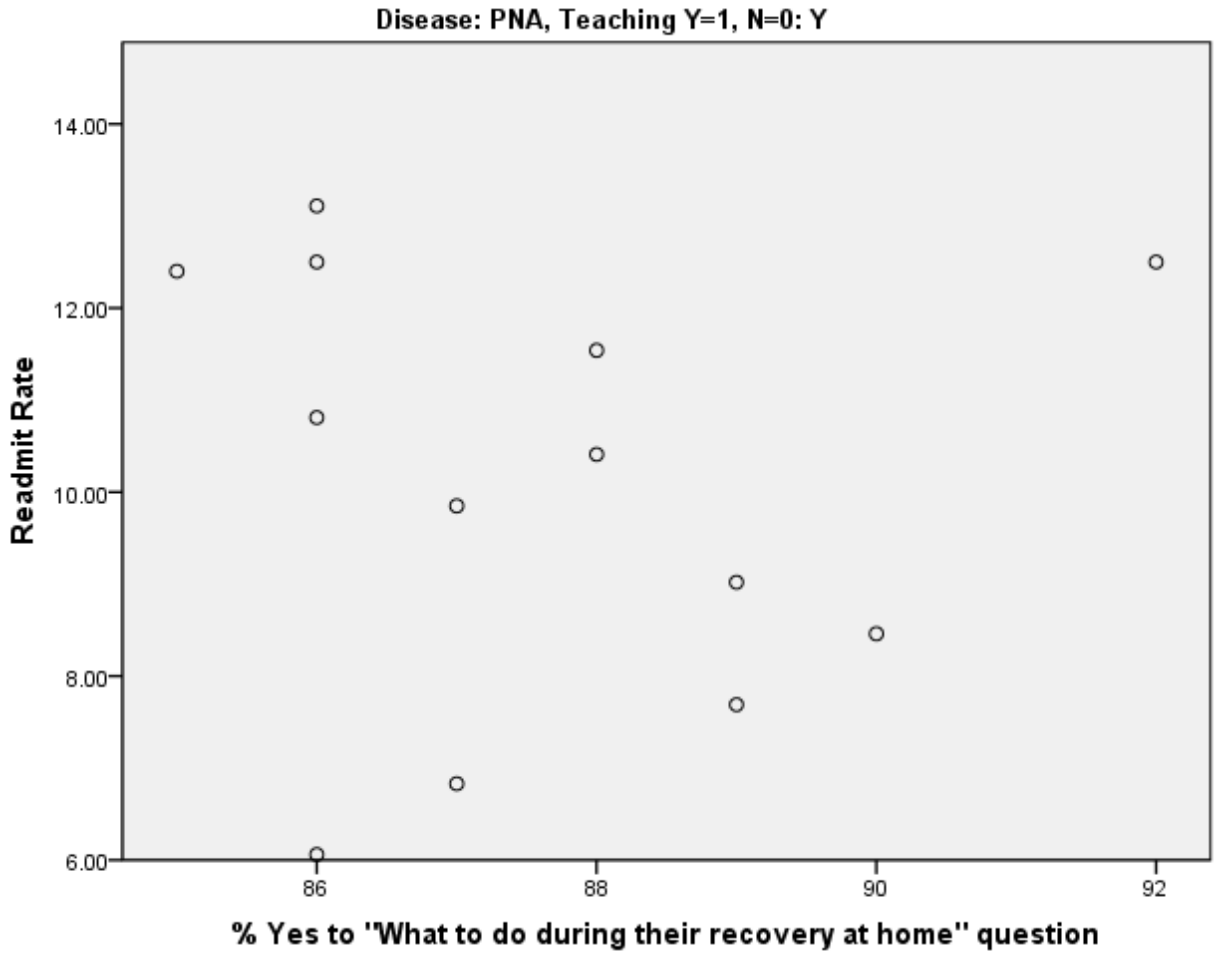

Figure 67. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for teaching hospitals with 25 or more pneumonia discharges.

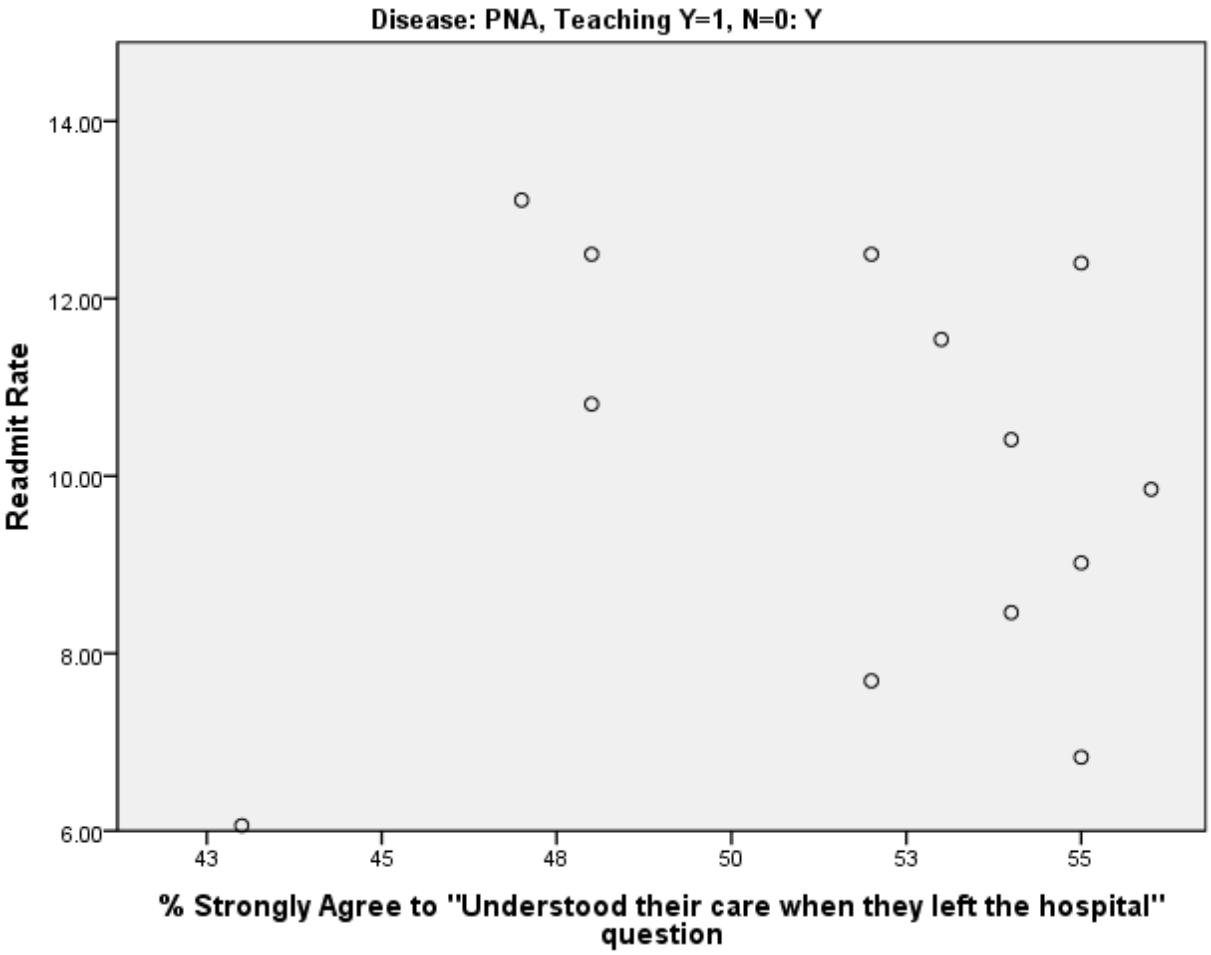

Figure B68. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for teaching hospitals with 25 or more pneumonia discharges.

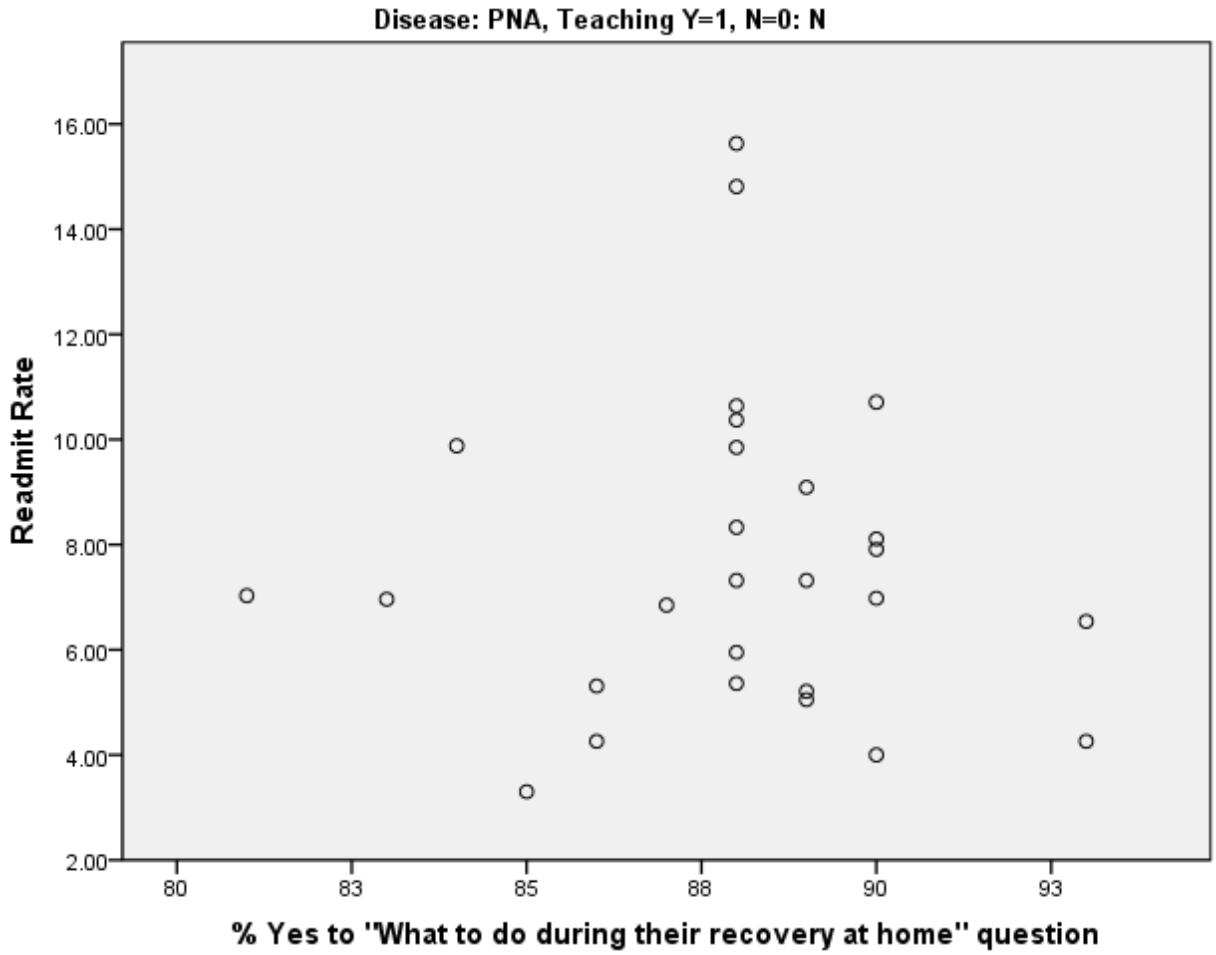

Figure B69. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more pneumonia discharges.

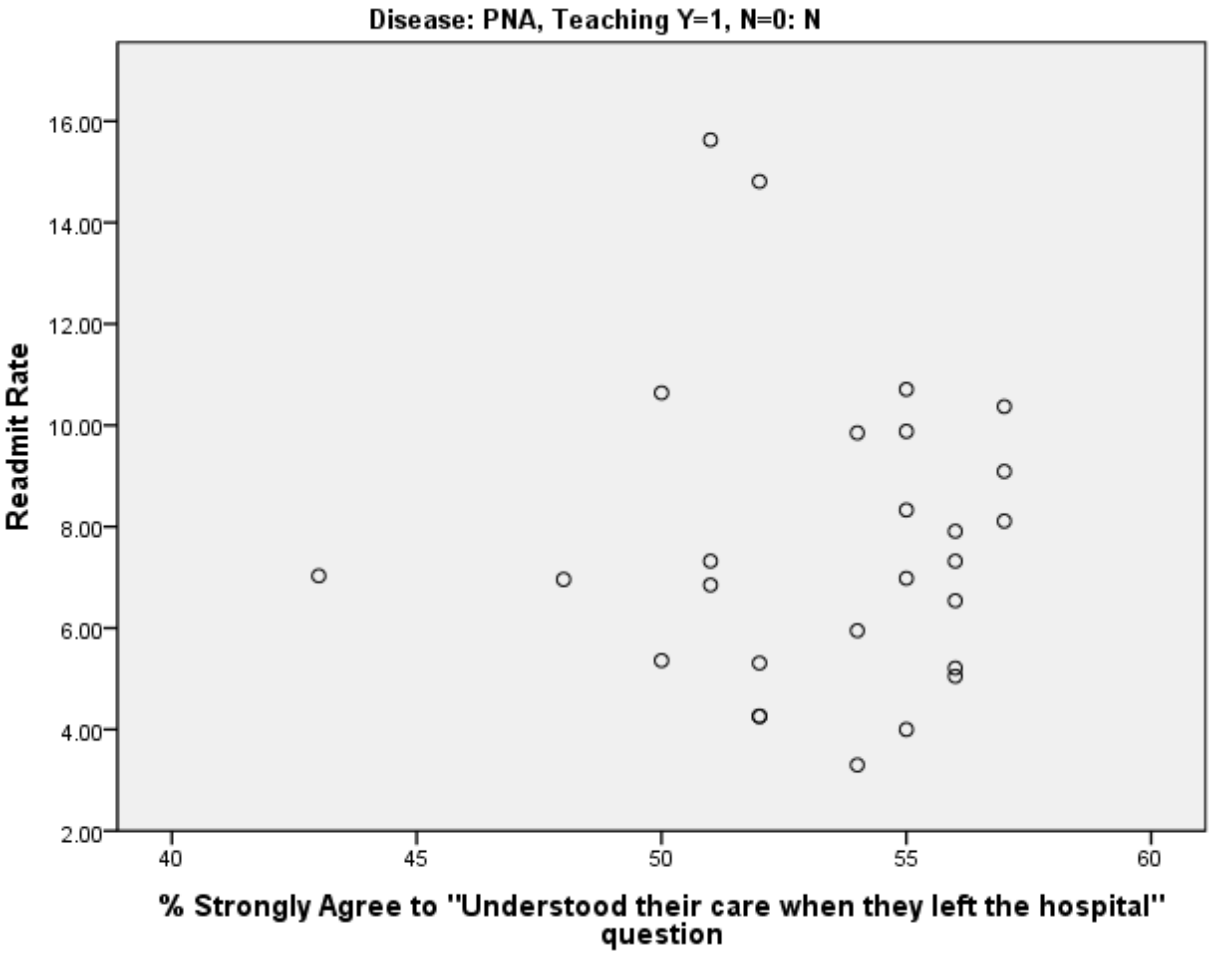

Figure B70. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more pneumonia discharges.

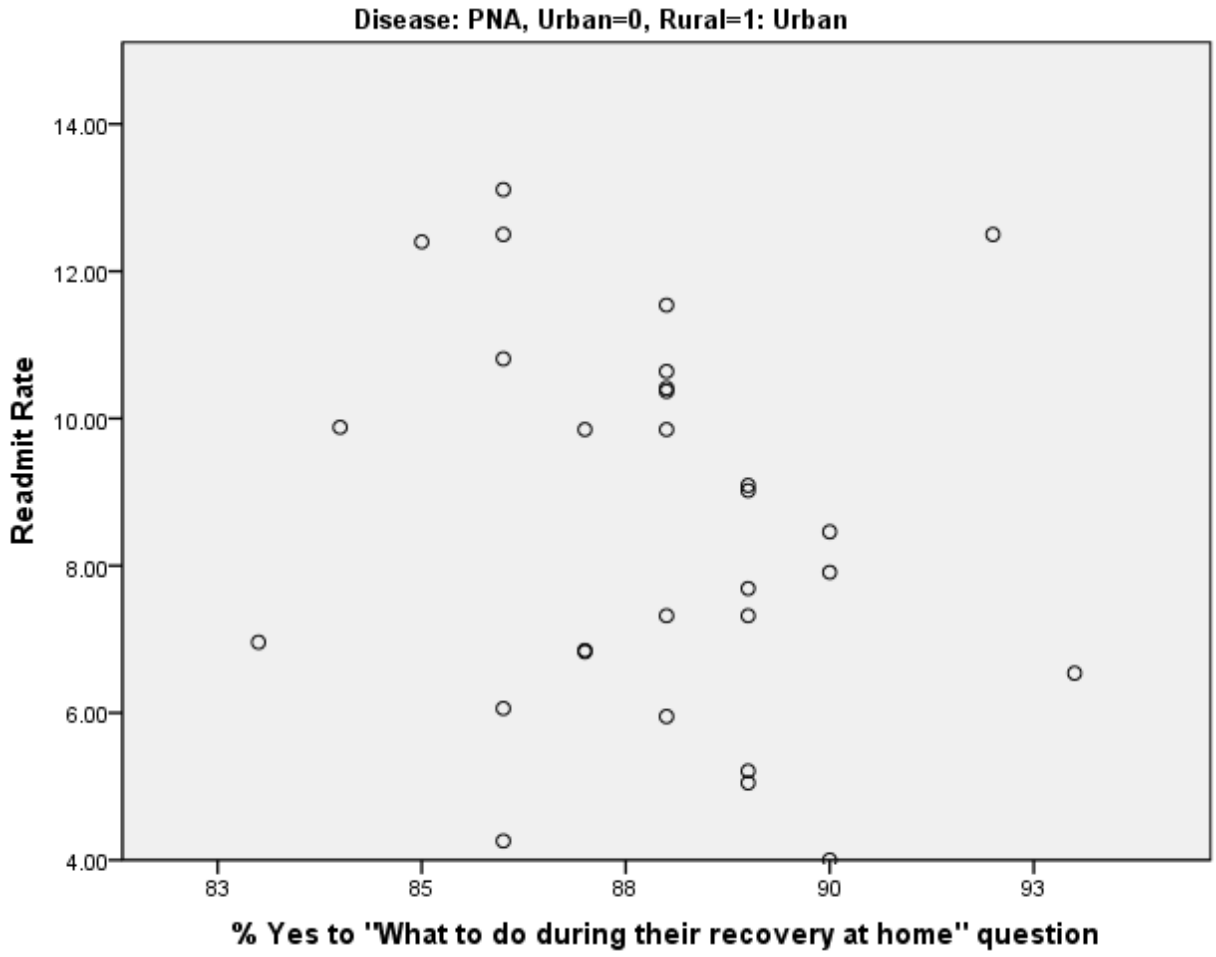

Figure B71. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for urban hospitals with 25 or more pneumonia discharges.

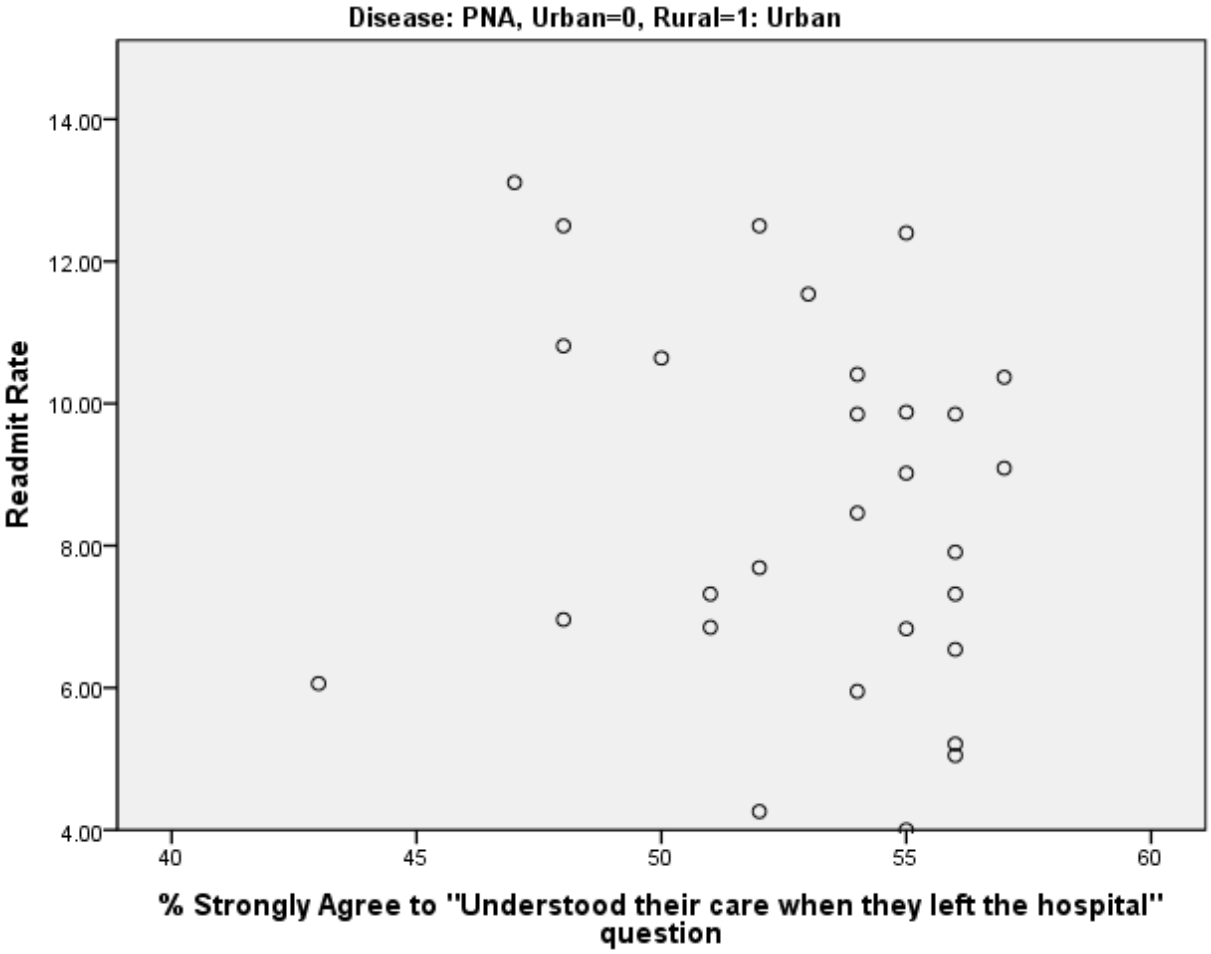

Figure B72. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for urban hospitals with 25 or more pneumonia discharges.

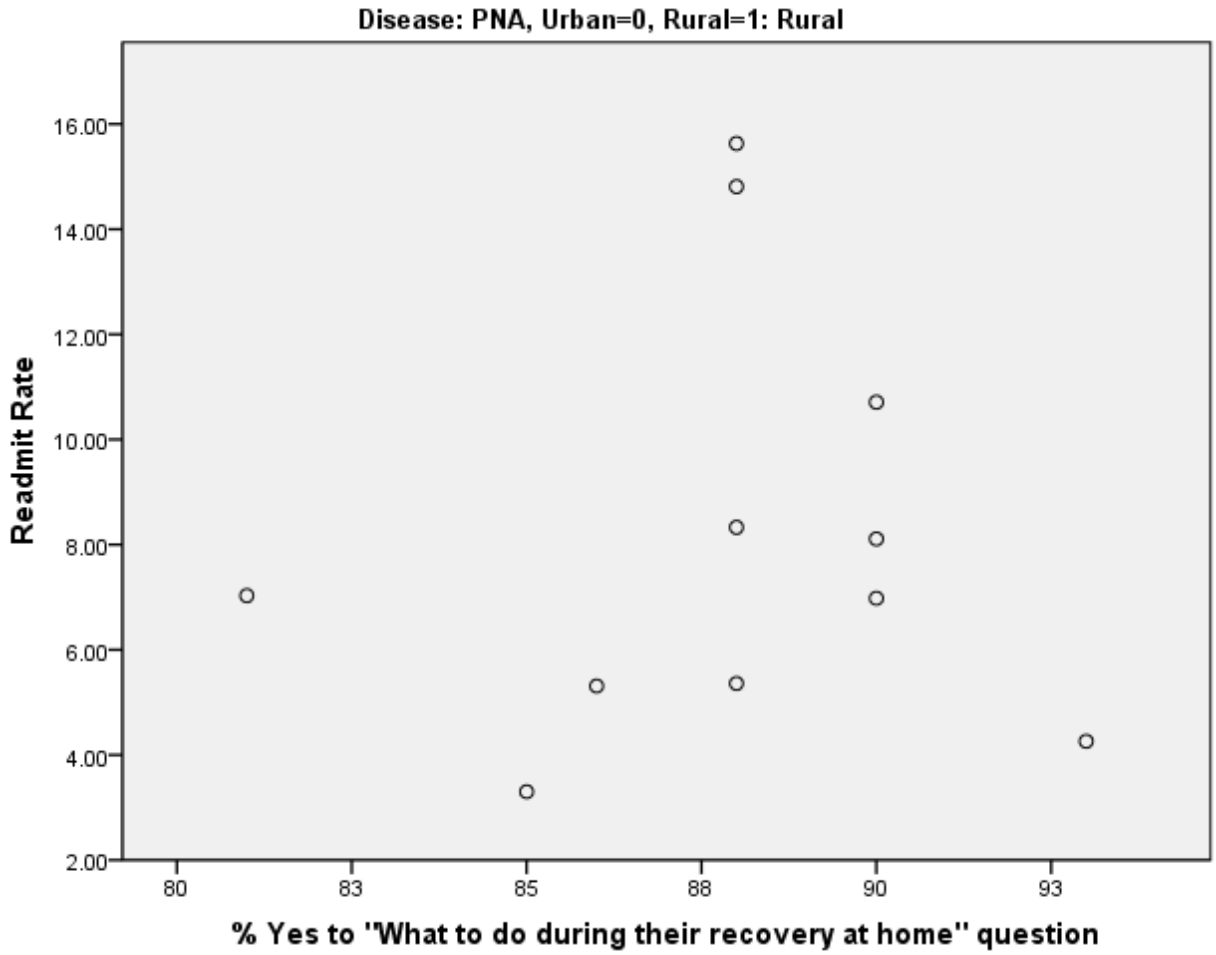

Figure B73. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for rural hospitals with 25 or more pneumonia discharges.

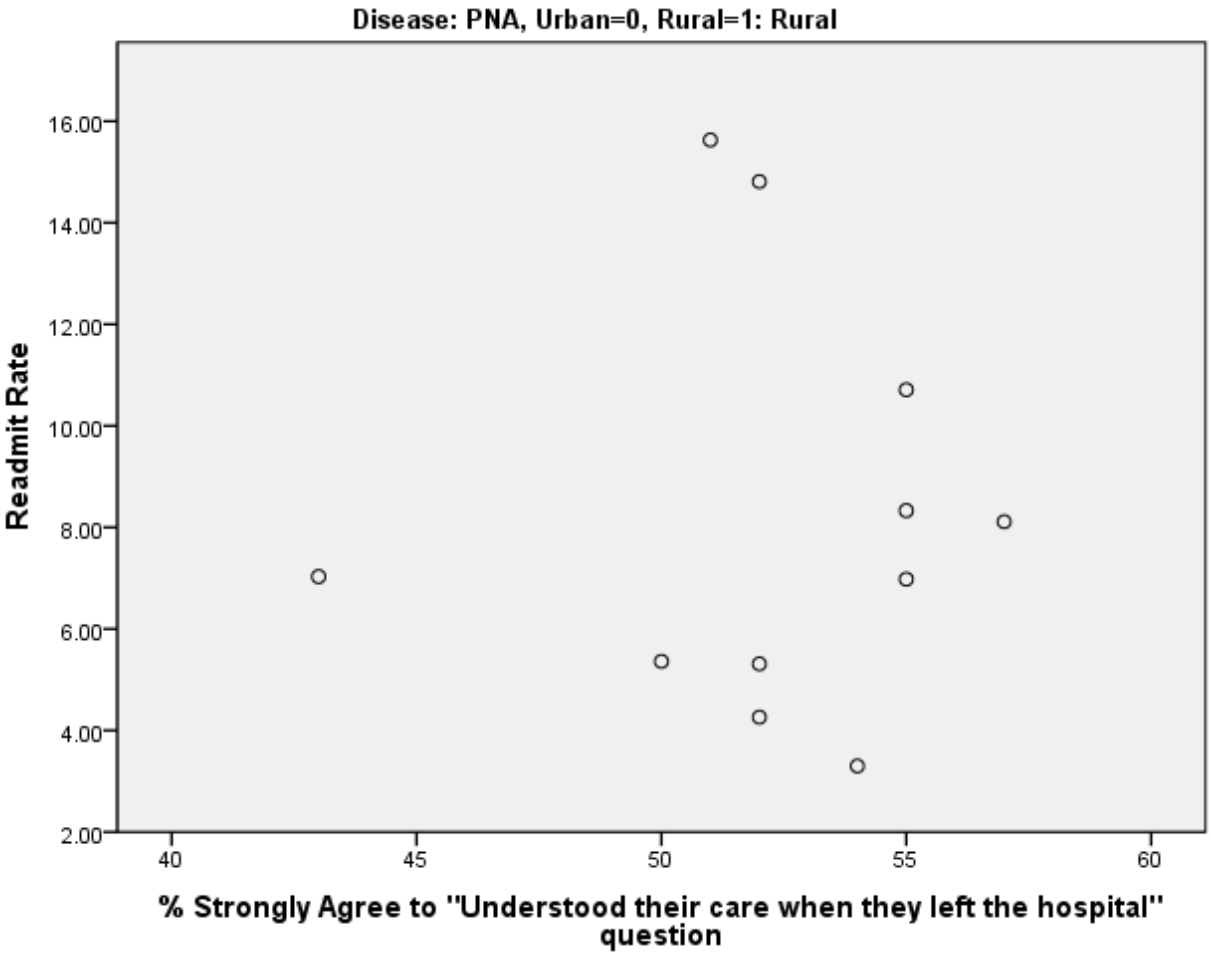

Figure B74. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for rural hospitals with 25 or more pneumonia discharges.

Figure B75. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for small hospitals with 25 or more pneumonia discharges.

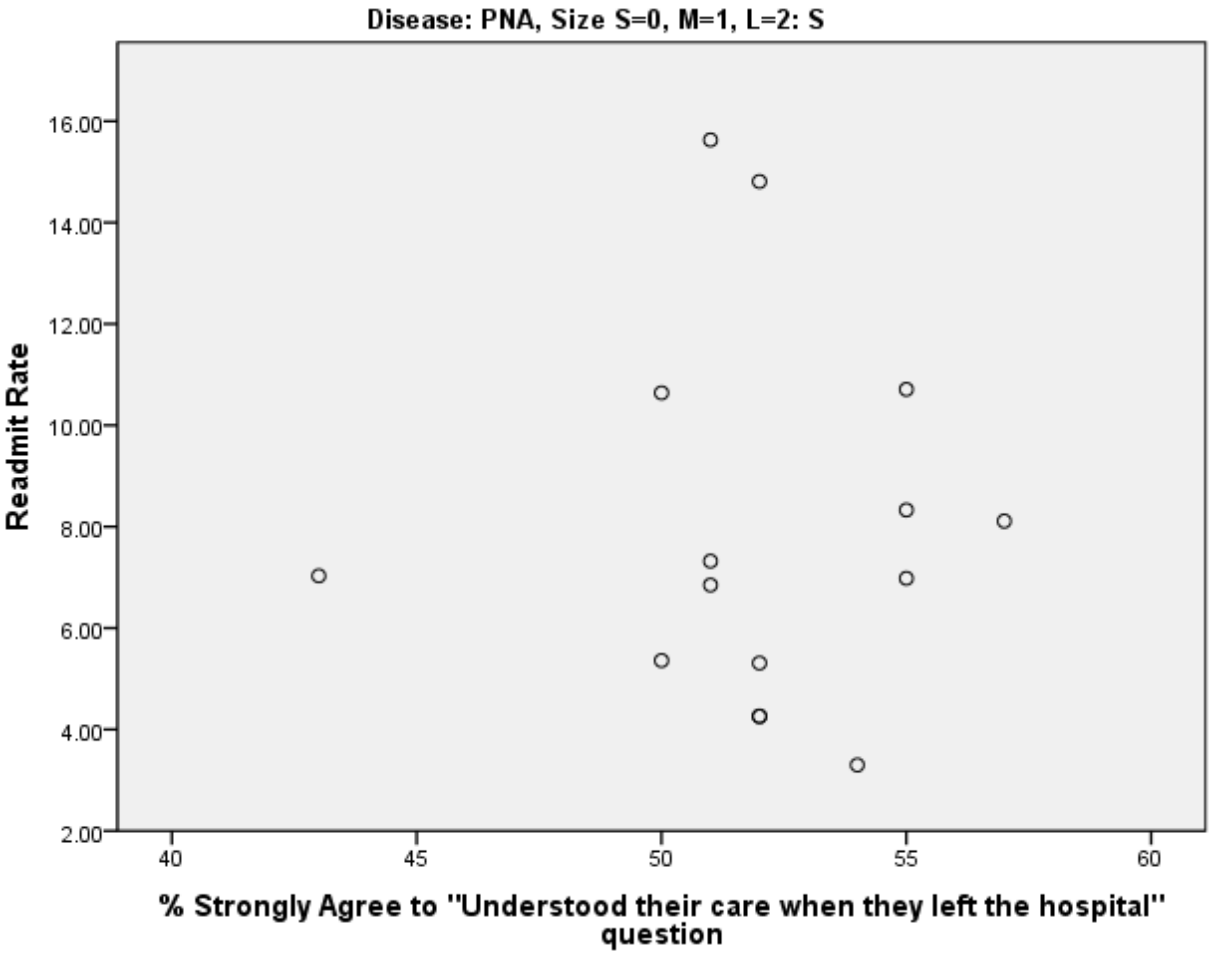

Figure B76. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for small hospitals with 25 or more pneumonia discharges.

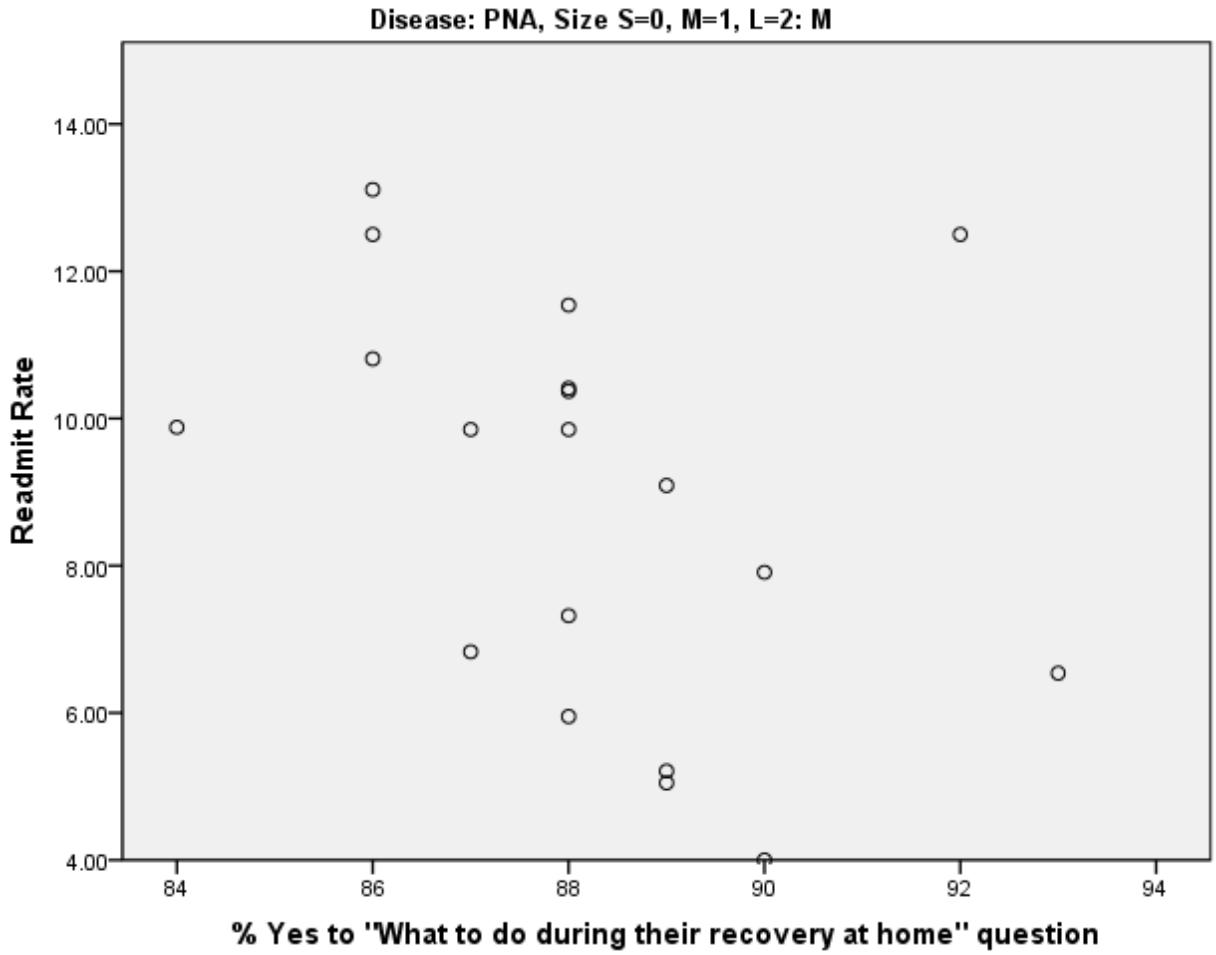

Figure B77. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for medium hospitals with 25 or more pneumonia discharges.

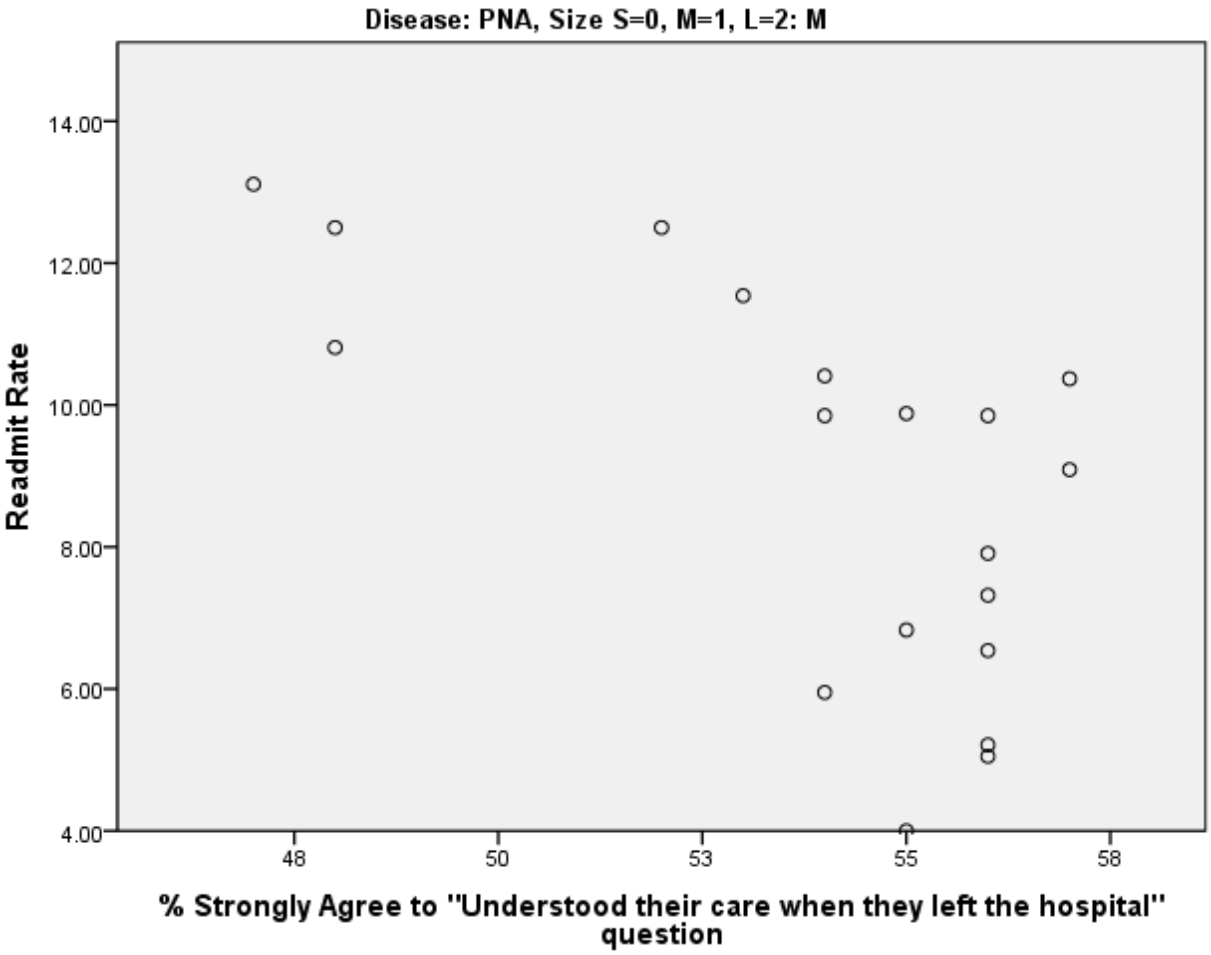

Figure B78. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for medium hospitals with 25 or more pneumonia discharges.

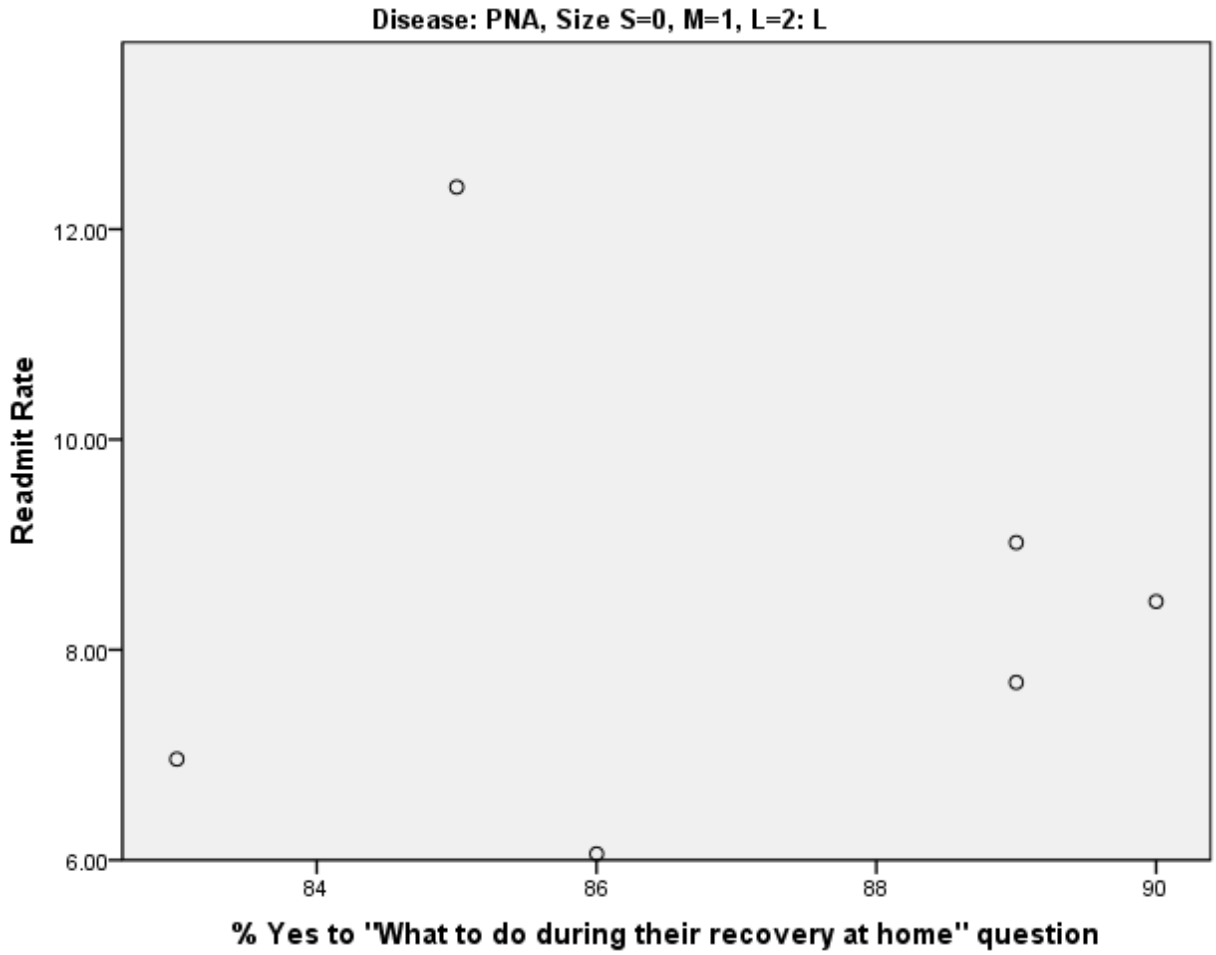

Figure B79. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for large hospitals with 25 or more pneumonia discharges.

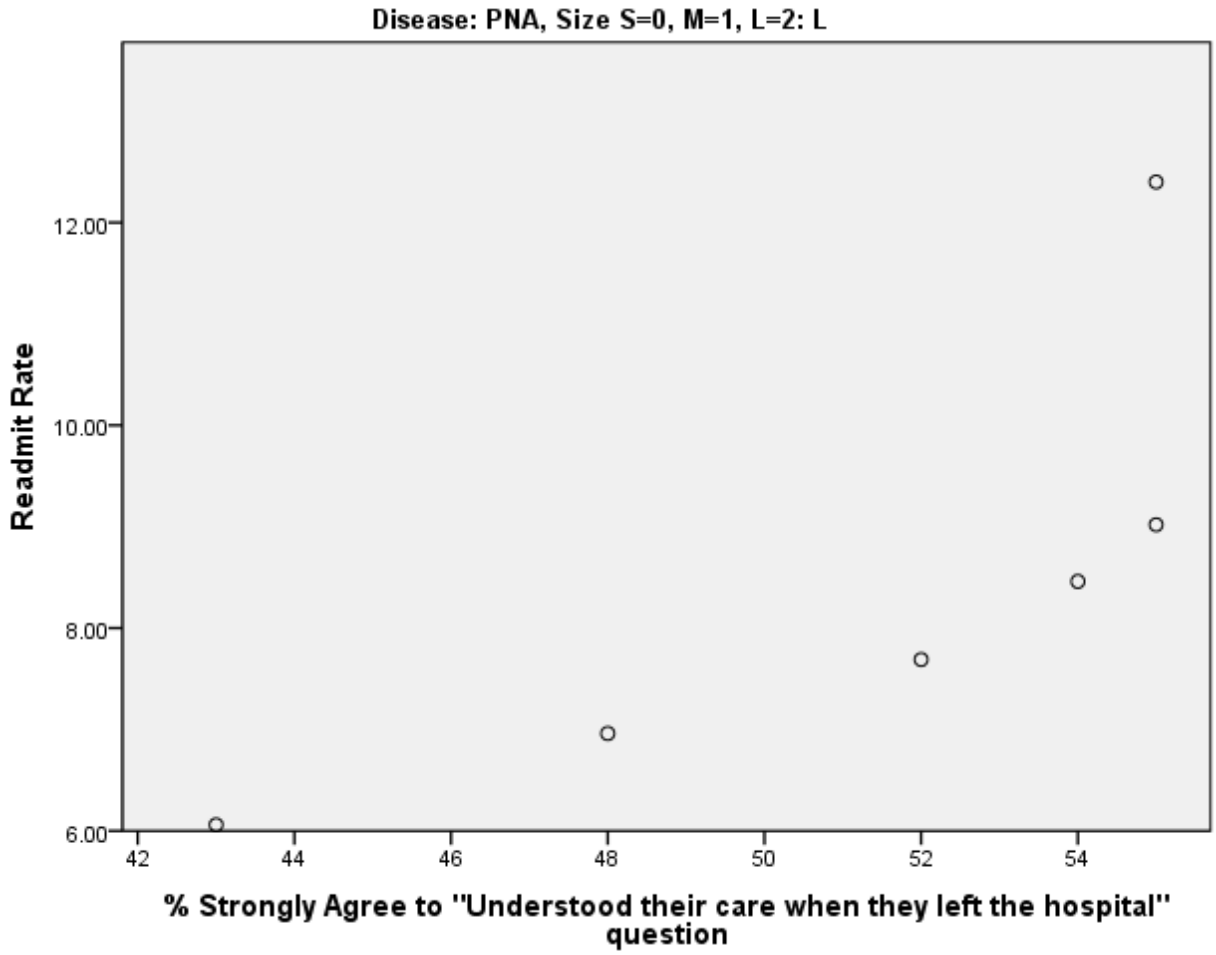

Figure B80. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for large hospitals with 25 or more pneumonia discharges.

Figure B81. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for all hospitals with 25 or more pneumonia discharges.

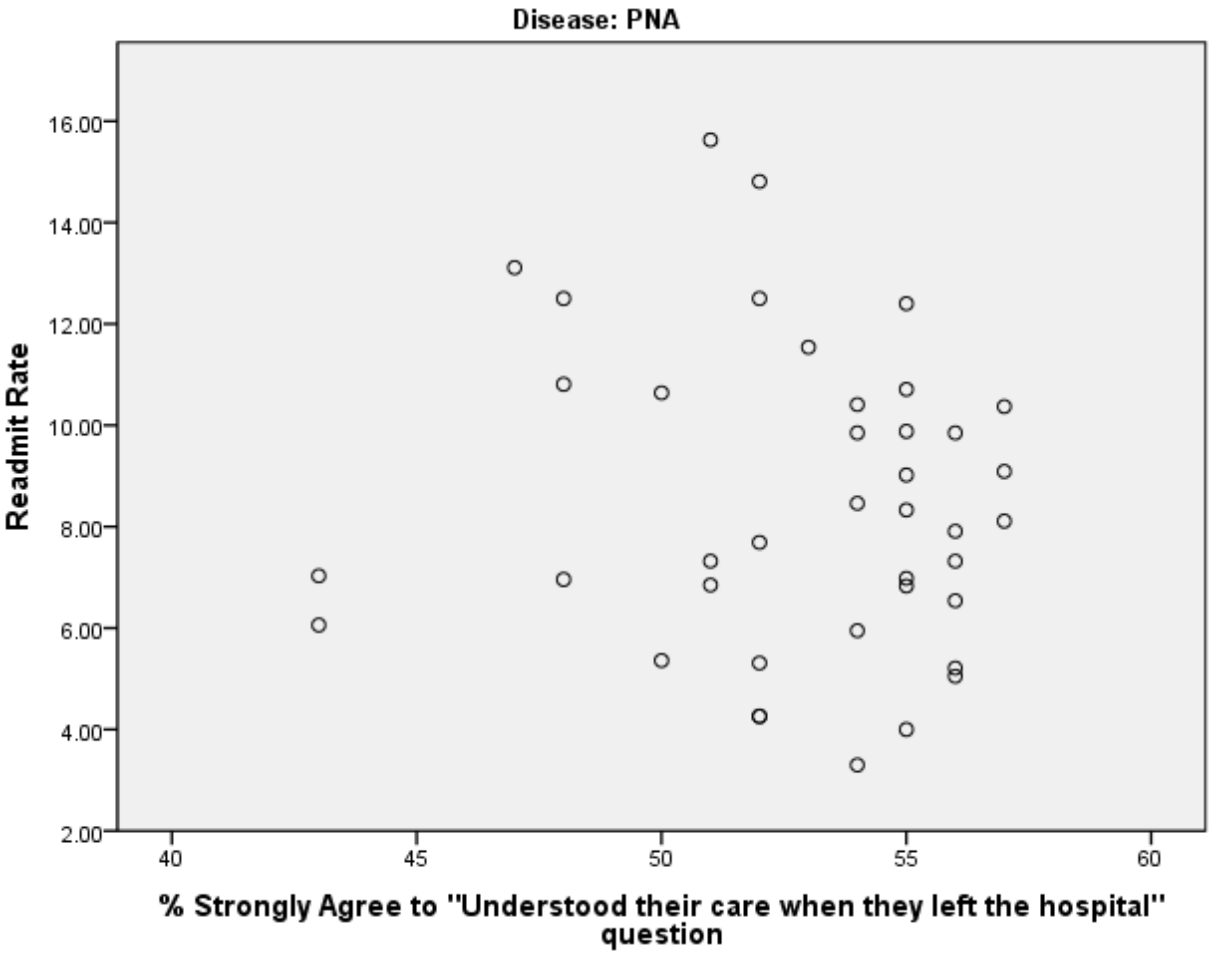

Figure B82. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all hospitals with 25 or more pneumonia discharges.

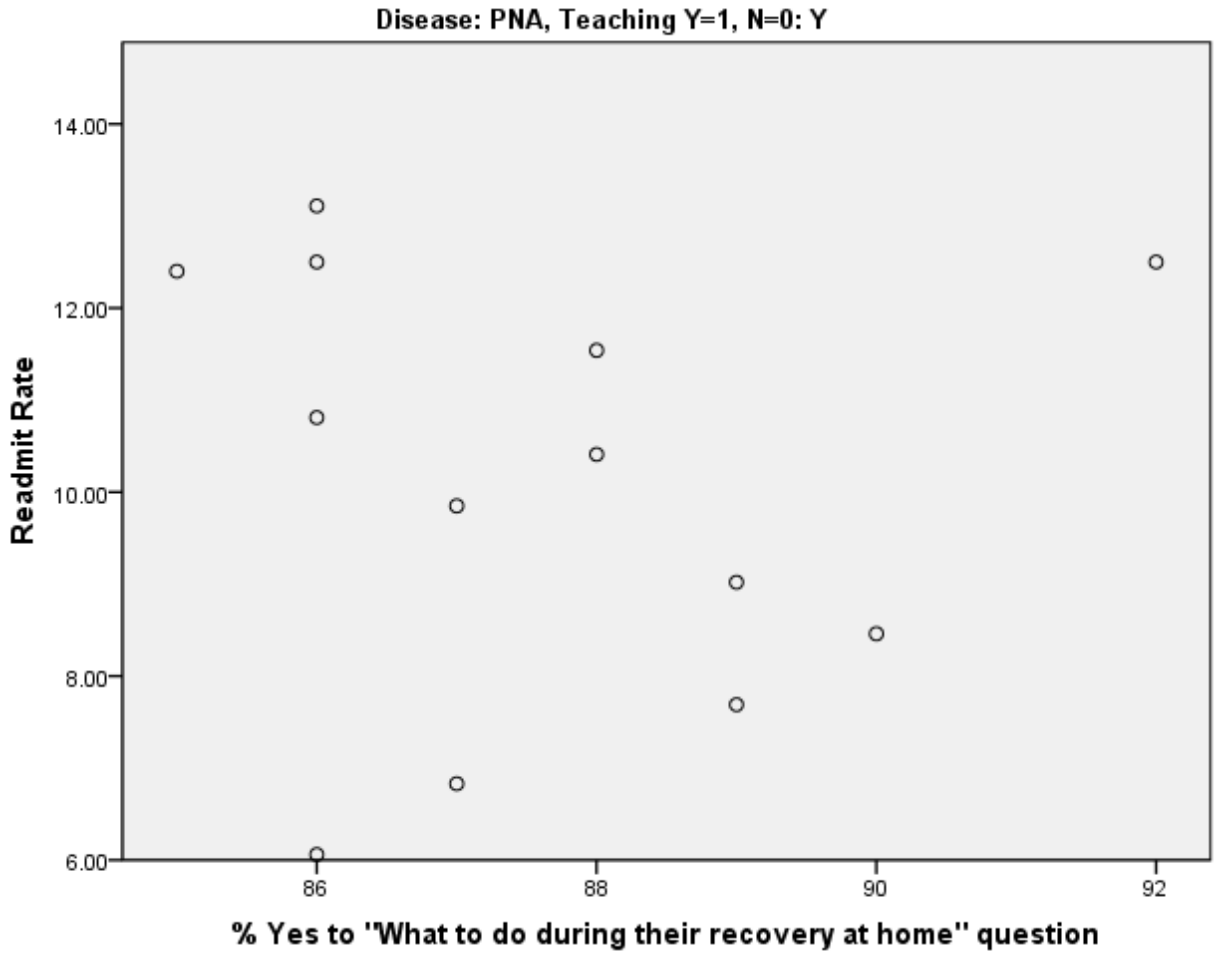

Figure B83. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for teaching hospitals with 25 or more pneumonia discharges.

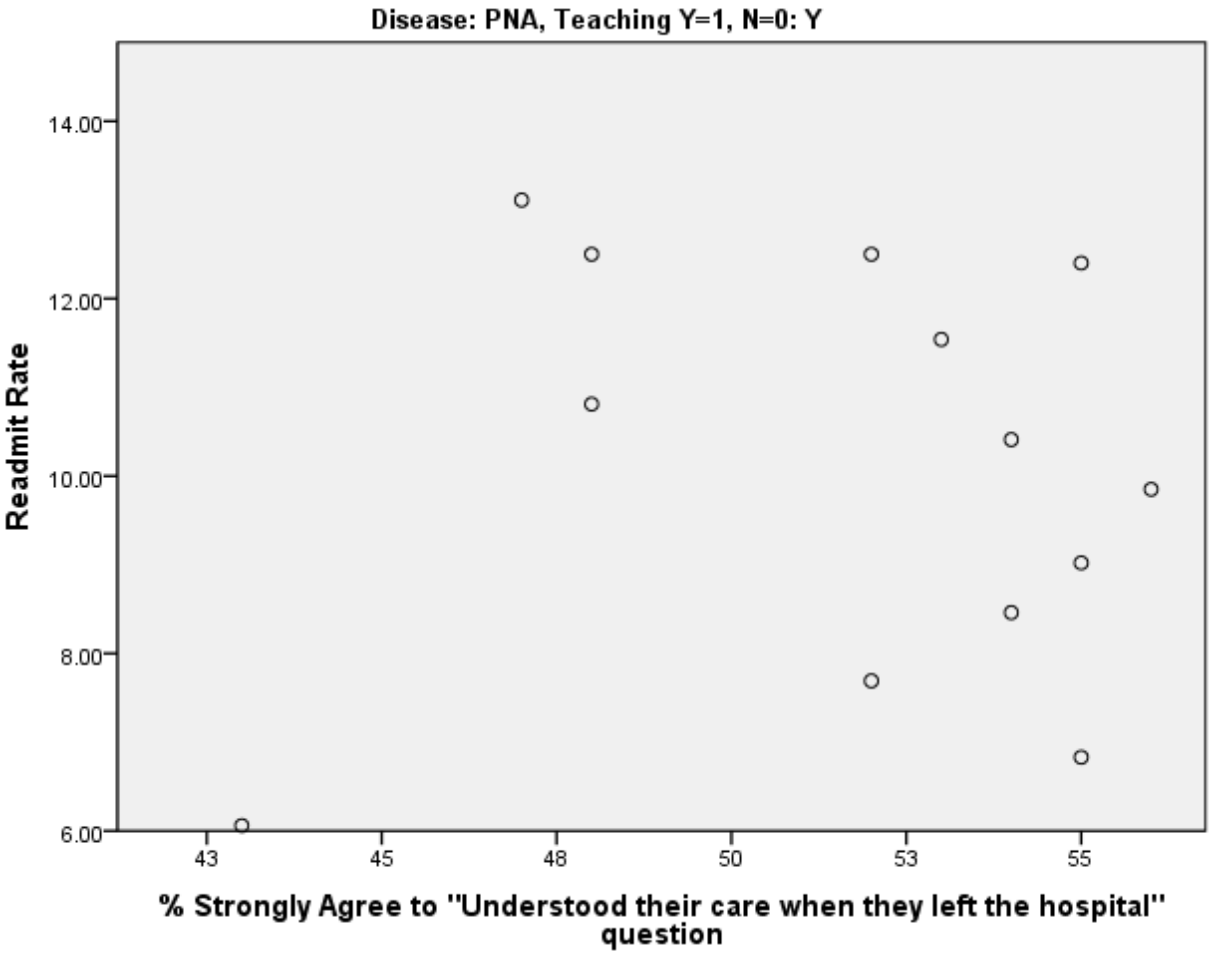

Figure B84. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for teaching hospitals with 25 or more pneumonia discharges.

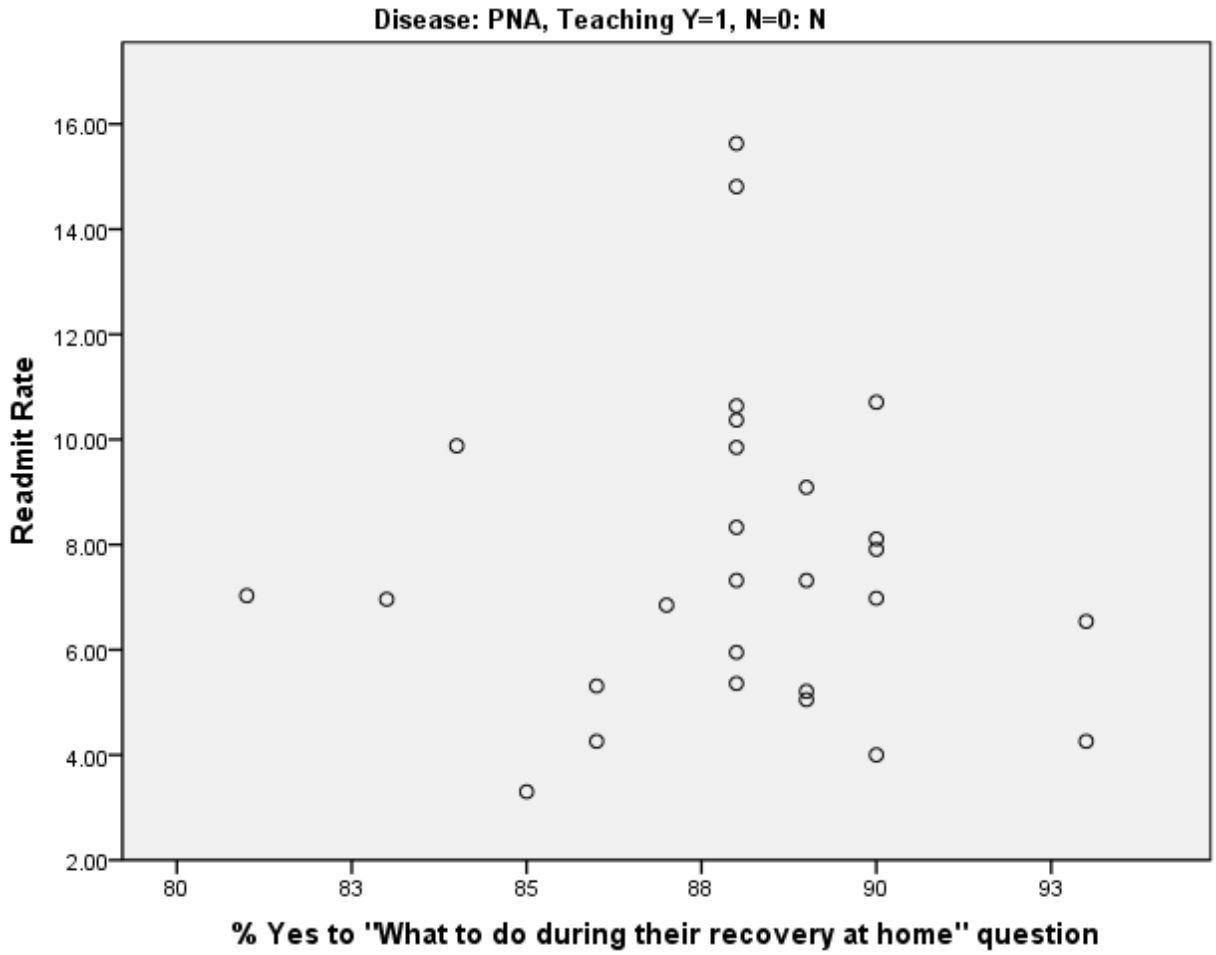

Figure B85. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more pneumonia discharges.

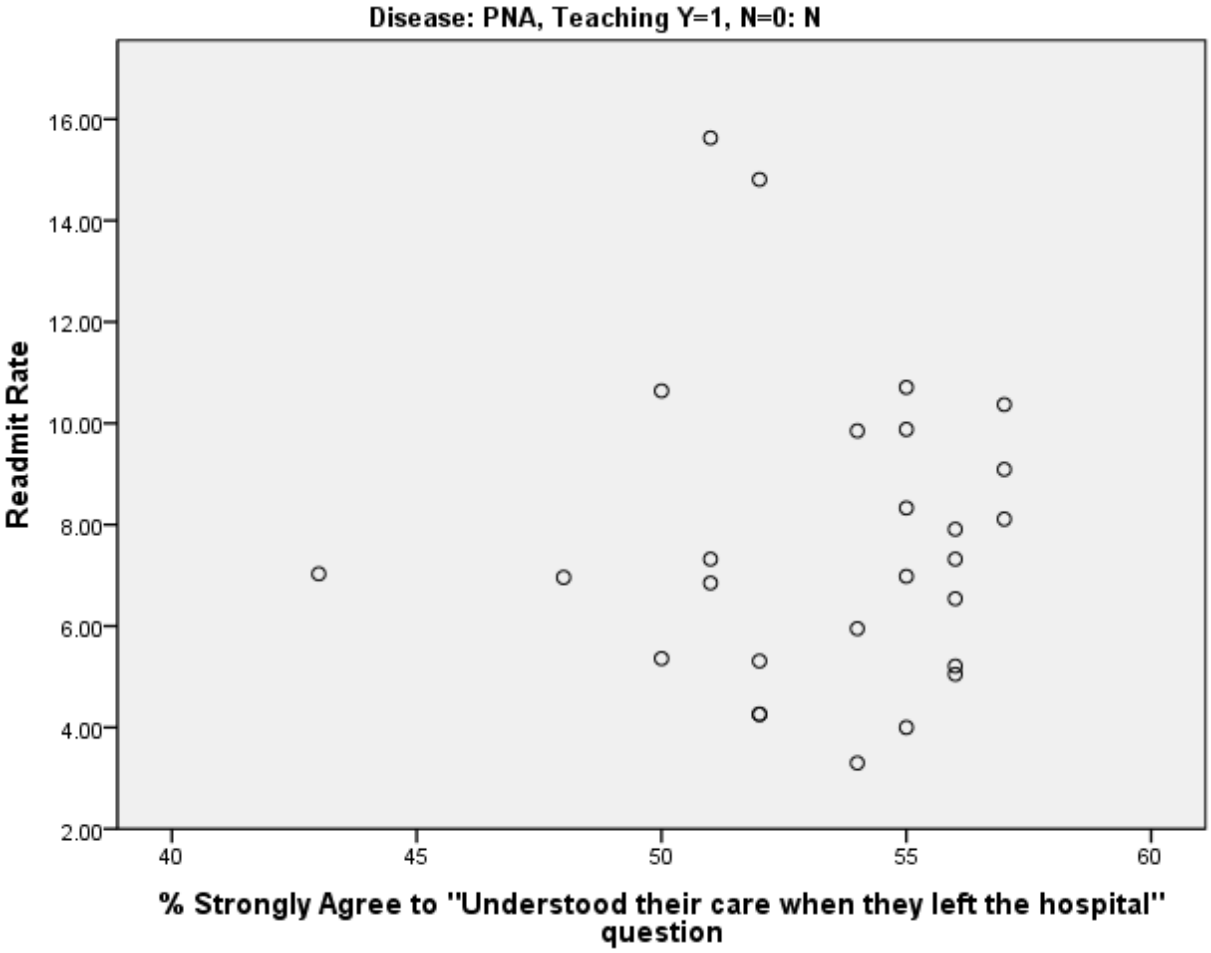

Figure B86. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more pneumonia discharges.

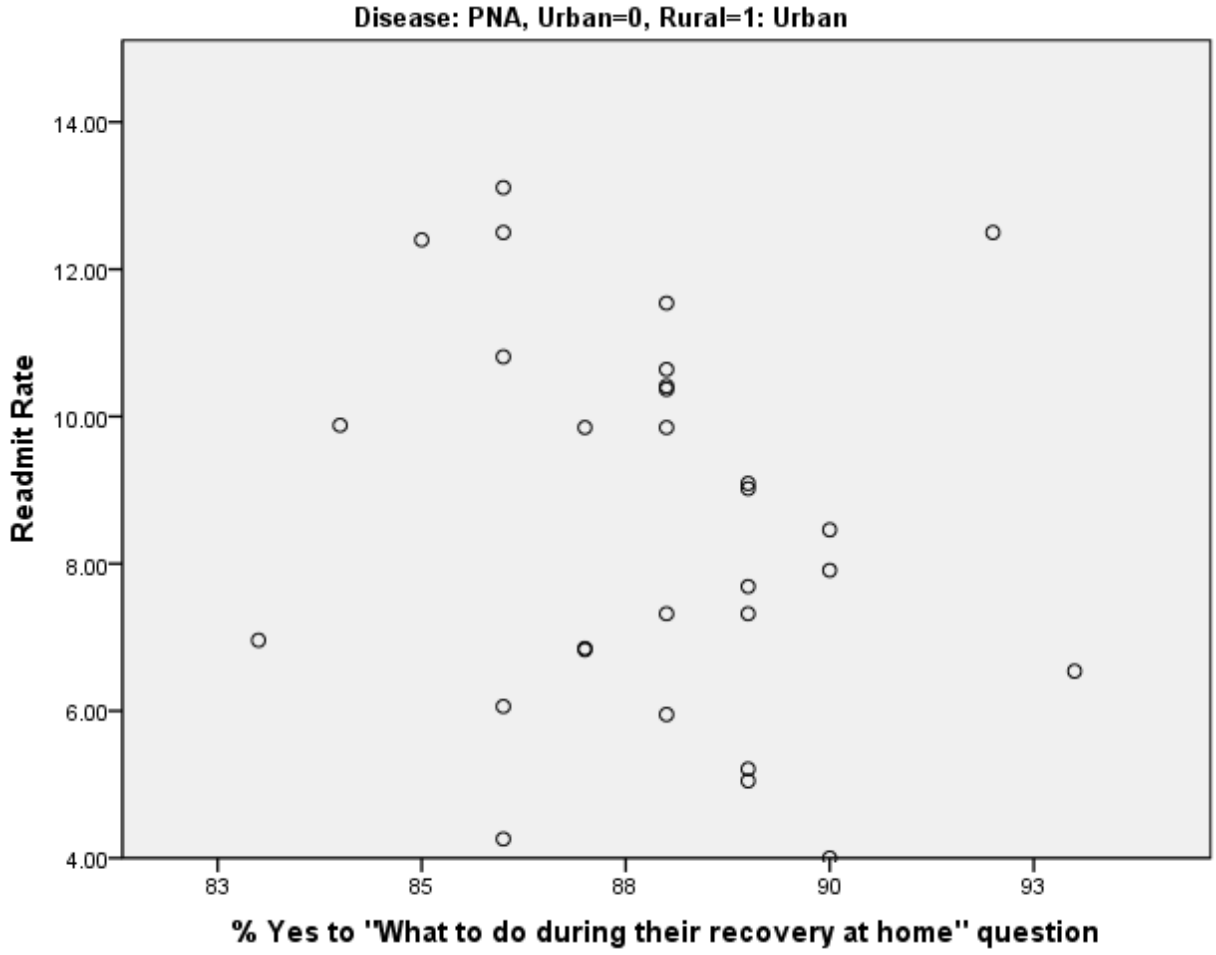

Figure B87. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for urban hospitals with 25 or more pneumonia discharges.

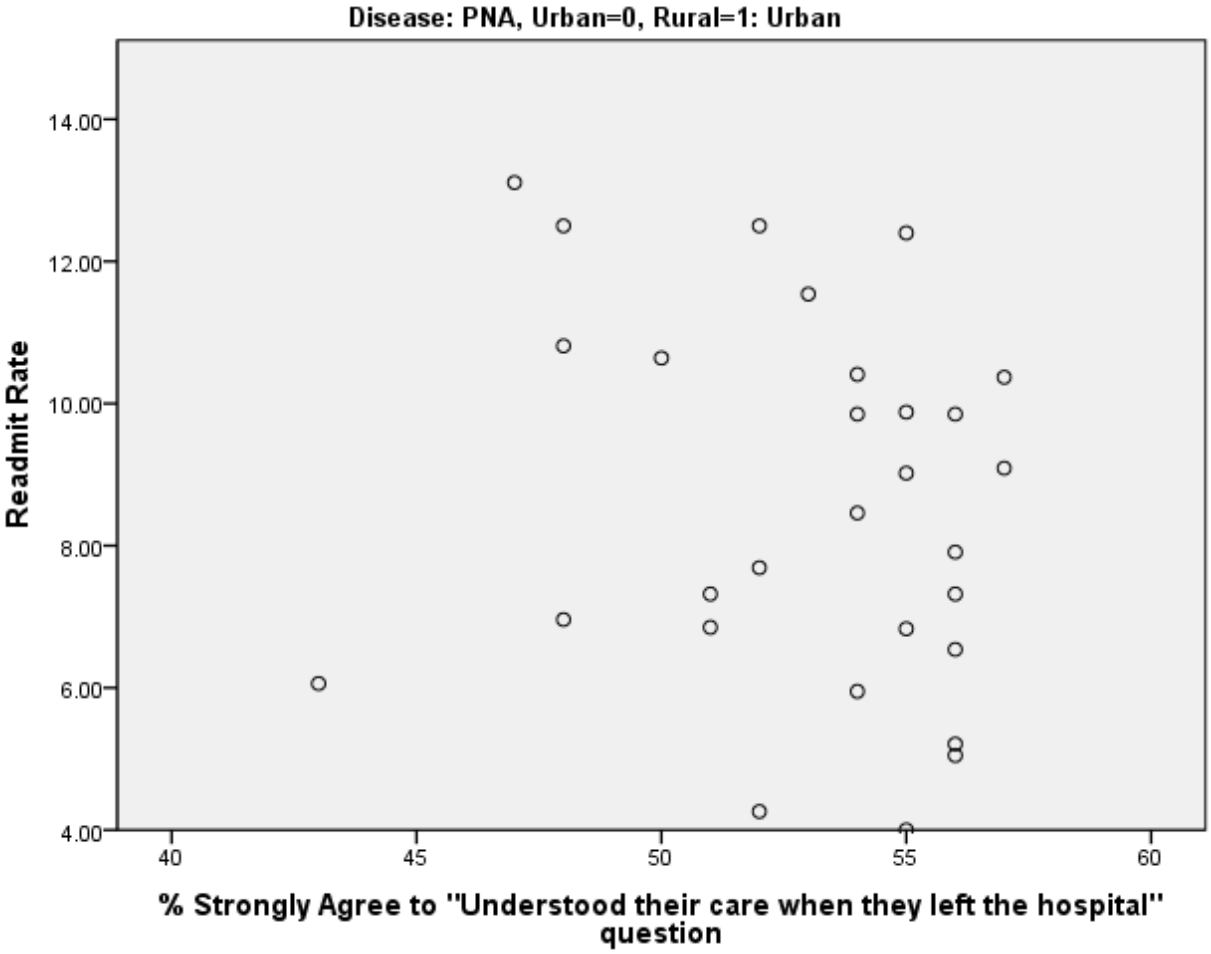

Figure B88. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for urban hospitals with 25 or more pneumonia discharges.

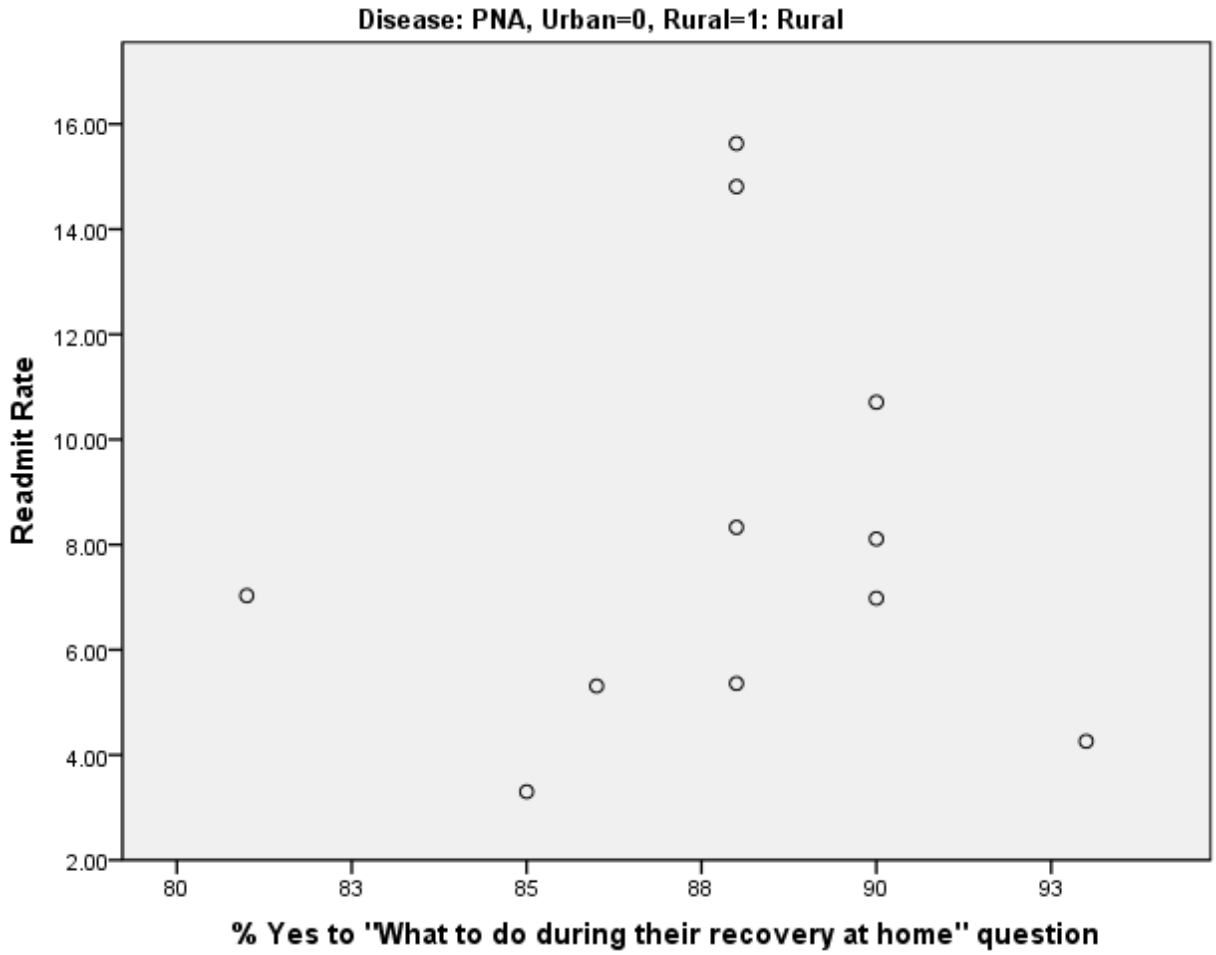

Figure B89. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for rural hospitals with 25 or more pneumonia discharges.

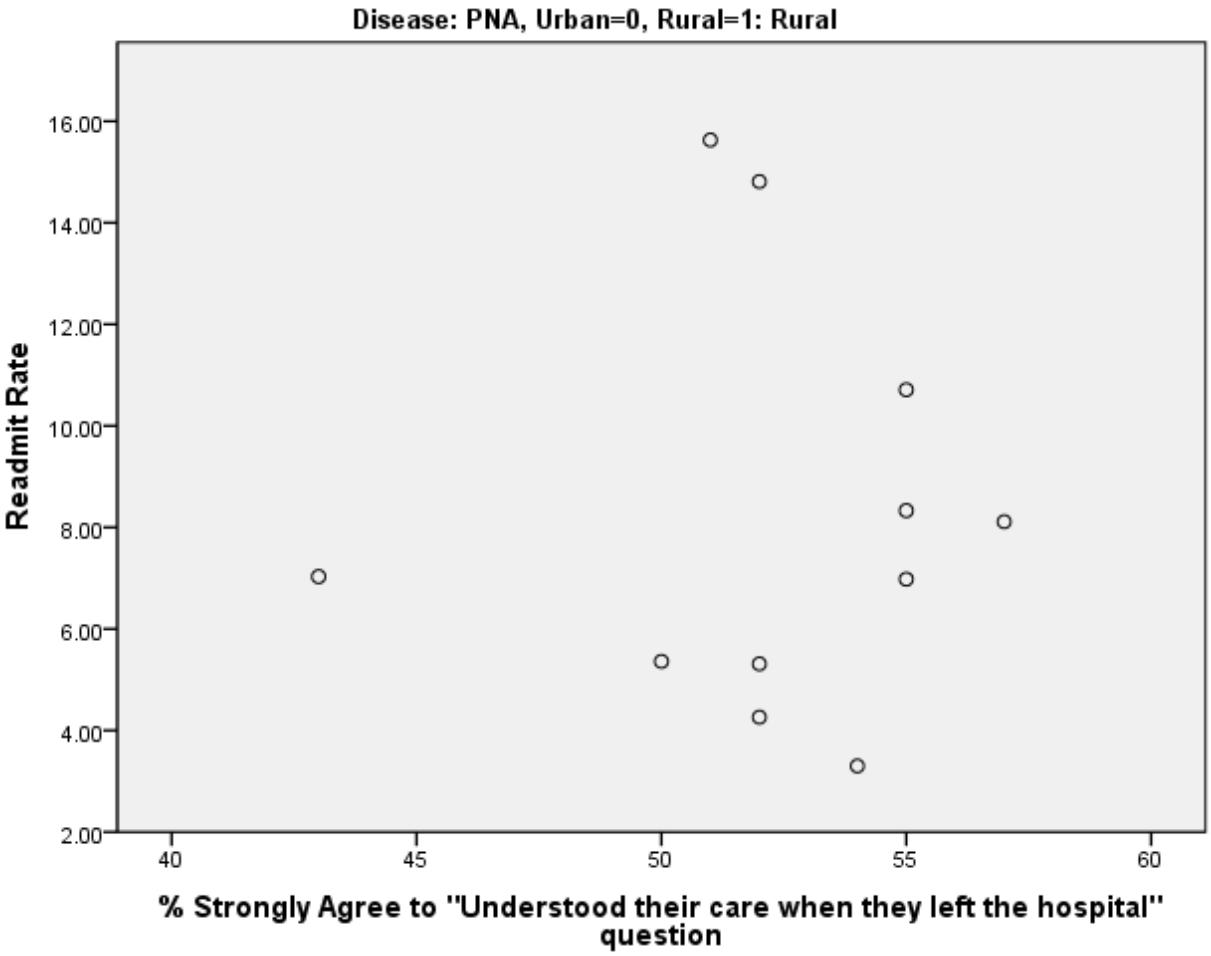

Figure B90. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for rural hospitals with 25 or more pneumonia discharges.

Figure B91. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for small hospitals with 25 or more pneumonia discharges.

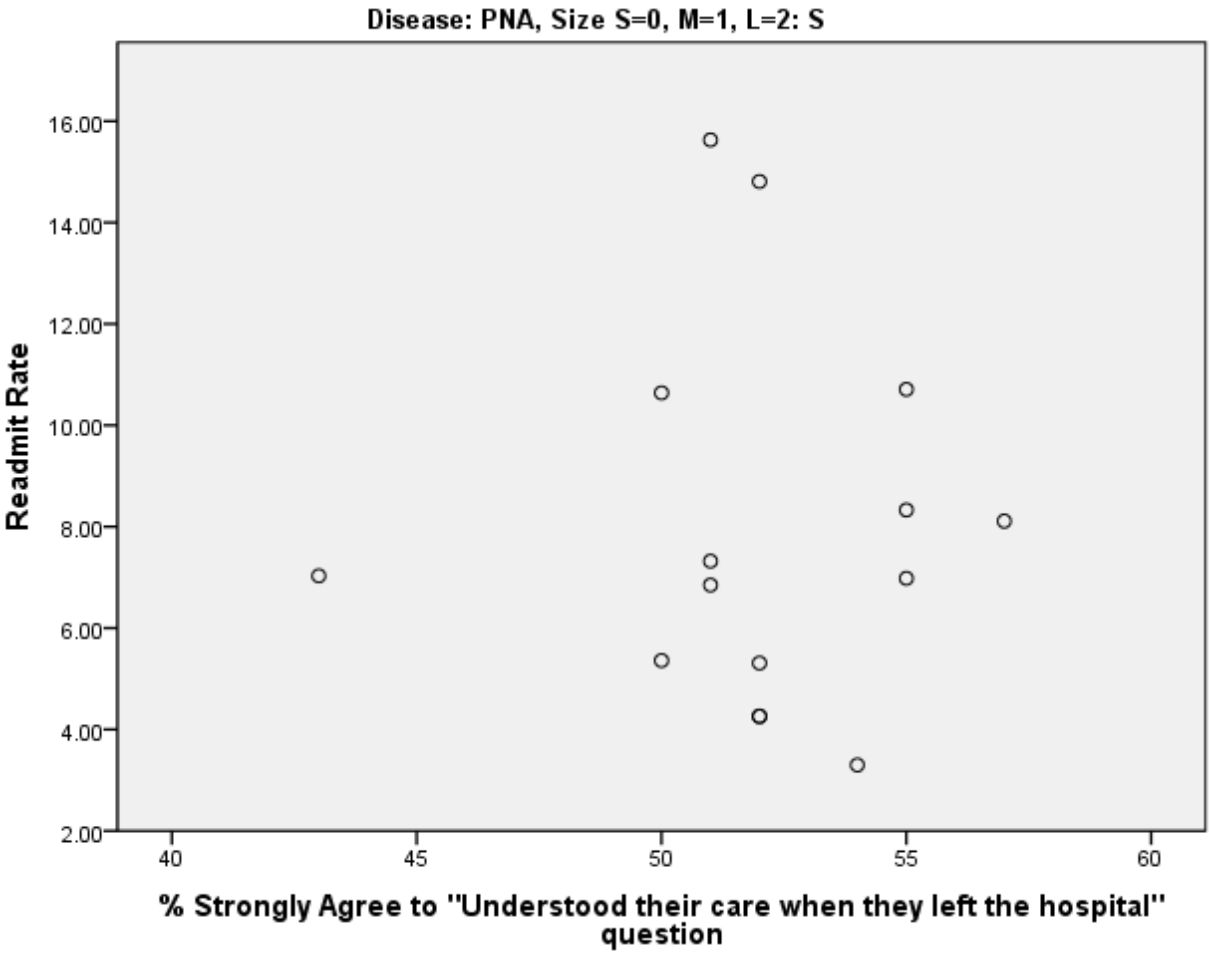

Figure B92. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for small hospitals with 25 or more pneumonia discharges.

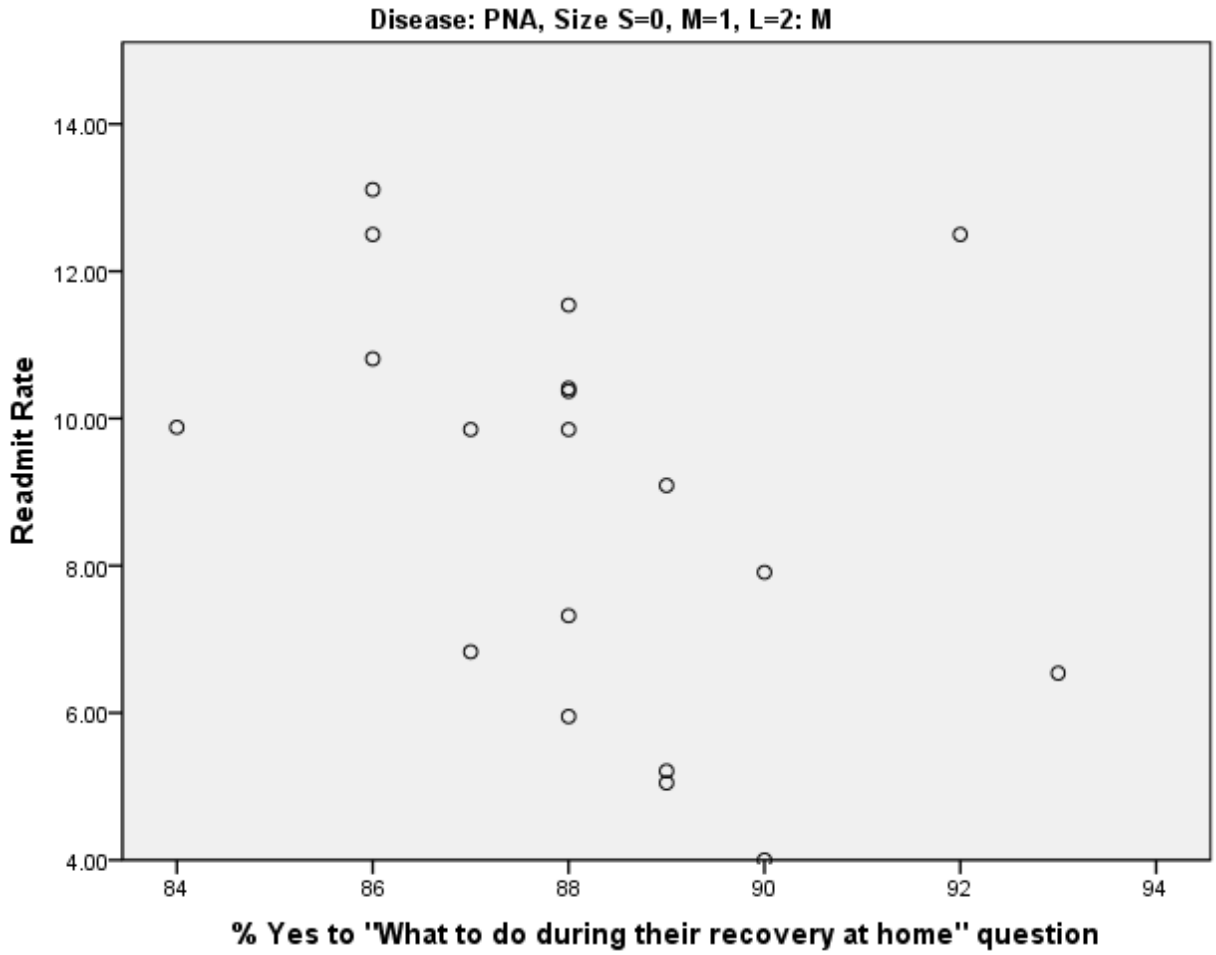

Figure B93. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for medium hospitals with 25 or more pneumonia discharges.

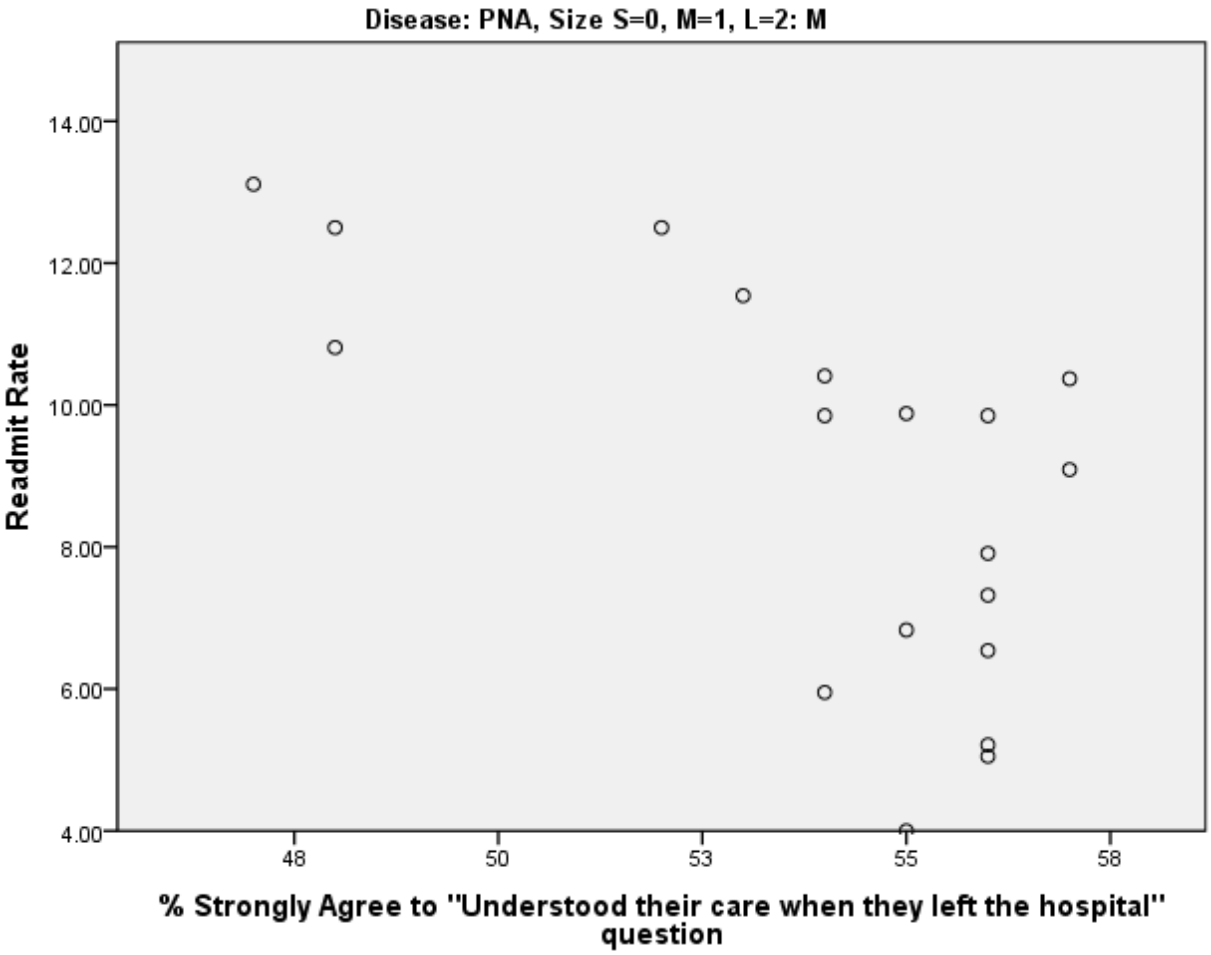

Figure B94. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for medium hospitals with 25 or more pneumonia discharges.

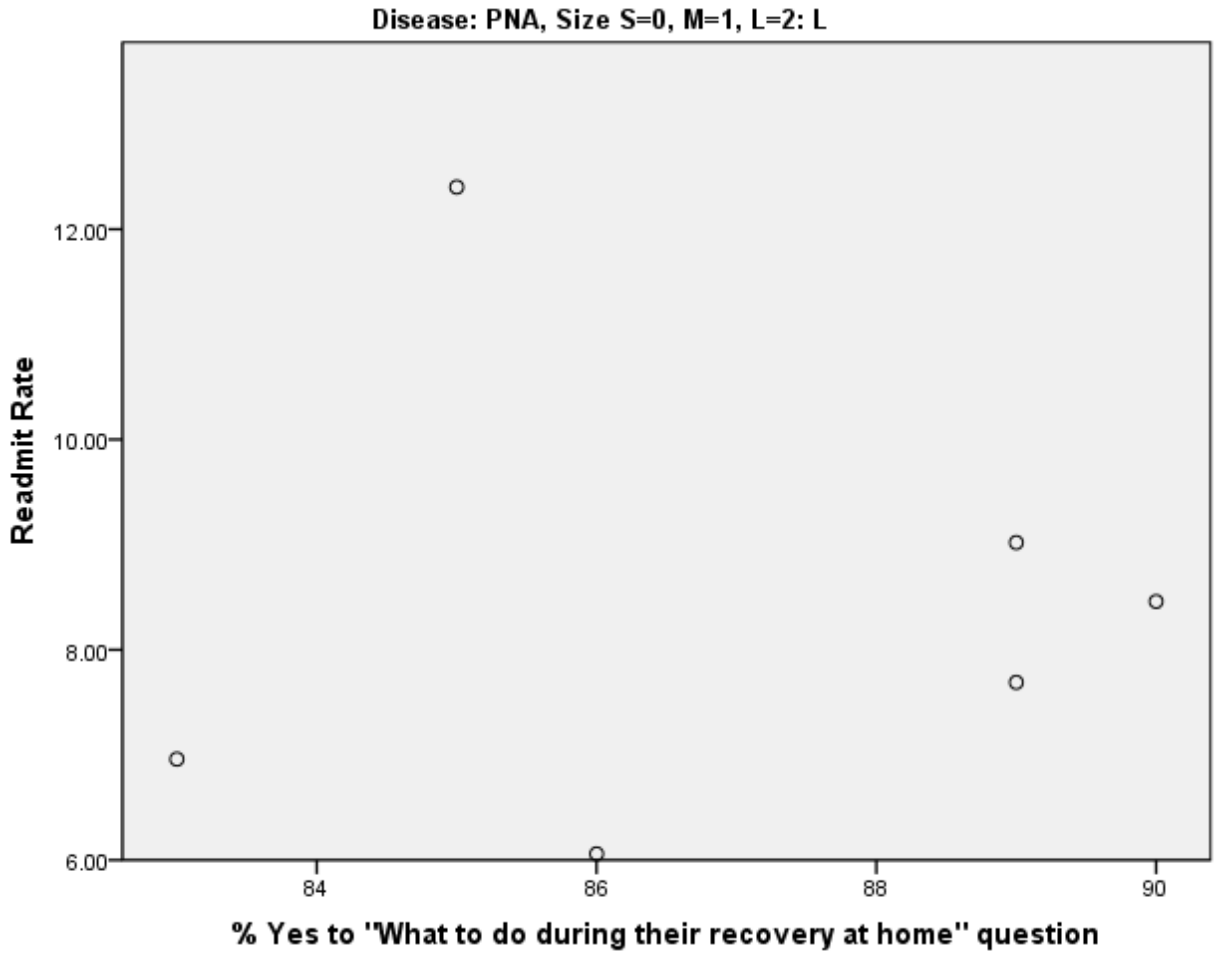

Figure B95. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for large hospitals with 25 or more pneumonia discharges.

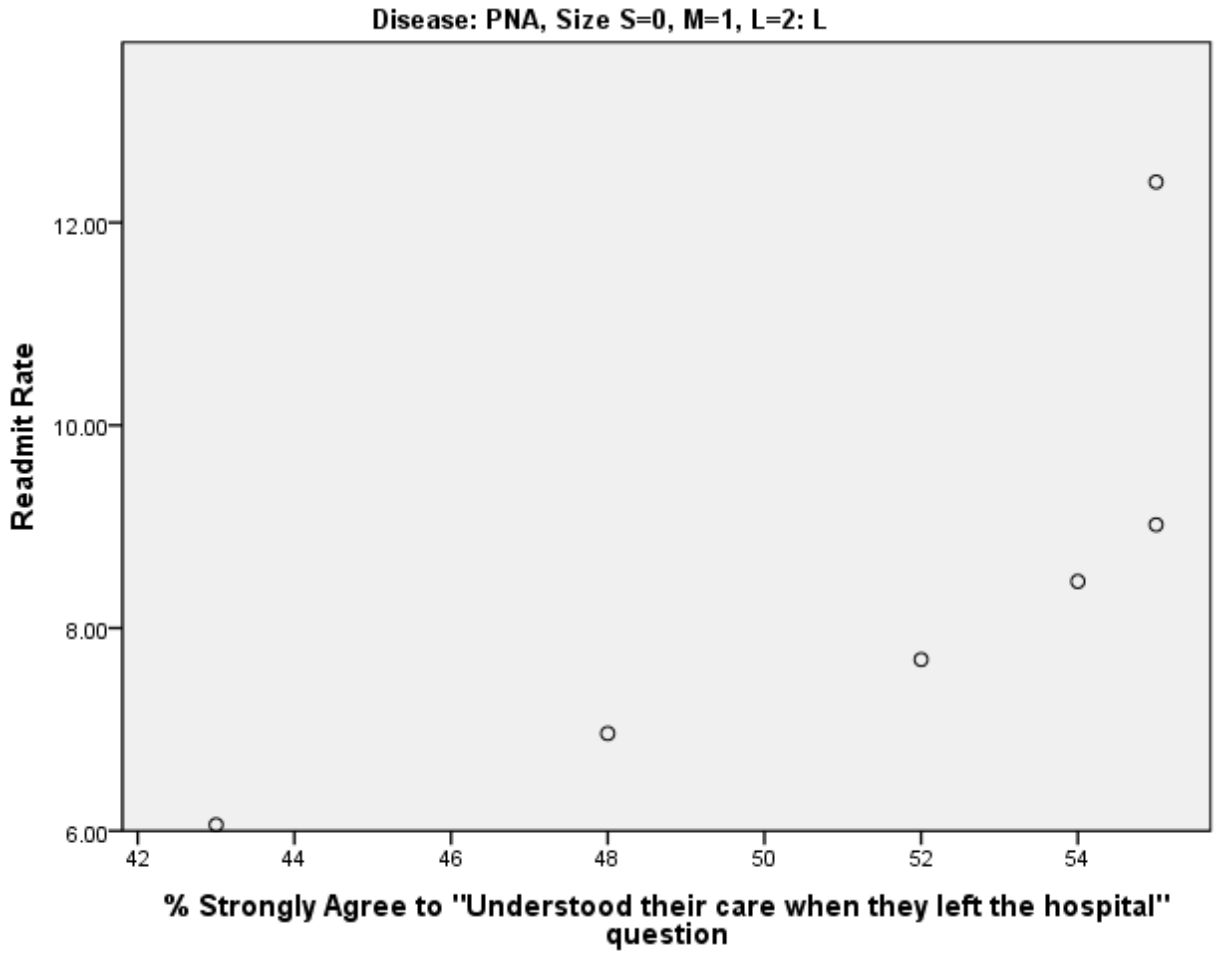

Figure B96. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for large hospitals with 25 or more pneumonia discharges.

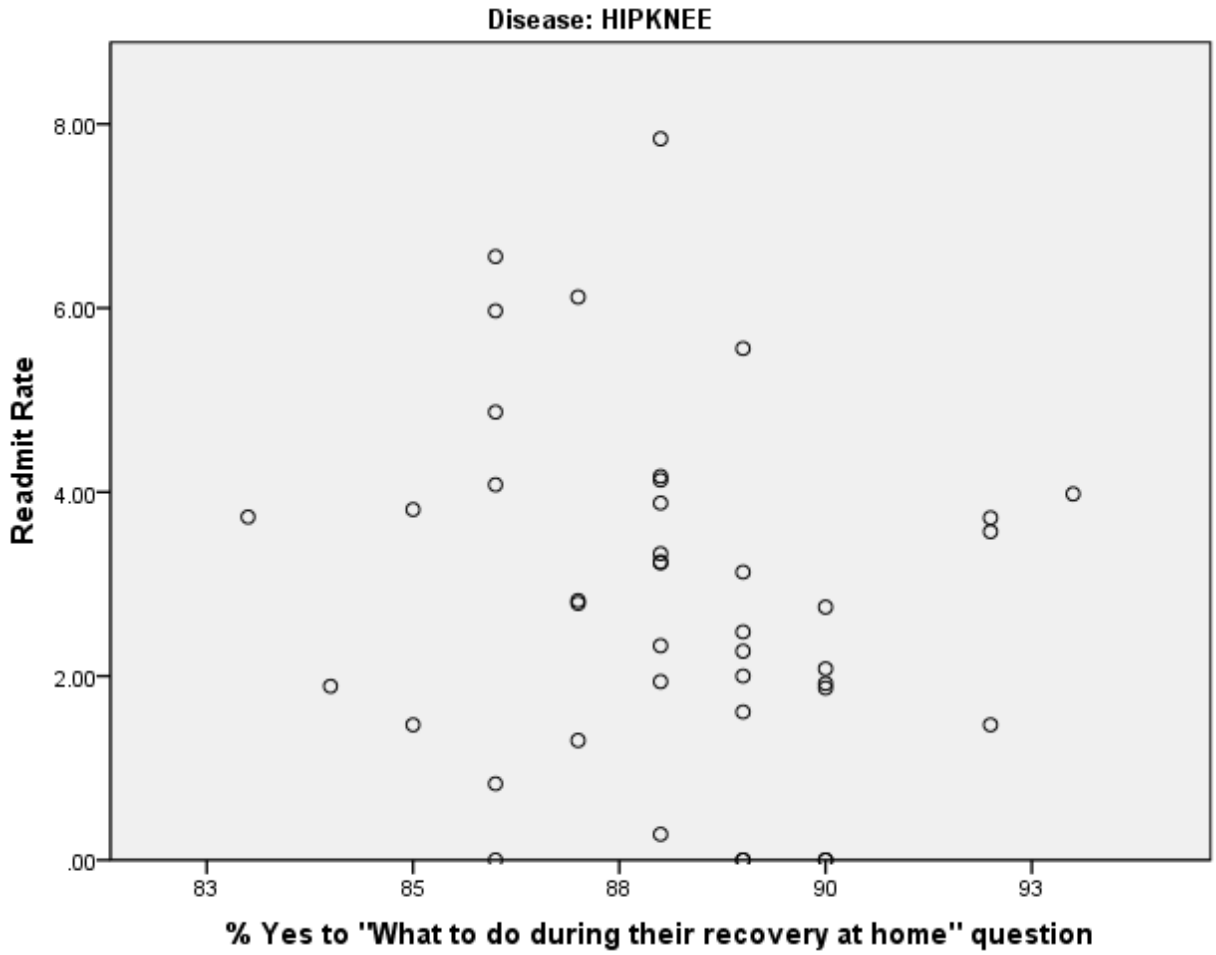

Figure B97. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for all hospitals with 25 or more hip and knee arthroplasty discharges.

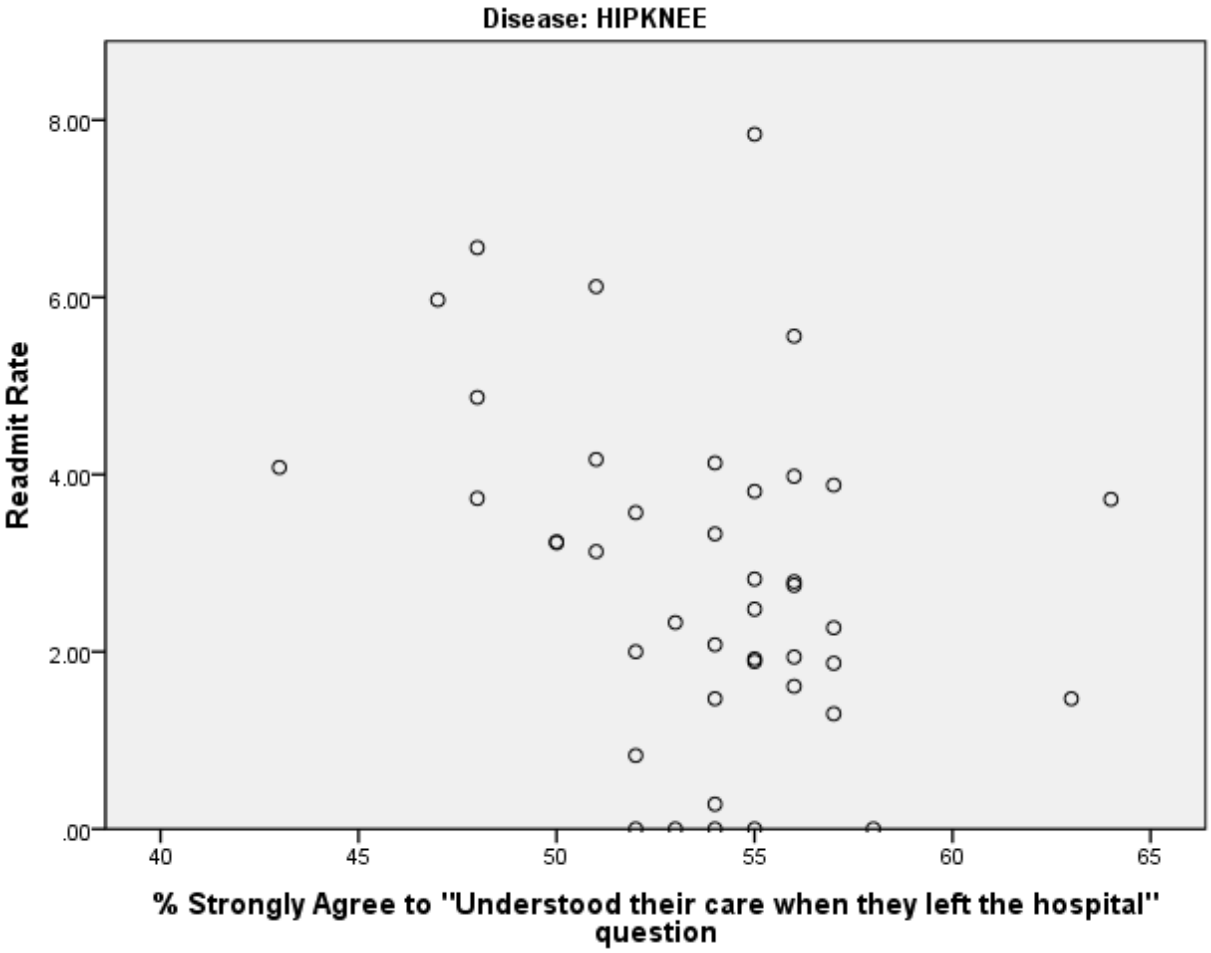

Figure B98. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all hospitals with 25 or more hip and knee arthroplasty discharges.

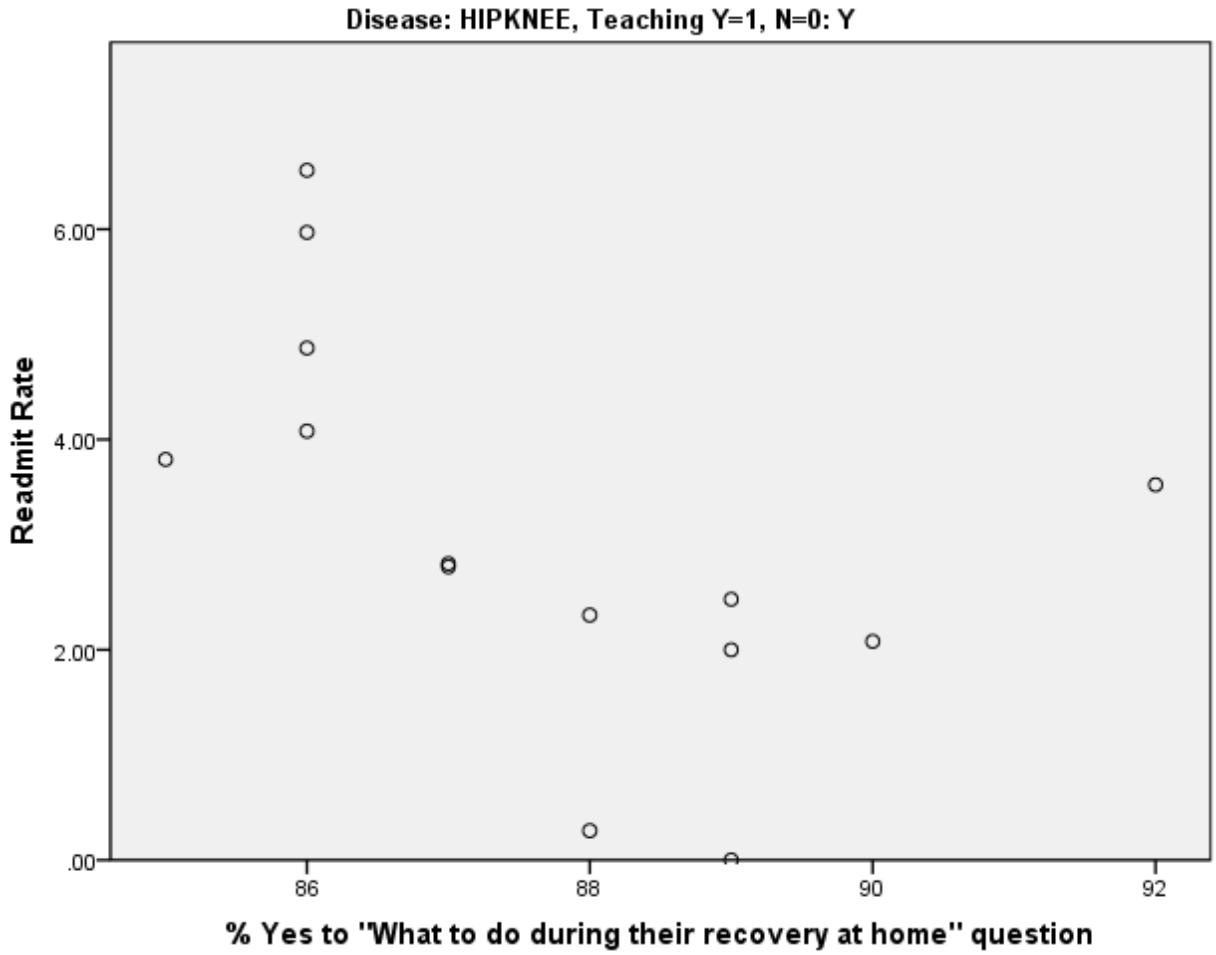

Figure B99. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for teaching hospitals with 25 or more hip and knee arthroplasty discharges.

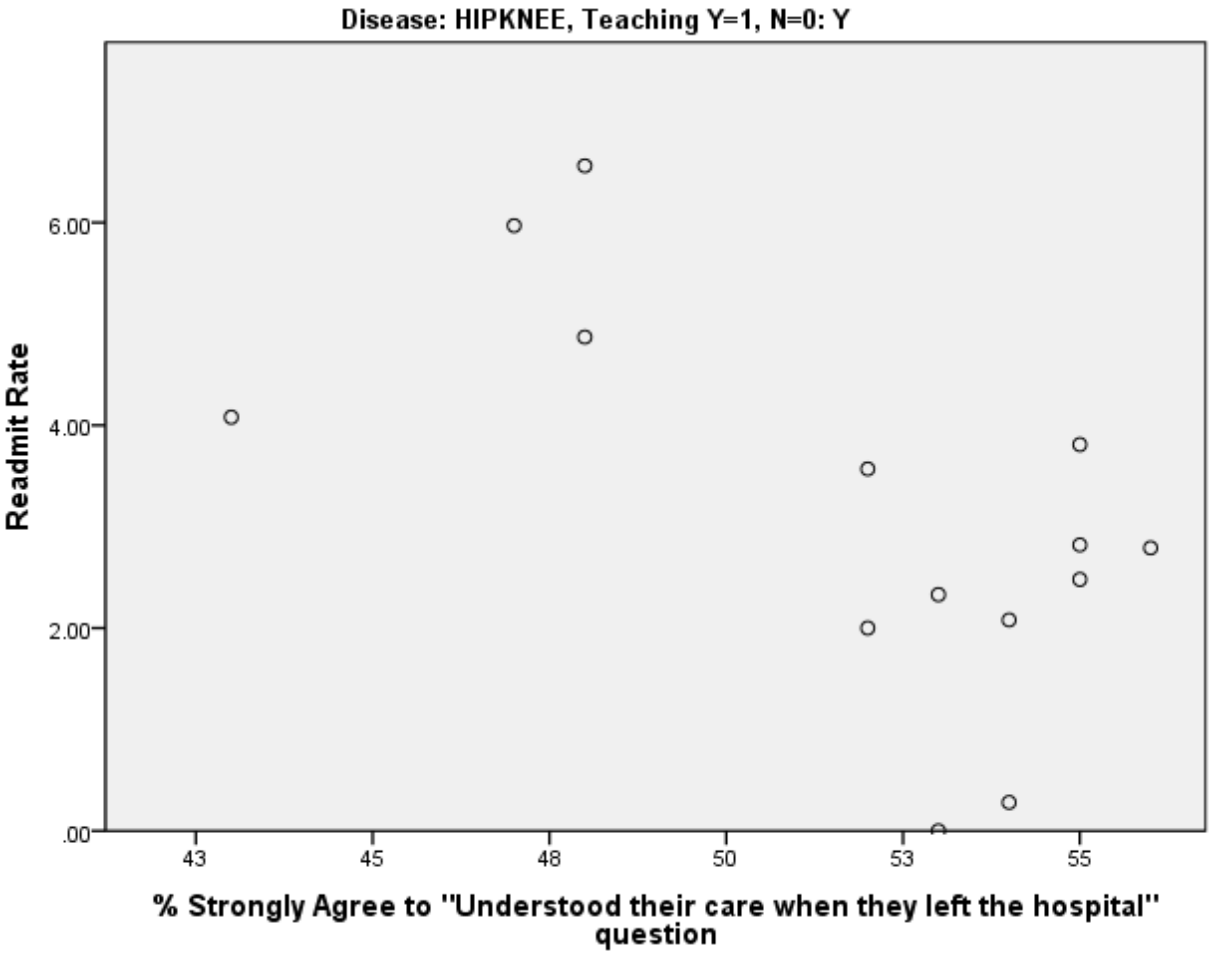

Figure B100. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all hospitals with 25 or more hip and knee arthroplasty discharges.

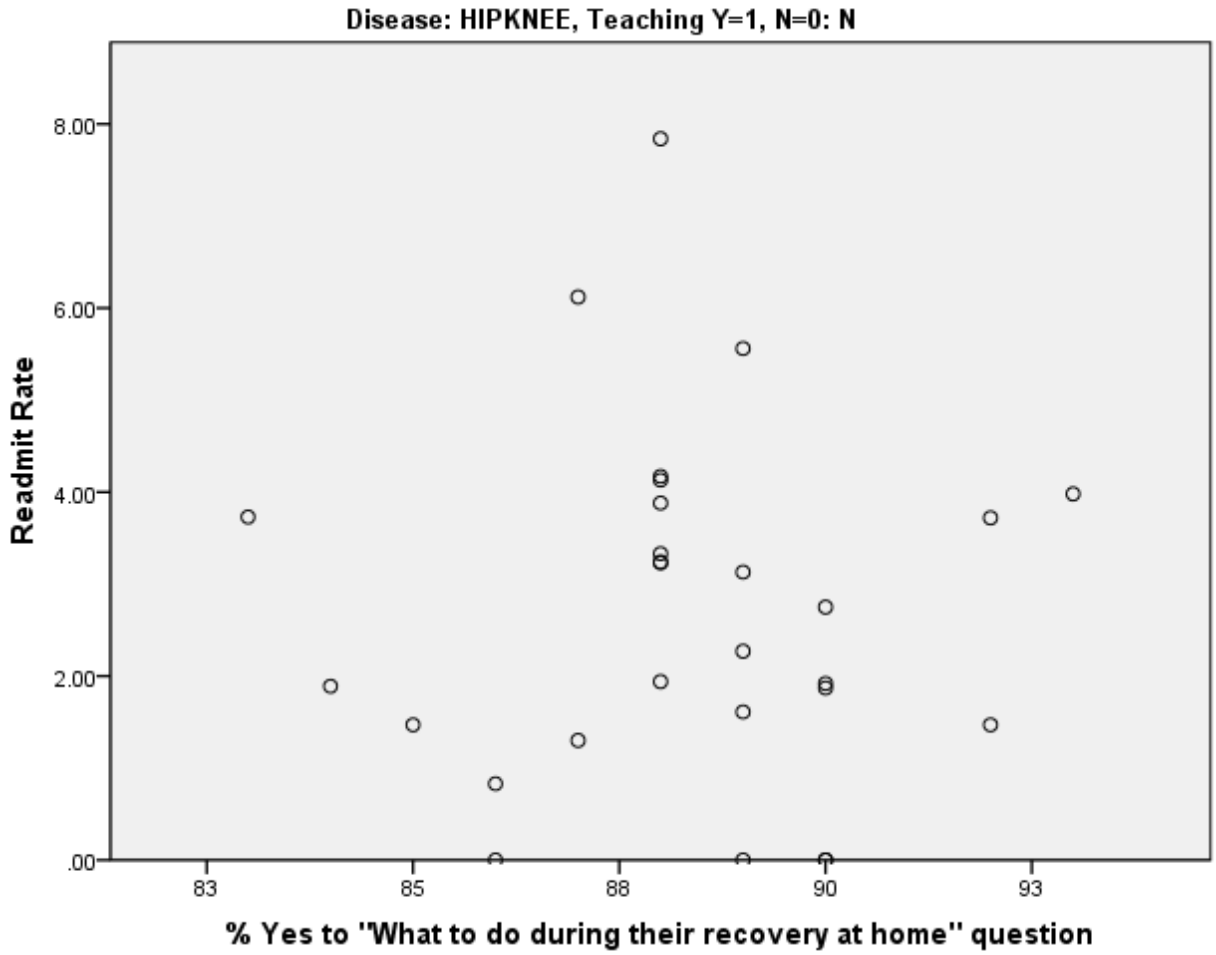

Figure B101. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for non-teaching hospitals with 25 or more hip and knee arthroplasty discharges.

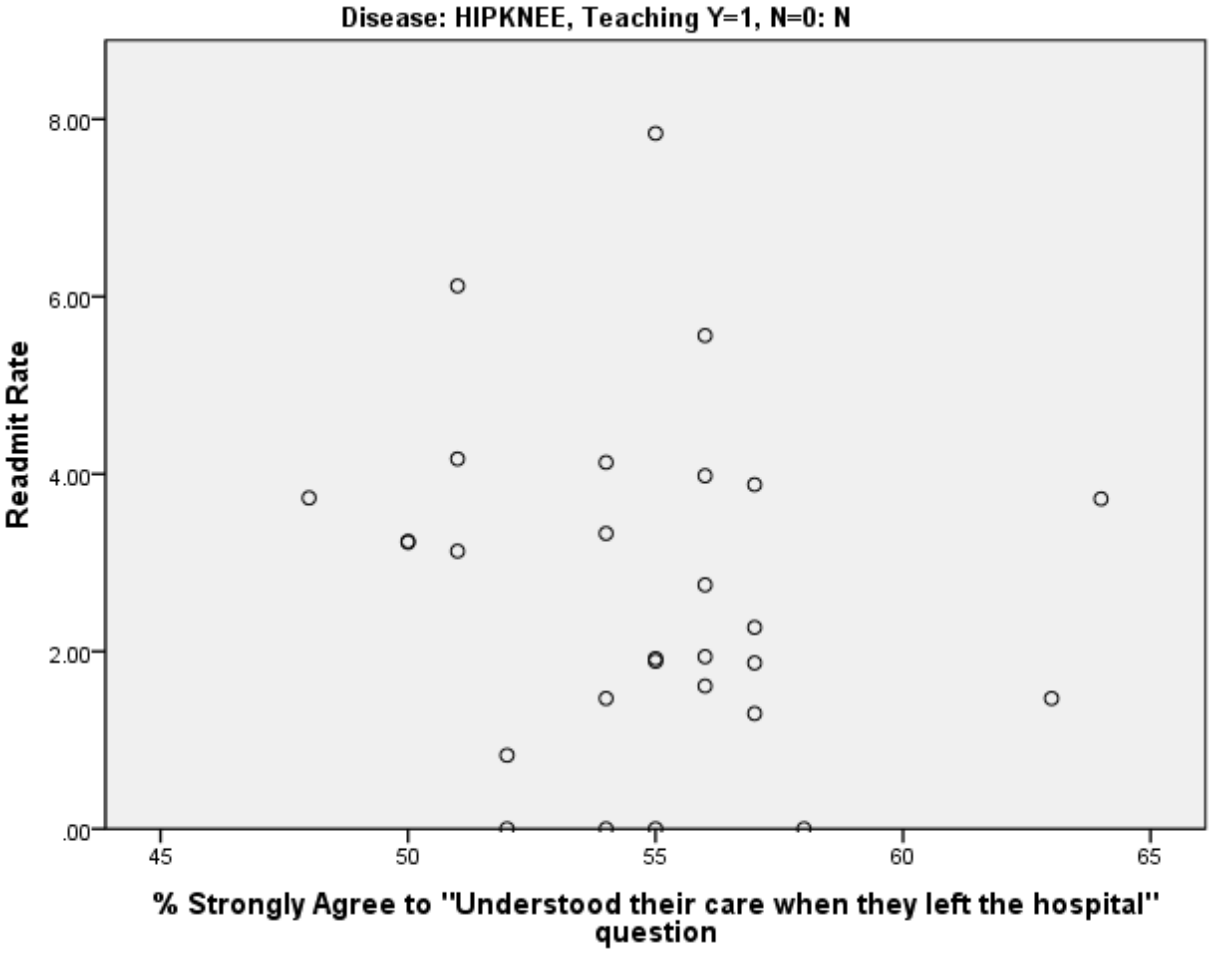

Figure B102. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for all hospitals with 25 or more hip and knee arthroplasty discharges.

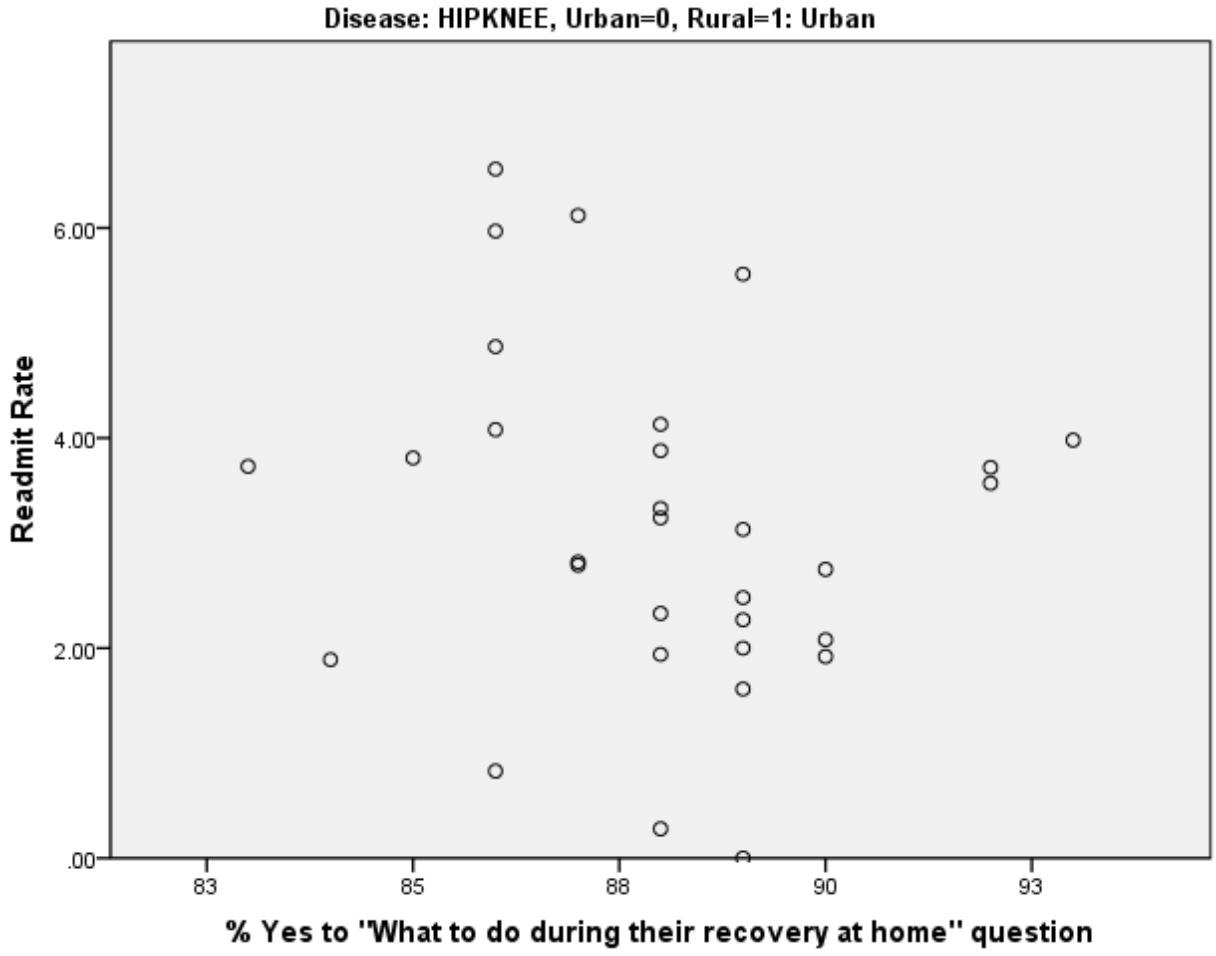

Figure B103. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for urban hospitals with 25 or more hip and knee arthroplasty discharges.

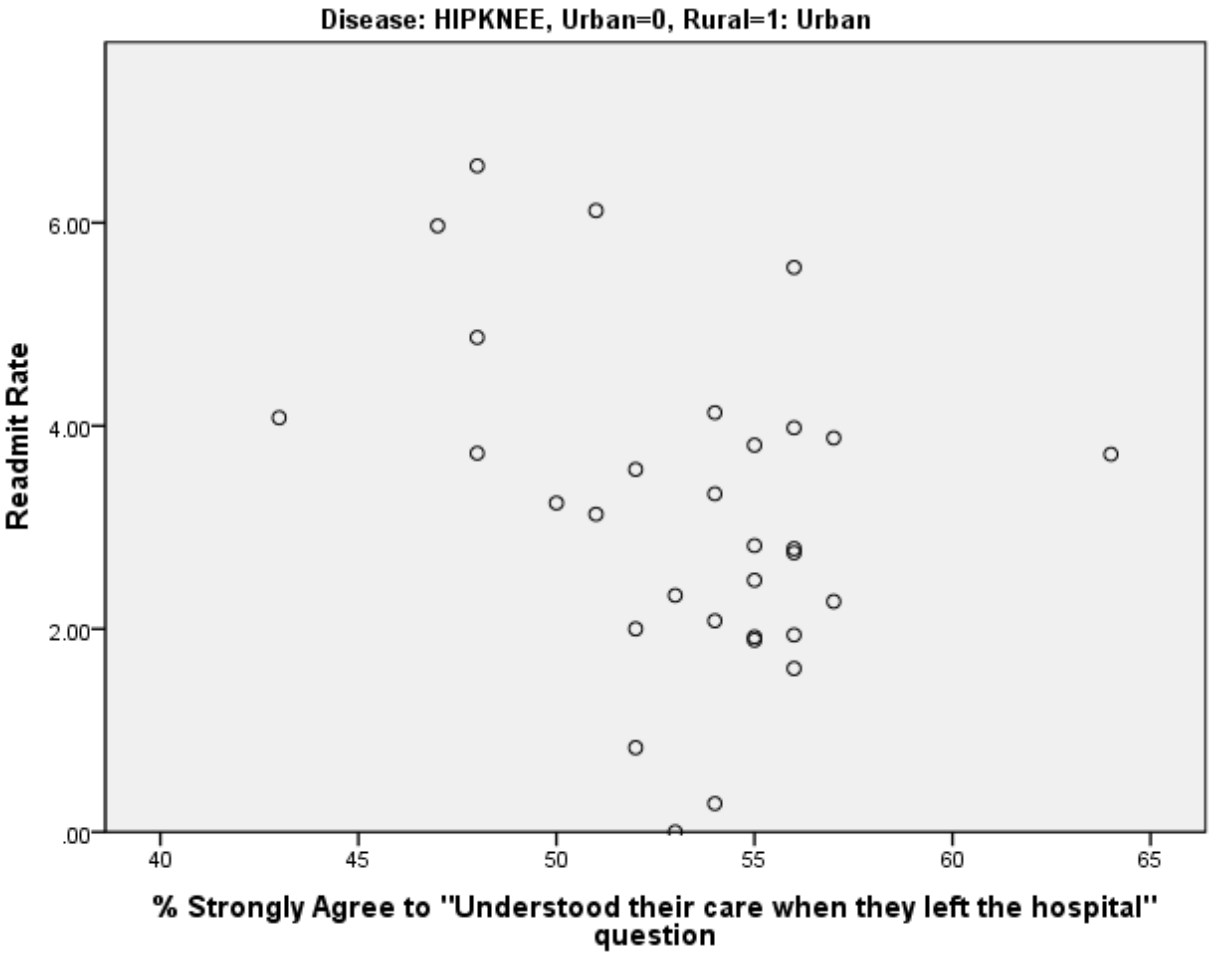

Figure B104. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for urban hospitals with 25 or more hip and knee arthroplasty discharges.

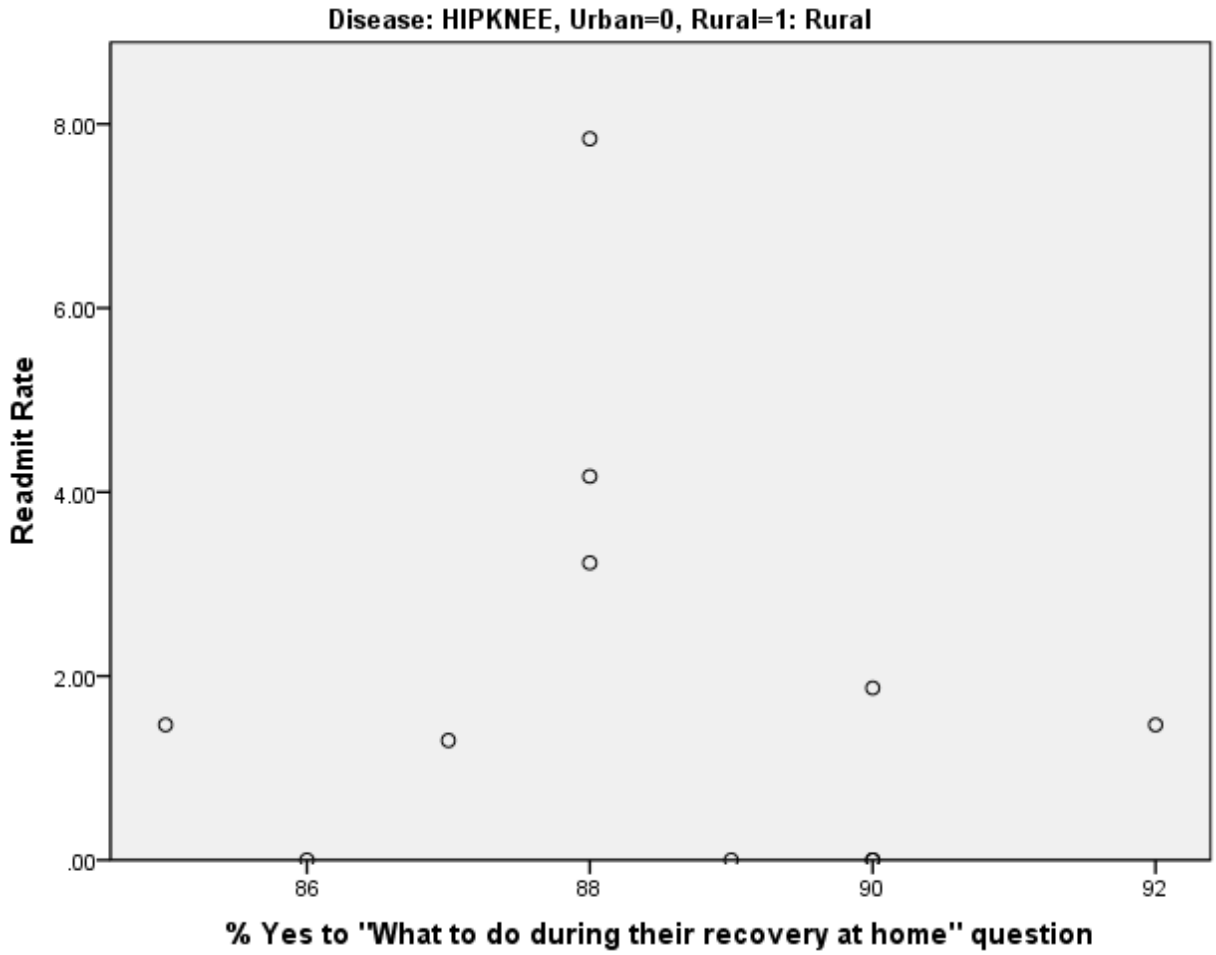

Figure B105. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for rural hospitals with 25 or more hip and knee arthroplasty discharges.

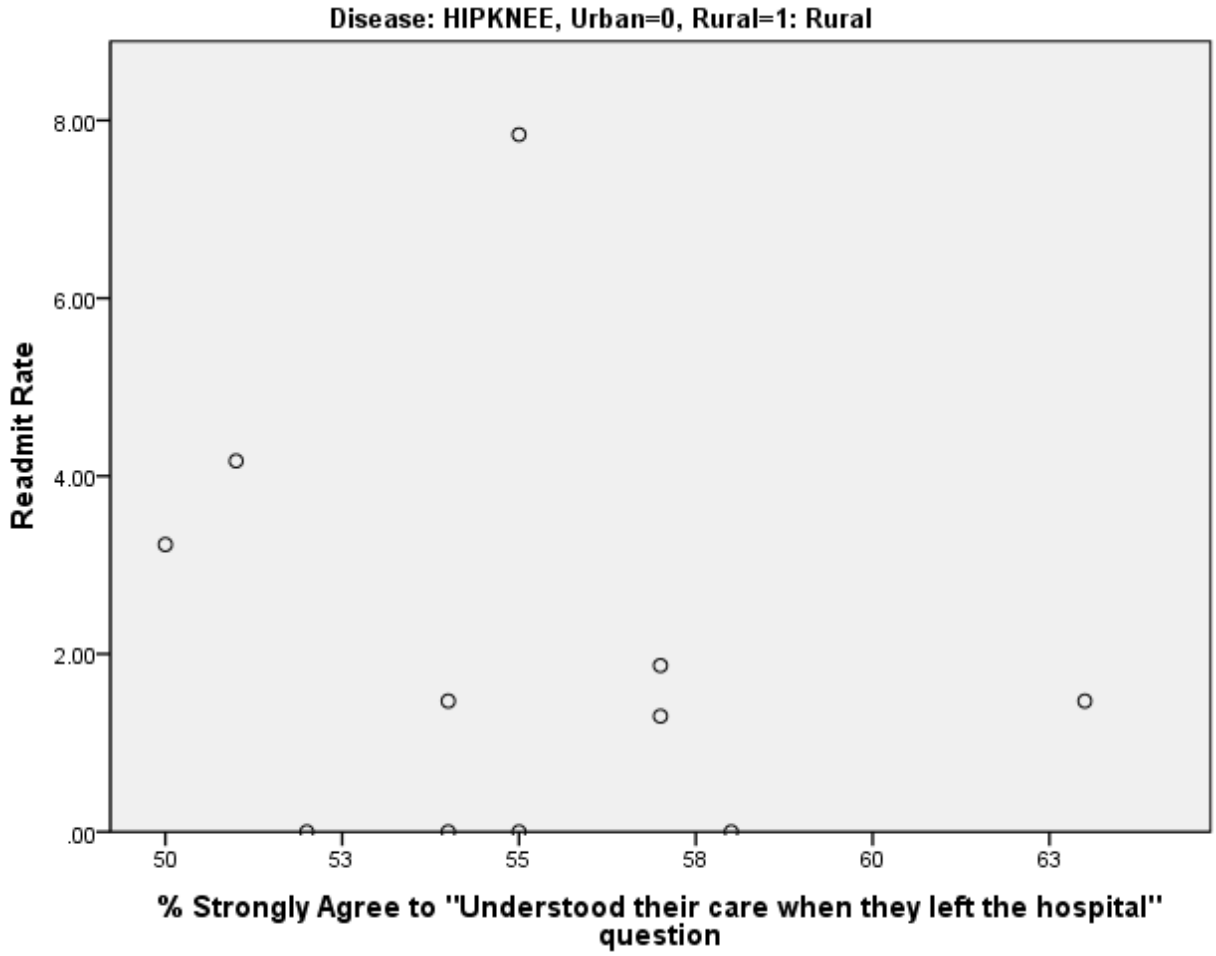

Figure B106. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for rural hospitals with 25 or more hip and knee arthroplasty discharges.

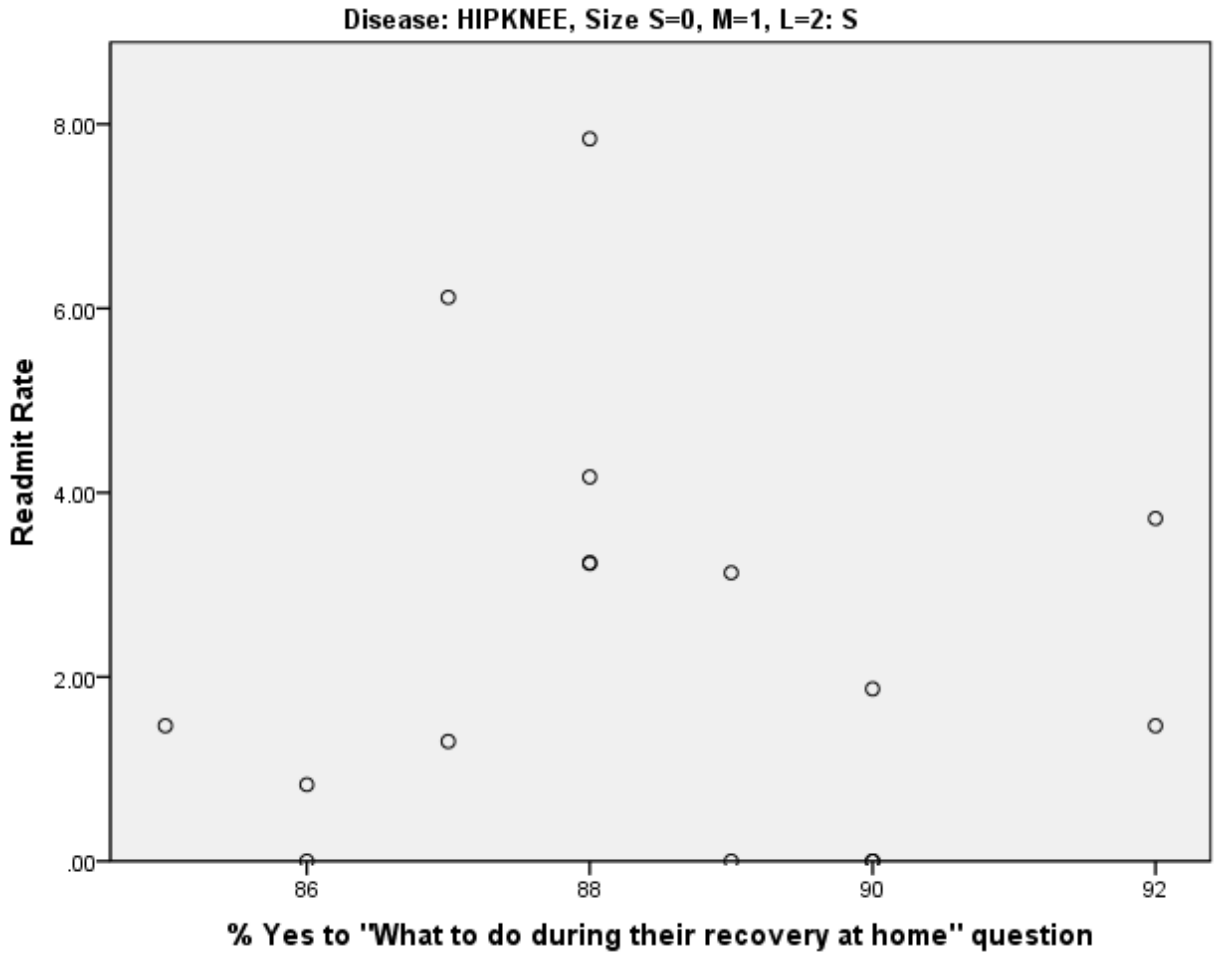

Figure B107. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for small hospitals with 25 or more hip and knee arthroplasty discharges.

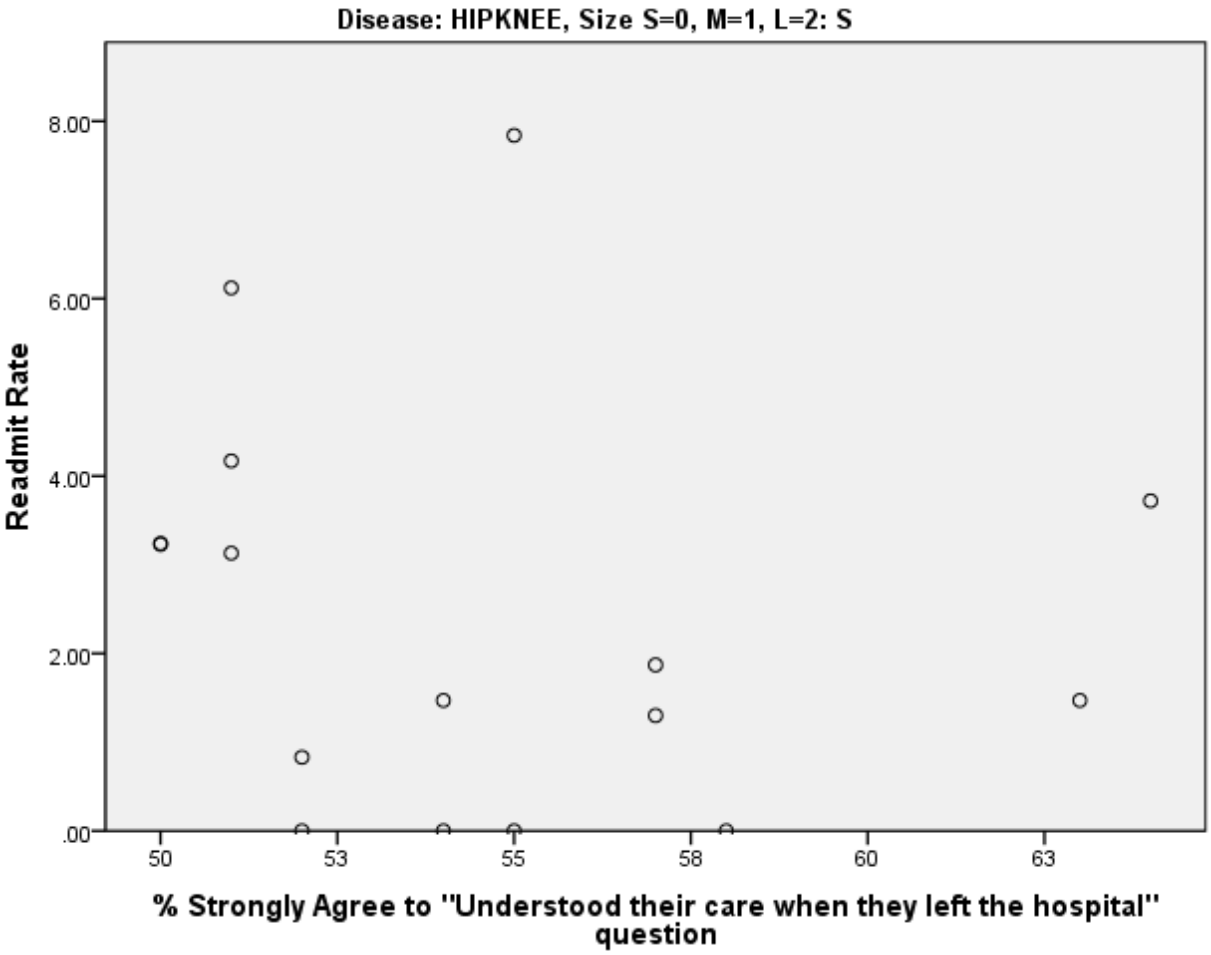

Figure B108. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for small hospitals with 25 or more hip and knee arthroplasty discharges.

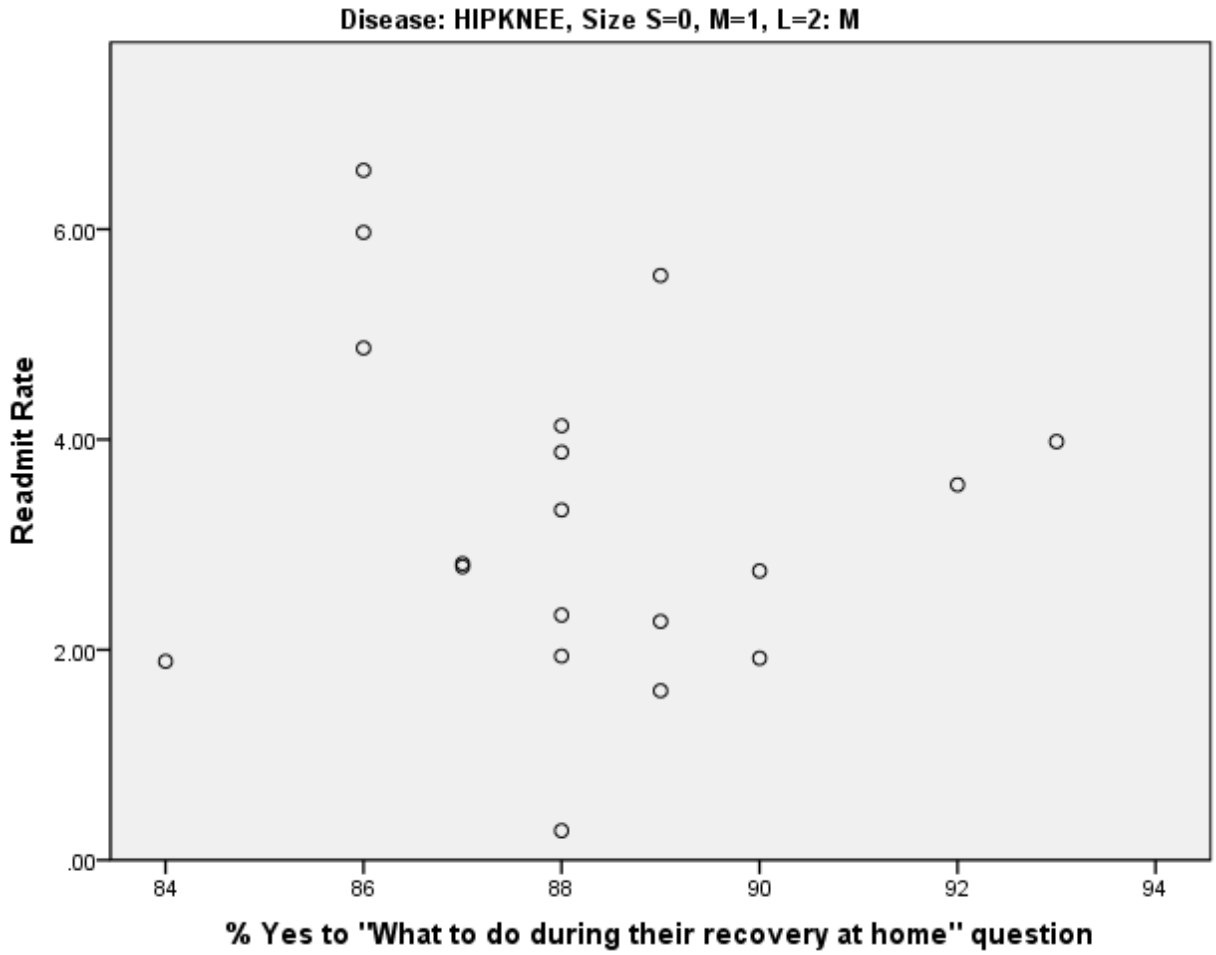

Figure B109. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for medium hospitals with 25 or more hip and knee arthroplasty discharges.

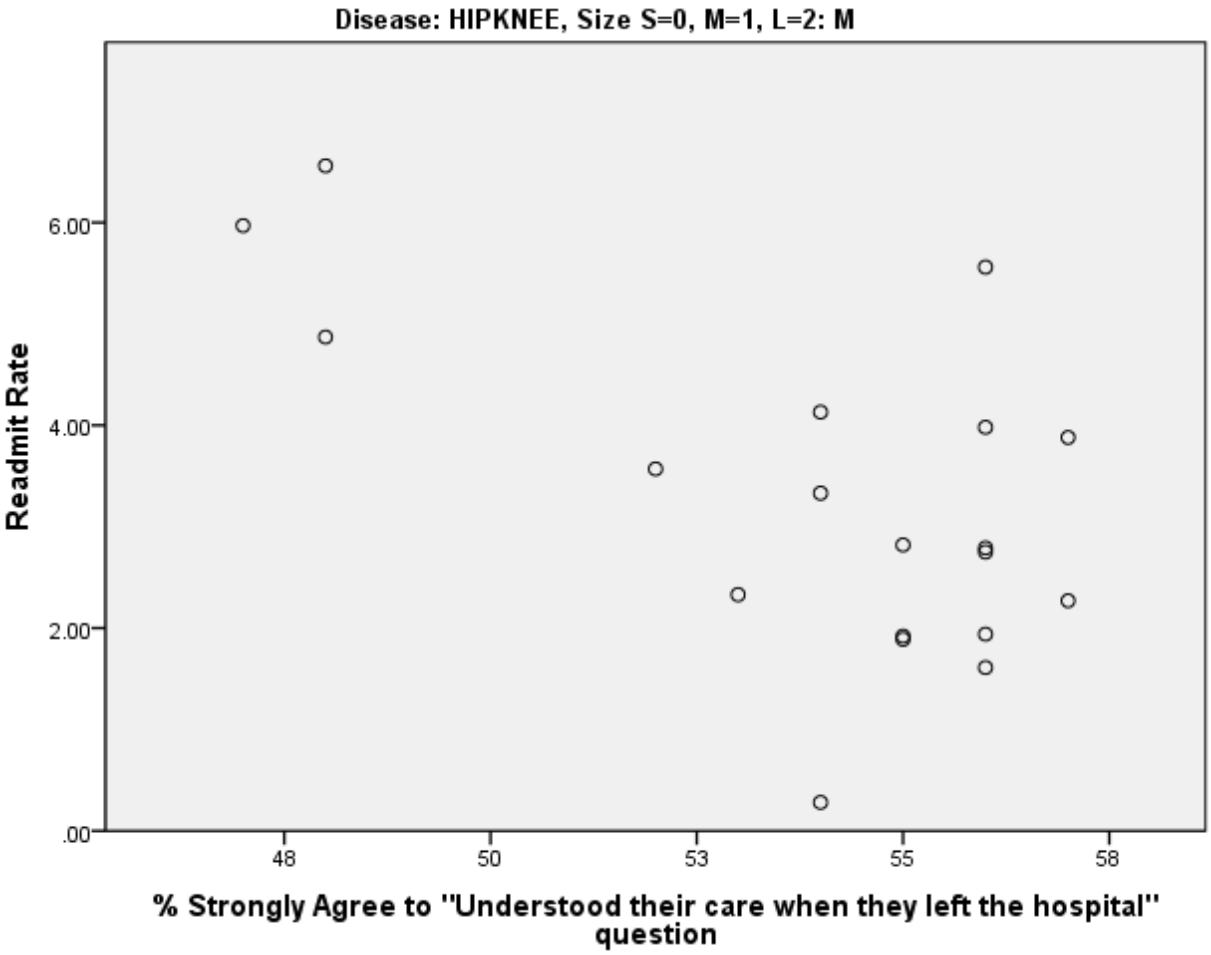

Figure B110. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for medium hospitals with 25 or more hip and knee arthroplasty discharges.

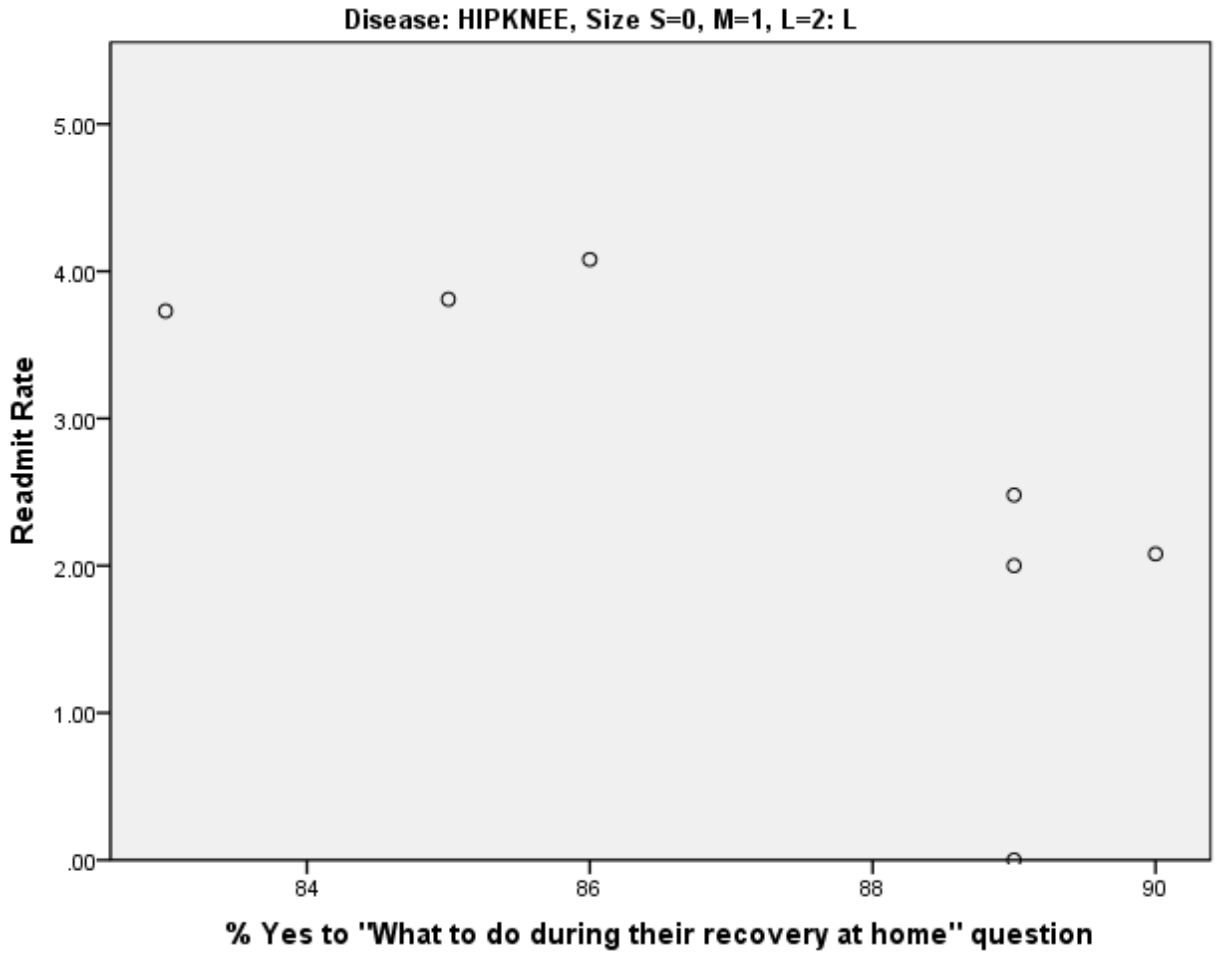

Figure B111. Scatterplot to summarize the results of correlation calculation between scores on discharge information composite and all cause 30-day readmission rate for large hospitals with 25 or more hip and knee arthroplasty discharges.

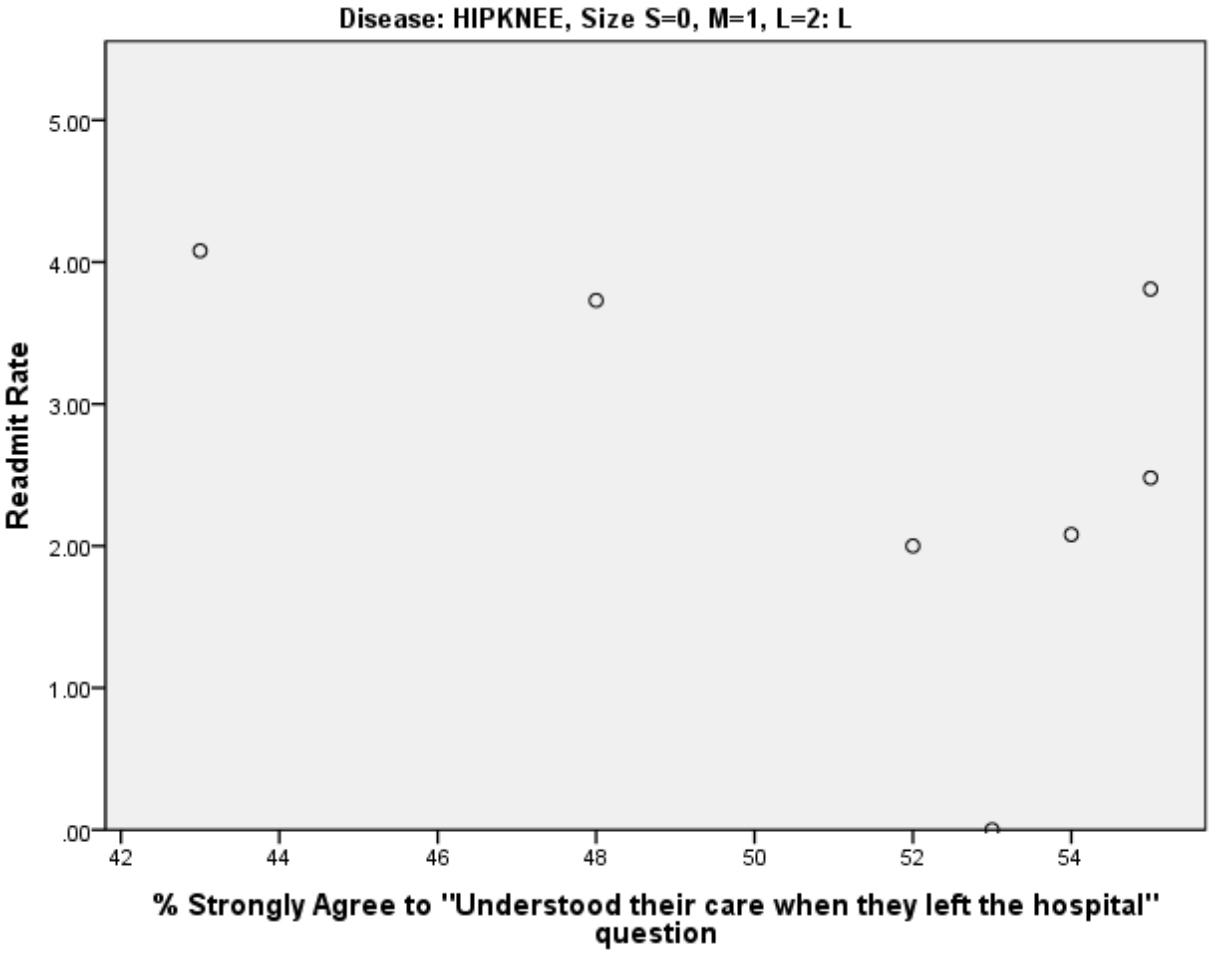

Figure B112. Scatterplot to summarize the results of correlation calculation between scores on care transition composite and all cause 30-day readmission rate for large hospitals with 25 or more hip and knee arthroplasty discharges.