Association of Provider Communication and Discharge Instructions on Lower Readmissions

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Abstract: Since the implementation of Value-Based Purchasing, hospital readmissions now effect Medicare reimbursement. This creation of a financial incentive, along with the inherent medical incentives to reduce those readmissions forces hospitals to examine their practices on the subject. Using the Donabedian model for healthcare quality, this study examined the relationship between discharge instructions and nurse/doctor communication with the patient and lower readmissions. The readmissions variable (30-day medical) along with the discharge instruction, nurse communication, and doctor communication variables came from the Centers for Medicare and Medicaid Service's Hospital Compare dataset. Zip code–level contextual variables (aggregated to the hospital service area) were used as control variables. Results suggest that while each of the independent variables of nurse communication, doctor communication, and discharge instructions were significant in predicting lower readmissions, the strongest association came from discharge instructions, while controlling for other hospital-level and contextual factors. These results call for an increased focus on patient-centeredness by making sure that the patient understands the scope and content of their discharge instructions.

Keywords
discharge instructions
readmissions
HCAHPS
communication

Purpose

This study hypothesizes that there may be a relationship between certain patient-reported Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) quality measures and medical readmissions. Specifically, this study seeks to understand the relationship between discharge instructions and provider/patient communication and their association with medical readmissions. By investigating this relationship, hospitals could reinforce their discharge procedures and encourage more interpersonal communication between providers and their patients.

Review of the Literature

Hospital readmissions are becoming more and more relevant to not only the current healthcare quality policy discussion but also to the financial standing of the hospital through Value-Based Purchasing (VBP) (VanLare and Conway, 2012). In 2003–2004, almost one fifth (19.6%) of the 11,855,702 Medicare discharges in the United States were rehospitalized within 30 days, for an annual cost of $17 billion (Jencks et al., 2009). In a meta-analysis, van Walraven and colleagues (2011) reported that of these readmissions, a median of 27.1% were avoidable (range, 5–79%).

Hospital, Patient, and Contextual Factors Related to Readmission

Several hospital-level characteristics have been shown to be related to higher readmission rates. Payer mix is a significant predictor of readmission, and Medicaid patients have been seen to have higher 30-day rates as compared with privately-insured patients (Jiang and Wier, 2010). Joynt and Jha (2011) reported that small hospitals had significantly higher readmissions rates (28.4%) than large hospitals (25.2%). Conversely, in a later study, Singh and colleagues (2014) found that when controlling for patient and hospital factors in a multilevel model, patient characteristics were the largest contributor to risk of readmission, as opposed to hospital characteristics. Contextually, Herrin and colleagues (2014) noted that 58% of the national variation in hospital readmissions was explained by the county characteristics in which the hospital was located.

Patient-level characteristics also play a part in determining readmission. Race

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may play a role in predicting surgical 30-day readmissions, as Black patients have been seen to be readmitted within 30 days at a significantly higher rate as compared with their White counterparts (Girotti et al., 2014; Jha et al., 2009; Rathore et al., 2003). Moreover, Black patients who receive care from primarily minority-serving hospitals had significantly higher readmission rates (26.4%) as compared with Black patients in nonhigh minority-serving hospitals (23.3%) (Joynt et al., 2011). Joynt and Jha (2011) reported that patients in counties with low median income were readmitted at a significantly lower rate (29.4%) as compared their high median income counterparts (25.7%). Additionally, rural patients have significantly higher readmission rates than their urban counterparts (Weeks et al., 2009).

Methods

Conceptual Model/Variables

This study used the Donabedian model for healthcare quality of Structure-Process-Outcome, within the context of the Andersen Behavioral Model to incorporate contextual factors. Specifically, the Donabedian model housed the independent variables of discharge instructions, doctor communication, and nurse communication (all fall under process level). Specifically, for doctor and nurse communication, the HCAHPS survey asked the patient, "How often did nurses/doctors communicate well with you?" Being aggregated to the hospital level, the responses were "Percent Never," "Percent Usually or Sometimes," and "Percent Always"; this study used the "Percent Always" for the independent variables of doctor and nurse communication. Likewise, for discharge instructions, patients were asked, "Were you given information about what to do during your recovery?" The responses to this question were "Percent Yes" and "Percent No"; this study used "Percent Yes" for the corresponding independent variable. The dependent variable, 30-day medical readmissions, represented the outcome level of the Donabedian model. Other control variables that fell under the Donabedian model for quality included for-profit status and bed size. Each hospital's Case Mix Index was used to control for the average level of acuity for each hospital. The Andersen Behavioral Health Model justified the contextual factors of rural/urban location, percent non-Hispanic White, percent high-school graduate, and the median household income. Contextual variables were collected from the Research Triangle Institute's (RTI) Spatial Impact Factor Database (RTI International, 2013) at the Zip Code Tabulation Area (ZCTA) level and were aggregated to the Hospital Service Area (HSA) using a weighted average. This was done by means of a hospital to HSA crosswalk provided by the Dartmouth Atlas of Health Care.

Data

Data were used from the 2013 RTI's Spatial Impact Factor Database (RTI International, 2013), the 2013 Centers for Medicare and Medicaid Service's (CMS) Hospital Compare (Centers for Medicare and Medicaid, 2010), and the 2010 Dartmouth Atlas of Health Care (Dartmouth Atlas of Health Care, 2010). All contextual zip code–level variables were collected from the RTI Spatial Impact Factor Database and all patient-reported hospital quality measures and 30-day medical readmissions were collected from the HCAHPS portion and readmissions portion of the CMS Hospital Compare.

Statistical Analysis

All analyses were conducted using SAS (Cary, NC). The study population started with 3,718 hospitals that responded to the HCAHPS survey. After merging these data with readmission data from CMS Hospital Compare (hospitals that reported readmission data), the final study population became 3,248 hospitals. Hospitals with missing data were not used in the analysis. Preliminary analysis described the study population of hospitals across the HCAHPS measures of discharge instructions, nurse communication, and

doctor communication. Unadjusted analysis estimated 30-day medical readmissions across select HCAHPS measures and control variables. Significant differences were identified using Wald chi-square tests for categorical variables and Student's *t*-tests for continuous variables. Finally, multivariable ordinary least squares regression analyses were performed to estimate 30-day medical readmissions, adjusting for hospital and contextual characteristics. Ordinary least squares analyses were used in this analysis because of the continuous readmission percentage, which represented the hospital level.

Results

Descriptive statistics of select HCAHPS measures from the study population are represented in Table 1. The mean percentage of patients who reported receiving discharge instructions was 84.14%. The mean percentage of patients who reported that their nurse communicated with this all the time was 77.95%, whereas doctors that communicated all the time was reported to be 81.19%. Hospitals that scored higher on providing discharge instructions to patients had smaller bed sizes, were nonprofit, located in the South and in a nonurban location, were in a high non-Hispanic White population HSA, were in an HSA with higher household median income, and were in an HSA with a high percentage of high-school graduates. Similarly, factors that were statistically significant related to nurse communication were being a smaller hospital, nonprofit or Non-Federal Governmental, located in the South and in a nonurban location, and being in an HSA with a high percentage of non-Hispanic White people, lower median household income, and higher percentages of high-school graduates. Lastly, factors that were statistically significant related to doctor communication were small bed size, Non-Federal Governmental control, being located in the South or Midwest nonurban location, being in an HSA with a high percentage of non-Hispanic White, lower household median income, and a higher percentage of high-school graduates.

Table 2 represents the unadjusted estimates of medical readmissions by select hospital- and HSA-level variables. As in Table 1, least squares means were used for categorical estimates and coefficients were used for continuous variables; significant differences were tested using analysis of variance. Medical readmissions had a significantly negative association with discharge instructions, nurse communication, doctor communication, percent non-Hispanic White, median household income, and percent high-school graduates. Conversely, medical readmissions had a significantly positive association with number of beds, for-profit hospitals, and being located in the Northeast or Midwest in an urban location.

Lastly, Table 3 represents the adjusted least squares regression analysis for 30-day medical readmissions. Four models are presented with different independent variables of interest; Model 1 focuses on discharge instructions, Model 2 has nurse communication, Model 3 on doctor communication, and Model 4 incorporates all of the above: discharge instructions, doctor, and nurse communication. All four models controlled for other hospital and contextual variables as described above. All three of the independent variables of interest had a significant negative association with readmissions in their respective models; however, when controlling for all three in one model (Model 4), only discharge instructions remained to have a significant negative association. Other control variables were fairly constant across the four models in significance and direction. Positive associations with readmissions included number of beds, for-profit hospitals, and not being in a West region. Significant negative associations with readmissions included percent non-Hispanic White and median hospital income.

Limitations

The cross-sectional nature of the data analyses presented in this study should not be interpreted as causal but rather associative. This study, however, should be interpreted as presenting a possible inverse

Table 1. Descriptive Statistics of Hospital Study Population and Select HCAHPS Measures

	Discharge instructions (mean = 84.15% [SD = 4.50])	Nurse communication (mean = 77.95% [SD = 5.41])	Doctor communication (mean = 81.19% [SD = 5.10])
Bed size			
≥245	83.494 (3.679)*	75.922 (4.378)*	78.785 (3.471)*
101–244	83.789 (4.150)*	76.427 (4.972)*	79.662 (4.352)*
<100	84.909 (5.172)*	80.626 (5.328)*	84.181 (5.195)*
Control			
Government	83.400 (5.340)	78.888 (6.241)†	83.039 (5.857)*
For profit	83.340 (4.783)	75.979 (6.011)†	80.739 (5.389)
Nonprofit	84.572 (4.073)*	78.200 (4.808)†	80.775 (4.662)
Region			
Northeast	83.609 (4.575)	76.886 (5.534)*	78.697 (4.280)*
South	85.838 (4.338)*	79.698 (4.793)*	82.010 (4.511)*
Midwest	83.140 (4.326)	78.279 (5.233)*	82.639 (5.263)*
West	84.071 (4.332)	75.480 (5.430)*	78.975 (4.701)*
Location			
Urban	83.806 (4.159)*	76.360 (5.226)*	79.304 (4.312)*
Micropolitan	84.652 (3.906)	78.657 (4.269)*	81.740 (4.267)*
Rural	84.502 (5.587)	81.138 (5.189)*	85.252 (5.084)*
%Non-Hispanic White			
≥90.0	85.647 (4.197)*	80.022 (4.471)*	82.549 (4.642)*
60.0–80.0	84.263 (4.075)*	77.987 (4.906)*	80.994 (4.987)*
<60.0	81.920 (4.753)*	75.105 (6.113)*	79.756 (5.451)*
Median household income			
>$44,450	84.520 (3.896)	77.035 (4.829)†	79.709 (3.915)*
$37,126–$44,449	84.659 (4.129)	77.828 (5.364)†	80.444 (4.827)*
<$37,126	83.642 (4.958)*	78.555 (5.669)†	82.484 (5.536)*
%High-school graduates			
≥38.4	85.159 (4.460)*	79.542 (5.001)*	82.027 (5.152)*
34.1–38.3	84.201 (4.237)*	78.190 (4.957)*	81.268 (5.015)*
<34.1	83.672 (4.572)*	77.130 (5.623)*	80.793 (5.083)*

*Significantly different at $P < .0001$.
†Significantly different at $P < .05$.

Table 2. Bivariate Estimates of Medical Readmissions Least Squares Mean Values (Categorical) or Coefficient (Continuous) by Selected Hospital and Hospital Service Area Variables

		Medical readmissions	
		Estimate (SD)/coefficient (95% CI)	*P* Significance
Hospital-level			
Discharge instructions	Yes	−10.898 (−12.680 to 8.762)	<.0001
Nurse communication	Always	−7.138 (−8.710 to 5.404)	<.0001
Doctor communication	Always	−5.221 (−6.963 to 3.425)	<.0001
Number of beds	Per 1	0.002 (0.001 to 0.003)	<.0001
Control	For profit	16.25% (3.02)	<.0001
	Nonprofit	15.67% (2.18)	
	Non-Federal Government	15.83% (2.42)	
Hospital service area: level			
Region	Northeast	16.14% (2.52)	<.0001
	South	15.63% (2.64)	
	Midwest	16.12% (2.31)	
	West	15.05% (2.48)	
Rural	Urban	16.01% (2.28)	<.0001
	Micropolitan	15.33% (3.00)	
	Rural	15.68% (2.43)	
%Non-Hispanic White	Percent	−1.934 (−2.314 to 1.515)	<.0001
Median household income	Dollar	−0.001 (0.156)	<.0018
%High-school graduates	Percent	−5.037 (−6.554 to 3.665)	<.0001

Confidence intervals are stated for continuous variables; standard deviations of least square mean values for categorical variables.

relationship between provider–patient communication and discharge instructions and medical readmissions. Second, the level of analysis, being at the hospital and HSA levels, cannot account for individual patient variables—future research should incorporate this. All HCAHPS data used were analyzed at the hospital level. Regarding the analysis, there is some multicollinearity (significantly correlated at 0.748) in Model 4 between doctor and nurse communication; therefore, these estimates may be understated. However, the significant independent variable of interest, discharge instructions, had a low correlation (0.341) to the aforementioned correlated variables. Finally, all CAHPS data are patient-reported and may not accurately represent hospital discharge practices as implemented.

Discussion

All three independent variables of interest (discharge instruction, nurse communication, and doctor communication) had a significant negative association on 30-day medical readmissions in both unadjusted and their respective adjusted analysis models. In the adjusted analysis, when all placed in the same model, only discharge instructions remained significant in predicting lower readmissions, suggesting that discharge instructions may be the most important tool associated with lower readmission rates. Therefore, this study suggests that after controlling for the socioeconomic conditions of the HSA in which a hospital practices, by providing discharge instructions and maintaining nurse and doctor communication with the patient, medical readmissions can be reduced.

Table 3. Adjusted Least Squares Regression Analysis for 30-Day Medical Readmissions and Select HCAHPS Measures

		Discharge Instructions	Nurse Communication	Doctor Communication	All Variables
Intercept		23.004 (22.832 to 26.646)*	20.875 (19.224 to 22.526)*	21.614 (19.640 to 23.589)*	24.271 (22.013 to 26.529)*
Hospital					
Discharge instructions	Yes	−8.001 (−10.253 to 5.781)*			−5.532 (−8.182 to 2.882)*
Nurse communication	Always		−6.414 (−8.398 to 4.429)*		−2.436 (−5.321 to 0.448)
Doctor communication	Always			−6.394 (−8.564 to 4.225)*	−2.369 (−5.339 to 0.601)
Number of beds	Per 1	0.001 (0.001 to 0.018)*	0.001 (0.001 to 0.002)*	0.001 (0.001 to 0.002)†	0.001 (0.001 to 0.002)†
Control (ref: Nonprofit)	For profit	0.585 (0.419 to 0.868)*	0.426 (0.189 to 0.662)†	0.531 (0.300 to 0.762)*	0.476 (0.239 to 0.712)*
	Non-Federal Governmental	0.216 (−0.027 to 0.436)	0.158 (−0.074 to 0.390)	0.202 (−0.030 to 0.434)	0.161 (−0.071 to 0.393)
Hospital service area: level					
Region (ref: West)	Northeast	1.364 (1.111 to 1.683)*	1.554 (1.268 to 1.839)*	1.497 (1.212 to 1.782)*	1.449 (1.161 to 1.737)*
	South	1.161 (0.895 to 1.436)*	1.273 (0.998 to 1.548)*	1.247 (0.972 to 1.521)*	1.256 (0.981 to 1.530)*
	Midwest	0.912 (0.623 to 1.113)*	1.122 (0.869 to 1.374)*	1.151 (0.894 to 1.408)*	1.044 (0.781 to 1.307)*
Rural (ref: Urban)	Micropolitan	−0.352 (−0.543 to 0.062)†	0.275 (−0.475 to 0.011)	−0.219 (−0.463 to 0.025)	−0.232 (−0.475 to 0.011)
	Rural	−0.073 (−0.213 to 0.422)	−0.232 (−0.047 to 0.598)	0.369 (0.038 to 0.700)†	0.269 (−0.063 to 0.601)
%Non-Hispanic White	Percent	−0.670 (−1.495 to 0.363)†	−1.132 (−1.685 to 0.5778)*	−1.334 (−1.877 to 0.791)*	−0.866 (−1.435 to 0.298)†
Median household income	Dollar	−0.001 (−0.002 to 0.001)†	−0.001 (−0.002 to 0.001)†	−0.001 (−0.002 to 0.001)†	−0.001 (−0.002 to 0.001)†
%High-school graduate	Percent	−2.369 (−2.986 to 0.803)†	−1.045 (−2.942 to 0.852)	−1.570 (−3.496 to 0.356)	−1.498 (−3.419 to 0.422)
Case mix index	Adjustment	0.228 (−0.231 to 0.687)	0.155 (−0.302 to 0.612)	−0.014 (−0.466 to 0.437)	0.253 (−0.208 to 0.715)
R^2		.1116	.1090	.1068	.1158

*Significantly different at $P < .0001$.
†Significantly different at $P < .05$.

The results of this study suggest that processes within a hospital are more important to readmissions as compared with the basic characteristics of that hospital. Specifically, this study builds on the work of Singh and colleagues (2014) and Herrin and colleagues (2014) by shifting the focus away from simple hospital characteristics to the process of discharge instructions and area-level contextual factors when predicting readmissions. This also confirms the theoretical link between process and outcome under the Donabedian quality model. Expanding this model to include structure, hospitals would be well served to apply structural elements to support the discharge instruction and provider communication processes. For example, electronic reminders (within an Electronic Medical Record) for discharge instruction and interpersonal training for communication may improve those processes and thus improve readmissions.

This study is applicable to VBP in two ways: (1) HCAHPS scores and (2) readmissions. Under VBP, hospitals receive either incentive payments or penalties, calculated by 45% being tied to inpatient clinical process measures, 30% to patient-reported experience of care measures, and 25% to medical outcomes (Centers for Medicare and Medicaid Services, HHS, 2011). As per this study, by focusing on the HCAHPS measures of discharge instructions, nurse, and doctor communication, hospitals may realize a double benefit; they would realize increases in the 30% patient-reported process of care measures and also the 25% outcomes portion through readmission reduction. Finally, this study follows the work of Naylor (2006) and Gorman (The Care Transitions Program, 2014) by demonstrating value in preloading information about postdischarge for the patient (through discharge instructions) for a successful care transition.

Directions for Future Research

A more detailed study is warranted to determine patient-level readmission propensities while controlling for discharge instructions. Perhaps, different groups of patients act differently to the same level of discharge information. Although this study demonstrated a broad national association between discharge instructions and lower readmissions, future research should focus on a more microanalysis that would demonstrate patient specifics rather than broad regional or hospital-level factors.

Implications for Practice

The common theme of the this study is that regardless of socioeconomic situation of the HSA of the hospital, by maintaining good nurse–patient or doctor–patient communication and providing discharge instructions to the patient, medical readmissions can potentially be reduced. This calls for a focus on patient-centeredness by making sure the patient understands the scope and content of their discharge instructions. The consistent attention paid to these three processes could not only reduce unnecessary medical readmissions but also protect the hospital against Medicare reimbursement penalties under VBP.

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The authors declare no conflicts of interest.