Heart Failure Is a Major Contributor to Hospital Readmission Penalties

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ABSTRACT

Background: The Hospital Readmissions Reduction Program provides incentives to hospitals to reduce early readmissions for heart failure (HF), acute myocardial infarction (AMI), and pneumonia (PNE).

Methods and Results: To examine the contribution of each diagnosis to readmissions penalty size, data were obtained from the Center for Medicare and Medicaid Services, American Hospital Association, and United States Census Bureau including number of cases; readmissions payment adjustment factor (values <1 indicate a penalty for excess readmissions), excess readmission ratio (ERR, or ratio of adjusted predicted readmission based on comorbidities, frailty, and individual patient demographics to expected probability of readmission at an average hospital) for each diagnosis, hospital teaching status, bed number, and zip code socioeconomic status. Of 2,228 hospitals with ≥25 cases per diagnosis, 1,636 received a penalty. Univariate correlation coefficients between penalty and ERR were −0.66, −0.61, and −0.43 for HF, PNE, and AMI, respectively (all $P < .001$). Correlation between ERRs was greatest for PNE and HF (0.30; $P < .001$) and weakest for PNE and AMI (0.12; $P < .001$). In regression analyses, the HF ERR explained the most variance in the penalty (R^2 range 0.21−0.44).

Conclusion: HF ERR, not the number of cases, was related to penalty magnitude. These findings have implications for the design of hospital-based quality initiatives regarding readmissions. (*J Cardiac Fail 2015;21:134−137*)

Key Words: Heart failure, acute myocardial infarction, hospital readmission, Medicare.

Rehospitalization of patients in Medicare fee-for-service affects 19.6% of patients at 30 days.[1] The Hospital Readmissions Reduction Program was instituted to provide incentives to hospitals to reduce early readmissions for 3 highly prevalent conditions: heart failure (HF), acute myocardial infarction (AMI), and pneumonia (PNE).[2] If a patient has an index admission to a hospital for 1 of the 3 conditions, any readmission to any acute care hospital within 30 days of discharge from the index admission is counted against the same hospital for the 1st indexed condition, regardless of whether the patient is readmitted to the same or a different hospital.[3] This approach can have significant implications for hospital finances and care delivery.

In the program's 1st year, 61% of hospitals were penalized by the Center for Medicare and Medicaid Services (CMS) for higher than expected readmissions rates.[4] The degree to which HF, AMI or PNE influences the overall penalty can influence decisions about investment of resources into initiatives designed to decrease readmission. However, although an earlier analysis suggested that hospitals with higher readmission rates have higher rates across all 3 conditions,[5] to date there has been no evaluation of contemporaneous data used by Medicare to assess the penalties.

Methods

Data from the "FY 2014 IPPS Final Rule Correction Notice: Hospital Readmissions Reduction Program" (updated September 2013) were downloaded from the CMS public website.[3] The dataset contains (a) hospital Medicare provider ID, (b) the Fiscal Year (FY) 2014 readmissions payment adjustment factor (RPAF),

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ranging from 0.9800 to 1.0000, where values <1 indicate a percentage penalty for excess readmissions (maximum 2%), (c) the number of cases of PNE, HF, and AMI, and (d) the excess readmission ratio for each diagnosis (ERR, or ratio of adjusted predicted readmission based on frailty, comorbidities, and demographics of the individual patient to expected probability of readmission at an average hospital).

A series of formulas are used to derive these variables.[3] The RPAF is based on the "Ratio," calculated as: 1 − (aggregate payments for excess readmissions/aggregate payments for all discharges). The aggregate payments for excess readmissions is defined as: [sum of base operating diagnosis-related group (DRG) payments for AMI × (excess readmission ratio for AMI −1)] + [sum of base operating DRG payments for HF × (excess readmission ratio for HF − 1)] + [sum of base operating DRG payments for PNE × (excess readmission ratio for PNE − 1)], and the aggregate payments for all discharges is defined as the sum of base operating DRG payments for all discharges. The RPAF is equivalent to the "Ratio" up to a value of 0.98 (in FY 2014). If the "Ratio" is <0.98, the RPAF remains 0.98 (a 2% maximum penalty).

Additional data were obtained from the American Hospital Association (AHA; www.healthforum.com) and matched by Medicare provider ID: hospital teaching status, including nonteaching, minor teaching, and major teaching; number of staffed beds; and zip code. Teaching status was categorized as major if the hospital was a Council of Teaching Hospitals and Health Systems (COTH) member. This variable was broken down to 2 dummy-coded variables (0/1) with "nonteaching" status as the reference group. The continuous variable "number of staffed beds" was transformed for analysis into quartiles (score range 1−4). Finally, data on poverty (percentage of individuals living below the poverty level) and median household income, matched to hospital by zip code tabulation area, were obtained from the American Factfinder website of the United States Census Bureau,[6] specifically the 2008−2012 American Community Survey 5-Year Estimates. The poverty and income variables were strongly correlated ($r = -0.77$; $P < .001$); before data analysis, standardized T scores (mean 50, SD 10) were computed for each variable and averaged to obtain a composite socioeconomic status (SES) variable.

Hospitals with and without readmission penalties were compared by all variables with the use of independent-sample t tests or chi-square tests of association. To evaluate the strength of association of each ERR value with the magnitude of the readmission penalty, correlation coefficients were calculated between the RPAF and ERR variables for hospitals that received a penalty. Multiple regression analyses were conducted with the ERR variables entered in 1 of 6 possible orders, after accounting for variance associated with teaching status, SES, and number of hospital beds. This allowed quantification of the amount of adjusted variance explained in RPAF by each of the ERR variables. The change in R^2 was evaluated after each step. Pearson correlations were calculated to determine the strength of association between case volume and ERR. For all analyses, the "number of cases" variables were statistically transformed to account for inordinate skewness.

Results

A total of 3,483 hospitals are represented in the database, 2,228 when restricted to hospitals with ≥25 cases per disease per CMS definitions. Of this latter group, 1,636 (73.4%) received a readmission penalty. Descriptive data are presented in Table 1.

Among hospitals that received a penalty, the number of cases had weak or no associations with the size of the penalty, with correlations of −0.04 ($P = .10$) for AMI, −0.14 ($P < .001$) for PNE, and −0.16 ($P < .001$) for HF. Associations between penalty and ERR based on univariate correlation coefficients were −0.66 for HF, −0.61 for PNE, and −0.43 for AMI (all $P < .001$). Correlation between the ERRs for the 3 diseases were 0.30 ($P < .001$) for PNE and HF, 0.18 ($P < .001$) for HF and AMI, and 0.12 ($P < .001$) for PNE and AMI.

In multiple regression analyses, the amount of incremental variance explained by each of the 3 ERR variables was calculated across the 6 possible orders of entry of the ERR variables (PNE-HF-AMI, PNE-AMI-HF, HF-PNE-AMI, HF-AMI-PNE, AMI-PNE-HF, AMI-HF-PNE), after first entering SES, number of hospital beds, and teaching status into the equation. Together, the latter variables explained only 1% of the variance in penalty magnitude ($P = .023$). Hospitals occupying lower-SES zip code tabulation areas, larger hospitals, and major teaching hospitals received significantly higher penalties (minor teaching status was nonsignificant: $P = .24$). For the ERR variables, at each position of entry (1st, 2nd, or 3rd), HF ERR explained the most variance in the penalty (R^2 range 0.21−0.44) relative to the PNE (0.18−0.38) and AMI (0.09−0.19) ERRs.

Fisher r-to-Z comparisons were made for R values (square root of R^2) for each ERR at each step of the regression equation. As presented in Table 2, HF ERR explained significantly more variance (44%) than the PNE ERR (38%) and AMI ERR (19%) when entered 1st in the regression equations (after adjustment for SES, number of staffed beds, and teaching status). When entered in the 2nd step of the regression equations, after adjusting for each other, HF ERR explained significantly more variance (26%) than the PNE ERR (19%). When entered in the 2nd step after AMI, however, the HF ERR and PNE ERR explained statistically

Table 1. Descriptive Data for Study Variables, Mean (SD)

Variable	Readmission Penalty (n = 1,636)	No Readmission Penalty (n = 592)	P Value
RPAF	0.9963 (.0035)	1.0000 (0)	—
No. of PNE cases	368.3 (230.6)	386.3 (246.6)	.13
PNE ERR	1.03 (0.07)	0.93 (0.06)	<.001
No. of HF cases	478.6 (350.9)	481.9 (369.0)	.62
HF ERR	1.02 (0.08)	0.92 (0.07)	<.001
No. of AMI cases	205.0 (209.1)	245.9 (229.0)	<.001
AMI ERR	1.02 (0.07)	0.94 (0.06)	<.001
Major teaching status, % (n)	11.4 (187)	8.1 (48)	.01
Percentage below poverty level	17.7 (10.1)	16.2 (9.6)	<.01
Median household income	51000 (20700)	53000 (20700)	<.05
Hospital beds	281 (221)	276 (204)	.62

RPAF, readmissions payment adjustment factor; PNE, pneumonia; ERR, Excess Readmission Ratio; HF, heart failure; AMI, acute myocardial infarction.