Readmission Penalties for Chronic Obstructive Pulmonary Disease Will Further Stress Hospitals Caring for Vulnerable Patient Populations

To the Editor:

The Hospital Readmission Reduction Program (HRRP) was established by the Affordable Care Act to improve care quality and reduce hospital spending by penalizing hospitals for "excessive" readmissions rates for common medical conditions (1). At present, the Centers for Medicare & Medicaid Services (CMS) calculates hospital risk-adjusted readmission rates for acute myocardial infarction, congestive heart failure, and pneumonia and penalizes hospitals above the national average up to 2% of their total Medicare reimbursement. Recent data demonstrate that hospitals caring for medically complex and socially vulnerable populations are disproportionately penalized under the HRRP (2).

Beginning in 2015, CMS will add chronic obstructive pulmonary disease (COPD) to the list of penalized conditions and will increase the maximum penalty to 3% of total reimbursement for hospitals with excessive readmissions (3). Exacerbations of COPD disproportionately affect minorities and individuals of lower socioeconomic status (SES) (4). Whether adding COPD readmissions to the HRRP will further hurt hospitals caring for such patients is unknown. Our aim in this study was to determine the relationship between COPD readmission rates and two hospital characteristics: hospital teaching status and the SES of the hospital's patient population. We hypothesized that hospitals caring for a high percentage of patients of low SES and teaching hospitals would be those most likely penalized for high COPD readmission rates under the HRRP.

Table 1. Characteristics of Hospitals with Varying COPD Readmission Rates

	Hospital Quartile of COPD Readmission Rate				
	Quartile 1 (*N* = 757) (%)	Quartile 2 (*N* = 753) (%)	Quartile 3 (*N* = 752) (%)	Quartile 4 (*N* = 756) (%)	*P* Value
COPD readmission rates	17–21	21–22	22–23	23–28	
Hospital characteristics					
Ownership					<0.001
Nonprofit	68.0	58.6	58.5	61.5	
Profit	17.0	23.1	25.3	23.7	
Government	14.9	18.3	16.2	14.8	
Hospital beds					0.08
<200	69.1	70.7	71.9	65.5	
200–399	23.7	23.6	20.9	25.8	
>400	7.3	5.7	7.2	8.7	
COPD volume (quartiles)					<0.001
Lowest (<38 per year)	19.3	28.3	29.5	10.6	
Second (38–77)	28.7	25.9	25.0	24.2	
Third (78–133)	27.1	25.2	24.3	27.7	
Highest (134–920)	25.0	20.6	21.1	37.6	
Teaching status					<0.001
None	69.0	69.5	69.2	64.4	
Minor teaching	23.7	19.5	17.0	20.2	
Major teaching	7.4	11.0	13.8	15.3	
DSH patient percentage					0.01
Lowest quartile	28.0	25.9	22.4	22.8	
Second quartile	32.2	35.0	36.3	29.2	
Third quartile	17.5	15.8	15.9	17.9	
Highest quartile	22.3	23.3	25.5	30.1	

Definition of abbreviations: COPD = chronic obstructive pulmonary disease; DSH = disproportionate share.
All numbers are percentages. *P* values are from chi-squared analysis. Minor teaching includes less than 0.25 full-time equivalent residents/hospital bed; major teaching includes greater than 0.25 full-time equivalent/bed. DSH patient percentage is a measure used by CMS to quantify care provided to the poor, calculated as follows: (patient-days of Medicare and supplemental security income eligible patients)/(total Medicare patient-days) + (Medicaid, non-Medicare patient-days)/(total patient-days).

Methods

We used publically reported data from the HRRP supplemental file for 2015, which includes risk-standardized COPD readmission ratios for each hospital (5). We multiplied each hospital's ratio by 22.1%, the national readmission rate for COPD in the Medicare population, to calculate COPD readmission rates at each hospital.

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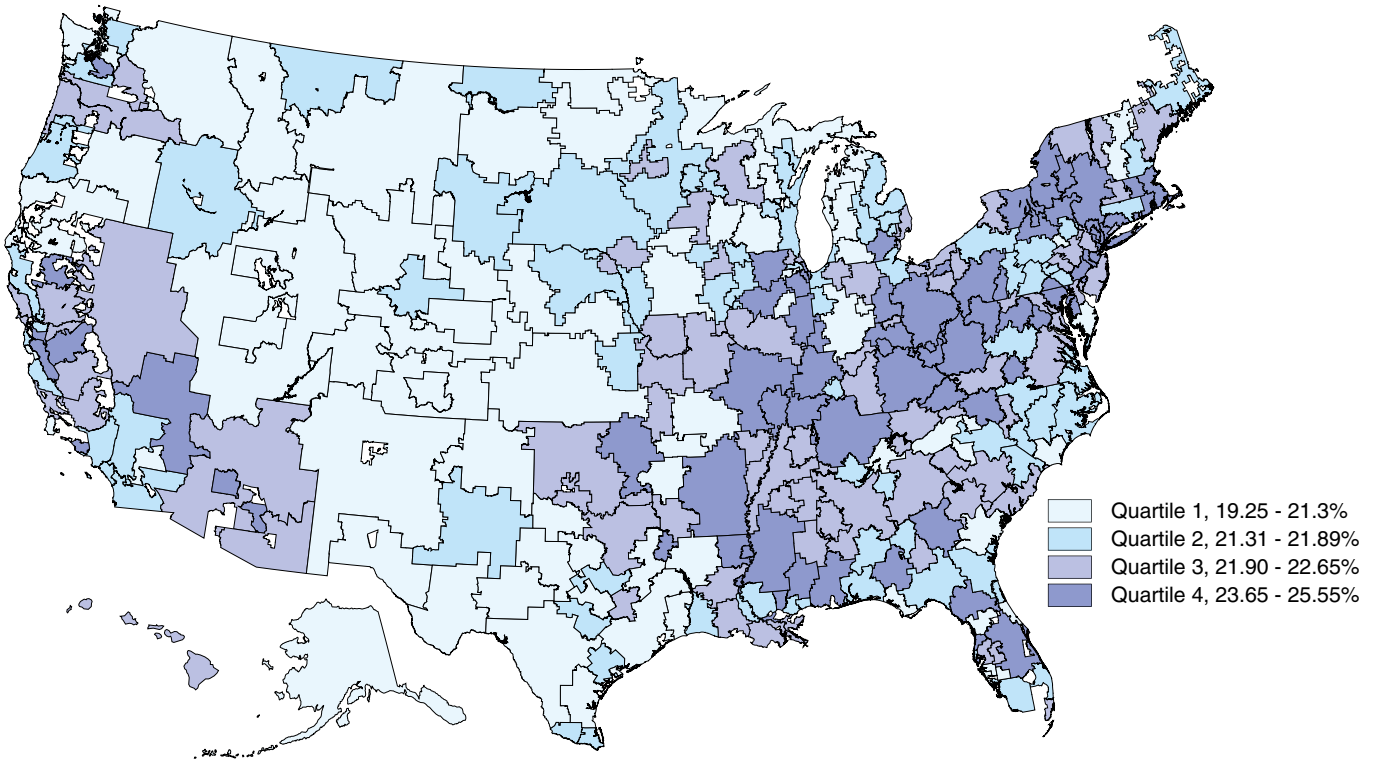

Figure 1. Chronic obstructive pulmonary disease readmission rates across hospital referral regions. Rates were calculated by averaging hospital rates within each region weighted by volume, and referral regions were grouped into quartiles.

We grouped hospitals into quartiles by readmission rates and linked these hospital-level data to hospital characteristics available in the Healthcare Cost Report and Information System (6). We defined teaching status as hospitals with no residents, fewer than 0.25 full-time equivalent (FTE) residents per bed, or greater than 0.25 FTE residents/bed. We defined hospitals with a high proportion of low-SES status patients as those in the highest quartile of disproportionate share patient percentage, a measure used by CMS to quantify care provided to the poor (7).

We compared hospital characteristics across COPD readmission rate quartile, using chi-squared tests. We entered teaching status and the SES status of the hospital's patients into a single multivariable ordinal logistic regression model to determine their association with a higher quartile of COPD readmission rate. We adjusted the model for profit status, bed number, and volume of COPD admissions. We included those hospital characteristics as potential confounders because of their potential association with readmission rates. Finally, we estimated COPD readmission rates across Hospital Referral Regions by averaging hospital rates within each region weighted by volume and grouped referral regions into quartiles. All data management and analysis was conducted using Stata 13 (StataCorp, College Station, TX). Our study received an exemption from our institutional review board because of our use of public data.

Results

Data were available from 3,018 hospitals. COPD readmission rates ranged from 17% to 28% across hospitals. Hospitals with higher readmission rates were more often high-volume centers, major teaching hospitals, and hospitals with a high proportion of low-SES-status patients (in the highest quartile of disproportionate share patient percentage; Table 1). After adjusting for all other characteristics, major teaching hospital status (odds radio [OR], 1.85; 95% confidence interval [CI], 1.44–2.39), highest quartile of low-SES patients (OR, 1.42; 95% CI, 1.15–1.74), and highest quartile of COPD volume (OR, 2.35; 95% CI, 1.85–2.99) were all characteristics independently associated with being in a higher quartile of COPD readmission rate ($P < 0.001$ for all). COPD readmission rates were greatest in the Mid-Atlantic, Midwest, and South relative to other regions (Figure 1).

Discussion

We found that high-volume hospitals, major teaching hospitals, and hospitals with the highest percentage of low-SES patients were more often among hospitals with high COPD readmission rates. In addition, geographic areas often with a greater burden of low-income patients also had higher COPD readmission rates. These data suggest that hospitals caring for disadvantaged populations are more likely to be penalized for high COPD readmission rates.

Prior work demonstrates that readmission penalties for congestive heart failure, acute myocardial infarction, and pneumonia disproportionately affect hospitals caring for vulnerable patient populations. Penalties for COPD target the same hospitals, suggesting that inclusion of the disease in the HRRP will increase the hospitals' financial losses and further deplete their limited resources. The HRRP encourages hospitals to reduce readmissions by improving inpatient care and care transitions. However, no interventions to date have been shown to reliably reduce COPD

readmission rates (8). Moreover, patient factors linked to socioeconomic resources (social support, stable housing, and access to care) often contribute to readmissions (9, 10).

A National Quality Forum working group convened at the request of the federal government recently recommended that CMS include socioeconomic factors in the risk adjustment of hospital performances measures (11). Whether CMS will adopt this recommendation and whether the new adjustment methods will be adequate remains unclear. For now, hospitals caring for socially vulnerable patients will continue to receive penalties for factors outside their control. ■

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Azithromycin: We're There!

To the Editor:

We write in response to a number of issues raised in the recent editorial by Restrepo and Anzueto (1) pertaining to our previously published studies of azithromycin to prevent acute exacerbations of chronic obstructive pulmonary disease (AECOPDs) (2, 3).

Restrepo and Anzueto (1) cited our finding that long-term use of azithromycin increased the prevalence of macrolide-resistant respiratory pathogens cultured from the nose in patients who were not colonized with resistant organisms at the time of enrollment (81% vs. 41%) (2). They failed to note, however, that azithromycin decreased the prevalence of colonization with respiratory flora to a considerable extent (66 vs. 172 patients in the azithromycin group vs. the placebo group, respectively). Because of this, although the percentage of patients who became colonized with macrolide-resistant respiratory pathogens was higher in those taking azithromycin, the actual number of patients who became colonized with resistant organisms was lower (38 vs. 44).

Restrepo and Anzueto (1) correctly cited our finding that hearing decrements occurred more commonly in patients receiving azithromycin than those receiving placebo (25% vs. 20%) (1). However, they failed to comment on the fact that 32% of participants who developed hearing decrements while receiving azithromycin had reversal of these decrements on subsequent testing, despite continuing to receive the medication. Because comparable reversals in measured hearing decrements occurred in the patients receiving placebo, we concluded that the audiograms performed by our research coordinators (as opposed to those done by audiologists) were too insensitive to confirm that the hearing decrements we recorded actually occurred. Ototoxicity has been reported in 21% of patients receiving 4 g/day of intravenous erythromycin (4), and hearing decrements have been reported in response to daily oral azithromycin in doses of 500 or 600 mg/day, but in many of these reports, the patients were also receiving other ototoxic medications. Whether ototoxicity occurs in response to long-term azithromycin at a dose of 250 mg/day remains to be determined.

Restrepo and Anzueto (1) also question what the appropriate dose of azithromycin should be, stating that "most clinical studies in COPD and other respiratory conditions used three times/week dosing." At the time our protocol was designed, we could find only two studies that administered azithromycin three times/week, and both were conducted in patients with cystic fibrosis (i.e., no such studies had been done in patients with COPD). As stated in the manuscript, we opted to use daily dosing to avoid missing a potentially positive therapeutic effect because of inadequate dosing. In addition, our protocol review committee believed that compliance taking the study drug would be enhanced by daily dosing.

Restrepo and Anzueto (1) suggest that dosing three times/week may result in fewer macrolide-related adverse effects. Although this is logical, there are no published data that support this suggestion. The cardiac and hearing adverse effects associated with macrolides are related to peak drug levels, and peak drug levels will likely be the same, irrespective of whether the medication is given daily or three times/week (although there