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What Incentives Are Created by Medicare Payments for Total Hip Arthroplasty?

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ABSTRACT

Background: Differences in profitability and contribution margin (CM) between various patient populations may make certain patients particularly attractive (or unattractive) to providers. This study seeks to identify patient characteristics associated with increased profit and CM among Medicare patients undergoing total hip arthroplasty (THA).

Methods: The expected Medicare reimbursement for consecutive patients of Medicare-eligible age (65+ years) undergoing primary unilateral elective THA (n = 498) was calculated in accordance with Center for Medicare and Medicaid Services policy. Costs were derived from the hospital's cost accounting system. Profit and CM were calculated for each patient as reimbursement less total and variable costs, respectively. Patients were compared based on clinical and demographic factors by univariate and multivariate analyses.

Results: Medicare patients undergoing THA generated negative average profits but substantial positive CMs. Lower profit and CM were associated with higher American Society of Anesthesiologists Physical Status Classification ($P < .01$, $P = .03$), older age ($P < .01$), and longer length of stay ($P < .01$, $P = .03$). No association was found with gender, body mass index, or race.

Conclusion: If our results are generalizable, Medicare patients requiring THA are currently financially attractive, but institutions have a long-term incentive to shift resources to more profitable patients and service lines, which may eventually restrict access to care for this population. THA providers have a financial incentive to favor Medicare patients with younger age, lower American Society of Anesthesiologists Physical Status Classification, and those who can be expected to require relatively short admissions. The Center for Medicare and Medicaid Services must strive to accurately match reimbursement rates to provider costs to avoid inequitable payments to providers and financial incentives discouraging treatment of high-risk patients or other patient subpopulations.

Medicare is the primary payer for more than 60% of the total hip arthroplasty (THA) procedures performed in the United States, and major arthroplasty procedures of the lower extremity represent the single largest procedural cost in the Medicare budget [1]. The Centers for Medicare and Medicaid Services (CMS) sets Medicare reimbursement rates. Patients are assigned medical severity diagnosis-related group weights based on comorbidities and clinical complexity. This, combined with an adjustment for the hospital's reported costs, is the major factor used to determine hospital payment [1]. Still, there remains a large variability in profits and contribution margin (CM) between patients.

Profit and CM are generally considered reliable gauges for providers' long- and short-term incentives, respectively. Differences in profit and CM between various patient populations may make

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certain patients particularly attractive (or unattractive) to hospitals. Such differences may become increasingly relevant in the future as demand for THA is expected to grow much faster than the surgical workforce, allowing providers to be increasingly selective in the cases they perform [2].

Previous studies have shown that certain THA patient subpopulations tend to generate higher hospital costs. For example, patients older than 85 years were found to generate higher total costs than younger patients [3]. In addition, males have higher rates of infections after total joint arthroplasty than do females, likely contributing to higher costs [4]. This data suggest that there may also be discrepancies in profit and CM between these groups. Racial disparities have also been reported in the treatment of osteoarthritis which could be related to differences in profit and CM between races [5]. Knowledge of existing financial incentives could help CMS adjust its payment policies to prevent unintended treatment discrimination. The purpose of this research effort is to identify patient characteristics associated with increased profit and CM among Medicare patients undergoing THA.

Material and Methods

All patients of Medicare-eligible age (65+ years) undergoing primary unilateral elective THA at 3 urban academic hospitals (all part of a single hospital network) in Philadelphia between July 2009 and June 2011 were included. Subjects were identified on the basis of *International Classification of Diseases, Ninth Revision, Clinical Modification*, volume 3, procedure code 81.51. The study was performed under an institutional review board–approved protocol. It was compliant with the Health Insurance Portability and Accountability Act, and informed consent was waived. Age, American Society of Anesthesiologists Physical Status Classification (ASA class), body mass index (BMI), gender, length of hospital stay (LOS), and race were recorded for all patients. Expected Medicare hospital reimbursement was calculated for each patient in accordance with CMS policy. Variable costs (the sum of all marginal costs attributable to a patient's care) and total costs (variable costs plus fixed, or overhead, costs) were derived from the hospital's cost accounting system (Horizon Performance Manager software; McKesson Corp, San Francisco, CA). Profit and CM were calculated for each patient as reimbursement less total and variable costs, respectively.

Statistical Analysis

To determine the effects of age, ASA class, BMI, gender, LOS, and race on profit, CM, variable costs, total costs, and reimbursement, linear regressions were performed for the continuous variables (age, LOS, BMI) and 1-way analysis of variance was performed for the ordinal and nominal variables (ASA class, race, gender). Variables that significantly correlated with profit and/or CM were then used in multivariate regressions to determine the overall strength of these variables for predicting profit and CM. Multivariate regression analysis was chosen as it takes into account confounding between the predicting variables.

Theory/Calculation

This investigation rests on the assumption that financial incentives have the potential to influence provider behavior. CM is generally considered an indicator of short-term incentives as it only incorporates variable costs, which are the operating expenses that an organization can restructure in the relatively near future. Practically speaking, this means CM is most relevant to treatment decisions on a case-by-case basis (ie, whether to treat a given patient). Conversely, profit is considered an indicator of long-term incentives as the calculation incorporates all costs, and over the long term, organizations have the ability to revise their entire cost structure. In practical terms, this means profit is most relevant in service-line decisions (ie, whether to maintain an arthroplasty program).

Financial incentives stemming from reimbursement levels can be expected to become more influential in the future as growth of the volume of THAs performed is projected to outpace growth of the volume of providers. If surgeons respond to financial incentives, this growth pattern can be expected to amplify any discrimination among patient subpopulations.

Results

Four hundred ninety-eight patients were included in the study. Our cohort was 62.2% female, average age was 73.5 years, and average BMI was 29.2 kg/m^2. These demographic factors as well as race were statistically similar across the 3 hospitals included in the study. Patients remained in the hospital 4.1 days on average, resulting in an $18,642 median total cost and a $9590 median variable cost. They generated $18,710 in median reimbursement, resulting in $8028 in median CM and −$1025 in median profit (Table 1). This negative profit value signifies that when all overhead costs are considered, the hospitals lose money when providing THA to the Medicare population.

Increased ASA class and longer LOS were associated with higher variable and total hospital costs as well as higher levels of reimbursement ($P < .01$). Increased age and male gender were associated with higher variable and total costs ($P \leq .03$) but not with reimbursement ($P = .24$ and $P = .75$, respectively). Higher BMI was associated with higher total costs and higher reimbursement ($P < .01$) but not with higher variable costs ($P = .11$). No association with costs or reimbursement was found for race (Table 2).

ASA class, age, and LOS were correlated significantly with profit and CM in univariate regression analysis ($P < .01$), and gender correlated with profit ($P = .03$). Specifically, male patients tended to generate higher (less negative) profit than female patients. BMI and race did not significantly correlate with profit or CM (Table 3). LOS

Table 1
Patient Characteristics (n = 498).

Variable	Mean (SD) or Count (%)	Range
Age (y)	73.5 (6.3)	65-93
ASA class		
I	3 (0.6%)	
II	299 (60.0%)	
III	193 (38.8%)	
IV	3 (0.6%)	
BMI (kg/m^2)	29.2 (6.1)	14.9-54.8
Gender		
Male	188 (37.8%)	
Female	310 (62.2%)	
Length of stay (d)	4.1 (2.7)	2-22
Race		
American Indian	2 (0.4%)	
Asian	2 (0.4%)	
Black	101 (20.3%)	
Other	7 (1.4%)	
Unknown	7 (1.4%)	
White	379 (76.1%)	
Reimbursement	$18,710 ($8188)	$10,492-$79,211
Variable cost	$9590 ($3969)	$2780-$54,238
Total cost	$18,642 ($7214)	$8458-$84,309
Profit	−$1025 ($7750)	−$41,396 to $44,409
Contribution margin	$8028 ($5909)	−$17,157 to $54,267

SD, standard deviation; ASA class, American Society of Anesthesiologists Physical Status Classification; BMI, body mass index.