# Teaching Hospitals Are Critical Providers of Care for Medicare Hospital Transfer Patients

### Introduction

Teaching hospitals are unique in their tripartite mission of research, medical education, and patient care. Teaching hospitals have pioneered many of the fundamentals of high-quality clinical care that exist today because of their focus on this mission.[1] One important way in which teaching hospitals continue to demonstrate their advanced capabilities and serve as indispensable resources to their communities is in treating a disproportionate share of transfer patients from other hospitals.[2,3]

Transfer patients have been found to be higher acuity than average patients — they spend more time in the intensive care unit, are less likely to discharge directly to home, and ultimately cost more to treat.[4] Teaching hospitals have demonstrated that they are uniquely able to provide specialized services or intensity of care to these patients when other hospitals are not equipped to deliver such care.[2,3]

However, in the years since the AAMC last examined the care of transfer patients, there have been changes in coverage due to the Affordable Care Act, advances in technology, and changes in clinical care models. As a result, this analysis sought to understand whether teaching hospitals continue to serve as the critical providers for this complex and costly patient population in the current health care environment. Further, this analysis sought to determine whether teaching hospitals are sufficiently compensated for the additional costs of care.

Therefore, this *Analysis in Brief* (1) examines whether transfer patients are disproportionately sent to teaching hospitals, (2) assesses the complexity of transfer patients, and (3) determines whether teaching hospitals are sufficiently compensated for the costs they bear in treating a disproportionate share of these resource-intensive patients.

### Methods

This analysis examined data for Medicare beneficiaries from the Medicare inpatient claims-level database for fiscal year 2016.[5] Medicare beneficiaries include patients who are 65 and older, disabled, or suffering from end-stage renal disease. The database flags the patient for each case as a hospital transfer patient if they were admitted to an acute-care facility from another acute-care facility where they were an inpatient.

This case-level data was analyzed for the 3,332 hospitals in the database paid under the Inpatient Prospective Payment System (IPPS).[6] Hospitals were classified into categories based on their association with the AAMC and their intern and resident-to-bed (IRB) ratios.[7] Specifically, the database contained 233 current AAMC-member teaching hospitals, representing 65% of the largest teaching hospitals (those with more than 500 beds), 872 other teaching hospitals, and 2,227 nonteaching hospitals. While this report focuses on these three categories, additional categories for comparison (i.e., major and minor teaching hospitals[8]) are included in Tables 1 and 2.

The analysis compared the observed average case mix indices (CMIs) and computed average Medicare payment-cost differences for transfer versus nontransfer cases. The CMI reflects the relative complexity, work intensity, and cost associated with the Medicare severity diagnosis-related group (MS-DRG)[9] of each patient. To calculate the Medicare payment-cost difference, total costs were computed for each transfer and nontransfer case by grouping the charges for each case by cost center, multiplying each by their corresponding national cost-to-charge ratio,[10] and summing the resulting cost-center-level costs. From computed total cost and reported Medicare payment,[11] the Medicare payment-cost difference for each case was computed. To determine how the Medicare payment-cost difference per case varies by hospital teaching status and patient transfer status, a multilevel model[12] was run on the difference to control for payment factors (i.e., the patient's DRG weight and the hospital's wage index, IRB ratio, and Disproportionate Share Hospital Patient Percentage (DPP)[13]) as well as an effect of the hospital itself.

### Results

In 2016, while teaching hospitals only accounted for less than one-third of all IPPS hospitals, four out of every five transfer cases were treated at teaching hospitals (Table 1). Further, AAMC-member teaching hospitals, while accounting for only 7% of all hospitals in this analysis, treated 40% percent of the 512,324 transfer cases nationwide, with transfer cases representing 13% of their inpatient case volume compared with 3% for nonteaching hospitals.

Consistent with previous findings,[2,3] the average CMI for transfer cases is higher than that for nontransfer cases across each hospital category (Table 2). Further, the average CMI for transfer cases varies by hospital type. Specifically, transfer cases at

AAMC-member teaching hospitals have an average CMI of 2.58 — compared with the average CMI of 2.14 at other teaching hospitals and 2.01 at nonteaching hospitals. This is particularly significant considering that the average CMI for the nontransfer patient population at AAMC-member teaching hospitals is also high (1.99) relative to other teaching hospitals (1.73) and nonteaching hospitals (1.62).

Having confirmed that transfer cases are more complex and are disproportionately sent to AAMC-member teaching hospitals, the final step is determining whether teaching hospitals are sufficiently compensated for their critical role in caring for this patient population. Upon examination of the Medicare payment-cost differences, Medicare underpaid for all cases, both transfer and nontransfer cases (Figure 1). However, transfer cases are more severely underpaid than nontransfer cases for AAMC-member teaching hospitals and slightly more underpaid for other teaching hospitals, with the opposite being true for nonteaching hospitals. Specifically, AAMC-member teaching hospitals are underpaid by $1,669 per case through the IPPS payment system for a transfer patient compared with a nontransfer patient, after controlling for other payment factors and effect of the hospital; other teaching hospitals are underpaid by $44 per case for transfers, and nonteaching hospitals are actually underpaid more ($170) for nontransfers.

### Discussion

These results have several implications. As shown in previous analyses,[2,3] teaching hospitals still receive the majority of transfers, with AAMC-member teaching hospitals treating a disproportionate number of these cases. This finding demonstrates that teaching hospitals continue to play a significant role in providing specialized care to patients when other hospitals cannot and affirms their continued value as important community and regional assets.

This study confirms the prior finding[2,3] that patients admitted as transfers to AAMC-member teaching hospitals fall into more complex DRGs than nontransfer patients based on their CMIs and that

**Table 1. Number and Percentage of Patient-Transfer and Nontransfer Cases to Hospitals by Hospital Teaching Status, 2016**

|  | All | AAMC-member teaching | Other teaching | Non-teaching | Major teaching | Minor teaching |
|---|---|---|---|---|---|---|
| **Transfer Cases** | 512,324 | 203,914 | 201,254 | 107,156 | 162,791 | 242,377 |
| **Other Cases** | 8,618,277 | 1,605,211 | 3,230,290 | 3,782,776 | 1,513,035 | 3,322,466 |
| **Percentage of Transfer Cases** | 5.9% | 12.7% | 6.2% | 2.8% | 10.8% | 7.3% |

**Table 2. Average Case Mix Index (CMI) of Patient-Transfer and Nontransfer Cases to Hospitals by Hospital Teaching Status, 2016**

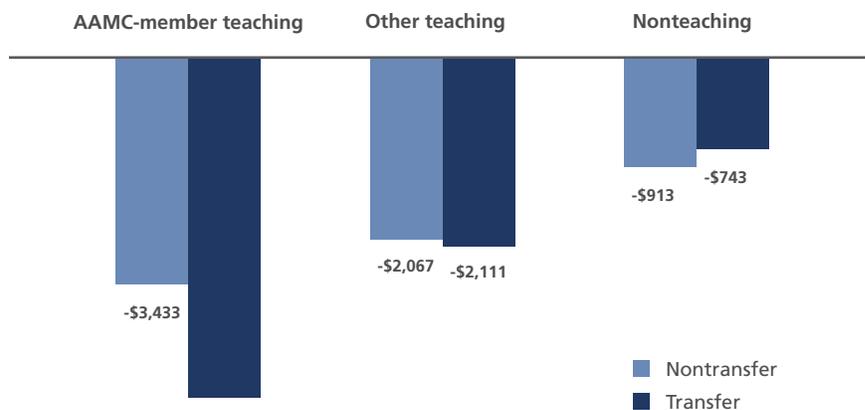|  | All | AAMC-member teaching | Other teaching | Non-teaching | Major teaching | Minor teaching |
|---|---|---|---|---|---|---|
| **Transfer Cases** | 2.29 | 2.58 | 2.14 | 2.01 | 2.59 | 2.20 |
| **Other Cases** | 1.73 | 1.99 | 1.73 | 1.62 | 1.92 | 1.77 |
| **Difference** | 0.56 | 0.59 | 0.41 | 0.39 | 0.67 | 0.43 |

these transfer patients are more clinically complex than transfer patients at other types of hospitals. While the Medicare program recognizes these cases through IPPS policies (i.e., with outlier and MS-DRG payments), the costs of these resource-intensive patients are not fully covered by these payments alone.

AAMC-member teaching hospitals are underpaid by $1,669 more for transfer cases than for nontransfer cases, even after controlling for hospital- and case-specific factors that could lead to payment differences. Therefore, when taken together with the fact that AAMC-member teaching hospitals treat a disproportionate number of transfer cases, these results demonstrate the critical role that teaching hospitals play in providing

specialized and intensive care to patients transferred from lower acuity settings.

A limitation of this analysis is that it focuses only on Medicare beneficiaries. However, this limitation may be considered acceptable because the Medicare database is extremely comprehensive, nationally representative of its population, and publicly available.

Regardless of the insurer of transfer cases, teaching hospitals must be mindful of challenges associated with these complex cases; remain committed to caring for these patients, whom other hospitals often cannot accommodate; and continue to provide the highest-quality care, deliver value, and control costs.

**Figure 1. Estimated average difference between Medicare payment and cost per case adjusted for case- and hospital-specific factors, 2016.**

based on International Classification of Diseases diagnoses, gender, age, sex, treatment procedure, discharge status, and the presence of complications or co-morbidities. The system was developed for Medicare. CMS uses this system as part of the prospective payment system that uses a predetermined rate per case or type of discharge. Learn more at https://definitions.uslegal.com/d/diagnosis-related-group-drg/. As of Oct. 1, 2007 (Version 25 of the CMS DRGs), CMS adopted a refined system to further quantify severity associated with each DRG; this revised DRG system is referred to as the MS-DRG system.

### Examples of MS-DRGs and Their Respective Weight

| MS-DRG | MS-DRG Title | Weight |
|--------|--------------|--------|
| 007 | Lung transplant | 10.6510 |
| 103 | Headaches without major complications or co-morbidities (MCC) | 0.7814 |
| 313 | Chest pain | 0.7073 |

*Source: FY2019 IPPS Final Rule and Correction Notice Table 5.*

### Disproportionate Share Hospital Patient Percentage (DPP)

Disproportionate Share Hospital Patient Percentage measures the proportion of a hospital's patients who are dually eligible for Medicare and Medicaid and is defined by the following formula:

DSH Patient Percent = (Medicare Supplemental Security Income Days / Total Medicare Days) + (Medicaid, Non-Medicare Days / Total Patient Days)

For additional information, https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/dsh.html.

### Multilevel Model

This analysis used a multilevel model to capture both between-hospital and within-hospital effects. Specifically, the model included fixed effects of case DRG weight, hospital wage index, hospital IRB ratio, and hospital DPP, and a random

### Notes

1. AAMC. Academic Medicine: Where Patients Turn for Hope. https://members.aamc.org/eweb/upload/Academic%20Medicine%20Where%20Patients%20Turn%20for%20Hope.pdf. Accessed April 26, 2019.
2. Steinmetz E, Morse, CB. Hospital transfers of Medicare patients. *AAMC Analysis in Brief*. 2009; 9(1): 1-2.
3. Huderson A, Haberman M, Conroy J. Medicare patient hospital transfers in the era of health care reform. *AAMC Analysis in Brief*. 2013; 13(2): 1-2.
4. Sokol-Hessner L, White AA, Davis KF, Herzig SJ, Hohmann SF. Interhospital transfer patients discharged by academic hospitalists and general internists: characteristics and outcomes. *J Hosp Med*. 2016; 11(4): 245-250.
5. This analysis examined only cases where Medicare was the primary payer and reimbursement was greater than 0.
6. Because the database defines hospital transfer as a patient admitted from an acute care facility and because this analysis examines Medicare payments, for the sake of comparability, the pool of hospitals includes only nonfederal, short-term general hospitals paid under the same Medicare payment system.
7. IRB ratios are from the FY2019 IPPS Final Rule and Correction Notice Impact File. If the hospital did not appear on this file, the last IPPS impact file that the hospital appeared on was used.
8. Major teaching hospitals are defined as having IRB ratios of 0.25 or greater, while minor teaching hospitals have IRB ratios that fall between 0 and 0.25.
9. For more information, see glossary.
10. National cost-to-charge ratios are from the FY2019 IPPS Final Rule.
11. Medicare payment is the sum of the DRG price amount and DRG outlier approved payment amount reported in the database for each case. The DRG price amount includes the Medicare payment amount (the sum of the DRG-adjusted base payment and the disproportionate share, indirect medical education, and total Prospective Payment System capital amounts), beneficiary coinsurance liability amount, beneficiary inpatient deductible liability amount, and beneficiary blood deductible amount.
12. For more information, see glossary.
13. DPP is from the FY2019 IPPS Final Rule and Correction Notice Impact File. For more information, see glossary.

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### Glossary

### Case Mix Index (CMI)

Each Medicare patient is classified into a diagnosis-related group (DRG) based on clinical information. CMS assigns a relative weight to each DRG based on the average resources used to treat Medicare patients in that DRG. DRGs that are high complexity and/or high work intensity will have a higher CMI, while those that are lower complexity will have a lower CMI.

### Medicare Severity Diagnosis-Related Group (MS-DRG)

Diagnosis-related group is a patient classification system based on distinct groupings of diagnoses. DRGs are

effect of hospital to capture unobserved hospital characteristics that affect case-level outcomes. The analysis merged in the hospital wage index, IRB ratio, and DPP from the FY2019 IPPS Final Rule and Correction Notice Impact File (or the most recent impact file in which the hospital appeared if they did not appear on the FY2019 file), and the case DRG weight was pulled from the FY2016 IPPS Final Rule and Correction Notice Table 5.