Differences in Medicare Beneficiary Risk Scores by Physician's International Medical Graduate Status

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INTRODUCTION

International medical graduates (IMGs) comprise nearly one-fourth of US practicing physicians and are more likely to practice primary care and in underserved regions.[1,2] Despite evidence on the quality of care provided by IMGs, limited data exists on whether populations served by IMGs have different medical complexity than those served by domestic graduates (DGs).[3] Understanding differences in populations served by IMGs and DGs is important when assessing the potential impact of federal immigration policies on IMGs and the patients they serve. Therefore, we examined the relationship between physician IMG status and Medicare beneficiary medical complexity, among internal medicine (IM) physicians.

METHODS

We performed a cross-sectional analysis of US physicians within Centers for Medicare & Medicaid Services (CMS) Physician Compare in 2015, which contains demographic and practice information for all healthcare providers participating in Medicare. Data included gender, specialty, medical school graduation year, practice location, and claims-based hospital affiliations. Physicians reported as IM were included, excluding those also reporting IM subspecialties. Using claims-based affiliations, physicians were stratified by teaching status (major, minor, none). Medicare utilization data was obtained from the 2015 Medicare Provider Utilization and Payment Data File (PUF). Characterization as a DG or IMG was based on each physician's medical school, obtained from Doximity data.

The main outcome variable was average CMS Hierarchical Condition Category (HCC) risk score of all unique Medicare beneficiaries for each physician, as reported in the PUF. The CMS-HCC model, using demographic information and diagnoses, generates risk scores for each beneficiary that summarize expected cost of care relative to an average beneficiary (risk score = 1.0). A risk score of 1.5 would predict expenditures to be 50% higher than an average beneficiary. Average CMS-HCC risk score for each physician was used for several reasons: public availability, importance in value-based payment models, and use as a proxy for health status.[4]

A multivariable quantile regression model was constructed, estimating the association between average beneficiary HCC risk score and IMG status as well as additional physician and practice characteristics. Based on positive skewness of the outcome variable, linear regression modeling assumptions regarding normally distributed residuals were violated. Thus, quantile regression was employed as a more robust approach to estimate average HCC risk score.

Multiple imputation was employed to account for unknown IMG status and was included in the final regression model. Sensitivity analyses were performed in which unknown IMG status was imputed as DG and then as IMG. Statistical analyses were performed using R 3.4.3 (mice, quantreg libraries).

RESULTS

Among 74,999 IM physicians, 51.8% were DGs, 29.7% were IMGs, and 18.5% had unknown IMG status (Table 1). The overall median of average beneficiary HCC risk score was 1.73 (IQR 1.20, 2.39). The unadjusted median of average beneficiary HCC risk score was 1.45 (IQR 1.11, 2.23) among DGs and 1.94 (IQR 1.32, 2.46) among IMGs. When adjusting for covariates and accounting for unknown IMG status, the median IMG average beneficiary HCC risk scores were 0.30 (95% CI 0.29–0.31) units higher than DGs (Table 2). Sensitivity analyses assessing the impact of unknown IMG status resulted in attenuated estimates of changes in median IMG average beneficiary HCC risk scores (i.e., unknown = DG 0.26 (95% CI 0.25–0.27) and unknown = IMG 0.27 (95% CI 0.26–0.29).

Table 1 Characteristics of Internal Medicine Physicians in Study Sample by International Medical Graduate Status (*N* = 74,999)

Characteristics	Domestic medical graduate *N* = 38,886	International medical graduate *N* = 22,274	Unknown *N* = 13,839
Gender			
Male	24,886 (64)	14,401 (65)	8059 (58)
Female	14,000 (36)	7873 (35)	5780 (42)
Years since residency completion			
0–10	10,546 (27)	4277 (19)	7945 (57)
11–20	12,148 (31)	7286 (33)	3061 (22)
21–30	9261 (24)	6633 (30)	1790 (13)
31–40	5827 (15)	3113 (14)	809 (6)
40+	1104 (3)	965 (4)	234 (2)
Teaching affiliation			
None	10,717 (28)	6932 (31)	3797 (27)
Minor	14,320 (37)	8635 (39)	5310 (38)
Major	13,849 (36)	6707 (30)	4732 (34)
Rurality			
Urban	34,867 (90)	20,229 (91)	12,571 (91)
Rural	4019 (10)	2045 (9)	1268 (9)
Region			
Midwest	8164 (21)	4853 (22)	3120 (23)
Northeast	8935 (23)	6114 (27)	3973 (29)
South	13,096 (34)	7668 (34)	4285 (31)
West	8691 (22)	3639 (16)	2461 (18)
Total Medicare services provided[a]			
0–500	10,342 (27)	4846 (22)	4447 (32)
501–1000	8210 (21)	4580 (21)	3405 (25)
1001–2500	11,028 (28)	7839 (35)	4209 (30)
2501+	9306 (24)	5009 (22)	1778 (13)
Total unique Medicare beneficiaries			
0–100	6084 (16)	3050 (14)	2428 (18)
101–250	10,898 (28)	5680 (26)	3921 (28)
251–500	13,850 (36)	8322 (37)	4988 (36)
501+	8054 (21)	5222 (23)	2502 (18)
Total Medicare allowed amount ($)[b]			
0–50,000	12,080 (31)	5516 (25)	4750 (34)
50,001–100,000	9869 (25)	5104 (24)	3671 (27)
100,000–150,000	6697 (17)	4200 (19)	2492 (18)
150,001+	10,240 (26)	7454 (33)	2926 (21)

[a]Total services represents total number of CPT codes billed by each provider in 2015
[b]Total allowed amount equals sum of the following: Medicare payment, beneficiary payments (coinsurance and/or deductible), and any amount a third party is responsible for

Table 2 Multivariable Quantile Regression Model: Average Beneficiary CMS HCC Risk Score of Internal Medicine Physicians in 2015 (*N* = 74,999)

Physician characteristics	Estimate of average HCC risk score of Medicare beneficiaries	95% CI
Intercept	2.02	1.99, 2.04
Medical school		
Domestic graduate	Reference	
International medical graduate	0.30	0.29, 0.31
Gender		
Male	Reference	
Female	−0.16	−0.17, −0.15
Years since residency completion		
0–10	Reference	
11–20	−0.36	−0.38, −0.35
21–30	−0.61	−0.62, −0.59
31–40	−0.67	−0.69, −0.65
40+	−0.74	−0.78, −0.71
Teaching affiliation		
None	Reference	
Minor	0.13	0.11, 0.14
Major	0.15	0.13, 0.16
Rurality		
Urban/suburban	Reference	
Rural	−0.06	−0.08, −0.04
Region		
Midwest	Reference	
Northeast	−0.06	−0.08, −0.04
South	0.06	0.05, 0.08
West	0.02	0.00, 0.04
Total Medicare services provided		
0–500	Reference	
501–1000	−0.38	−0.41, −0.36
1001–2500	−0.80	−0.82, −0.77
2501+	−1.22	−1.26, −1.19
Total unique Medicare beneficiaries		
0–100	Reference	
101–250	0.09	0.07, 0.11
251–500	0.23	0.21, 0.26
501+	0.34	0.31, 0.37
Total Medicare allowed amount		
0–50,000	Reference	
50,00–100,000	0.36	0.33, 0.38
100,000–150,000	0.57	0.54, 0.60
150,001+	0.67	0.69, 0.71

DISCUSSION

IMGs practicing IM had significantly higher average Medicare beneficiary CMS HCC risk scores than DGs, after adjustment for several physician and practice characteristics. Implementation of federal immigration policies that affect current and prospective IMGs may adversely impact access to care for Medicare beneficiaries with poorer health. IMGs may already face overt and subtle workplace bias and discrimination and professional limitations.[5] Additionally, a milieu that reduces prospective IMGs from seeking to practice in the USA could exacerbate the physician shortage, particularly in primary care.[6]

Study limitations include using average CMS-HCC risk scores, which may not fully reflect patient medical complexity. Further, average CMS-HCC risk score does not account for volume or intensity of care provided to individual beneficiaries or their socioeconomic status. Despite multiple imputation and sensitivity analyses, unknown IMG status remains a limitation. Potential differences in coding and documentation practices may also confound the findings, warranting additional study.

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Compliance with Ethical Standards:

Conflict of Interest: *The authors declare that they do not have a conflict of interest.*

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