Physician Density and Location of Physician Training: The Impact on Avoidable Hospitalizations

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ABSTRACT

Avoidable hospitalizations are those hospitalizations that could have been avoided had there been appropriate levels of primary care.

Higher levels of avoidable hospitalizations have been linked to higher rates of poverty and of race/ethnicity and to individuals who are on Medicaid or who are uninsured. The association with physician density has, however, been inconsistent, with research linking both better and worse physician density to higher rates of avoidable hospitalizations.

This study assessed the rate of avoidable hospitalizations in primary care service areas (PCSAs) against physician density and the percentage of physicians who are international medical graduates (IMGs) in New York State adjusting for selected community characteristics.

Results suggested that the community characteristics of poverty, underrepresented minorities, and age had more of an impact on the rate of avoidable hospitalizations than physician density or the percentage of IMGs. Higher percentages of IMGs were associated with higher rates of avoidable hospitalizations in Upstate rural PCSAs and in more affluent PCSAs of New York City. Only the least physician dense areas in New York City were associated with higher rates of avoidable hospitalizations.

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INTRODUCTION

Poor access to primary care or poor quality is associated with an increase in the number of unnecessary hospitalizations. Potentially, these hospitalizations could have been avoided if a sufficient number of primary care providers were available. The existing literature suggests a number of other factors are associated with avoidable hospitalization admissions, such as age, race/ethnicity, and socioeconomic status, but very little research has been conducted, however, on the impact of primary care physician density on avoidable hospital admissions.

METHODS

The purpose of this research was to determine if there are associations between the rate of avoidable hospitalizations and physician density and the location of physician training. Other variables considered as part of this study included:
- Patients' individual predisposing factors (race/ethnicity, age, and gender)
- Community enabling factors (poverty, race/ethnicity, income inequality, percent of female physicians, and % of physicians 40 years of age and older)

The geographic unit for this analysis was primary care service areas (PCSAs). The PCSAs were categorized by:
- New York City where poverty (FPL) and % of under represented minorities (URMs) less than 20%
- New York City where poverty or % URMs are greater than or equal to 20%
- Upstate urban
- Upstate rural

Avoidable hospitalizations were defined using the Agency for Healthcare Research and Quality prevention quality indicators (version 4.5) and were applied to New York's hospital inpatient data from 2009 – 2011. Approximately 765,000 avoidable hospitalizations were analyzed for this study.

Physician data was obtained from the Center for Health Workforce Studies Re-licensure Survey for 2010. The survey captures information on:
- Demographics (such as race/ethnicity, age, and gender)
- Practice setting
- Address
- Specialty
- Time spent on patient care

Physician patient care hours were used to calculate the physician density. Locations of medical school and high school were used to identify foreign training status, identifying those physicians who were both foreign born and foreign trained (IMGs).

RESULTS

New York City (poverty and URM < 20%)

In New York City areas where the percentage of poverty and of individuals were less than 20%, the higher percentages of population 65 years of age and older and of IMGs were both associated with higher rates of avoidable hospitalizations. The statistically significant rate ratio for physician density represents one PCSA that is located in the flight path of a major airport.

Variable	Category	Initial Rate of Avoidable Hospitalizations	Initial Rate Ratio	Adjusted Rate Ratio
Population 65 Plus	< 10%	81.2	1	1
	10% - 19%	108.4	1.33	1.62**
	20% and Higher	211.2	2.6	2.55***
IMGs	< 20%	86.1	1	1
	20% and Higher	135.5	1.57	1.62***
Physician Density	Less than 1,500:1	108.2	1	1
	1,500:1 to 1,999:1	123.7	1.14	0.92
	2,000:1 to 2,999:1	120.3	1.11	0.99
	3,000:1 and Higher	178.9	1.65	1.30***

* p < .05   ** p < .01   *** p < .001

New York City (poverty or URM >= 20%)

Higher percentages of poverty and of underrepresented minorities (URMs) were related to higher rates of avoidable hospitalizations in New York City areas where poverty or the percentage of minorities were greater than or equal to 20%.

Variable	Category	Initial Rate of Avoidable Hospitalizations	Initial Rate Ratio	Adjusted Rate Ratio
FPL	< 10%	129.2	1	1
	10% - 19%	161.9	1.25	1.03
	20% - 39%	192.9	1.49	1.15
	40% and Higher	314.9	2.44	1.66**
URMs	< 20%	147.8	1	1
	20% - 49%	141.5	0.96	1.05
	50% - 69%	171.1	1.16	1.27**
	70% and Higher	233.7	1.58	1.55***
Population 65 Plus	< 10%	199.2	1	1
	10% - 19%	175.4	0.88	0.98
	20% and Higher	259.1	1.3	1.32**
IMGs	<20%	176.4	1	1
	20% -59%	181.6	1.03	1.04
	60% and Higher	201.3	1.14	1.09
Physician Density	Less than 1,500:1	185.7	1	1
	1,500:1 to 1,999:1	181.8	0.98	0.91
	2,000:1 to 2,999:1	200	1.08	0.88
	3,000:1 and Higher	165.8	0.89	0.89*

* p < .05   ** p < .01   *** p < .001

Upstate Urban

Higher percentages of poverty and of URMs were both associated with higher rates of avoidable hospitalizations in Upstate urban areas.

Variable	Category	Initial Rate of Avoidable Hospitalizations	Initial Rate Ratio	Adjusted Rate Ratio
FPL	< 10%	134.8	1	1
	10% and Higher	161.2	1.2	1.12 **
URMs	< 20%	138.4	1	1
	20% - 49%	149	1.08	1.03
	50% and Higher	177.4	1.28	1.20**
IMGs	< 20%	132.1	1	1
	20% and Higher	154.6	1.17	1.1
Physician Density	Less than 1,500:1	145.2	1	1
	1,500:1 to 1,999:1	155.6	1.07	1.1
	2,000:1 to 2,999:1	146.8	1.01	1.05
	3,000:1 and Higher	147.7	1.02	1.08

* p < .05   ** p < .01   *** p < .001

RESULTS (cont.)

Upstate Rural

Higher percentages of poverty, of the elderly, and of IMGs all contributed to higher rates of avoidable hospitalizations.

Variable	Category	Initial Rate of Avoidable Hospitalizations	Initial Rate Ratio	Adjusted Rate Ratio
FPL	< 10%	128.4	1	1
	10% - 19%	176.9	1.38	1.35***
	20% - 29%	121.6	0.95	1.02
	30% and Higher	188.4	1.47	1.94***
Population 65 Plus	< 12%	109.9	1	1
	12% - 24%	167.3	1.52	1.33***
	25% and Higher	228.2	2.08	2.18**
IMGs	<20%	145.7	1	1
	20% and Higher	181.2	1.24	1.18**
Physician Density	Less than 1,500:1	165.8	1	1
	1,500:1 to 1,999:1	160.2	0.97	1.07
	2,000:1 to 2,999:1	150.6	0.91	1.05
	3,000:1 and Higher	157.5	0.95	0.97

* p < .05   ** p < .01   *** p < .001

CONCLUSIONS AND DISCUSSION

- **Social determinants of health appear to have a deeper impact on the rate of avoidable hospitalizations than physician characteristics.**

  Any response to addressing avoidable hospitalizations must also address social determinants of health. Appropriate levels of social programs must be available within each community, targeting the most vulnerable populations and within reach of those populations.

- **Effective delivery of primary care must consider the people and their social service needs.**

  To close gaps in coverage, interventions to improve health care delivery should include the coordination of care both within and across health care settings, such as with social service organizations.

- **Geography affects those factors that influence the rate of avoidable hospitalizations.**

  Geographically diverse communities have differing needs. Even within small areas such as New York City, there is extreme diversity in the population composition and the health care outcomes, specifically the rate of avoidable hospitalizations, and ultimately the solutions must be similarly diverse to address these issues.