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Association Between Insurance Status and Access to Hospital Care in Emergency Department Disposition

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IMPORTANCE Studies of public hospitals have reported increasing incidence of emergency department (ED) transfers of uninsured patients for hospitalization, which is perceived to be associated with financial incentives.

OBJECTIVE To examine the differences in risk-adjusted transfer and discharge rates by patient insurance status among hospitals capable of providing critical care.

DESIGN, SETTING, AND PARTICIPANTS A cross-sectional analysis of the 2015 National Emergency Department Sample was conducted, including visits between January 2015 and December 2015. Adult ED visits throughout 2015 (n = 215 028) for the 3 common medical conditions of pneumonia, chronic obstructive pulmonary disease, and asthma, at hospitals with intensive care capabilities were included. Only hospitals with advanced critical care capabilities for pulmonary care were included.

MAIN OUTCOMES AND MEASURES The primary outcomes were patient-level and hospital-level risk-adjusted ED discharges, ED transfers, and hospital admissions. Adjusted odds of discharge or transfer compared with admission among uninsured patients, Medicaid and Medicare beneficiaries, and privately insured patients are reported. Hospital ownership status was used for the secondary analysis.

RESULTS Of the 30 542 691 ED visits to 953 hospitals included in the 2015 National Emergency Department Sample, 215 028 visits (0.7%) were for acute pulmonary diseases to 160 intensive care–capable hospitals. These visits were made by patients with a median (interquartile range [IQR]) age of 55 (40-71) years and who were predominantly female (124 931 [58.1%]). Substantial variation in unadjusted and risk-standardized ED discharge, ED transfer, and hospital admission rates was found across EDs. Compared with privately insured patients, uninsured patients were more likely to be discharged (odds ratio [OR], 1.66; 95% CI, 1.57-1.76) and transferred (adjusted OR [aOR], 2.41; 95% CI, 2.08-2.79). Medicaid beneficiaries had comparable odds of discharge (aOR, 1.00; 95% CI, 0.97-1.04) but higher odds of transfer (aOR, 1.19; 95% CI, 1.05-1.33).

CONCLUSIONS AND RELEVANCE After accounting for hospital critical care capability and patient case mix, the study found that uninsured patients and Medicaid beneficiaries with common medical conditions appeared to have higher odds of interhospital transfer.

Invited Commentary

Supplemental content

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The Emergency Medical Treatment and Active Labor Act (EMTALA) was authorized by the US Congress in 1986 to ensure timely access to emergency care.[1] At the time, evidence had accumulated of financially motivated refusal to provide care and medically unwarranted transfers of uninsured and underinsured patients from private to public, hospital-based emergency departments (EDs).[2-4] The passage of the EMTALA created a federal mandate to provide both a medical screening examination to any patient presenting to an ED and essential universal access to acute emergency care. Although previous analyses of EMTALA investigations have shown reported violations to be rare,[5,6] these studies were limited to extreme cases and did not examine more subtle refusals of acute care access that occur after completion of an EMTALA-mandated medical screening examination.

Analyses of national data sets have shown that uninsured and underinsured patients, such as Medicaid beneficiaries, particularly those requiring specialized care for severe trauma or psychiatric and renal emergencies, are more likely to be transferred than admitted compared with patients who have private insurance or Medicare coverage.[7-9] However, previous work did not account for differences in hospital capabilities to care for patients. As a result, the observed transfers may reflect patient needs for appropriate specialty care.[10-13] Furthermore, previous work modeled ED disposition as a binary decision between transfer and hospital admission,[8,9] thereby neglecting ED discharge as another potential option for limiting access to acute hospital care.

To overcome these limitations, we examined ED discharges, transfers, and admissions for common medical conditions at hospitals capable of caring for severely ill patients. Specifically, we examined 3 medical conditions commonly evaluated in the ED (pneumonia, chronic obstructive pulmonary disease, and asthma[14,15]) for which treatment is well defined and for which more severely ill patients can generally be cared for in hospitals with standard intensive care capabilities.[16-18] Risk-standardized variation in ED admission rates between hospitals has been well documented for these conditions; however, little is known about variation in ED transfer and discharge rates as well as the degree to which patient insurance status may be associated with ED disposition decisions and access to acute hospital care.[19-21]

Accordingly, we tested the hypothesis that patients with common pulmonary conditions who were either uninsured or insured by Medicaid were more likely to be transferred or discharged from the ED despite the capability of hospitals to care for them. As a secondary analysis, we examined whether hospital ownership status—nonprofit or for-profit—was a factor in the association between patient insurance status and ED disposition.

Key Points

Question Are emergency department patients more likely to be transferred to another hospital after stabilization for common medical conditions on the basis of insurance status?

Findings In this cross-sectional analysis of 215 028 emergency department visits to 160 US hospitals, uninsured patients and Medicaid beneficiaries were more likely to be transferred for pneumonia, chronic obstructive pulmonary disease, or asthma despite hospital capabilities to provide advanced pulmonary or critical care.

Meaning After accounting for differences in hospital capabilities, the study found that uninsured patients who were discharged or transferred from an emergency department with pulmonary disease appeared to not have access to the same level of hospital care as was available to privately insured patients.

Methods

Study Design and Setting

We conducted a cross-sectional analysis of the 2015 National Emergency Department Sample (NEDS), including visits between January 2015 and December 2015. In the United States, NEDS is the largest, all-payer administrative claims data set of ED visits and includes more than 30 million visits from 953 hospitals, which represent an approximately 20% stratified sample of hospital-based EDs. Patient-level data in the NEDS are deidentified, but the data set includes all ED visits at every included hospital, enabling the assessment of hospital-level variation in ED disposition decisions. This study was deemed to be not human participant research by the Yale University Human Research and Protection Program.

Selection of Participants and Measurements

We included all adult (≥18 years) ED visits from January 2015 to December 2015. We excluded visits with an ED disposition of died in ED, left against medical advice, or unknown, as disposition decisions could not be reliably evaluated. Patient-level information available in the NEDS included age, sex, insurance status, median income of zip code of residence, and *International Classification of Diseases, Ninth Revision* (*ICD-9*) or *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10)* principal and secondary discharge diagnosis codes. Consistent with studies of ED visitation and hospitalization, we applied the Charlson comorbidity index to all secondary diagnoses to enable risk adjustment.[19,22] We identified each patient's primary insurance status as uninsured (self-pay), Medicaid, Medicare, or private (commercial). Details of this insurance status definition are available in eTable 1 in the Supplement.

For the primary analysis, we examined ED visits for patients who were either uninsured or insured by Medicaid. This focus was based on research suggesting higher transfer rates for both uninsured and Medicaid patients,[7,8] as well as examples of hospital closings or curtailments of acute care services in response to low Medicaid payment rates,[23,24] and the hospital perception of uncertainty in Medicaid payment owing to frequent, temporary losses of coverage of patients insured by Medicaid.[25,26]

We limited the study to ED visits for common medical conditions for which specialized care beyond traditional intensive care capabilities is generally not necessary; namely, we included ED visits for pneumonia, asthma, and chronic obstructive pulmonary disease. To construct this pulmonary cohort of ED visits, we used the Agency for Healthcare Research and Quality Clinical Classifications Software (CCS) to group

each visit's principal ED or hospital discharge diagnosis code into meaningful clinical conditions. The CCS schema is a mutually exclusive set of 285 clinical condition categories consisting more than 14 000 *ICD-9* and 60 000 *ICD-10-CM* (*Clinical Modification*) diagnosis codes and 3900 *ICD-9* and 87 000 *ICD-10-PCS* (*Procedure Coding System*) procedure codes.[27] We identified ED visits for pneumonia (CCS 122), chronic obstructive pulmonary disease and bronchiectasis (CCS 127), and asthma (CCS 128) for inclusion.

To limit confounding of outcomes by necessary transfers of patients requiring specialty care or intensive care capabilities that were unavailable in the hospital, we restricted the data set to hospitals with evidence of advanced critical care capabilities for pulmonary care. To do so, consistent with previous work, we used patient-level procedural codes to identify hospitals that provided both continuous mechanical ventilation for greater than 96 hours (*ICD-9* procedure code 96.72 or *ICD-10-PCS* code 5A1955Z) and inpatient hemodialysis (*ICD-9* procedure code 39.95 or *ICD-10-PCS* codes), both of which may be required for the critical care of patients with respiratory failure, shock, and end-organ damage.[28,29] Consistent with studies and publicly reported measures of hospital admission and readmission rates, we excluded hospitals with fewer than 25 ED visits that met the inclusion criteria, to enhance the robustness of study findings.[30] We also excluded hospitals that transferred less than 0.05% of their ED patients, to avoid including institutions for which patient transfer was not a realistic hospital-level disposition option. The **Figure** summarizes the construction of the data set.

For the secondary analysis, we used the NEDS hospital ownership status variable, which is based on the American Hospital Association Annual Survey.[31] This analysis was limited to 71 of the included 160 hospitals in the cohort for which ownership status information was made available by the Agency for Healthcare Research and Quality on the basis of confidentiality provisions of the data use agreement. With this information, we categorized each nonfederal hospital as either nonprofit or for-profit.

Outcomes

At the hospital level, the primary outcome was the risk-standardized ED discharge, ED transfer, and hospital admission rates. At the patient level, the primary outcome was the risk-adjusted ED discharge, ED transfer, or hospital admission status. The primary outcome was reported on the basis of patient insurance status.

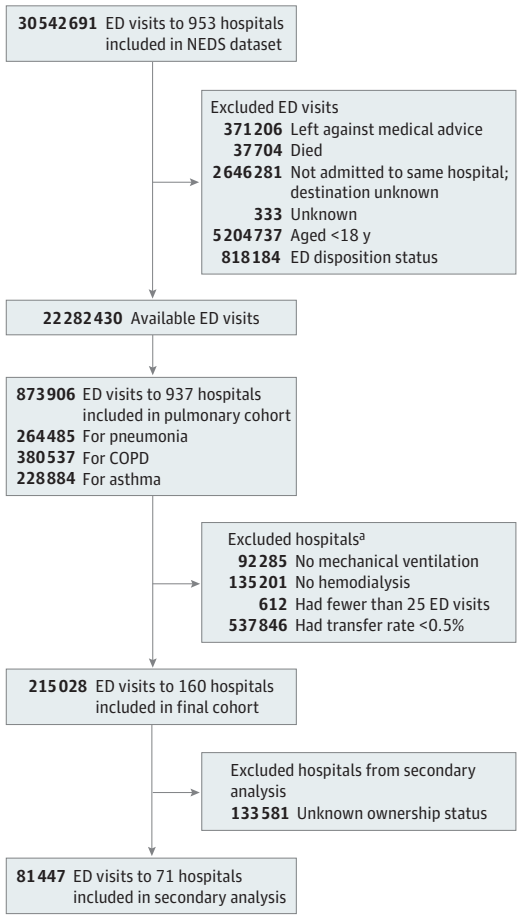
We defined ED discharge as disposition to home or prior dwelling, with a code of routine; transfer other (includes skilled nursing facility, intermediate care facility, and another type of facility); or home health care.[19] We defined ED transfer as an ED disposition code of transfer to short-term hospital. We defined admission as an ED disposition code of admitted to this same hospital.

Statistical Analysis

For the primary analysis, we conducted both hospital-level and patient-level analyses. At the hospital level, we calculated and report several measures of ED disposition variations, including both unadjusted and risk-standardized ED discharge, ED transfer, and hospital admission rates, using a hierarchical regression model, as described by Krumholz et al,[32] in 3 separate models with each ED disposition outcome as the outcome of a binary event. Each hierarchical model includes a random hospital effect to account for the clustering of observations by hospital.[33] For example, to calculate a hospital's risk-standardized ED discharge rate, we considered discharge as an event and both admission and transfer as nonevents in the regression models. We present medians and percentiles for the unadjusted and risk-standardized ED disposition rates. To further compare the magnitude of variation between different dispositions, we also calculated the coefficient of variation, defined as the ratio of the SD to the mean, for unadjusted and risk-standardized ED discharge rates, ED transfer rates, and hospital admission rates.

At the patient level, we constructed regression models to calculate the odds of ED transfer or discharge compared with hospital admission for patients who were uninsured or underinsured (Medicaid insured) and patients with Medicare or private insurance. We used multinomial logistic regression

Figure. Construction of Study Cohort



COPD indicates chronic obstructive pulmonary disease; ED, emergency department; NEDS, 2015 National Emergency Department Sample.

[a] More than 1 exclusion may have applied.

Table 1. Demographics and Emergency Department Visits for Pulmonary Conditions of Study Sample

Variable	Insurance Status, No. (%)			
	Uninsured	Medicaid	Medicare	Private
Age, y				
18-44	12 754 (63.1)	28 782 (52.5)	4238 (4.6)	18 193 (42.7)
45-64	6814 (33.7)	23 942 (43.7)	19 721 (21.3)	19 985 (46.9)
65-84	580 (2.9)	1796 (3.3)	54 196 (58.5)	3900 (9.1)
≥85	80 (0.4)	297 (0.5)	14 480 (15.6)	571 (1.3)
Sex				
Male	10 248 (50.7)	19 840 (36.2)	39 966 (43.1)	17 729 (41.6)
Female	9980 (49.3)	34 975 (63.8)	52 659 (56.9)	24 916 (58.4)
Zip code annual income quartile, US$				
1-41 999	7638 (37.8)	21 485 (39.2)	29 177 (31.5)	10 943 (25.7)
42 000-51 999	5509 (27.2)	15 384 (28.1)	24 133 (26.1)	10 772 (25.3)
52 000-67 999	4450 (22.0)	10 724 (19.6)	21 624 (23.3)	10 886 (25.5)
≥68 000	2027 (10.0)	5860 (10.7)	15 835 (17.1)	9240 (21.7)
Charlson comorbidity index score, mean (SD)	1.6 (1.4)	1.0 (0.7)	1.3 (1.1)	2.0 (1.7)

models to calculate the adjusted odds ratio (aOR) of ED transfer and discharge in comparison to the reference of hospital admission. By using multinomial regression modeling, we were able to better align our statistical approach with ED decision making in which a clinician is frequently deciding simultaneously between patient discharge, transfer, and admission. To account for differences in patient case mix, we adjusted each regression model for patient age, sex, income, and Charlson comorbidity index. Income was determined with the patient's zip code-based median household income quartile: $1 to $41 999, $42 000 to $51 999, $52 000 to $67 999, and $68 000 or more. The Charlson comorbidity index was selected on the basis of previous work that validated its use in estimating mortality among ED patients,[34,35] its similar predictive performance to clinical risk scores among critically ill patients,[36] and evidence of validity for the pulmonary conditions included in this study cohort.[37,38]

For the secondary analysis, we restricted the study sample to the 71 nonfederal hospitals for which ownership status was reported in the NEDS. We used multinomial logistic regression with the addition of hospital ownership as a fixed effect to report the odds of ED discharge or transfer compared with hospital admission for patients who were uninsured or underinsured and patients with Medicare or private insurance among nonprofit and for-profit hospitals.

Two of us (S-X.L. and J.C.) performed all analyses using SAS, version 9.4 (SAS Institute Inc). Statistical significance was defined as $\alpha<.05$, and we report all ORs with 95% CIs. We ensured model fit and discrimination through Hosmer-Lemeshow goodness-of-fit test and marginal C statistics.[39]

Results

Characteristics of Study Sample

The 2015 NEDS included a total of 30 542 691 ED visits to 953 hospitals. Of these visits, 215 028 (0.7%) were for acute pulmonary diseases to 160 intensive care–capable hospitals (Figure). Of all ED visits for pulmonary diseases, 142 900 (66.5%) resulted in ED discharge, 3210 (1.5%) in ED transfer to another hospital, and 68 918 (32.1%) in hospital admission. These visits were made by patients with a median (interquartile range [IQR]) age of 55 (40-71) years and who were predominantly female (124 931 [58.1%]). A total of 20 228 (9.4%) visits were uninsured, 54 817 (25.5%) insured by Medicaid, and 139 983 (65.1%) insured by Medicare or a private plan. Further details of the study sample by ED disposition are shown in **Table 1**, and the distribution of included visits by primary and secondary expected payers is shown in eTable 2 in the Supplement.

The 160 study hospitals, compared with all 953 NEDS hospitals, were predominantly metropolitan-based nonteaching institutions (70 [43.8%] vs 313 [32.8%]), and nearly all were located in urban areas (154 [96.3%] vs 724 [76.0%]), with a similar proportion of known trauma centers (61 [38.1%] vs 319 [33.5%]). The median (IQR) annual ED visit volume of the included hospitals was 35 813 (25 305-57 643) visits, compared with a median (IQR) volume of 22 242 (7580-46 654) visits for all NEDS hospitals. The median (IQR) annual ED visit volume for pulmonary conditions for included hospitals was 1175 (750-1 801) compared with a median (IQR) volume of 876 visits (334-1805) for all NEDS hospitals. Detailed hospital-level characteristics are shown in eTable 3 in the Supplement.

Main Findings

Hospital-Level Variation in ED Disposition

In the primary hospital-level analysis (**Table 2**), substantial variation was found in unadjusted and risk-standardized ED discharge, ED transfer, and hospital admission rates. The median (IQR) risk-standardized ED discharge rate was 66.2% (60.2%-71.9%), the median (IQR) risk-standardized ED transfer rate was 1.3% (1.0%-1.9%), and the median (IQR) risk-standardized hospital admission rate was 32.3% (26.6%-37.7%). Variation was particularly high for the outcome of ED transfer, which had associated risk-standardized

Table 2. Unadjusted and Risk-Standardized Variation in Hospital-Level ED Disposition

Variable	Mean (SD), %	%					
		Coefficient of Variation	5th Percentile	25th Percentile	Median	75th Percentile	95th Percentile
Unadjusted rate							
ED discharge	64.8 (11.7)	18.0	43.9	58.0	65.2	73.0	82.4
Hospital admission	33.6 (11.6)	34.5	15.8	25.2	33.1	39.9	54.6
ED transfer	1.6 (1.9)	119.6	0.52	0.69	1.1	1.6	4.5
Risk-standardized rate							
ED discharge	63.17 (11.0)	17.3	49.0	60.2	66.2	71.9	78.0
Hospital admission	27.5 (9.2)	33.4	19.4	26.6	32.3	37.7	46.6
ED transfer	1.4 (1.7)	120.4	0.8	1.0	1.3	1.9	4.6

Abbreviation: ED, emergency department.

Table 3. Differences in ED Disposition by Patient Insurance Status

Insurance Status	ED Discharge Disposition			ED Transfer Disposition		
	Observed Rate, %	OR (95% CI)	aOR (95% CI)	Observed Rate, %	OR (95% CI)	aOR (95% CI)
Uninsured	88.8	2.40 (2.28-2.53)	1.66 (1.57-1.76)	1.6	2.80 (2.41-3.23)	2.41 (2.08-2.79)
Medicaid	80.2	1.12 (1.08-1.16)	1.00 (0.97-1.04)	1.3	1.16 (1.04-1.31)	1.19 (1.05-1.33)
Medicare	47.4	0.24 (0.23-0.25)	0.66 (0.63-0.68)	1.6	0.51 (0.47-0.56)	0.63 (0.56-0.71)
Private	78.5	1 [Reference]	1 [Reference]	1.2	1 [Reference]	1 [Reference]

Abbreviations: aOR, adjusted odds ratio; ED, emergency department; OR, odds ratio.

Odds ratio reflects odds of ED discharge or transfer compared with hospital admission (reference category). Adjusted ORs are ORs adjusted for age, sex, zip code income, and Charlson comorbidity index score.

Table 4. Differences in ED Disposition by Hospital Ownership

Insurance Status	aOR (95% CI)			
	Nonprofit or Federal Ownership (n = 48)		For-profit Ownership (n = 23)	
	ED Discharge	ED Transfer	ED Discharge	ED Transfer
Uninsured	1.63 (1.47-1.80)	0.70 (0.47-1.05)	1.33 (1.12-1.59)	1.64 (0.97-2.76)
Medicaid	0.99 (0.93-1.06)	0.74 (0.58-0.96)	0.72 (0.64-0.81)	0.43 (0.27-0.68)
Medicare	0.69 (0.65-0.74)	0.65 (0.52-0.81)	0.73 (0.65-0.82)	0.80 (0.53-1.20)
Private	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]

Abbreviations: aOR, adjusted odds ratio; ED, emergency department.

ED transfer rates ranging from 0.8% at the 5th percentile to 4.6% at the 95th percentile, representing a coefficient of variation of 120.4, which was substantially higher than the coefficient of variations for ED discharge (17.3) and hospital admission (33.4).

ED Disposition and Insurance Status

In the primary patient-level analysis, uninsured patients (1.6% [331 of 20 228]) and Medicaid beneficiaries (1.3% [726 of 54 817]) were more often transferred compared with privately insured patients (1.2% [530 of 42 649]) (**Table 3**). Both uninsured patients (aOR, 2.41; 95% CI, 2.08-2.79) and Medicaid beneficiaries (aOR, 1.19; 95% CI, 1.05-1.33) were more likely to be transferred compared with privately insured patients after adjustment for patient age, sex, income, and Charlson comorbidity index (Table 3). In addition, uninsured patients (88.8% [17 967 of 20 228]) and Medicaid beneficiaries (80.2% [43 962 of 54 817]) were more often discharged compared with privately insured patients (78.5% [33 487 of 42 649]). In adjusted analyses, uninsured patients were more likely to be discharged (OR, 1.66; 95% CI, 1.57-1.76) compared with privately insured patients, whereas Medicaid beneficiaries had similar odds of discharge (aOR, 1.00; 95% CI, 0.97-1.04).

Hospital Ownership Status

In the secondary analysis (**Table 4**), among the 71 hospitals [44.4%] with available ownership data, 23 (14.4%) were for-profit and 48 (30.0%) nonprofit. The odds of ED transfer for uninsured patients was lower than that for privately insured patients in nonprofit hospitals (aOR, 0.70; 95% CI, 0.47-1.05) but higher in for-profit hospitals (aOR, 1.64; 95% CI, 0.97-2.76); however, the wide 95% CIs preclude statements of association. Uninsured patients also had higher odds of ED discharge in both nonprofit and for-profit hospitals. Medicaid beneficiaries had lower odds of ED transfer in both nonprofit (aOR, 0.74; 95% CI, 0.58-0.96) and for-profit (aOR, 0.43; 95% CI, 0.27-0.68) hospitals.

Discussion

Among a national sample of ED visits for common medical conditions at hospitals with critical care capabilities, we found that, after accounting for patient characteristics, both uninsured patients and Medicaid beneficiaries were more likely to be transferred to another hospital compared with those with private insurance. These findings are consistent with studies conducted over the past decade and confirm the belief that financial incentives, or a patient's ability to pay, may be associated with hospitalization decisions.[7-9] The present study confirms the hypotheses of previous research, indicating that hospital transfer patterns are associated with patient insurance status despite accounting for the usual caveats, namely, interhospital transfer was necessary for specialty or critical care services unavailable at the index hospital.

Furthermore, we found that uninsured patients were markedly more likely to be discharged from the ED. This finding has been consistently observed over the past several decades despite a higher likelihood of serious illness.[10] That the uninsured had nearly half of the admission rate of the privately insured in this study, even after risk adjustment, was an unanticipated finding, given the relatively standard clinical guidelines used for hospitalization decisions for the common pulmonary conditions studied. These findings may be explained by a higher threshold for inpatient admission from the perspective of the patients, the physicians, or both for financial reasons.[10,40] Previous work assessing admissions alone found that uninsured patients were less likely to be admitted than the privately insured for various conditions, including trauma, cardiovascular, and pulmonary diseases.[41-44] For traumatic injuries and acute cardiovascular disease, in particular, lack of admission has been associated with increases in mortality,[43] and future research should explore similar outcomes among patients evaluated for other common cardiopulmonary conditions.

To the extent that financial incentives are associated with disposition decisions, transferring uninsured or Medicaid patients may have simply moved the gateway to the hospital from the front door of the ED to the front door of the hospital. Traditional EMTALA violations, such as refusing to provide or providing inadequate medical screening examinations in the ED are rare; however, our findings suggest that financial incentives may be associated with access to inpatient hospital care. The EMTALA is commonly described as an unfunded mandate,[45] and hospitals provide access to an ED visit for acute diagnostic and treatment services through a complete ED visit that often exceeds the medical screening examination requirements of the law[46]; however, subsequently transferring patients on the basis of their ability to pay may not adhere to the EMTALA expectation for appropriate transfers as those beyond the capacity of the hospital. In addition, the discharge of patients after ED evaluation is entirely ignored by the law, despite concerns that interpretation of the stabilization requirements of the EMTALA may allow for unstable patients to be discharged with only instructions to seek care elsewhere.[47] Policymakers should seek to rectify these gaps in hospital care access by acknowledging these hospitalization patterns and developing financing policies capable of fully supporting the hospitalization needs of uninsured patients.

By restricting this analysis to hospitals capable of providing critical care for patients with pulmonary conditions, we were less prone to incorrectly identifying medically necessary transfers as financially motivated. In addition, by accounting for both discharge and admission decisions in the evaluation of transfer practices, we were able to consider the full spectrum of patient dispositions from the ED. As such, our finding of distinct ED disposition patterns for patients with different insurance types should encourage the reevaluation of previous studies and promote a more comprehensive examination of the association between ED disposition variations and access to hospital care.

We were encouraged to find that coverage by public insurance provided similar access to hospital admission for patients presenting to the ED when compared with those who were privately insured, a finding consistent with previous work that demonstrated improved access to care among Medicaid beneficiaries.[48-51] In the case of acute hospital care, expanded Medicaid coverage may offer financial advantages to hospitals[52] in addition to the Disproportionate Share Hospital payments.[53-55] Therefore, policymakers should continue to consider the importance of health insurance coverage to population access to acute hospital care.

Despite the limited availability of hospital ownership data, the secondary analysis findings were nearly opposite those of Kindermann et al[8]: for-profit ownership status appeared to be more likely associated with ED transfer for uninsured patients, whereas visits to nonprofit-owned hospitals by the uninsured were less likely to result in a transfer. The financial rationale for this situation is clear but requires further study using more complete data sets before any specific conclusions based on hospital governance and financial structure can be drawn. The findings, however, support the general trend toward underlying patterns of acute care access association with financial incentives.

Limitations

These results must be interpreted within the limitations of a cross-sectional analysis of an administrative database limited to patients with select pulmonary diagnoses. Although we controlled for demographics and used well-established methods to account for comorbidities, we used administrative data that did not include clinical details of illness severity, such as examination and laboratory findings; information on the hospital environment, such as bed availability; and information on social context, including patient preferences that may have affected ED disposition decisions. Furthermore, although we selected hospitals that can provide advanced pulmonary care but are unlikely to encounter patients who would require medically necessary transfers, we were unable to determine the appropriateness of the transfers examined in this study. In addition, our sample was restricted to capable hospitals to minimize bias and therefore reflects a sample of hospitals; in turn, the observed disposition rates are not representative of all hospitals across the United States. The secondary analyses, which were based on hospital ownership, should only be hypothesis-generating in nature as they are both underpowered and prone to selection bias because of limited data availability.

Conclusions

More than 3 decades after the passage of the EMTALA, we found differences in access to hospital care based on patient insurance status, suggesting a unique modern-day barrier to hospitalization for common medical conditions. Policymakers should broaden the scope of hospital quality, payment, and certification initiatives to reduce these disparities and improve access to hospital-based care.

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Author Contributions: Drs Venkatesh and Li had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Venkatesh, Choi, D'Onofrio.
Acquisition, analysis, or interpretation of data: All authors.
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REFERENCES

1. Health Care Financing Administration. The Emergency Medical Treatment and Active Labor Act, as established under the Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1985 (42 USC 1395 dd). *Fed Regist*. 1994;59:32086-32127.

2. Kellermann AL, Hackman BB. Emergency department patient "dumping": an analysis of interhospital transfers to the Regional Medical Center at Memphis, Tennessee. *Am J Public Health*. 1988;78(10):1287-1292. doi:10.2105/AJPH.78.10.1287

3. Himmelstein DU, Woolhandler S, Harnly M, et al. Patient transfers: medical practice as social triage. *Am J Public Health*. 1984;74(5):494-497. doi:10.2105/AJPH.74.5.494

4. Ansell DA, Schiff RL. Patient dumping: status, implications, and policy recommendations. *JAMA*. 1987;257(11):1500-1502. doi:10.1001/jama.1987.03390110076030

5. Terp S, Seabury SA, Arora S, Eads A, Lam CN, Menchine M. Enforcement of the Emergency Medical Treatment and Labor Act, 2005 to 2014. *Ann Emerg Med*. 2017;69(2):155-162.e1. doi:10.1016/j.annemergmed.2016.05.021

6. Rosenbaum S. The enduring role of the Emergency Medical Treatment and Active Labor Act. *Health Aff (Millwood)*. 2013;32(12):2075-2081. doi:10.1377/hlthaff.2013.0660

7. Nacht J, Macht M, Ginde AA. Interhospital transfers from U.S. emergency departments. *Acad Emerg Med*. 2013;20(9):888-893. doi:10.1111/acem.12209

8. Kindermann DR, Mutter RL, Cartwright-Smith L, Rosenbaum S, Pines JM. Admit or transfer? the role of insurance in high-transfer-rate medical conditions in the emergency department. *Ann Emerg Med*. 2014;63(5):561-571.e8. doi:10.1016/j.annemergmed.2013.11.019

9. Delgado MK, Yokell MA, Staudenmayer KL, Spain DA, Hernandez-Boussard T, Wang NE. Factors associated with the disposition of severely injured patients initially seen at non–trauma center emergency departments. *JAMA Surg*. 2014;149(5):422-430. doi:10.1001/jamasurg.2013.4398

10. Newton MF, Keirns CC, Cunningham R, Hayward RA, Stanley R. Uninsured adults presenting to US emergency departments. *JAMA*. 2008;300(16):1914-1924. doi:10.1001/jama.300.16.1914

11. Hadley J. Sicker and poorer—the consequences of being uninsured: a review of the research on the relationship between health insurance, medical care use, health, work, and income. *Med Care Res Rev*. 2003;60(2)(suppl):3S-75S. doi:10.1177/1077558703254101

12. Melkun ET, Ford C, Brundage SI, Spain DA, Chang J. Demographic and financial analysis of EMTALA hand patient transfers. *Hand (N Y)*. 2010;5(1):72-76. doi:10.1007/s11552-009-9214-7

13. Spain DA, Bellino M, Kopelman A, et al. Requests for 692 transfers to an academic level I trauma center. *J Trauma*. 2007;62(1):63-67. doi:10.1097/TA.0b013e31802d9716

14. Ford ES. Hospital discharges, readmissions, and ED visits for COPD or bronchiectasis among US adults. *Chest*. 2015;147(4):989-998. doi:10.1378/chest.14-2146

15. National Center for Health Statistics, Center for Disease Control and Prevention. National Hospital Ambulatory Medical Care Survey: 2013 emergency department summary tables. 2013. https://www.cdc.gov/nchs/data/ahcd/nhamcs_emergency/2013_ed_web_tables.pdf. Accessed February 23, 2019.

16. Nazarian DJ, Eddy OL, Lukens TW, Weingart SD, Decker WW. Clinical policy: critical issues in the management of adult patients presenting to the emergency department with community-acquired pneumonia. *Ann Emerg Med*. 2009;54(5):704-731. doi:10.1016/j.annemergmed.2009.07.002

17. National Heart, Lung, and Blood Institute. Guidelines for the Diagnosis and Management of Asthma (EPR-3). https://www.nhlbi.nih.gov/health-topics/guidelines-for-diagnosis-management-of-asthma. Published August 2007. Accessed February 23, 2019.

18. US Department of Veterans Affairs. VA/DoD Clinical Practice Guideline. Management of Chronic Obstructive Pulmonary Disease (COPD). 2014. https://www.healthquality.va.gov/guidelines/cd/copd/. Accessed February 23, 2019.

19. Venkatesh AK, Dai Y, Ross JS, Schuur JD, Capp R, Krumholz HM. Variation in US hospital emergency department admission rates by clinical condition. *Med Care*. 2015;53(3):237-244. doi:10.1097/MLR.0000000000000261

20. Sabbatini AK, Nallamothu BK, Kocher KE. Reducing variation in hospital admissions from the emergency department for low-mortality conditions may produce savings. *Health Aff (Millwood)*. 2014;33(9):1655-1663. doi:10.1377/hlthaff.2013.1318

21. Dean NC, Jones JP, Aronsky D, et al. Hospital admission decision for patients with community-acquired pneumonia. *Ann Emerg Med*. 2012;59(1):35-41. doi:10.1016/j.annemergmed.2011.07.032

22. Quan H, Sundararajan V, Halfon P, et al. Coding algorithms for defining comorbidities in *ICD-9-CM* and *ICD-10* administrative data. *Med Care*. 2005;43(11):1130-1139. doi:10.1097/01.mlr.0000182534.19832.83

23. Ford R. *Hospital Closures and Medicaid Shifts Took Toll on NYC's Health*. New York, NY: City Limits; 2017.

24. Wishner J, Solleveld P, Rudowitz R, Paradise J, Antonisse L. A look at rural hospital closures and implications for access to care: three case studies. Kaiser Family Foundation. https://www.kff.org/medicaid/issue-brief/a-look-at-rural-hospital-closures-and-implications-for-access-to-care/. Published July 7, 2016. Accessed February 23, 2019.

25. Sommers BD. Loss of health insurance among non-elderly adults in Medicaid. *J Gen Intern Med*. 2009;24(1):1-7. doi:10.1007/s11606-008-0792-9

26. Summer L, Mann C. Instability of public health insurance coverage for children and their families: causes, consequences, and remedies. Georgetown University Health Policy Institute. https://www.commonwealthfund.org/sites/default/files/documents/__media_files_publications_fund_report_2006_jun_instability_of_public_health_insurance_coverage_for_children_and_their_families__causes__consequence_summer_instabilitypubhltinschildren_935_pdf.pdf. Published June 2006. Accessed February 23, 2019.

27. Healthcare Cost and Utilization Project. Clinical Classifications Software (CCS) for ICD-9-CM. https://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp. Accessed February 23, 2019.

28. Sjoding MW, Prescott HC, Wunsch H, Iwashyna TJ, Cooke CR. Longitudinal changes in ICU admissions among elderly patients in the United States. *Crit Care Med*. 2016;44(7):1353-1360. doi:10.1097/CCM.0000000000001664

29. Mudumbai SC, Barr J, Scott J, et al. Invasive mechanical ventilation in California over 2000-2009. *West J Emerg Med*. 2015;16(5):696-706. doi:10.5811/westjem.2015.6.25736

30. QualityNet. Measure Methodology. Centers for Medicare and Medicaid Services. https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/measure-methodology.html. Modified January 24, 2019. Accessed February 23, 2019

31. American Hospital Association Linkage Files. *Healthcare Cost and Utilization Project (HCUP)*. Rockville, MD: Agency for Healthcare Research and Quality; 2013.

32. Krumholz HM, Wang Y, Mattera JA, et al. An administrative claims model suitable for profiling hospital performance based on 30-day mortality rates among patients with heart failure. *Circulation*. 2006;113(13):1693-1701. doi:10.1161/CIRCULATIONAHA.105.611194

33. Ash AS, Fienberg SE, Louis TA, Normand S-LT, Stukel TA, Utts J. Statistical issues in assessing hospital performance. Commissioned by the Committee of Presidents of Statistical Societies. https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/downloads/statistical-issues-in-assessing-hospital-performance.Pdf. Revised January 27, 2012. Accessed February 23, 2019.

34. Olsson T, Terent A, Lind L. Charlson Comorbidity Index can add prognostic information to Rapid Emergency Medicine Score as a predictor of long-term mortality. *Eur J Emerg Med*. 2005;12(5):220-224. doi:10.1097/00063110-200510000-00004

35. Murray SB, Bates DW, Ngo L, Ufberg JW, Shapiro NI. Charlson Index is associated with one-year mortality in emergency department patients with suspected infection. *Acad Emerg Med*. 2006;13(5):530-536. doi:10.1197/j.aem.2005.11.084

36. Christensen S, Johansen MB, Christiansen CF, Jensen R, Lemeshow S. Comparison of Charlson comorbidity index with SAPS and APACHE scores for prediction of mortality following intensive care. *Clin Epidemiol*. 2011;3:203-211. doi:10.2147/CLEP.S20247

37. Bordon J, Wiemken T, Peyrani P, et al; CAPO Study Group. Decrease in long-term survival for hospitalized patients with community-acquired pneumonia. *Chest*. 2010;138(2):279-283. doi:10.1378/chest.09-2702

38. Patil SP, Krishnan JA, Lechtzin N, Diette GB. In-hospital mortality following acute exacerbations of chronic obstructive pulmonary disease. *Arch Intern Med*. 2003;163(10):1180-1186. doi:10.1001/archinte.163.10.1180

39. Fagerland MW, Hosmer DW, Bofin AM. Multinomial goodness-of-fit tests for logistic regression models. *Stat Med*. 2008;27(21):4238-4253. doi:10.1002/sim.3202

40. Weissman JS, Stern R, Fielding SL, Epstein AM. Delayed access to health care. *Ann Intern Med*. 1991;114(4):325-331. doi:10.7326/0003-4819-114-4-325

41. Selassie AW, Pickelsimer EE, Frazier L Jr, Ferguson PL. The effect of insurance status, race, and gender on ED disposition of persons with traumatic brain injury. *Am J Emerg Med*. 2004;22(6):465-473. doi:10.1016/j.ajem.2004.07.024

42. Selassie AW, McCarthy ML, Pickelsimer EE. The influence of insurance, race, and gender on emergency department disposition. *Acad Emerg Med*. 2003;10(11):1260-1270. doi:10.1197/S1069-6563(03)00497-4

43. Committee on the Consequences of Uninsurance. *Care Without Coverage: Too Little, Too Late*. Washington, DC: Institute of Medicine; 2002.

44. Oster A, Bindman AB. Emergency department visits for ambulatory care sensitive conditions. *Med Care*. 2003;41(2):198-207. doi:10.1097/01.MLR.0000045021.70297.9F

45. Sawyer NT. Why the EMTALA mandate for emergency care does not equal healthcare "coverage". *West J Emerg Med*. 2017;18(4):551-552. doi:10.5811/westjem.2017.5.34826

46. Centers for Medicare and Medicaid Services. Emergency Medical Treatment & Labor Act (EMTALA). https://www.cms.gov/regulations-and-guidance/legislation/emtala/. Modified March 26, 2012. Accessed February 23, 2019.

47. Rosenbaum S, Cartwright-Smith L, Hirsh J, Mehler PS. Case studies at Denver Health: "patient dumping" in the emergency department despite EMTALA, the law that banned it. *Health Aff (Millwood)*. 2012;31(8):1749-1756. doi:10.1377/hlthaff.2012.0517

48. Sommers BD, Gunja MZ, Finegold K, Musco T. Changes in self-reported insurance coverage, access to care, and health under the Affordable Care Act. *JAMA*. 2015;314(4):366-374. doi:10.1001/jama.2015.8421

49. Sommers BD, Baicker K, Epstein AM. Mortality and access to care among adults after state Medicaid expansions. *N Engl J Med*. 2012;367(11):1025-1034. doi:10.1056/NEJMsa1202099

50. Baicker K, Taubman SL, Allen HL, et al; Oregon Health Study Group. The Oregon experiment–effects of Medicaid on clinical outcomes. *N Engl J Med*. 2013;368(18):1713-1722. doi:10.1056/NEJMsa1212321

51. Polsky D, Candon M, Saloner B, et al. Changes in primary care access between 2012 and 2016 for new patients with Medicaid and private coverage. *JAMA Intern Med*. 2017;177(4):588-590. doi:10.1001/jamainternmed.2016.9662

52. Blavin F. Association between the 2014 Medicaid expansion and us hospital finances. *JAMA*. 2016;316(14):1475-1483. doi:10.1001/jama.2016.14765

53. American Hospital Association. Table 4.3: annual change in hospital operating revenue and expenses per adjusted admission, 2014. In: *Trendwatch Chartbook*. Chicago, IL: American Hospital Association; 2014.

54. Cunningham P, Rudowitz R, Young K, Garfield R, Foutz J. Understanding Medicaid hospital payments and the impact of recent policy changes. Kaiser Family Foundation. https://www.kff.org/medicaid/issue-brief/understanding-medicaid-hospital-payments-and-the-impact-of-recent-policy-changes/. Published June 9, 2016. Accessed February 23, 2019.

55. Stensland J, Gaumer ZR, Miller ME. Contrary to popular belief, Medicaid hospital admissions are often profitable because of additional Medicare payments. *Health Aff (Millwood)*. 2016;35(12):2282-2288. doi:10.1377/hlthaff.2016.0599