Understanding Admission Patterns: The Impact of Payer Type and ESI Level on Hospitalization Decisions

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BACKGROUND

- Most Emergency Departments (ED) utilize the Emergency Severity Index (ESI) to triage patients based on their level of clinical acuity and severity.
- ESI scores are based on objective factors but can be subject to bias, and some studies have shown racial and ethnic triage disparities.
- ED admission rates have an inverse relationship with ESI score, i.e., the lower the ESI, therefore the higher the acuity, the higher the admission rate.
- It is important to understand factors that influence ESI scoring and admission rates. These factors may vary across regions as population characteristics differ.

RESEARCH QUESTIONS

1. Are admission rates related to clinical severity as judged by ESI Level?
2. Are admission rates related to type of insurance?
3. Are admission rates still related to type of insurance when controlling for level of clinical severity?
4. Are discharge rates related to type of insurance when controlling for demographic factors & level of clinical severity?

METHODS

- Retrospective study design of all patients who presented to the Stony Brook Emergency Department between Jan 2018 to Dec 2024.
- Excluded 42,738 encounters without an assigned ESI Level. Majority of these were OB triaged patients.
- Excluded 142 encounters without any insurance information.
- We used Chi square analysis to evaluate the statistical significance of the relationships between admission rate, ESI Level, and insurance type.
- We used Odds Ratio calculations to evaluate the statistical significance of the relationship between discharge rate and insurance type.

RESULTS

Descriptive Statistics

- There were 780,437 total ED visits between Jan 1st, 2018 – Dec 31st, 2024.
- There were 737,584 visits after excluding those without an ESI level or insurance information.
- 37.9% were privately insured (Commercial) encounters (n= 279,936).
- 52.5% were Medicare and Medicaid encounters (n= 387,360).
- 7.7% were Self Pay encounters (n= 56,450).
- 1.9% were Workers Comp/No Fault encounters (n=13,838).
- The overall admission rate was 23.6% (173,976/737,584).

Table 1: Distribution of ED encounters by ESI, 2018-2024

		ESI Distribution for All Encounters (%)
ESI Level	1	1.37%
	2	33.41%
	3	54.29%
	4	10.39%
	5	0.54%

RESULTS

Table 2: Encounters by Insurance type and ESI levels Including % Admitted

		Total Visits by Insurance type N, [% Admitted]				
		Commercial	Medicare/Medicaid	Self-Pay	WC/No Fault	Total
ESI Level	1	2348, [69.08%]	6313, [74.16%]	772, [43.65%]	669, [88.94%]	10102, [71.63%]
	2	82086, [32.89%]	146650, [46.69%]	13848, [14.78%]	3826, [44.07%]	246410, [40.25%]
	3	163452, [12.31%]	200563, [21.79%]	30899, [4.92%]	5542, [13.51%]	400456, [16.50%]
	4	30622, [1.80%]	32145, [2.34%]	10245, [0.62%]	3617, [1.80%]	76629, [1.87%]
	5	1428, [0.49%]	1689, [1.01%]	686, [0.15%]	184, [0.00%]	3987, [0.63%]
	Total	49290, [17.61%]	117623, [30.37%]	3968, [7.03%]	3095, [22.37%]	737, 584 [23.59%]

Figure 1: Admission rates by Insurance Type and ESI Levels

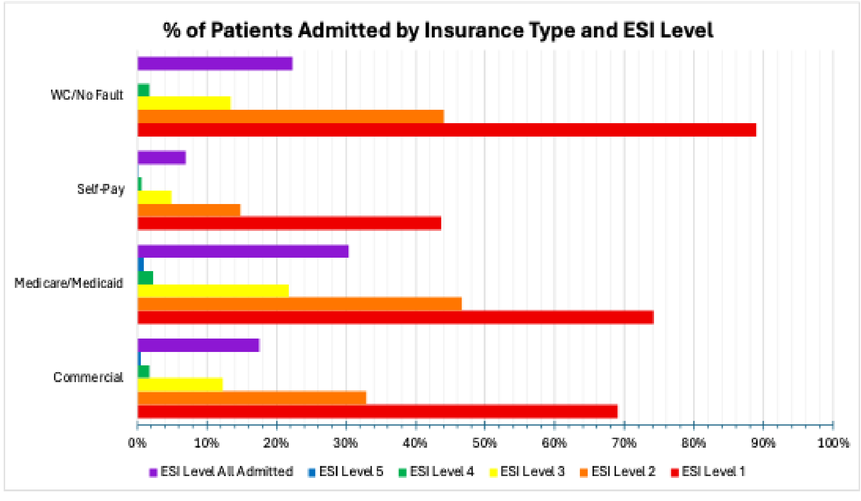

Table 3: Odds Ratio for Likelihood of Discharge of Self Pay vs Commercial insurance Patients Broken Down by Clinical Severity

Likelihood of Discharge of Self Pay patients vs Commercially Insured Patients, Overall and by Level of Severity		
	Odds Ratio, [95% CI]	p-value
All ESI Levels	2.83, [2.73 - 2.92]	<0.0001
ESI Level 1	2.88, [2.44 - 3.42]	<0.0001
ESI Level 2	2.82, [2.69 - 2.97]	<0.0001
ESI Level 3	2.71, [2.57 - 2.86]	<0.0001
ESI Level 4	2.91, [2.25 - 3.77]	<0.0001
ESI Level 5	3.37, [0.41 - 27.48]	0.256

DISCUSSION

- Most ED encounters between 2018-2024 were by Medicaid and Medicare patients (52.5%), followed by privately insured patients (37.9%), Self-Pay patients (7.7%) and Workers Comp/No Fault patients (1.9%).
- The majority of ED encounters were ESI Level 3 (45.3%) followed by ESI 2 (33.4%), ESI 4 (10.4%), ESI 1 (1.4%) and ESI 5 (0.5%) (Table 1).
- There is an inverse relationship between ESI Level and admission rate across all payer types (Table 2). This is expected as higher acuity patients typically present with more severe conditions that warrant further evaluation and treatment. This relationship was statistically significant ($\chi^2 = 83301$, DF 4, $P<0.001$).
- Medicare/Medicaid patients have the highest admission rate (30.4%), followed by WC/No Fault (22.4%), Commercial (17.6%), and Self-Pay (7%) (Table 2). Medicare/Medicaid patients are likely admitted at higher rates due to higher overall level of comorbidities and older age.
- There was an overall statistical significance when evaluating the influence of admission by insurance type across all ESI levels (χ^2 11085, DF 3, $P<0.0001$). This statistical significance remained when evaluating influence of admission by insurance type among individual ESI levels: ESI Level 1 ($\chi^2 = 423$, DF 3, $p<0.0001$), 2 ($\chi^2 = 8134$, DF 3, $p<0.0001$), 3 ($\chi^2 = 9206$, DF 3, $p<0.0001$) and 4 ($\chi^2 = 127$, DF 3, $p<0.0001$), but not ESI 5.
- Self-Pay patients consistently have the lowest admission rates across all ESI levels (Table 2).
- To evaluate whether insurance type influences likelihood of discharge, we conducted an odds ratio analysis on the Self-Pay and Commercial payer types, assuming they are more likely similar in demographics and comorbidities.
- Across almost all ESI levels, Self Pay patients are significantly more likely to be discharged than their commercially insured counterparts. The odds ratio is consistently above 2.7 with a narrow 95% CI, and all comparisons (except ESI 5) are statistically significant ($p<0.0001$) (Table 3). There is likely no significance for ESI Level 5 due to very few admitted patients in this group.

CONCLUSIONS

- Our research shows Self-Pay patients are more likely to be discharged from the ED than all other payer types, even when attempting to control for clinical severity.
- Self-Pay patients may face more admission resistance or may opt against admission due to cost concerns, suggesting potential disparities in care based on financial factors.
- These findings suggest a need to evaluate admission practices for possible bias or inequity in care based on socioeconomic or systemic factors.
- The characteristics of ED users—such as age, insurance status, and socioeconomic factors such as race and language—are not static, and controlling for these factors is crucial for tailoring care and optimizing resources.
- Future studies should explore the underlying causes of admission disparities across ESI levels, focusing on the roles of payer status, and potential systemic biases to inform more equitable admission practices.