



Nationwide Analysis of CTPA Yield Rates Using the EPIC Cosmos Database: Insights into Overutilization Patterns

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Introduction

Computed Tomography Pulmonary Angiogram (CTPA) is the gold standard for diagnosing pulmonary embolism (PE). Despite its critical role, concerns regarding its overutilization persist. Previous evaluations of CTPA yield rates, often limited to single or a few institutions, have primarily focused on institutional-level data. By examining nationwide CTPA yield rates across a large multi-institutional dataset, this study aims to evaluate variability across different demographic, geographic, and institutional factors.

Hypothesis

By examining nationwide CTPA yield rate trends, the study seeks to provide a more comprehensive understanding of CTPA use patterns, including potential overutilization in specific patient subgroups and regions. These findings could inform targeted interventions, improve adherence to clinical decision-support tools, and ultimately enhance resource utilization and patient outcomes.

Methods

A retrospective cohort study was conducted using EPIC Cosmos, encompassing over 6.4 million CTPA scans performed across 1,614 hospitals in the United States between November 2021 and 2024. Patients included in the study underwent CTPA with an encounter diagnosis of acute pulmonary embolism, and yield rates were calculated as the ratio of positive PE diagnoses to total CTPA scans during an encounter. Subgroup analyses were conducted based on sex, race, age, geographic region, urban versus rural settings, and institutional factors.

Results

The study included a total of 6,465,645 CTPA scans. While the national positive CTPA yield rate was 7.88%, our home institutional yield rate was marginally higher at 8.61%. Yield rates varied significantly by sex, with males exhibiting a higher rate (8.38%) than females (7.47%). Geographic disparities were notable, with the Northeast reporting the highest yield (8.65%) and the South the lowest (7.55%). Urban and rural settings demonstrated nearly identical rates (7.98% and 7.98%, respectively). Minority groups, including Asians and Hispanics, had the lowest yield (6.48%). Yield increased with age, peaking at 9.28% for patients older than 85 years.

Conclusion

This is the first study leveraging the EPIC Cosmos database to evaluate CTPA yield nationwide. The findings highlight the potential overutilization of CTPA, particularly among women, minority groups, and younger patients. These disparities suggest a need for improved adherence to evidence-based guidelines to optimize resource utilization and reduce unnecessary radiation exposure. Addressing these issues through targeted interventions is crucial for improving diagnostic efficiency and patient outcomes.

Figure(s)

		Positive PE	Total CTPA	CTPA Yield Rates
National Average		509689	6465645	7.883034098
Emory Healthcare Average		3869	44921	8.612898199
Subgroup Analysis				
Sex	Male	245868	2933140	8.382416114
	Female	263770	3531729	7.468579837
Race	White	376869	4852116	7.767106145
	Blacks	113713	1264266	8.994388839
	Minorities (Asian, Pacific Islanders, Hispanics)	54170	835769	6.481456
Area Type	Rural	14009	175385	7.987570203
	Urban	472089	5980839	7.893357437
Census Region	Midwest	144631	1841815	7.852634494
	South	219723	2910940	7.548180313
	West	44173	542484	8.142728633
	Northeast	100425	1160446	8.654000272
Age (years)	>85	40859	440277	9.280293997
	75-85	94623	1096389	8.630422232
	65-75	124750	1460378	8.542308909
	50-65	136802	1745922	7.835516134
	40-50	52941	725984	7.292309472
	30-40	37130	565017	6.57148369

Figure 1. Positive Pulmonary Embolism (PE) Cases and Computed Tomography Pulmonary Angiography (CTPA) Yield Rates by Demographic and Regional Categories

Keywords

Administration & Operations; Clinical Workflow & Productivity; Quality Improvement & Quality Assurance