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Race and Sex-Based Disparities in Treatment and Mortality Following Pulmonary Embolism Intervention

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Introduction

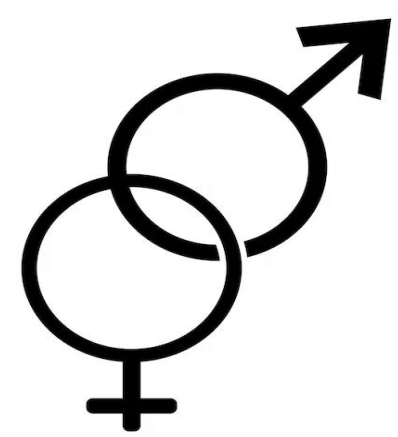
Research related to **pulmonary embolism (PE)** disparities largely evaluates the influence of race and sex, *separately*, on PE outcomes:



Race + PE:

Black patients are:

- Hospitalized more frequently.^{1,2}
- Have higher rates of PE-related mortality.⁴



Sex + PE:

Female patients are:

- Diagnosed with PE 35%–55% less often⁵
- Studies had conflicting data regarding sex and PE mortality⁶⁻⁷

In reality, these demographic variables do not exist in a vacuum by themselves. There remains an unmet need to understand how one's intersectional identify impacts PE outcomes.

Research Question



Using data from our academic healthcare system, we sought to better understand the **intersection of race and sex** as they relate to the **receipt of PE treatment modalities** and **mortality after PE**.

References:

- 1 Phillips AR, Reitz KM, Myers S, et al. J Am Heart Assoc. Sep 7 2021;10(17):e021818.
- 2 Martin KA, McCabe ME, Feinglass J, Khan SS. Arteriosclerosis, Thrombosis, and Vascular Biology. 2020;40(9):2338-2340.
- 3 Jarman AF, Mumma BE, Singh KS, Nowadly CD, Maughan BC. J Am Coll Emerg Physicians Open. 2021;2(1):e12378.
- 4 Marshall AL, Bartley AC, Ashrani AA, et al. Vasc Med. Apr 2017;22(2):121-127.
- 5 Rosovsky RP, Elgendy IY, Cannegieter SC, et al Blood. 2019/11/13/ 2019;134:2429.
- 6 Thachil R, Nagraj S, Kharawala A, Sokol SI. J Cardiovasc Dev Dis. Jul 25 2022;9(8).

Methods

Data Source:

Large academic healthcare system
Corporate data warehouse



10/01/2015 to 12/31/2019



> 18 years old



Hospital admissions with Acute PE



PE admissions undergoing treatment with anticoagulation AND an additional treatment (excluding IVC Filter)

Classify each patient by self-identified, administratively collected identities:

Race: White, Black, Other

Ethnicity: Hispanic, Non-Hispanic

Sex: Men, Women

Tabulate data using administrative and predefined billing and procedural codes:

- Demographic
- Comorbidity
- Primary intervention: systemic thrombolysis, catheter-based therapy, surgical thromboendarterectomy
- Mortality

Statistical analysis:

Assess association between mortality and intersectional identify, insurance status, procedural type, and procedural site.

Results

Table 1. Demographic Characteristics

		Total N=906	Non-Hispanic White Women N=211	Non-Hispanic Black Women N=262	Non-Hispanic White Men N=234	Non-Hispanic Black Men N=199	P-value
Age, median (IQR)		57.8 (45.2 – 67.5)	59.4 (45.5 – 68.6)	57.2 (43.1 – 66.8)	59.6 (49.0 – 69.6)	54.0 (42.8 – 64.4)	< 0.001
Insurance Status	Public	254 (28.0%)	70 (33.2%)	68 (26.0%)	60 (25.6%)	56 (28.1%)	< 0.001
	Private	486 (53.6%)	111 (52.6%)	137 (52.3%)	147 (62.8%)	91 (45.7%)	
	Medicaid	113 (12.5%)	21 (10.0%)	44 (16.8%)	14 (6.0%)	34 (17.1%)	
	Uninsured	53 (5.9%)	9 (4.3%)	13 (5.0%)	13 (5.6%)	18 (9.1%)	
Comorbidity	Asthma	232 (25.6%)	63 (29.9%)	92 (35.1%)	41 (17.5%)	36 (18.1%)	< 0.001
	Chronic Obstructive Pulmonary Disease	174 (19.2%)	48 (22.8%)	61 (23.3%)	38 (16.2%)	27 (13.6%)	0.019
	Hypertension	362 (40.0%)	80 (37.9%)	123 (47.0%)	78 (33.3%)	81 (40.7%)	0.018
	Adv. Kidney Disease (CKD 3-5 + on dialysis)	141 (15.6%)	17 (8.1%)	51 (19.5%)	22 (9.4%)	51 (25.6%)	< 0.001
Prior history	Pulmonary Embolism	125 (13.8%)	26 (12.3%)	51 (19.5%)	18 (7.7%)	30 (15.1%)	0.002

Table 2. Intervention Type by Intersectional Identity

		Total N=906	Non-Hispanic White Women N=211	Non-Hispanic Black Women N=262	Non-Hispanic White Men N=234	Non-Hispanic Black Men N=199	P-value
Systemic alteplase		721 (79.6%)	172 (81.5%)	223 (85.1%)	163 (69.7%)	163 (81.9%)	0.002
Catheter-based therapy		169 (18.7%)	37 (17.5%)	36 (13.7%)	64 (27.4%)	32 (16.1%)	
Surgical thrombectomy		16 (1.8%)	2 (1.0%)	3 (1.2%)	7 (3.0%)	4 (2.0%)	

Table 3. Mortality After PE Admission Among Groups

	Total (N=906)	Non-Hispanic White (N=445)		Non-Hispanic Black (N=461)		P-value
Overall Mortality	246 (27.2%)	107 (24.0%)		139 (30.2%)		0.039
		Women (N=211)	Men (N=234)	Women (N=262)	Men (N=199)	P-value
		50 (23.7%)	57 (24.4%)	79 (30.2%)	60 (30.2%)	NS

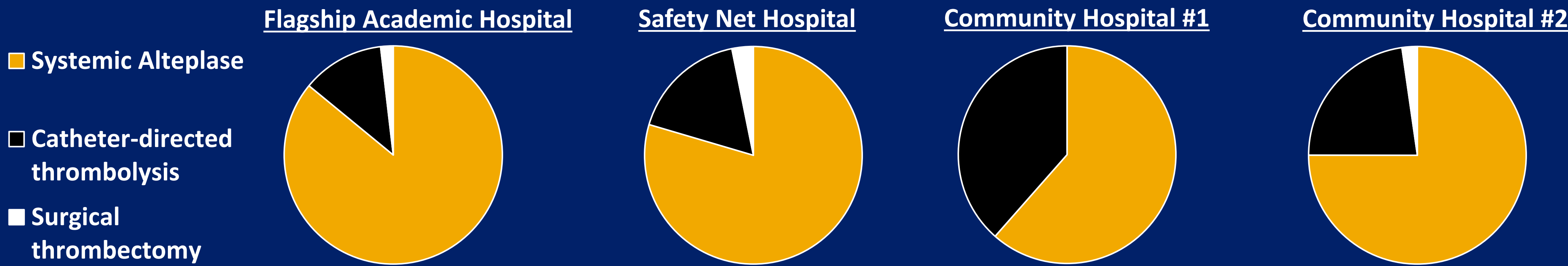


Table 4. Association between factors of interest and mortality (univariate analysis)

		1-year mortality			3-year mortality		
		OR	95% CI	P-value	OR	95% CI	P-value
Race and Sex Referent: Non-Hispanic White Men	Non-Hispanic Black Men	1.24	0.79 – 1.93	0.36	1.31	0.85 – 2.01	0.22
	Non-Hispanic White Women	0.89	0.56 – 1.41	0.61	0.93	0.60 – 1.45	0.76
	Non-Hispanic Black Women	1.17	0.76 – 1.78	0.48	1.26	0.84 – 1.89	0.27
Insurance Referent: Private	Public	1.411	0.99 – 2.01	0.057	1.58	1.13 – 2.23	0.01
	Medicaid	1.592	1.00 – 2.53	0.048	1.58	1.01 – 2.47	0.05
	Uninsured	0.232	0.07 – 0.76	0.016	0.28	0.10 – 0.78	0.02
Procedure type Referent: Catheter-based	Surgical thrombectomy	2.63	0.77 – 8.99	0.12	3.59	1.13 – 11.45	0.03
	Systemic alteplase	2.65	1.60 – 4.39	< 0.001	3.20	1.93 – 5.30	< 0.001
Procedure site Referent: Flagship Academic Hospital	Safety Net Hospital	0.52	0.37 – 0.74	< 0.001	0.55	0.39 – 0.76	< 0.001
	Private Community Hospital - Large	0.32	0.19 – 0.56	< 0.001	0.36	0.22 – 0.60	< 0.001
	Private Community Hospital - Small	0.29	0.11 – 0.75	0.01	0.31	0.13 – 0.75	0.009

Next Steps

1. Semi-structured interviews with key stakeholders to discern facilitators and barriers to catheter-based therapies in PE care.
2. Bridge the chronological gap between 2019 and 2025 to see if the trends and outcomes persist as well as identify areas for practice optimization.