

Sex Differences in Testing for Pulmonary Embolism Among Emergency Department Patients by Chief Complaint

Angela F Jarman,¹ Brandon C Maughan,² Richard White,³ Zainab Akinjobi,⁴ Sandra Taylor,⁴ Bryn E Mumma¹

¹Dept of Emergency Medicine, University of California, Davis, ²Dept of Emergency Medicine Oregon Health and Science University, ³ Dept of Internal Medicine, UC Davis ⁴ Dept of Public Health Sciences, UC Davis

BACKGROUND

For reasons that are complex and not well understood, women undergo diagnostic testing for pulmonary embolism (PE) at far greater rates than men, despite the disease incidence being higher in men overall. It is unknown if testing for PE varies based on patient chief complaint in addition to their sex.

METHODS

- Retrospective cohort study at two regional tertiary care hospitals
- Non-pregnant adult patients (aged 18-49) included between 1/1/2016 and 12/31/2018 with any of the following chief complaints: chest pain, shortness of breath, hemoptysis, syncope AND had objective testing for PE (imaging or laboratory)
- Clinical & demographic data obtained retrospectively from the electronic medical record

RESULTS (TABLES & FIGURES)

	Male N=735 (36.9%)	Female N=1256 (63.1%)
	mean, SD	mean, SD
Age	36.5, 8.6	35.7, 8.7
Chief Complaint	n, %	n, %
Chest Pain	408, 55.5%	750, 59.7%
Shortness of Breath	284, 38.6%	437, 34.8%
Syncope	27, 3.7%	54, 4.3%
Hemoptysis	16, 2.2%	15, 1.2%
Initial Vital Signs	mean, SD, (n missing)	mean, SD, (n missing)
Heart Rate	98, 22, (2)	97, 20, (3)
Respiratory Rate	19, 4.5, (4)	18.7, 4.1, (6)
Systolic Blood Pressure	136.8, 19.7, (1)	134.3, 21.4, (0)
Diastolic Blood Pressure	84.1, 15.4, (1)	82.5, 15.5, (0)
Risk Factors	n, %	n, %
Prior VTE	107, 14.6%	188, 15.0%
Active Cancer	59, 8.0%	98, 7.8%
Recent Surgery	39, 5.3%	70, 5.6%
Unilateral Lower Limb Pain	29, 3.9%	44, 3.5%
Hemoptysis	34, 4.6%	33, 2.6%
Unilateral Leg Pain & Edema	11, 1.5%	18, 1.4%
Pretest Risk	Median, IQR	Median, IQR
Geneva Score	5 (3-5)	5 (3-5)
Geneva Risk Category	n, %	n, %
Low	265, 36.1%	454, 36.1%
Moderate	456, 62.0%	779, 62.0%
High	14, 1.9%	23, 1.8%
Outcome Measures	n, %	n, %
Dimer Performed	523, 71.2%	956, 76.1%
Dimer Positive	115, 22.0%	221, 23.1%
Imaging Performed	313, 42.6%	480, 38.2%
PE Diagnosis	39, 5.3%	39, 3.1%

Table 1: Baseline Patient Characteristics

Chief Complaint	Outcome Measure	Male (735) n, %	Female (1,256) n, %	p
Chest Pain	n	408 (55.5%)	750 (59.7%)	<0.001
	Geneva Score (M, IQR)	5 (3, 5)	5 (3, 5)	0.981
	Dimer Performed	307 (75.2%)	603 (80.4%)	0.041
	Dimer Positive	54 (17.6%)	124 (20.6%)	0.285
	Imaging Performed	153 (37.5%)	253 (33.7%)	0.199
Dyspnea	PE Diagnosed	22 (5.4%)	15 (2.0%)	0.002
	n	284 (38.6%)	437 (34.8%)	<0.001
	Geneva Score	5 (3, 5)	5 (3, 5)	0.886
	Dimer Performed	181 (63.7%)	301 (68.9%)	0.151
	Dimer Positive	54 (29.8%)	90 (29.9%)	0.988
Syncope	Imaging Performed	145 (51.1%)	206 (47.1%)	0.304
	PE Diagnosed	15 (5.3%)	22 (5.0%)	0.883
	n	27 (3.7%)	54 (4.3%)	0.003
	Geneva Score	5 (3, 6.5)	5 (3, 5)	0.944
	Dimer Performed	23 (85.2%)	46 (85.2%)	1.000
Hemoptysis	Dimer Positive	5 (21.7%)	6 (13.0%)	0.352
	Imaging Performed	8 (29.6%)	11 (20.4%)	0.354
	PE Diagnosed	0	0	-
	n	16 (2.2%)	15 (1.2%)	0.857
	Geneva Score	6.5 (4.5, 7)	5 (5, 7)	0.743
Imaging Performed	Dimer Performed	12 (75.0%)	6 (40.0%)	0.048
	Dimer Positive	2 (16.7%)	1 (16.7%)	1.000
	Imaging Performed	7 (43.8%)	10 (66.7%)	0.200
	PE Diagnosed	2 (12.5%)	2 (13.3%)	0.945

Table 2: Outcome Measures by Sex and Chief Complaints

Outcome Variable	D-dimer Performed		D-dimer Positive		Imaging Performed		PE Diagnosis	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Chief Complaint; Dyspnea (ref)								
Chest Pain	1.76 (1.25-2.46)	0.001	0.51 (0.33-0.79)	0.003	0.57 (0.42-0.79)	0.001	1.01 (0.51-2.00)	0.983
Syncope	3.19 (1.06-9.59)	0.039	0.76 (0.24-2.05)	0.611	0.44 (0.18-1.02)	0.066	-	-
Hemoptysis	1.58 (0.49-5.01)	0.443	0.52 (0.08-2.08)	0.414	0.83 (0.29-2.31)	0.724	2.82 (0.58-13.79)	0.199
Study Site; Site 1 (ref)								
Site 2	1.34 (1.09-1.66)	0.007	1.10 (0.85-1.43)	0.465	0.91 (0.75-1.10)	0.338	0.63 (0.39-1.00)	0.052
Patient Age	0.97 (0.96-0.99)	<0.001	1.03 (1.01-1.04)	0.001	1.03 (1.02-1.04)	<0.001	1.01 (0.98-1.03)	0.622
Patient Sex; Male (ref)								
Female	1.13 (0.78-1.64)	0.521	1.11 (0.70-1.79)	0.656	0.90 (0.64-1.28)	0.560	0.85 (0.39-1.84)	0.673
Dyspnea*Patient Sex (F/M)	1.32 (0.95-1.82)	0.095	1.02 (0.68-1.53)	0.933	0.85 (0.62-1.15)	0.281	0.93 (0.47-1.86)	0.845
Chest Pain*Patient Sex	1.36 (1.01-1.84)	0.040	1.24 (0.86-1.78)	0.252	0.86 (0.66-1.11)	0.240	0.37 (0.19-0.74)	0.005
Syncope*Patient Sex	1.02 (0.28-3.80)	0.974	0.51 (0.14-1.92)	0.321	0.59 (0.20-1.72)	0.333	-	-
Hemoptysis*Patient Sex	0.22 (0.05-1.01)	0.052	1.00 (0.07-14.16)	0.998	2.57 (0.59-11.22)	0.210	1.04 (0.13-8.60)	0.970
Geneva Risk; Low (ref)								
Moderate	0.81 (0.65-1.01)	0.058	1.25 (0.96-1.63)	0.098	1.25 (1.03-1.53)	0.023	1.81 (1.03-3.16)	0.039
High	0.24 (0.12-0.48)	<0.001	1.93 (0.64-5.32)	0.214	4.19 (2.06-9.08)	<0.001	10.29 (3.82-27.70)	<0.001
Physician Gender; Man (ref)								
Woman	0.96 (0.69-1.35)	0.819	0.90 (0.58-1.39)	0.643	0.91 (0.67, 1.24)	0.567	0.72 (0.36-1.45)	0.354
Attending Years of Experience	0.99 (0.98-1.01)	0.268	1.00 (0.99-1.02)	0.599	1.01 (1.00-1.02)	0.306	1.00 (0.98-1.03)	0.825

Table 3: Predictors of PE Testing and Diagnosis

RESULTS

- 1,991 unique patients encounters
- 61% (1,256/1,991) were female
- Females were more likely (76.1%; 956/1,256) than males (71.2%; 523/735; p=0.015) to have a D-dimer performed and less likely (3.1%; 39/1,256 F vs 5.3%; 39/735 M; p=0.015) to have a PE
- This trend varied by chief complaint
- All significant sex differences were among patients presenting with *chest pain*
- Yield of testing was much higher for patients with hemoptysis and was similar by sex

CONCLUSION

Both patient sex and presenting complaint were associated with trends in diagnostic testing for PE. Further research is needed to elucidate the relationship between patient gender, presenting complaints, and physician diagnostic reasoning.