ISSN: 03875547
Volume 43, Issue 02, June, 2020

Appraisal of clinical likelihood and passing result of aspiratory embolism among ICU patients neighborhood experience from Saudi Arabia

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Keywords:
ICU, Death , Causes

ABSTRACT

Pulmonary embolism (PE) is serious event in medical and surgical practice. Many patients are admitted to the intensive care unit (ICU), and Few reports have addressed the outcome of patients with PE. Data were collected retrospectively of 53 (PE) patients admitted to the ICU between January 2010 and June 2012. Demographic, clinical, radiological and therapeutic data were collected on admission to ICU. Overall ICU mortality rate is 15% of which causes of death related to PE was 25% and PE with metastatic CA 12.5%. The most common predisposing factors were prolonged reduced mobility (45.3%) and major surgery within three months (34%). The result of this study could provide the background for a larger triage studies integrating demographic data, predisposing factors, clinical signs and diagnostics into the early detection and management of PE.

1. INTRODUCTION

Pulmonary Embolism (PE) is a medical condition that is particularly difficult to diagnose in the acute setting. The true incidence of PE is difficult to diagnose that may be missed because of its non-specific clinical presentation. The prevalence of PE among hospitalized patients in the US according to data collected between 1979 and 1999, was 0.4%. Though only 40-53 per 100 000 persons were diagnosed with PE per year, the annual incidence in the US was estimated at 600 000 cases [1], [2]. The corresponding figures for Europe are unavailable. Among regional registries, an analysis of 2356 autopsies performed in 1987 on 79% of all deceased inhabitants from the city of Malmo, Sweden, with a population of 230 000 revealed VTE in 595 (25%), while PE was found in 431 (18.3%) of all cases. In 308 autopsies (13.1%), PE is considered the main cause or a contributory cause of death. Here in Saudi Arabia, only few studies have studied on the outcomes of pulmonary embolism yet figures are unavailable [3- 5]. In 90% of cases, suspicion of PE raised by clinical symptoms such as dyspnea, chest pain and syncope, either singly or in combination. In several series, dyspnea, tachypnea or chest pain were present in more than 90% of patients with PE. Despite the limited sensitivity and specificity of individual symptoms, signs and common tests, accurate, objective predictive model of prognosis for PE is imperative. This study aims to develop a predictive clinical model for likelihood of pulmonary embolism based on demographic data, clinical signs and the interpretation of diagnostics and its relation to major outcome that is death In Saudi Arabia.

2. MATERIALS AND METHODS

A retrospective study conducted at king Abdul-Aziz Hospital, Saudi Arabia between January 2010 and June 2012. A total of 53 patients admitted to the ICU with a mean length of stay of 21 days. Patients during the period of the study diagnosed by physicians as being at high risk for PE were included in the study with no exclusion criteria. Database records maintained by the hospital laboratory as well as clinical information provided from chart records provided the data used in this study. Patient records used in this study only come from patients clinically identified as being at risk for possible PE by attending physician based on their age, sex, predisposing factors (major surgery within three months, malignancy, prolonged/reduced mobility, previous DVT and major trauma/fracture), clinical signs (blood pressure, heart rate, Oxygen saturation, respiratory rate), and diagnostics (d-dimer, troponin I, ECG).

3. RESULTS

All 53 patients were included in the derivation cohort in whom 57% of the patients are female, mean age is 58 year- old and mean length of stay is 21 days. Overall ICU mortality rate is 15% of which causes of death related to PE was 25% and PE with metastatic CA 12.5%. The most common predisposing factors were prolonged reduced mobility (45.3%) and major surgery within three months (34%). A nonparametric correlation using the spearman rho's bivariate analysis was computed to assess the relationship between clinical probability variables and death outcome of Pulmonary Embolism. The patients' age, sex, predisposing factors, clinical signs and diagnostics findings were correlated as shown in table 1. There was a moderately negative correlation between prolonged reduced mobility (r=0.47, n=53, p= 0.001) to death outcome of pulmonary embolism. There was a moderately positive correlation between Systolic Blood Pressure (r=0.59, n=53, p=0.001), and Respiratory Rate (r=0.45, n=53, p=0.oo1) to death outcome of pulmonary embolism. The Effect size of relationship was moderate (Cohen, 1988). Overall, increasing prolonged reduced mobility, high Systolic Blood Pressure and High Respiratory Rate moderately increases the likelihood of death outcome of Pulmonary Embolism. There was a weakly negative correlation between Oxygen Saturation (r=0.29, n=53, p=0.001) and D-dimer (r=0.33, n=53, p=0.001) to death outcome of pulmonary embolism. There was a weakly positive correlation between Major trauma & surgery (r=0.34, n=53, p=0.001), and Heart Rate (r=0.27, n=53, p=0.001) to death outcome of pulmonary embolism. The Effect size of relationship was small (Cohen, 1988). Overall, decreasing oxygen saturation, major trauma and surgery, high d-dimer, high heart rate and abnormal ECG findings weakly increases the likelihood of outcome of pulmonary embolism.

4. DISCUSSION

The present study gives an insight into the clinical probability variables and death outcome of Pulmonary Embolism in one of the local hospitals in Saudi Arabia. The overall mortality rate in the present study related to PE and PE with metastatic CA were 25% and 12.5% respectively, which is higher than reported in previous studies. In our study, prolonged reduced mobility, increased systolic blood pressure and increased respiratory rate have moderate likelihood of causing death outcome to PE patients. Oxygen saturation, D-dimer, major trauma/surgery and heart rate on the other hand have small likelihood of causing death outcome to PE patients. A similar study of outcome of pulmonary embolism and clinic radiological predictors of mortality was done here in University Hospital in Saudi Arabia concluding Congestive Heart Failure ($p < 0.001$), tachypnea ($p < 0.036$) and tachycardia ($p = 0.014$) at presentation were associated with higher mortality [3], [5]. Another study on Pulmonary Embolism in Intensive Care Unit concluded acute medical illness, the presence of meningeal hemorrhage, the presence of spine fracture, hypoxemia with $PaO_2/FiO_2 < 300$ and the absence of pharmacological prevention of venous thromboembolism as the predictive factors of Pulmonary embolism [4]. Evaluating the likelihood of PE in an individual patient according to the clinical presentation is of utmost importance but because of lack of sensitivity and

specificity of clinical manifestations, several explicit clinical prediction rules have been developed in the last few years. These sought to determine the clinical signs and symptoms predicting the diagnosis of PE, yet it is important to note that when using scoring system by itself, PE cannot be ruled out completely in patients with a low probability score or confirmed in patients with a high probability score [6- 9]. This study makes it possible to discriminate suspected PE patients wherein early diagnosis is fundamental, since early treatment is highly effective [10-15]. The general applicability of this study limited by the evaluations at single study site and small number of patients and therefore these findings need to be verified by studies with larger number of patients.

5. CONCLUSION

The overall correlations were not strongly significant relative to the standard alpha level of 0.05 by this we cannot surmise the direction and magnitude of age, sex, predisposing factors, clinical signs and its correlation to the whole population as effecting death outcome of pulmonary embolism (16,17,18,19). But the result of this study could provide the background for a larger triage studies integrating demographic data, predisposing factors, clinical signs and diagnostics into the early detection and management of PE, more specifically, implementing this clinical model to obviate clinically unrecognized fatal cases of PE.

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			Gender	Age (Yrs)	RF for VTE	major surgery within3months	Malignancy	Prolonged reduced mobility	previous proven VTE	majortrauma or fracture within 3 months	Was the patient on DVT prohylaxis (for Pes occuring as inpt)	BP (sys)	BP(dia)	HRatDx	O2 sat(RA)at Dx	RR at Dx	Ddimers	Trop I	ECG at timeofDx	normal	sinus tachycardia	Right bundle branch block	Outcome
Spearman's rho	Gender	Correlation Coefficient	1.000	-0.184	.	0.161	0.078	0.088	0.096	0.140	-0.181	0.001	0.145	0.052	-0.036	0.246	0.116	-0.062	.	-0.394	0.221	0.282	-0.034
		Sig. (2-tailed)		0.187	.	0.251	0.579	0.532	0.496	0.319	0.376	0.993	0.301	0.712	0.798	0.076	0.455	0.685	.	0.006	0.131	0.052	0.808
		N	53	53	0	53	53	53	53	53	35	53	53	53	53	53	44	45	0	48	48	48	53
	Age (Yrs)	Correlation Coefficient	-0.184	1.000	.	0.091	-0.036	0.472	-0.091	0.140	0.057	-0.059	-0.309	-0.151	-0.273	-0.059	0.040	0.031	.	0.105	0.017	0.172	0.065
		Sig. (2-tailed)	0.187		.	0.515	0.796	0.000	0.518	0.317	0.782	0.674	0.024	0.280	0.048	0.673	0.797	0.839	.	0.478	0.911	0.244	0.646
		N	53	53	0	53	53	53	53	53	35	53	53	53	53	53	44	45	0	48	48	48	53
	RF for VTE	Correlation Coefficient			.									.	.		.						.
		Sig. (2-tailed)			.									.	.		.						.
		N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	majorsurgerywithin3months	Correlation Coefficient	0.161	0.091	.	1.000	-0.059	0.060	-0.183	0.354	0.086	-0.211	-0.171	0.050	0.000	-0.025	-0.333	0.253	.	0.346	-0.151	0.000	0.071
		Sig. (2-tailed)	0.251	0.515	.		0.674	0.670	0.189	0.009	0.676	0.129	0.220	0.721	1.000	0.861	0.027	0.094	.	0.016	0.305	1.000	0.613
		N	53	53	0	53	53	53	53	53	35	53	53	53	53	53	44	45	0	48	48	48	53
	Malignancy	Correlation Coefficient	0.078	-0.036	.	-0.059	1.000	0.117	-0.096	-0.139	0.208	-0.228	-0.047	-0.022	-0.011	-0.126	-0.017	0.002	.	0.000	-0.158	-0.169	-0.176
		Sig. (2-tailed)	0.579	0.796	.	0.674		0.405	0.496	0.320	0.308	0.101	0.736	0.877	0.938	0.367	0.913	0.988	.	1.000	0.283	0.251	0.207
		N	53	53	0	53	53	53	53	53	35	53	53	53	53	53	44	45	0	48	48	48	53
	Prolonged reduced mobility	Correlation Coefficient	0.088	-0.472	.	0.060	-0.117	1.000	0.214	0.048	0.033	0.096	0.233	0.082	0.089	0.054	0.198	0.142	.	0.076	0.014	0.076	0.000
		Sig. (2-tailed)	0.532	0.000	.	0.670	0.405		0.123	0.735	0.873	0.495	0.093	0.559	0.527	0.702	0.197	0.353	.	0.610	0.924	0.610	1.000

ISSN: 03875547
Volume 43, Issue 02, June, 2020

	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			
previous proven VTE	Correlation Coefficient	0.096	-0.091	.	-0.183	-0.096	0.214	1.000	-0.088	0.085	0.270	0.064	0.080	0.043	0.030	0.219	-0.066	.	0.115	0.108	0.115	0.111			
	Sig. (2-tailed)	0.496	0.518	.	0.189	0.496	0.123		0.533	0.679	0.051	0.648	0.569	0.760	0.834	0.153	0.668	.	0.434	0.465	0.434	0.430			
	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			
majortraumaorfracturewithin 3 months	Correlation Coefficient	0.140	0.140	.	0.354	-0.139	0.048	-0.088	1.000	0.085	-0.101	-0.119	-0.033	0.027	0.047	0.014	-0.192	.	0.000	-0.158	0.000	0.134			
	Sig. (2-tailed)	0.319	0.317	.	0.009	0.320	0.735	0.533		0.679	0.471	0.397	0.814	0.846	0.738	0.928	0.206	.	1.000	0.283	1.000	0.337			
	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			
Was the patient on DVT prohylaxis (for Pes occuring as inpt)	Correlation Coefficient	-0.181	0.057	.	0.086	0.208	0.033	0.085	0.085	1.000	-0.057	-0.085	-0.014	0.043	-0.150	0.273	-0.037	.	0.158	-0.331	0.215	0.257			
	Sig. (2-tailed)	0.376	0.782	.	0.676	0.308	0.873	0.679	0.679		0.783	0.678	0.945	0.834	0.464	0.273	0.678	.	0.483	0.133	0.339	0.205			
	N	36	36	0	36	36	36	36	36	36	36	36	36	36	36	28	30	0	32	32	32	36			
BP (sys)	Correlation Coefficient	0.001	-0.059	.	-0.211	0.228	0.096	0.270	-0.101	0.057	0.000	0.592	-0.271	0.183	0.031	0.077	-0.211	.	0.157	0.056	-0.050	-0.122			
	Sig. (2-tailed)	0.993	0.674	.	0.129	0.101	0.495	0.051	0.471	0.783		1.000	0.050	0.190	0.824	0.620	0.164	.	0.285	0.706	0.733	0.384			
	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			
BP (dia)	Correlation Coefficient	0.145	-0.309	.	-0.171	0.047	0.233	0.064	0.119	0.085	0.592	1.000	0.065	0.188	0.007	0.002	-0.016	.	0.210	0.032	-0.133	-0.065			
	Sig. (2-tailed)	0.301	0.024	.	0.220	0.736	0.093	0.648	0.397	0.678	0.000		0.642	0.178	0.958	0.989	0.916	.	0.152	0.831	0.367	0.646			
	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			
HR at Dx	Correlation Coefficient	0.052	-0.151	.	0.050	-0.022	0.082	0.080	-0.033	0.014	0.271	0.065	0.000	0.212	0.291	0.075	-0.161	.	0.046	0.133	0.071	0.203			
	Sig. (2-tailed)	0.712	0.280	.	0.721	0.877	0.559	0.569	0.814	0.945	0.050	0.642	.	0.127	0.034	0.628	0.291	.	0.754	0.368	0.633	0.145			
	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			
O2 sat(RA) at Dx	Correlation Coefficient	-0.036	-0.273	.	0.000	0.011	0.089	0.043	0.027	0.043	0.183	0.188	0.212	0.000	-0.457	-0.025	-0.363	.	0.055	0.093	-0.284	0.067			
	Sig. (2-tailed)	0.798	0.048	.	1.000	0.938	0.527	0.760	0.846	0.834	0.190	0.178	0.127	.	0.001	0.872	0.014	.	0.712	0.532	0.051	0.631			
	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			
RR at Dx	Correlation Coefficient	0.246	-0.059	.	-0.025	-0.126	0.054	0.030	0.047	0.150	0.031	0.007	0.291	-0.457	0.000	0.258	0.149	.	0.205	0.203	0.087	0.204			
	Sig. (2-tailed)	0.076	0.673	.	0.861	0.367	0.702	0.834	0.738	0.464	0.824	0.958	0.034	0.001	.	0.091	0.329	.	0.163	0.166	0.556	0.144			
	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			
Ddimers	Correlation Coefficient	0.116	0.040	.	-0.333	-0.017	0.198	0.219	0.014	0.273	0.077	0.002	0.075	-0.025	0.258	0.000	0.221	.	0.268	0.130	0.238	-0.089			
	Sig. (2-tailed)	0.455	0.797	.	0.027	0.913	0.197	0.153	0.928	0.273	0.620	0.989	0.628	0.872	0.091	.	0.181	.	0.090	0.417	0.133	0.567			
	N	44	44	0	44	44	44	44	44	28	44	44	44	44	44	44	38	0	41	41	41	44			
Trop I	Correlation Coefficient	-0.062	0.031	.	0.253	0.002	0.142	-0.066	-0.192	0.037	0.211	0.016	0.161	-0.363	0.149	0.221	-.000	.	0.027	0.159	0.091	-0.178			
	Sig. (2-tailed)	0.685	0.839	.	0.094	0.988	0.353	0.668	0.206	0.878	0.164	0.916	0.291	0.014	0.329	0.181			0.869	0.321	0.570	0.243			
	N	45	45	0	45	45	45	45	45	30	45	45	45	45	45	38	45	0	41	41	41	45			
ECG at time of Dx	Correlation Coefficient			.																					
	Sig. (2-tailed)			.																					
	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
normal	Correlation Coefficient	-0.394	0.105	.	0.346	0.000	0.076	0.115	0.000	0.158	0.157	0.210	0.046	0.055	0.205	0.268	0.027	.	1.000	0.399	0.288	-0.185			
	Sig. (2-tailed)	0.006	0.478	.	0.016	1.000	0.610	0.434	0.000	0.483	0.285	0.152	0.754	0.712	0.163	0.090	0.869	.		0.005	0.045	0.209			
	N	48	48	0	48	48	48	48	48	32	48	48	48	48	48	41	41	0	48	48	48	48			
sinus tachycardia	Correlation Coefficient	0.221	-0.017	.	-0.151	-0.158	0.014	-0.108	-0.158	0.331	0.056	0.032	-0.133	-0.093	0.203	0.130	0.159	.	-0.399	1.000	0.331	0.138			
	Sig. (2-tailed)	0.131	0.911	.	0.305	0.283	0.924	0.465	0.283	0.133	0.706	0.831	0.368	0.532	0.166	0.417	0.321	.	0.005	.	0.020	0.350			
	N	48	48	0	48	48	48	48	48	32	48	48	48	48	48	41	41	0	48	48	48	48			
Right bundle branch block	Correlation Coefficient	0.282	0.172	.	0.000	0.169	0.076	0.115	0.000	0.215	0.050	0.133	0.071	0.284	0.087	0.238	0.091	.	-0.288	0.331	1.000	0.115			
	Sig. (2-tailed)	0.052	0.244	.	1.000	0.251	0.610	0.434	0.000	0.335	0.733	0.367	0.633	0.051	0.556	0.133	0.570	.	0.045	0.020	.	0.435			
	N	48	48	0	48	48	48	48	48	32	48	48	48	48	48	41	41	0	48	48	48	48			
Outcome	Correlation Coefficient	-0.034	0.065	.	0.071	-0.176	0.000	0.111	0.134	0.257	0.122	0.065	0.203	0.067	0.204	0.089	-0.178	.	0.185	0.138	0.115	1.000			
	Sig. (2-tailed)	0.808	0.646	.	0.613	0.207	1.000	0.430	0.337	0.205	0.384	0.646	0.145	0.631	0.144	0.567	0.243	.	0.209	0.350	0.435	.			
	N	53	53	0	53	53	53	53	53	36	53	53	53	53	53	44	45	0	48	48	48	53			