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A Comparison between an Emergency Medicine Specialist and a Radiology Specialist in Reading Chest Radiography

A comparison between an emergency medicine specialist and a radiology specialist in reading chest radiography

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ABSTRACT

Chest X-ray is the most commonly used imaging in patients with trauma in emergency departments. The CXR performed in the emergency department is evaluated and read by the Trauma Team including different specialist. The aim of this study was to compare the findings of an emergency medicine specialist and radiology specialist in reading chest radiography. Our results showed that Due to the high sensitivity of the results, in cases where the diagnosis of a doctor has not been found to have a valid clinical sign in multiple traumatic patients, a chest x-ray can be avoided. Background: Chest X-ray is the most commonly used imaging in patients with trauma in emergency departments. The CXR performed in the emergency department is evaluated and read by the Trauma Team including different specialists. Aims: The aim of this study was to compare the findings of an emergency medicine specialist and radiology specialist in reading chest radiography. Methods: Our study is a cross-sectional diagnostic study in emergency department of Imam Khomeini Hospital in Sari in 2017.The study population included all patients with chest wall blunt trauma and multiple trauma patients.

Key words: Chest X-ray, Emergency, Trauma

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INTRODUCTION

An initial assessment of a person injured as a result of multiple acute trauma is in fact a challenging task, and each minute can determine the boundary between death and life. Early death may occur from a few minutes to several hours after injury. These patients often die of bleeding and heart disease often before the hospital. Delayed mortality from trauma rises from days to weeks after injury, primarily due to sepsis and multiple organ failure. Organized systems for the care and rescue of a traumatic patient are focused on early mortality, while care is provided to prevent latent mortality of a special trauma [1-3].

The purpose of the initial evaluation of the trauma patient is as follows: 1) rapid identification of life-threatening injuries, 2) initiation of appropriate supportive care, and 3) definitive treatment or

transfer to a facility that provides the ultimate therapeutic treatment.

The goal of triage is to prioritize patients with high probability of primary clinical disorder. The traumatic trauma of the patients evaluates the trauma according to the clinical symptoms and the clinical course of the hospital, the mechanism of injury, the age of the patient, and known or suspected concomitant diseases. Findings that lead to quick reviews include multiple harm, very high age, evidence of severe neurological damage, unstable vital signs, and existing cardiovascular disease or pulmonary disease [4].

Chest X-ray is the most commonly observed imaging study in patients with trauma. It can be easily performed during the recovery phase, and it provides information on the presence of a hemothourax, pneumothorax, or lung crush. AP chest radiography also helps in the placement of respiratory tubes, which are critical to early regeneration and early-stage studies [5-7].

Generally, the CXR performed in the emergency department is evaluated and read by the Trauma Team. Although the trauma team may have sufficient interpretative skills, they generally do not have enough time to interpret long-term and specialized images and have to work under difficult conditions. The latent pneumothorax can be obscured in over 76% of all patients when CXRs are interpreted by a trauma team. Potentially, the diagnostic function of the CXR is greatly enhanced if a traumatic radiologist contributes to the trauma team. The aim of this study was to compare the findings of an emergency medicine specialist and radiology specialist in reading chest radiography.

RESULTS

According to the results, we observed that fractures of one rib and subcutaneous emphysema (P-value = 0.037), pneumothorax alone and subcutaneous emphysema (P-value = 0.037), and single hemothourax and subcutaneous emphysema (P-value = 0.007) at a significant level of 5%, have a statistically significant relationship with each other and are not independent of each other.

To determine the relationship between the two variables of the fracture of a rib and subcutaneous emphysema, we use the Fi coefficient. The small significance of the coefficient of fi (<0.001) in the 95% confidence level indicates that there is a relationship between the two variables and the value of the coefficient statistic Fi (0.251) shows that the severity of the relationship between these two variables is weak.

To determine the relationship between the two variables of pneumothorax only and subcutaneous emphysema, we use the Fi coefficient. A small significance of the coefficient of fi (<0.001) in the 95% confidence level indicates that there is a relationship between the two variables and the value of the coefficient fi (0.251) shows that the intensity of the relationship between these two variables is weak.

To determine the relationship between the two variables of hemotourax and subcutaneous emphysema, we use the Fi coefficient. The small significance of the coefficient of fi (<0.001) in the 95% confidence level indicates that there is a relationship between the two variables and the amount of the fi coefficient 0.576) shows that the severity of the relationship between these two variables is moderate. Table1

Table 1: Result of Fisher's exact test value

asymptotic significance (2-sided)	Fisher's exact test value	Second variable	First variable
		Symptoms (subcutaneous emphysema)	
0.037*	-	Fracture of a rib	
1.000	-	Multi-rib fracture	
0.037*	-	Pneumothorax only	
0.007*	-	Hemothorox only	
1.000	-	Pneumonia alone	
1.000	-	Multi-rib fracture and pneumothorax	
1.000	-	Multi-rib fracture and contusion	
1.000	-	clavicle Fracture	

According to the results, we see that multi-rib fracture and scratching (P-value = 0.002), single pneumothorax and scratch (P-value = 0.008), multi-rib fracture and scratch (P-value = 0.002) And clavicle fracture with scratch (P-value = 0.030) have a significant statistical relationship with each other at 5% significance level and they are not independent of each other.

To determine the relationship between the two variables of multi-gear fracture and scratching, we use the Fi coefficient. The small significance of the coefficient fi (<0.001) in the 95% confidence level determines that there is a relationship between

the two variables and the value of the fi coefficient 0.34) shows that the intensity of the relationship between these two variables is weak.

To determine the relationship between the two variables of pneumothorax and scratches, we use the Fi coefficient. The small significance of the coefficient fi (<0.001) at the 95% confidence level indicates that there is a relation between the two variables and the value of the fi coefficient (0.244) Shows that the severity of the relationship between these two variables is weak.

To determine the relationship between the two variables of multi-rib fracture and cantonment and scratches, we use the fi ne coefficient. The small significance of the coefficient fi (<0.001) in the 95% confidence level indicates that there is a relationship between the two variables and the value of the coefficient statistic Fi (0.325) shows that the severity of the relationship between these two variables is weak.

In order to investigate the relationship between the two variables, the Clavicle and Fracture fractures are used. The small significance of the coefficient fi (<0.001) at the 95% confidence level indicates that there is a relationship between the two variables and the amount of the fi coefficient (0.285) Shows that the severity of the relationship between these two variables is weak. Table 2. Result of Fisher's exact test value

Table 2: Result of Fisher's exact test value

Asymptotic significance (2-sided)	Fisher's exact test value value	Second variable	First variable
		Signs (scratches)	
1.000	-	Fracture of a rib	
0.0001>	-	Multi- rib fracture	
0.008	-	Pneumothorax only	
1.000	-	Hemothorox only	
1.000	-	Pneumonia alone	
0.059	-	Multi- rib fracture and pneumothorax	
0.002*	-	Multi-rib fracture and contusion	
0.030*	-	Clavicle Fracture	

According to the results, we observed that multi-rib fracture and ecchymosis (P-Value<0.001), single pneumothorax and ecchymosis (P-value = 0.009), multi-rib fracture and contusion with ecchymosis (P-value = 0.003) And Clavicle fracture with ecchymosis (P-Value = 0.032) at a significant level of 5% have a statistically significant relationship and are not independent of each other.

In order to investigate the relationship between the two variables of multi-gear fracture and ecchymosis, we use the fi ne coefficient. The small significance of the coefficient fi (<0.001) in the 95% confidence level determines that there is a relationship between the two variables and the amount of the fi coefficient 0.325) shows that the severity of the relationship between these two variables is weak.

To determine the relationship between the two variables, we use only the Pneumothorax and Ecchymosis variables. The small significance of the coefficient fi (<0.001) at the 95% confidence level indicates that there is a relationship between the two variables and the value of the Fi coefficient statistic (0.233) Shows that the severity of the relationship between these two variables is weak.
In order to investigate the relationship between the two variables of multi-gear fracture and contusion with ecchymosis, we use the Fi coefficient. A small significance of the coefficient of fi (<0.001) in the 95% confidence level indicates that there is a relationship between the two variables and the value of the coefficient statistic Fi (0.311) shows that the severity of the relationship between these two variables is weak.
In order to investigate the relationship between the two variables of the Clavicle and ecchymosis fractions, we use the Fi coefficient. The small significance of the coefficient fi (<0.001) at the 95% confidence level indicates that there is a relation between the two variables and the value of the fi coefficient statistic (0.273) Shows that the severity of the relationship between these two variables is weak. Table3.Result of Fisher's exact test value

Table 3: Result of Fisher's exact test value

asymptotic significance (2-sided)	Fisher's exact test value value	Second variable	First variable
		Signs (echymosis)	
0.152	-	Fracture of a rib	
0.001>	-	Multi- rib fracture	
0.009*	-	Pneumothorax only	
1.000	-	Hemotorox only	
1.000	-	Pneumonia alone	
0.064	-	Multi- rib fracture and pneumothorax	
0.003*	-	Multi-rib fracture and contusion	
0.032*	-	clavicle Fracture	

Sensitivity and specificity

The true positive patients are those who have at least one of the clinical symptoms listed and have one of the symptoms of chest injury in radiographic radiography. People who do not have any of these are considered to be real negative ones. False positives are patients with at least one positive symptom-free clinical symptom and positive false positives as clinically asymptomatic patients with a symptom of chest or lung damage in their graph. Table4 .Result of Radiography report

Table 4: Result of Radiography report

Total	Normal	Yes	(sign) Radiography report
19	2	17	Yes
384	293	91	Normal
403	295	108	Total

According to the results of the above table, the area under the ROC curve is 0.575. To test this hypothesis, we use the Z test for the hypothesis that the surface below the curve of the ROC graph is 0.5.

The value of the criterion is equal to (> 0) and the values corresponding to the ROC curves with a confidence interval of 95% for each one are given in the table below. Table5 .Result of Radiography report

Table 5: Result of Sensitivity, specificity, Positive likelihood ratio, Negative likelihood ratio

Negative likelihood ratio	Positive likelihood ratio	specificity	Sensitivity	
0.85	23.22	99.32	15.74	value
0.8 – 0.9	5.5 – 98.8	97.6 – 99.9	9.4 – 24.0	Confidence interval %95

DISCUSSION

Trauma is one of the greatest human health problems that can have a profound impact on human health. The most common cause of death is at a young age. Trauma can have a wide range of effects of lowering the function of individuals and reducing the quality of life to life threatening or even death. Chest trauma and its damage are important in patients with multiple traumas. Chest trauma can lead to high mortality due to vital organs such as the heart and lungs and large vessels such as aorta. After Head trauma is the second cause of death in patients with traumatism [8-10].

Studies have shown that only 13% of requested chest radiographs in patients with multiple trauma have a positive finding, such as laceration, lumbar spine fracture, lung contusion, pneumothorax and hemotourax, and mediastinum dilatation (in favor of aortic injury) [10].

For this reason, due to high costs and waste of time and patient dissatisfaction due to unnecessary graphs, as well as the dangers of radiation, the researchers decided to study the need for this study in the above patients. Finally, based on specific protocols, it is advisable to do this kind of graft in patients with traumatism [11-13].

In a cross-sectional study conducted by Nejati *et al.*, In Tehran University of Medical Sciences in 2012, 385 patients with multiple trauma were studied. The aim of this study was to find clinical criteria for chest X-ray in patients with multiple traumatic diseases. The results showed that in 87.3% of the requested graphs there were no abnormal findings [14].

We also found in our study that 95.2% of the chest wall chest findings did not report abnormal findings.

In fact, out of the 403 illnesses that were studied and for which the graph was performed, 384 graphs were found without any abnormal findings. Only two patients who did not have a clinical sign, but found in the graph, found an abnormal finding. Kristina Ziegler et al. reviewed a retrospective study in 2010 to examine the benefit and cost of chest simple grafts in trauma patients in 239 patients. In this study, sensitivity of CXR was 19% and its specificity was 91.7%. The false positive rate was 35.8% and the false negative rate was 24.5%.

The accuracy of CXR was 42.3% and the overall accuracy was 74.1%. If the simple chest routine was removed from these patients, cost savings of $ 14,641 to $ 142,185 would be achieved. They conclude that postponing CXR in cost-effective cost savings of up to $ 142,185 in patients who are hemodynamic in nature. In addition, CT is more sensitive and CXR is more accurate in detecting the damage in patients who have experienced chest blunt trauma [15].

In another study at the Indian Oriental University of Indiana, Kingston Jamaica Mint and colleagues evaluated and compared the clinical judgment of the patient with the doctor and the results of the chest X-ray. In this study, a prospective observation that was conducted in 2012 and for six months in the department Emergency was performed. The total number of patients with non-penetrating chest trauma, which were stable in terms of vital signs (77 patients), were evaluated. The clinical judgment and chest X-ray results were compared as two separate tests, and in terms of sensitivity, specificity, Positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy (DLR) of age were compared.
In the end, the researchers concluded that the large number of non-penetrating chest trauma patients who appear to be stable do not need to perform chest X-ray. This study showed that the emergency department physicians seem to be more than the requirement for chest radiography is used [16].

In our study, we also found sensitivity of 15.74% and specificity of 99.32% in the results of the sensitivity and specificity examination regarding the need for chest X-ray.

This finding means that according to 293 out of 403 patients with a lack of clinical symptoms consistent with normal chest radiography, our grays are very sensitive.

Perhaps at first glance it is understood that the sensitivity of these graphs is in determining a healthy person, but with little consideration, these two key perceptions were:

First of all, our doctors are in need of a chest X-ray for the concern that they are treating patients with traumatic symptoms, even if they do not have a valid clinical symptom.

Secondly, given the high correlation between the results of the graphs and the absence of a clinical sign in patients, we can conclude that the clinical diagnosis of our physicians about the absence of clinical symptoms in the patient and the absence of chest X-ray is correct and, in the case of The lack of credible clinics in patients is not a concern and a graphic request.

This is the result of our work, which should be passed on to our physicians, because it also reflects the correct clinical diagnosis. In addition to reducing costs, both in terms of what is imposed on the patient and in terms of what the body the health system of the country will enter.

Another consequence of great importance is not to give excessive radiation to the patient and maintain his health.

CONCLUSION

Due to the high sensitivity of the results, in cases where the diagnosis of a doctor has not been found to have a valid clinical sign in multiple traumatic patients, a chest x-ray can be avoided.

REFERENCES

1. Sauaia A, Moore FA, Moore EE, Moser KS, Brennan R, Read RA, et al. Epidemiology of trauma deaths: a reassessment. The Journal of trauma. 1995;38(2):185-93.
2. Nunez TC, Voskresensky IV, Dossett LA, Shinall R, Dutton WD, Cotton BA. Early prediction of massive transfusion in trauma: simple as ABC (assessment of blood consumption)? Journal of Trauma and Acute Care Surgery. 2009; 66(2):346-52.
3. Caspers CG.Care of Traumatic Conditions in an Observation Unit. Emergency Medicine Clinics. 2017; 35(3):673-83.
4. MacKenzie EJ, Rivara FP, Jurkovich GJ, Nathens AB, Frey KP, Egleston BL, et al. A national evaluation of the effect of trauma-center care on mortality. New England Journal of Medicine. 2006; 354(4):366-78
5. Moskowitz H. ICU chest radiology: principles and case studies: John Wiley & Sons, 2010.
6. Rodriguez RM, Hendey GW, Mower WR. Selective chest imaging for blunt trauma patients: The national emergency X-ray utilization studies (NEXUS-chest algorithm). The American Journal of Emergency Medicine. 2017; 35(1):164-70.
7. Sridhar S, Raptis C, Bhalla S.Imaging of Blunt Thoracic Trauma. Semin Roentgenol. 2016; 51(3):203-14.
8. Deyle S, Wagner A, Benneker LM, Jeger V, Eggli S, Bonel HM, Zimmermann H, Exadaktylos AK. Could full-body digital X-ray (LODOX-Statscan) screening in

trauma challenge conventional radiography?. Journal of Trauma and Acute Care Surgery. 2009; 66(2):418-22.
9. Kea B, Gamarallage R, Vairamuthu H, Fortman J, Lunney K, Hendey GW, Rodriguez RM. What is the clinical significance of chest CT when the chest x-ray result is normal in patients with blunt trauma?. The American Journal of Emergency Medicine. 2013; 31(8):1268-73.
10. Turk F, Kurt AB, Saglam S. Evaluation by ultrasound of traumatic rib fractures missed by radiography. Emergency Radiology. 2010; 17(6):473-77.
11. Chapagain D, Reddy D, Shah S, Shrestha K. Diagnostic modalities x-ray and CT chest differ in the management of thoracic injury. Journal of College of Medical Sciences-Nepal. 2015; 10(1):22-31.
12. El Wakeel MA, Abdullah SM, El Khalek RSA. Role of computed tomography in detection of complications of blunt chest trauma. Menoufia Medical Journal. 2015; 28(2):483-87.
13. Nagarsheth K, Kurek S. Ultrasound detection of pneumothorax compared with chest X-ray and computed tomography scan. The American Surgeon. 2011; 77(4):480-84.
14. Nejati A, Khalaj S, Azizkhani R, Shahryarian S, Kolahdouzan M, Hossein MS. Evaluating validity of clinical criteria for requesting chest X-rays in trauma patients referred to emergency room. Advanced Biomedical Research. 2012;1.
15. Ziegler K, Feeney JM, Desai C, Sharpio D, Marshall WT, Twohig M. Retrospective review of the use and costs of routine chest x rays in a trauma setting. Journal of Trauma Management & Outcomes. 2013; 7(1):2.
16. Myint K, French S, Williams-Johnson J, Williams E, Johnson P, Reid M, et al. Role of routine chest radiographs in the evaluation of patients with stable blunt chest trauma: a prospective analysis. West Indian Medical Journal. 2012; 61(1):64-72.