

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/283289741>

EVALUATION OF CHEST TRAUMA IN PATIENTS ADMITTED TO RASHT POURSINA HOSPITALS IN 2013

Article · November 2015

CITATIONS

0

READS

75

5 authors, including:



Ali Talebi

Guilan University of Medical Sciences

1 PUBLICATION 0 CITATIONS

[SEE PROFILE](#)



Manouchehr Aghajanzadeh

University of Guilan

62 PUBLICATIONS 105 CITATIONS

[SEE PROFILE](#)



Ali Davoudi kiakalayeh

Karolinska Institutet

25 PUBLICATIONS 69 CITATIONS

[SEE PROFILE](#)



Zahra Mohtasham-Amiri

Guilan University of Medical Sciences

47 PUBLICATIONS 207 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Now, I am working on Trauma system at northern Iran and GRTRC. [View project](#)



Survey of Indication and Results of Surgery in Patients with [View project](#)

All content following this page was uploaded by [Manouchehr Aghajanzadeh](#) on 28 October 2015.

The user has requested enhancement of the downloaded file. All in-text references [underlined in blue](#) are added to the original document and are linked to publications on ResearchGate, letting you access and read them immediately.



**International Journal of Biology, Pharmacy
and Allied Sciences (IJBPAS)**

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

**EVALUATION OF CHEST TRAUMA IN PATIENTS ADMITTED TO RASHT
POURSINA HOSPITALS IN 2013**

**ALI TALEBI MD^{1*}; MANOCHEHR AGHAJANZADEH²; SHAHROKH
YOUSSEFZADEH-CHABOK³; ALI DAVOUDI-KIAKALAYEH, MD⁴; ZAHRA
MOHTASHAM-AMIRI⁵**

1-Resident of General Surgery, Guilan University of Medical Sciences, Rasht, Guilan, Iran.

E Mail address: drali.talebi@yahoo.com

2-Professor of Thoracic Surgery, Department of Thoracic Surgery, Guilan University of Medical Sciences, Rasht, Guilan, Iran.

E Mail address: maghajanzadeh2003@yahoo.com

3-Professor of Neurosurgery, Guilan Road Trauma Research Center, Guilan University of Medical Sciences, Rasht, Guilan, Iran. E Mail address: Sh.yousefzadeh@gmail.com

4-PhD in Social Medicine, Guilan Road Trauma Research Center, Guilan University of Medical Sciences, Rasht, Guilan, Iran. davoudikiakalayeh@gmail.com

5-MD, PhD, Professor of Social Medicine, Guilan Road Trauma Research Center, Guilan University of Medical Sciences, Rasht, Guilan, Iran. E Mail address: mohtashamaz@yahoo.com

ABSTRACT

The purpose of this study is to review the epidemiology and the severity of patients with chest trauma damage. In this descriptive study, data of patients with chest trauma in 2013 who admitted to Poursina hospital in Rasht the patients in terms of demographic characteristics, type of trauma, associated injuries, length of hospitalization, ISS and mortality were evaluated.

According to research findings, chest internal injuries were, % (50.2) were the most leading damages which lead to hem pneumothorax% (28.6). % 79.5 patients recovered with supportive measures and the most common mechanism of injury was motor vehicle accident. (% 58.4) In this study, men had higher ISS and higher ISS in patients led to long hospitalization as well as

tube thoracotomy, mortality was higher in the group with higher ISS. Mortality in this study was 7.3%. In general, chest trauma was more in men. Vehicle accident and falling down are the most common mechanism of chest injury. Patients with high ISS had more days of hospitalization, need for intervention and more deaths.

Key words: Chest trauma, Poursina center of Rasht, ISS, blunt trauma

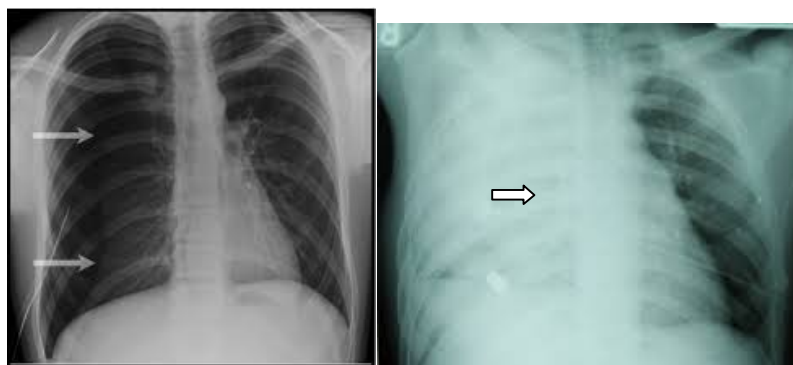
INTRODUCTION

Trauma is a major health problem all over the world is increasing every day. Tens of thousands of people lose their lives because of it. In most parts of the world trauma victims are young and efficient society. (6, 7) Trauma is the fourth cause of death in the world in addition to impose direct and indirect social and economic costs to society. (9, 6) It is reported that trauma is the major cause of death and disability in the first 4 years of life. (10, 9, 8) In the meantime trauma of the chest are included about 10-15% of all injuries, (11, and 12) and is occurred in 70% of driving accidents. (13) chest trauma accounts for about 25% of deaths and 25% of the cases are related to a factor (14, 15, 16, and 17) Eastern Mediterranean has highest number of deaths from trauma in the world is that, according to the WHO 300 thousand in 2008, i.e. 9% of all deaths in the world (16,18) The causes and pattern of chest trauma in a different

world, and because of environmental and social policies, the major causes of road traffic accidents and non-combat areas is chest trauma. (18)

Assess the patient's chest trauma is a critical component of monitoring and management of trauma patients. After securing the airway, the chest is a priority that complications arising from injury to trauma patients is one of the major causes of death.

Rib fractures of the chest is the most common injuries include a fracture ribs to fracture the whole first and second rinr is about 36% mortality rate, which can be associated with injuries such as Brain in 53%, 33% abdominal organs and other buildings chest in 64% of cases. Mortality rate of Flail chest due to its improved diagnosis and treatment has fallen to 11-16% and can cause long-term complications, such as shortness of breath and impaired lung function test (PFT) and so on. (14)



Hem thorax

Pneumothorax

Trauma scoring systems is one of the most important ways to evaluate and compare the standards in trauma treatment, (34) that ability to predict the outcome and has the proper triage of trauma severity quantitative methods to explain a number of physicians in the delivery of a single language in the provision of services given to patients. (35)

One of the divisions of the measurement systems in based on the ingredients of which is made up of 3 parts: (1)

Anatomic: explains severity of trauma on the body states, including AIS, ISS and NISS (2)

Physiologic: explains clinical status of the patient, such as blood pressure, pulse, respiratory rate and level of consciousness states such as PTS, RTS (3)

Combined: is a combination of the two systems have already been created, such as ASCOT, TRISS

Considering the huge impact of trauma on the human and financial resources, this study

investigated the patterns and causes of chest trauma and head trauma hospital in the city of Rasht during the 2013 and the identification of causes and effects and the severity of trauma.

Research questions

1. How is demographic distribution of patients with chest trauma transferred to the hospital?
2. How is the Distribution by type of chest trauma and trauma what is the mechanism?
3. How is Distribution of chest trauma in terms of the injury?
4. How is Distribution of chest trauma and traumatic times?

HISTORY OF RESEARCH

In a study on 987 patients by Cakan and colleagues retrospectively to the period 1989-1988 were carried out in Turkey, Blunt trauma 72% and 28% was penetrating trauma and 41% were under thoracotomy tube. 56% of patients were treated conservatively, while 3% were undergoing thoracotomy.

Complications are atelectasis mainly in 4.6 cases have arisen. Penetrating and blunt trauma morbidity and mortality is not different, but statistically significant difference in the number of hospitalization days. (26)

In a study by Zarga and colleagues prospectively on 276 patients in Iran is chest trauma, especially the most common cause of accidents with pedestrian and then stab wound to 32.1 and 11.6 percent was falling down. 76% was blunt trauma and 34% were penetrating injuries and 82% was side trauma which has been the most common trauma and pelvic organs. 12% of patients required surgical treatment for the treatment of chest trauma that the mortality rate was 14%. (28)

Athanassiadi and colleagues in a retrospective study on 250 patients with flail chest in Greece have done, show that the main cause of injury was road traffic accidents. 106 patients (42.4%) were treated conservatively, while 107 (46.8%) patients requiring tube thoracotomy and 19 (7.6%) requires surgery (thoracotomy or laparotomy). The mortality rate was 8.8%. Also has shown that the ISS higher mortality rate is also higher. (12).

Battle et al., In a retrospective study on all patients admitted to a trauma Blunt trauma center in the United Kingdom during 2009

and 2010 has done, complications of blunt chest trauma risk factors have been investigated during the recovery phase and showed that age over 65 years, 3 or more rib fractures, chronic pulmonary and cardiovascular disease, use of anticoagulant to damage Oxygen saturation less than 90% is considered to be risk factors for complications. (29)

Hanafi and colleagues in a retrospective study on 486 patients with blunt chest trauma between 2004 and 2007 were in Saudi Arabia, Have shown that 79% of those between 60-12 years old and were mostly male and motorcycle accidents cause 93% of the events. Isolated chest trauma were higher (69%) Thoracotomy in 4.5% of cases were seen and the most common cause Clot hem thorax was 3.7 percent. Mortality rate was 1%, especially in adults (29).

Athanassiadi and colleagues in a study of 150 patients with flail chest during 7 years in Greece has done show that only 66 patients (44%) flail chest of patients over 55 years old to have itself (58.3), mainly (53.3) were associated with pneumothorax. High ISS has been the most important factor of morbidity and prolonged hospitalization (31).

METHODOLOGY

This is a descriptive- cross section. This study examined the chest trauma patients

who were admitted in Poursina center in Rasht within 2013. All patients were examined in term of demographic data (age and gender), kind of chest trauma, trauma cause, side effects, hospitalization data, ISS and morality. All data was analyzed by SPSS software version 18. Descriptive data was used by average test and variance with 95% of confidence level for normal distribution, mean and range for not-normal distribution and also percentile is used for qualitative data and compare chi-square Z test and Kruskal Wallis and $P < 0.05$ was considered as significant level.

RESEARCH FINDINGS

A) The descriptive findings

Among 659 patients with chest trauma in 2013 who had been referred to the hospital Poursina, 550 patients (83.5%) were male and 109 (16.5%) were women.

The highest percentage of patients with chest trauma had length of stay in hospital less than a day. (% 54.3) The average hospital stay of patients was 4.91 ± 3.37 days while the minimum length of stay less than a day and a maximum length of stay was 30 days.

In examining the causes of trauma, motor vehicle accident had the highest percentage in the studied patients was chest trauma, (58.4%) and then falling 17.5% and 17.3%

sharps and violence 6.8% was in the following ranking.

Among patients, blunt trauma % 82.7 was highest chest trauma and penetrating trauma was 17.3% frequency. Among patients with chest trauma studied 369 patients had (56%) chest injury alone and 290 (44%) in addition to chest injury had damage in other parts of the body.

In the study of injuries associated with the thoracic, abdominal and pelvic injuries by 97 cases (33.4%) were most associated injuries include and then damage to the shoulder and upper extremity% 32.4 and lower extremities with 25.9% and damage to the brain and neck with 8.3% were in the next ranks.

The distribution of important chest injuries among the 391 patients, 165 patients (% 50.2) injury to the chest, 103% (26.3) of the chest wounds, 77 patients (19.7%) rib fractures and 46 (% 11.8) were superficial injuries.

Among chest damages, six patients 1.5% had simple pneumothorax, 46% (11.8) hem thorax and 112 (28.6%) had hem pneumothorax.

77 patients (19.7%) had rib fractures, 60% (15.4) had rib fracture and 17% (4.3) had multiple fractures of the ribs.

Most patients presenting with chest trauma had ISS more than 7 or less than 7 (70.9%) in patients, the mean ISS was 3.53 ± 6.08 while

the lowest ISS was 3 and the highest ISS in the patients was 19.

B) Inferential findings

Table (13 - 4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by gender

Statistical estimation	rate Z	Average ISS	Number	Gender
P=0.008	2.66	6.2	550	Woman
		5.48	109	Man

ISS average was higher in men than in women using the Mann-Whitney U test showed a significant difference between the values of the ISS can be seen in both sexes. (P = 0.008)

Table (14 -4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by age

Statistical estimation	Rate df	Average ISS	Number	Age
180.0	2	5.66	35	Lower 15 years old
		5.98	527	15-60 years old
		7.27	97	More than 60 years old

Although the average ISS in people over 60 years was higher than other age groups using Kruskal Wallis test revealed no significant differences between the values of various ages in ISS. (p = 0.081) (Table 14-4)

Table (15 -4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by days of hospitalization

Statistical estimation	Ate Z	Average ISS	Number	Days of hospitalization
p=0.0001	2	4.68	358	One day or less
		6.1	98	2-3 days
		8.53	203	More than 3 days

Using kruskal Wallis test showed that significant difference between the values of different categories on the ISS can be seen in the hospital. (P = 0.0001)

Table (16-4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by trauma

Statistical estimation	Ate Z	Average ISS	Number	Cause of trauma
0.015	3	6.19	385	Vehicle accident
		5.26	115	Falling
		6.8	114	Caused by sharp objects
		5.38	45	Violence

Using kruskal Wallis test showed that significant difference between the values of ISS in terms of the cause of chest trauma patients. (P = 0.015)

Table (17 -4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by type of trauma (penetrating - blunt)

Statistical estimation	Ate Z	Average ISS	Number	Type of trauma
0.08	-1.7	6.8	114	Penetrating
		5.93	545	Blunt

Although patients with chest trauma caused by penetrating trauma, but higher ISS using mann-whitney U test showed no significant difference between the values of the ISS in two groups of patients with penetrating and blunt chest trauma. (P = 0.08) (Table 17-4)

Table (18 -4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by damage associated with trauma to the chest

Statistical estimation	Ate Z	Average ISS	Number	Side injuries
0.07	-1.7	6.33	290	Yes
		5.88	369	No

Despite the ISS higher in patients with chest trauma, using mann-whitney U test showed no significant differences between the values of ISS in terms of the damage with chest trauma. ($p = 0.07$) (Table 18-4)

Table (19 -4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by major chest injury

Statistical estimation	Ate Z	Average ISS	Number	Important chest injury
0.46	2	6.47	103	Chest wounds
		5.66	77	Rib fractures
		6.03	165	Chest injury
		6.24	46	Surface damage

Using kruskal Wallis test showed no significant difference between the values of the ISS in terms of chest injuries in patients. ($P = 0.46$) (Table 19.4)

Table (20 -4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by types of injuries

Statistical estimation	Ate Z	Average ISS	Number	side injuries
0.1	4	5.88	369	Without side injuries
		7.42	24	Injuries the brain and neck
		6.29	97	Injury to the abdomen and pelvis
		5.89	94	Injury to shoulder and upper limb
		6.57	75	Injury to hips and lower extremities

Patients with intracranial lesions with higher ISS chest trauma but using kruskal Wallis test showed no statistically significant difference between the values of ISS in terms of the types of side injuries. ($p = 0.1$) (Table 20-4)

Table (21 -4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by the need for tube thoracotomy for treatment

Statistical estimation	Ate Z	Average ISS	Number	Need to tube thoracotomy
0.0001	-14.4	10.13	135	Yes
		5.03	524	No

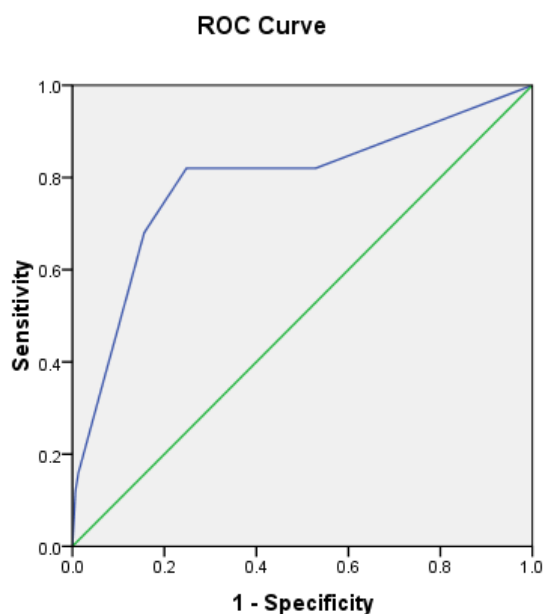
Mann-Whitney U test showed statistically significant differences between the amounts required ISS by tube thoracotomy seen for treatment, ($p = 0.0001$) and patients who had higher ISS in the course of treatment for their chest tube was need for intervention (Table 21-4)

Table (22 -4) comparison of standard ISS in patients with chest trauma admitted to Poursina of Rasht in 2013 by a result of treatment

Statistical estimation	Ate Z	Average ISS	Number	Result of treatment
0.0001	-7.2	5.67	611	Discharge
		10.67	48	Death

Mann-Whitney U test showed statistically significant differences between the values of ISS in terms of treatment outcome in patients seen, ($p = 0.0001$) and patients who have died in the course of treatment had a higher ISS. (Table 22-4)

Chart (7-4) ROC curve and relationship ISS and the result of chest trauma



Diagonal segments are produced by ties.

ROC area under the curve values: Table 23-4

Test Result Variable(s):ISS_severity

Area	Std. Error ^a	Asymptotic Sig. ^b	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.789	.039	.000	.712	.867

The test result variable(s): ISS_severity has at least one tie between the positive actual state group and the negative actual state group.

a. Under the nonparametric assumption

b. Null hypothesis: true area = 0.5

Table (24- 4) the sensitivity and specificity of based on the various positive points

Test Result Variable(s):ISS_severity		
Positive if Greater Than or Equal To ^a	Sensitivity	1 - Specificity
2.00	1.000	1.000
4.50	.820	.529
7.50	.820	.248
10.00	.680	.156
12.50	.160	.013
16.50	.120	.007
20.00	.000	.000

The test result variable(s): ISS_severity has at least one tie between the positive actual state group and the negative actual state.

Results Table 24-4 shows at the ISS = 7.5 had a sensitivity greater (82%) and specificity (75%) in predicting death.

CONCLUSION

Trauma generally affects more men in accordance with the results of other similar studies, including Maziar Moradi and colleagues, Hussein hemmati and colleagues, Demirhan et al., AL-koudmani and colleagues and has been Hanafi et al. (17, 18, 30, 44)

The average age of patients with chest trauma similar to the Hossein hemmati et al, Mefire and colleagues Demirhan et al has been Lema, which showed that the prevalence of trauma in young people, perhaps because of the greater community and social activities associated with the trauma is at this age. (17, 25, 32, 44)

The average number of days hospitalized was 4.91 ± 3.37 days. Most of the 308 patients (% 54.3) are admitted one day or less than a day to hospital. While the study Lema et al was 13.17 days and the average hospital stay was 9.2 days by Demirhan et al. (25, 32)

Most patients in the study, 524 patients (% 79.5) were treated with supportive measures and did not need to chest tube. Lema et al's study and Hanafi majority of patients were treated non-surgically in the form of 55.3%, while Demirhan and colleagues study the majority of patients (% 64.1) Thoracotomy tube was required. (17, 30, 32)

During the study, 85.1% of patients were discharged and 7.3% (48 patients) died % 9.3 during the study Demirhan et al Hadi Ahmadi Amoli and Associates has been a 14% mortality rate and the study Seyyed Mohammad Ali Hesami and Mahmoud Fakhri with mortality 4.5% and Hossein hemmati and Associates mortality was 4.3% higher. (17, 28, 42, 44)

During the present study, the average amount ISS 3.53 ± 6.08 while the majority of patients, 70.9% (476 people) had ISS equal to or less than 7 is that the low-intensity trauma. Lowest ISS was 3 and the maximum value was 19. While the average ISS during the study Lema et al. was 7.41, Mefire Demirhan et al 12 ± 16.4 and during the study was 8.8 ± 10.8 . (17, 32, 25)

During the study, the most traumatic chest was caused by a vehicle accident, % 58.4 (385), respectively, falling by 17.5%, trauma, sharp objects with % 17.3 and violence by 6.8% was next in rank. During the study Hossein hemmati and colleagues, the most common cause of trauma was traffic accidents. (51.7%) (44) Hanafi and colleagues in the study vehicle accident 93% and then falling by 4.5% was the most common cause of chest trauma. (30) During the study of Lema et al, the highest chest trauma was caused by a vehicle accident (%)

50.7) and then of violence with 28% and 16% in the next orders are falling. (32) AL-koudmani and colleagues in the study of violence with 41% and the most common cause of chest trauma after trauma from motor vehicle accident, with 33 percent. (18) Mefire and colleagues in the study, the most common cause of chest trauma, was a vehicle accident. (% 63.8) (25) During the present study most of blunt chest trauma resulting from the injuries% 82.7 while the damage penetrating was % 17.3, by the results of the research Hossein hemmati and colleague, Mefire and colleagues, AL-koudmani and colleagues, Demirhan et al, Seyyed Mohammad Ali Hesami and Mahmoud Fakhri comparable. (17, 18, 25, 42, 44)

In the study patients, 369 patients (56%) had only chest isolated damage (44%) of 290 patients in addition to chest trauma, associated injuries in other parts of the body, among which the most side injuries, injuries to the abdomen and pelvis with 33.4% and injuries to the upper extremities with 32.4 percent. In this study, Seyyed Mohammad Ali Hesami and Mahmoud Fakhri also 54.4% of patients without injury have been associated with the greatest damage, organ trauma was. Such as study AL-koudmani and colleagues, but the study Lema and partners

with the most trauma was head trauma. (17, 32, 42)

In this study, most types of trauma to the chest, the chest trauma is damage,% (50.2), leading to pneumothorax 1.5% alone, 11.8% and 28.6% hem thorax alone hem pneumothorax. Injury resulting in rib fractures and other wounds and injuries 19.7% had chest level Lema et al study was similar, but the AL-koudmani and colleagues studied 51% pneumothorax, hem thorax 38% and 34% of rib fractures. In the study 28.8% Demirhan et al pneumothorax, hem thorax (24%) and rib fracture% 23.9 and the studied Mefire and colleagues rib fracture was the most common finding. In the studied Hossein hemmati and colleagues hem thorax 64.3% and 26.5% rib fracture and pneumothorax was 2.7%. (17, 18, 25, 32, 44)

During this criteria upon which the ISS was chest trauma was a significant relationship between the amount of ISS and penetrating and blunt trauma was found, but in the gender difference was significant. Men had higher average ISS is probably a result of enormous social activities. Despite the higher number of trauma in young population (40-21 years), but the average ISS in the age group above 60 years, above, but there was no significant difference in age groups.

In the study patients, patients with higher ISS had admitted length of hospital and there was a statistically significant difference. ($p=0.0001$) also higher ISS patients who require intervention there Thoracotomy tube that was statistically significant. ($p=0.0001$)

As well as patients who died had higher ISS, which was statistically significant. ($p = 0.0001$)

Lema and partners in the ISS study with mortality and length of hospital stay were significantly correlated. (32) In the study Mefire et al Hadi Ahmadi Amoli and Friends also higher ISS was associated with higher mortality. (35, 28) In the present study the ISS 7.5 point with the highest sensitivity (82%) and specificity (75%) in predicting death is determined. In a study conducted by Narsi and Associates, ISS is the best system to determine prognosis and length of stay is most relevant to the outcome of the study Moradi and his colleagues obtained. (43, 33) Considering that all patients with chest trauma hospital Poursina within 2013, the sample size of the research community.

REFERENCES

1. Zohour, Alireza, Asadi, Farkhondeh, propose a national trauma registry system to Iran University of Medical Sciences, Volume XII, Issue 46, pp. 349-368
2. Texas Department of Health. Trauma Registry Overview USA; 2002. P. 1 Available from: www.tdh.state.tx.us. Accessed 2003.
3. Lo Cicero J, Mattox KL. Epidemiology of chest trauma. *Surg Clin North Am* 1989; 69:15-9.
4. Yung-Chang L, Chao-Hung C, Herng-Ching L. Risk Factors for 24-Hour Mortality after Traumatic Rib Fractures Owing to Motor Vehicle Accidents: A Nationwide Population-Based Study. *Ann Thorac Surg* 2009; 88: 1124-1130.
5. Hoyt DB, Coimbra R, Potenza B. Management of Acute Trauma. In Sabiston Textbook of Surgery.. 17 edition. Edited by: Townsend JR. Philadelphia: Elsevier; 2004:483-532.
6. Ziegler DW, Agarwal NN. The morbidity and mortality of rib fractures. *J Trauma* 1994; 37:975-979.
7. Athanassiadi A, Theakos N, Kalantzi N, Gerazounis M. Prognostic factors in flail chest patients. *Europ J Cardio-thorac Surg* 38 (2010) 466-471.
8. Adnet F, Lapandry C, Lapostolle F. Thoracic trauma. *Rev Prat* 2003; 53: 967-74.
9. Shorr RM, Crittenden M, Indeck M, Hartunian SL, Rodriguez A. Blunt thoracic

- trauma: analysis of 515 patients. *Ann Surg* 1987; 206:200–205.
10. O'Connor JV, Adamski J. The diagnosis and treatment of non-cardiothoracic trauma. *J R Army Med Corps* 2010, 156(1):5-14.
 11. WHO.int [Internet]: Mortality and Global Burden of Disease. Geneva: World Health Organization; c2009-10;, [updated 2011 Jun 22; cited 2011 Jul 7]. Available from: http://www.who.int/entity/gho/mortality_burden_disease/countries/deaths/en/index.html.
 12. Demirhan R, Onan B, Oz K, Halezeroglu S. Comprehensive analysis of 4205 patients with chest trauma: a 10-year experience. *Interact Cardiovasc Thorac Surg* 2009, 9(3): 450-453.
 13. Al-Koudmani I, Darwish B, Al-Kateb K, Taifour Y. Chest trauma experience over eleven-year period at al-mouassat university teaching hospital-Damascus: a retrospective review of 888 cases. *Journal of Cardiothoracic Surgery* 2012, 7:35.
 14. Shields TW., Ponn RB., Rusch VW. Thoracic Trauma .In *General Thoracic Surgery* 6th edition vol. 1, 2004, 952-971.
 15. Baker SP, O'Neill B, Haddon W, Long WB. The injury severity score: A method for describing patients with multiple injuries and evaluating emergency care. *J Trauma*, 14:187-196, 1974.
 16. American association for Automotive Medicine: The Abbreviated Injury Scale (AIS)-1985 Revision. Des Plaines, Illinois, 1985.
 17. Baker SP, O'Neill B, Haddon W, Long WB . The Injury Severity Score: An update. *J Trauma* 16:882-885, 1976.
 18. Bull JP. The Injury Severity Score of road traffic casualties in relation to mortality time of death, hospital treatment time and disability. *Accid. Anal. Prev.* 7:249-255, 1975.
 19. Copes WS, Champion HR, Sacco WJ, et al. The Injury Severity Score Revisited. *The Journal of Trauma*. Vol 28. No 1. 1988.
 20. Mefire AC, Pagbe JJ, Fokou M, Nguimbous JF, Guifo ML, Bahebeck J. Analysis of epidemiology, lesions, treatment and outcome of 354 consecutive cases of blunt and penetrating trauma to the chest in an African setting. *S Afr J Surg* 2010, 48(3):90-93.
 21. Cakan A, Yuncu G, Olgaç G, et al. Thoracic trauma: analysis of 987 cases. *Turkish Journal of Trauma & Emergency Surgery* .2001, 7(4):236-241.

22. Zargar M, Khaji A, Karbakhsh Davari M. Thoracic injury: a review of 276 cases. *Chin J Traumatol*. 2007 Oct;10(5):259-62.
23. Ahmadi Amoli, Hadi; Zafarghandi, Mohammad Reza Tavakoli, Hasan et al, chest trauma, evaluation of the severity of injury in 342 patients, Faculty of Medicine, Tehran University of Medical Sciences, Volume 66, Issue 11, February 2008, pp. 831-834
24. Battle CE, Hutchings H, James KE, Evans PA. The risk factors for the development of complications during the recovery phase following blunt chest wall trauma: A retrospective study. *Injury* (2012), <http://dx.doi.org/10.1016/j.injury.2012.05.019>
25. Hanafi M, Al-Sarraf N, Sharaf H, Abdelaziz A. Pattern and presentation of blunt chest trauma among different age groups. *Asian Cardiovasc Thorac Ann* 2011;19:48-51.
26. Athanassiadi K, Gerazounis M, Theakos N. Management of 150 flail chest injuries: analysis of risk factors affecting outcome. *European Journal of Cardio-thoracic Surgery* 26 (2004) 373–376.
27. Lema MK, Chalya PL, Mabula JB, Mahalu W. Pattern and outcome of chest injuries at Bugando Medical Centre in Northwestern Tanzania. *Journal of Cardiothoracic Surgery* 2011, 6:7.
28. Moradi Lakeh, Maziar; Tehrani, Seyed Arash, Varasteh Kia, GholamReza, Rouhi pour Ramin Mir, compare the ability of trauma severity of a patient's prognosis, Iran University of Medical Sciences, 129, Title 28, spring 2002, 129-138
29. Chaiyut Thanapaisal, Narongchai Wongkonkitsin, O-Tur Sae Seow, Dhanes Rangsrikajee, Kriangsak Jenwitheesuk, Ake Phugkhem, Vajarabhongsa Bhudisawadi, Outcome of In-Patient Trauma Cases: Accident and Emergency Unit, Khon Kaen.
30. M.N. Chawda, F. Hildebrand, H.C. Pape, P.V. Giannoudis, Predicting Outcome after Multiple Trauma: Which Scoring System? *Injury, Int. J. Care Injured* (2004) 35, 347-358
31. R. Kingston, SJ O'Flanagan, Scoring Systems in Trauma, *Irish Journal of Medical Science*. Volume 169. Number 3
32. H. R. Champion, Trauma Scoring, *Scandinavian Journal of Surgery* 91: 12-22, 2002
33. Kjetil Soreide, Andreas J. Kruger, Anne Line Vardal, Christian Lycke Ellingsen, Eldar Soreide, 32. Hans Morten Lossius, Epidemiology and Contemporary Patterns of Trauma Deaths: Changing place, Similar Pace, Older face, *World J surg* (2007) 31: 2092-2103

-
33. www.surgicalcriticalcare.net/resources/injury-serverityscoring-pdf Teaching Hospital, Guilan, Iran. Arch Trauma Res. 2013;1(4):161-165.
34. Adnan Narci, Okan Solak, Nurten Turhan-Haktanir, Abdullah Aycicek, Yavuz Demir, Yuksel Ela, Evrim Ozkaraca, Yuksel Terzi, The Prognostic Importance of Trauma Scoring Systems in Pediatric Patients, *Pediatr Surg Int* (2009) 25:25-30
35. Salimi, Javad, Nassaji Zovvar, Maryam, Khaji, Ali, Epidemiology of trauma-related deaths: six university hospitals of Tehran, Tehran University of Medical Sciences, Volume 65, Special Program II, 2007, 22-25
36. Hesami, Seyyed Mohammad Ali, Fakhri, Mahmoud, the condition of patients with chest injuries admitted to trauma centers Kermanshah (2002-2005) 12, 2008
37. Adnan Narci, Okan Solak, Nurten Turhan-Haktanir, Abdullah Aycicek, Yavuz Demir, Yuksel Ela, Evrim Ozkaraca, Yuksel Terzi, The Prognostic Importance of Trauma Scoring Systems in Pediatric Patients, *Pediatr Surg Int* (2009) 30-25:25
38. Hossein Hemmati, Ehsan Kazemnezhad-Leili, Zahra Mohtasham-Amiri, Ali Asghar Darzi, Ali Davoudi-Kiakalayeh, Anoush Dehnadi-Moghaddam, Leila Kouchakinejad-Eramsadati. Evaluation of Chest and Abdominal Injuries in Trauma Patients Hospitalized in the Surgery Ward of Poursina
-