

EPIDEMIOLOGY AND PATTERNS OF ISOLATED LIMB INJURIES AT A TERTIARY CARE HOSPITAL IN AHMEDABAD AUTHORS Shah VP¹, Patel Nisarg², Makwana HD², Patel PR⁴

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ABSTRACT:

INTRODUCTION: Due to recent advances in technology an increasing number of people suffer from trauma annually which has resulted in change in fracture pattern. As there is a lack of recent systematic trauma registry in India, very little data is available to set up health care facilities.

AIM: To determine epidemiology, pattern and initial outcome of patients admitted with isolated limb injury.

METHOD: We conducted an observational study on isolated limb injuries without any musculoskeletal disorder at a tertiary care hospital in Ahmedabad from June 2015 to May 2017. The limb injuries were classified as per the Limb Salvage Index score (LSI) for further management.

RESULTS:we have included 1300 patients in this study. Mean age was 41.5 years and 68 percent of them were males. Isolated limb injuries showed bi-modal age group with first peak between 21 to 30 years and second at 41 to 50 years. Road traffic accidents were the most common cause of injury followed by fall at home. The most commonly affected bone was femur in lower limb and radius in the upper limb.

CONCLUSION: Our study helped in identifying certain features that would be useful for planning preventive strategies, to reduce the numbers of accidents and redirect public investment in health. It also indicates establishment of trauma registry at local, state as well as national level.

INTRODUCTION:

Trauma epidemiology is essential to describe the morbidity, disability and dependency as well as defining the most important target for prevention regarding the severity of injury. The prevention of limb injuries is more important necessity for developing nations like India for its economy. It has been previously shown that limb injuries constitute the majority in trauma and road traffic accidents. Generally it involves young and productive persons who are hard core economy of the society, so it is the prime responsibility of the society to prevent such incidents.

Limb injury is the most common injury in younger population and permanent disability affects their quality of life, but Very few studies have been published on it, so we have done our study to evaluate the patients admitted with isolated limb injury.

Aim: To evaluate the patients admitted with isolated limb injury for epidemiology, pattern and initial outcome

Materials and Methods:

We have included 1300 patients of any age from June 2015 to May 2017 in our observational study.

Inclusion criteria:

- 1 The patients having isolated limb injury without any previous musculo-skeletal disorder.
- 2 Isolated limb injuries caused by road traffic accidents, fall from height, fall at home, farm accidents and sports injuries

Exclusion criteria:

- 1 Patient with polytrauma or multiple fractures
- 2 Injury other than described above

Data collected in form of age, gender, location and mode of injury, structure involved, operative intervention and initial outcome. Data were collected from case papers and patient or relatives.

Initial management: Done according to trauma protocol which varied with the type of trauma encountered.

All patients were immediately assessed and managed for airway, breathing and circulation.

They were given analgesics in form of Inj. Diclofenac sodium or Inj. Tramadol IM/ IV and Inj. Tetanus Toxoid 0.5 Mg IM

Appropriate antibiotics were given as and when required

Once stabilised X-rays of the limb were conducted

Primary management of fractures:

Open grade fractures and blood loss were given fast intravenous fluids along with measures to control further blood loss.

Clavicle-Clavicular brace or pouch arm sling

Humerus shaft- shoulder immobilizer or U-slab depending on the area affected.

Reducible distal end radius-Reduced in emergency department and splint was given.

Inter-trochanteric and sub trochanteric femur fractures- primarily by anklet skin traction

Shaft femur- Monitored vitally for shock management due to frequent severe blood loss in such injury. Fluids and blood were started almost immediately by two wide bore IV cannula.

Bohler splint with anklet traction were given before taking X-rays.

Patients in severe shock having complications like fat embolism requiring long term medical care, were managed with upper tibial Steinmanpin traction with one brick and bohler elevation.

Displaced patellar fracture-Aspiration of blood from the knee, RJ bandage with AK-BK (Above Knee and Below Knee) slab and elevation provided.

Closed shaft tibial fractures- AK (Above Knee) slabs Bohler elevation.

Patients, in which operative intervention was not possible immediately, were managed with Calcaneal Steinman pin traction.

Carpal, metacarpal, tarsal,metatarsal and phalangeal fractures- Below elbow(BE) or below knee (BK) slabs with toe rest.



Fig-1 Fracture shaft humerus Fig- 2 Fracture of distal radius

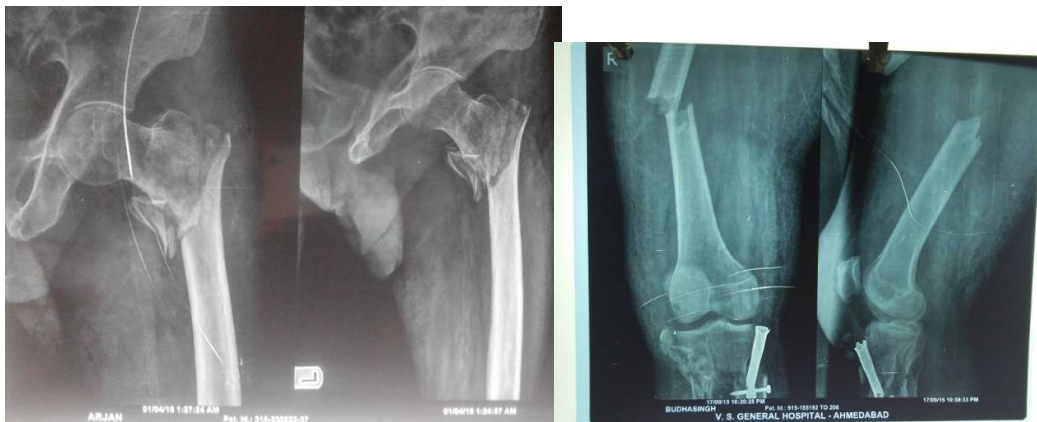


Fig- 3Fracture inter-trochanteric femur Fig- 4Fracture shaft femur



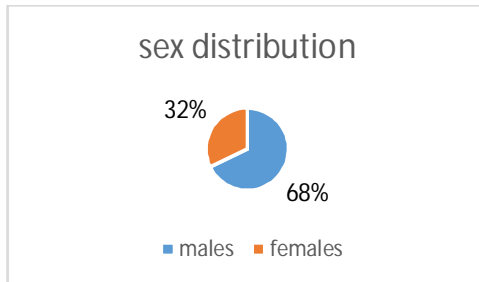
Fig-5 fracture shaft tibia



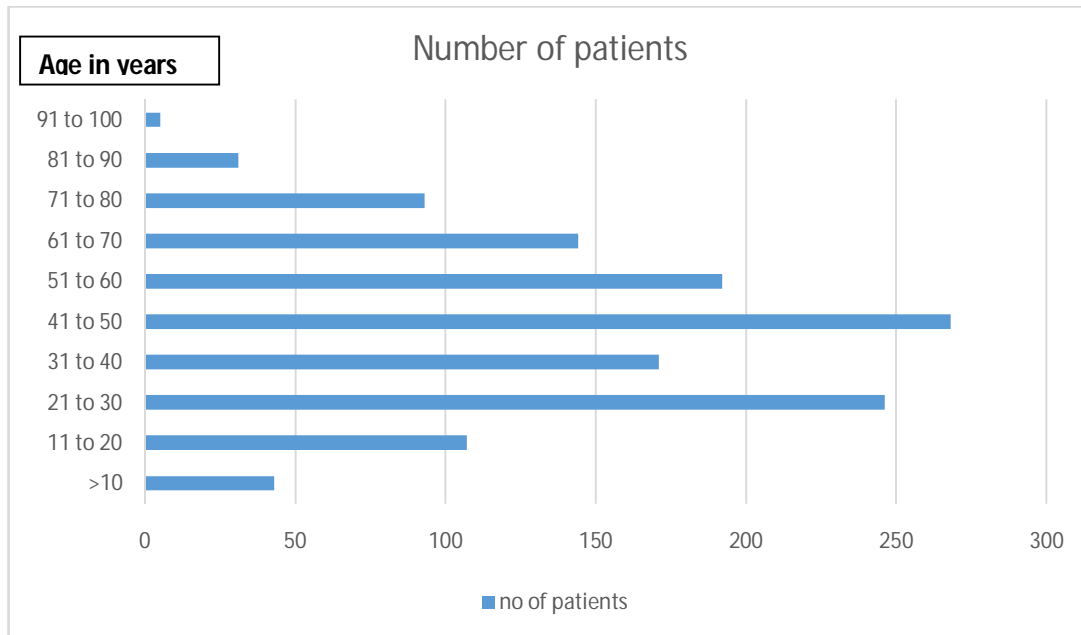
Fig-6 fracture shaft radius ulna

Results:

Data were collected between June 2015 and May 2017, for 1300 patients, who were victims of isolated limb injuries due to trauma. The mean age of patients was 41.5 years (minimum 5 years and maximum 95 years) with majority being males.



In this study, 68% i.e 884 out of 1300 patients were male and 32% i.e 416 patients were female.



There was bimodal peak, one at 21-30 years of age and the other at 41-50 years of age. Fractures of shaft of long bones like isolated ulna and shaft femur were seen commonly in younger age group while fracture of inter-trochanteric femur, distal radius and femur neck were seen commonly in elderly patients.

Mode of injury:

Table-1 Mode of injury

Mode of injury	% of population
Road traffic accident	42
Fall at home	23
Beaten by opposite party	18
Fall from height	10
Sports injuries	04
Farm accidents	03
Total	100

As shown in Table-1 road traffic accident is the most common mode of isolated limb injury followed by beaten by opposite party and fall down at home.

Table-2 Structure involved in upper limb

Structure involved	%
Clavicle	05
Humerus	18
Radius	38
Ulna	22
Carpal	02
Metacarpal	06
Phalanges	09
Total	100

Radius was the most common bone involved followed by ulna.

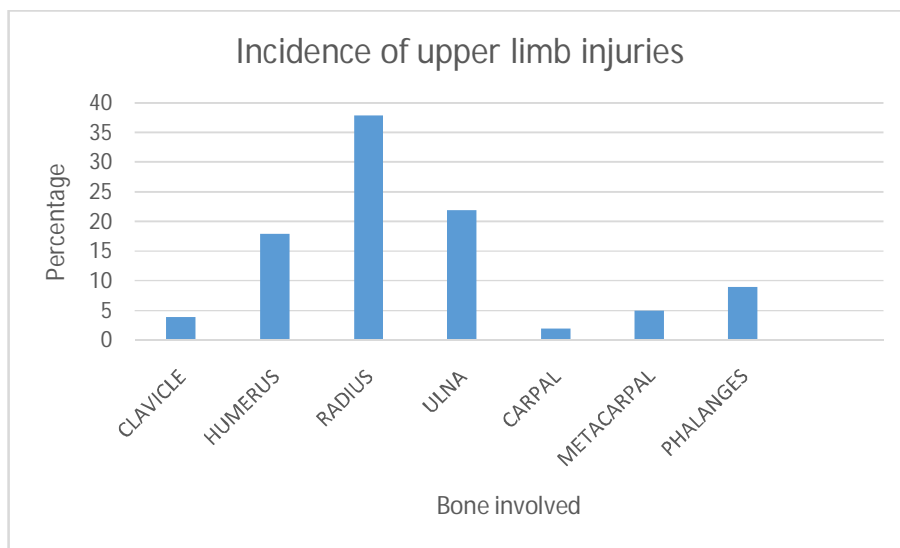
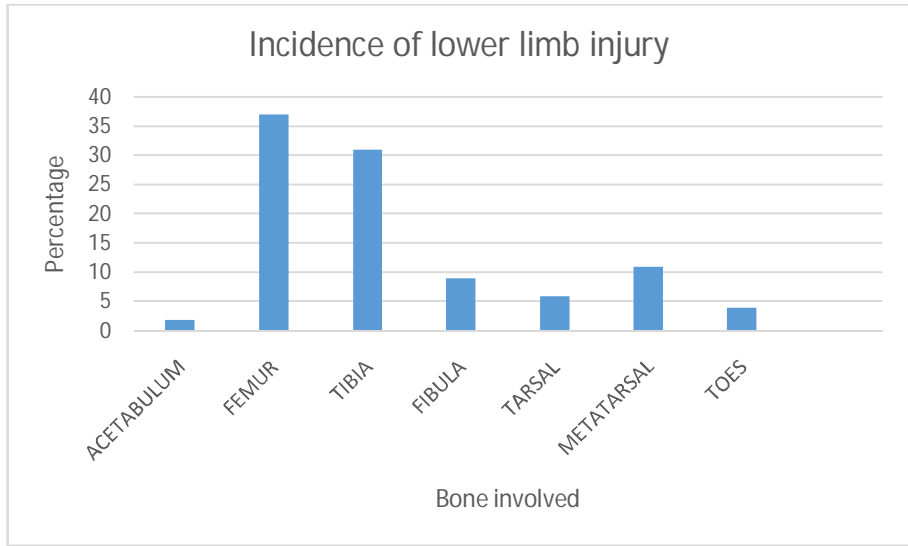


Table-3 Structures involved in lower limb

Structure involved	%
Acetabulum	02
Femur	37
Tibia	31
Fibula	09
Tarsal	06
Metatarsal	11
Toes	04
Total	100

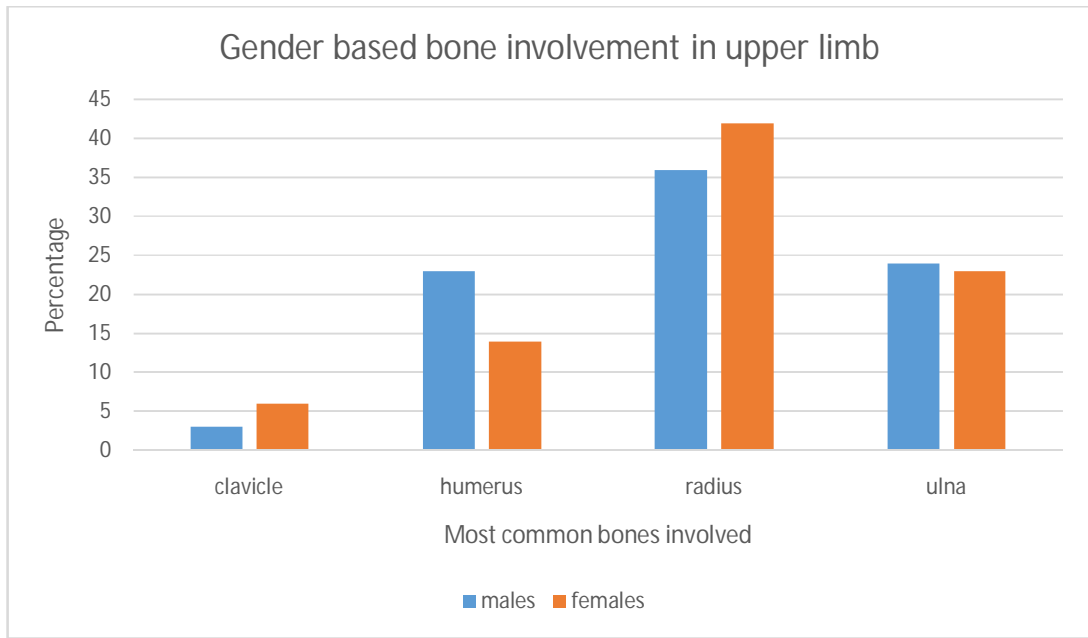
Femur was the most common injured bone (37%) followed by tibia (31%) in lower limb injuries.

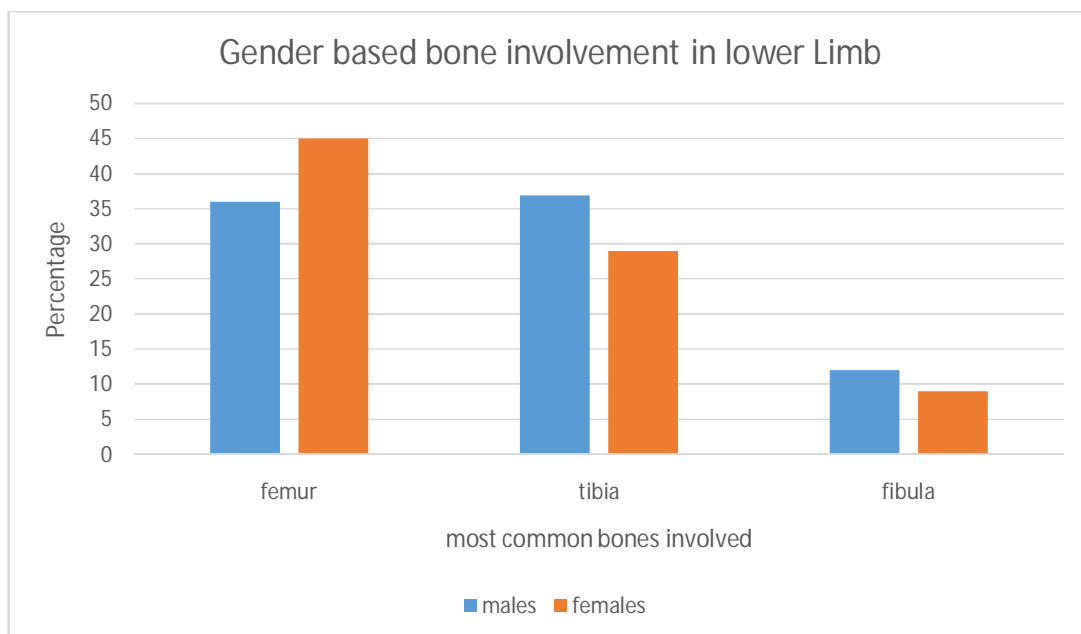


Gender based bone involvement:

In upper limb, radius was the most commonly involved bone in male and female both, but involvement rate of radius was higher in female as compared to male.

In female, femur was the most common involved bone in lower limb, which is higher than male. In male the most common involved bone in lower limb was the tibia followed by femur.





Discussion:

India is a developing nation and Gujarat is one of the fastest developing state in India. With the advent of new scientific advances, architectural designs and modes of transportation, there has been a significant change in the trauma pattern. Recently WHO reported that, by 2020 traumatic injuries will be the third largest killer in developing countries.

Throughout the world, about 3000 people die every day and 30,000 are injured seriously in accidents.

Ahmedabad is a metro city where many young population come for earning purpose. They all are having great transportation and fast life with due stress to meet all demands. It has few tertiary care public hospitals where patients are brought in emergency by the 108 ambulance services. Our hospital is one of them, with dedicated trauma centre. As it is in the centre of the city, easily approachable to nearby places and treatment is provided free of cost in almost all patients majority of the patients with trauma are admitted here. Mostly the patients

brought here are from a radius of around 120 Kilometres, but because of its popularity, patients from remote areas also received quiet frequently in the emergency department.

According to a study carried out in Royal Infirmary of Edinburgh between 2010 and 2011, males have greater incidence of fractures of metacarpals, finger phalanges and ankles while females have higher incidence of fractures of distal radius and proximal femur. This correlates well with the findings of this study which shows higher incidence of metacarpal and ulna fractures in males while distal radius and femur fractures are higher in females. This shows that post-menopausal women are particularly susceptible to fragility fractures in regions of distal radius and proximal femur.

The injury patterns are continuously evolving due to the changing life style. In this study, 42% of the fracture were due to road traffic accidents and 23% due to fall down at home. In the study carried out in Edinburgh the fractures due to road traffic accidents were less than 10%. This shows that in a developing nation like India there is an increased load of fractures due to rash driving particularly in younger population.

Conclusion

According to the mapping of the profile of individuals involving limb injury at the emergency department of our hospital, it was possible to identify some characteristics that may be useful for planning prevention strategies such as the development of protection mechanisms for lower limbs, stimulating the enforcement regarding the compliance of traffic laws by drivers, use of Zebra crossing for crossing roads, speed limit and awareness of safety measures to reduce the numbers of accidents and redirect public investment in health.

In the current era of advanced technology; it is not difficult to set up trauma registry. Such an initiative should be taken by the government to appropriately manage trauma victims. This will further reduce load on economy by avoiding morbidity and dependency.

So our study will provide insight to lots of epidemiologist, emergency physicians, orthopaedic surgeons and further aid for its preventive measures.

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References:

1. Jeffers, R. F. et al
Prevalence and patterns of foot injuries following motorcycle trauma
Journal of orthopaedic trauma 18, 2 (2004): 87-91

2. Davidson, Jennifer A
Epidemiology and outcome of bicycle injuries presenting to an emergency department in the United Kingdom
European journal of emergency medicine 12.1 (2005): 24-29
3. Goel SA, Bhavsar NM, Makwana H, Lil NA, Patel PR
Epidemiology and patterns of lower limb injuries at a tertiary care hospital in Ahmedabad
International Journal of Medical Research and Review 2015; 3(5):490-496
4. Beerekamp MSH, de Muinck Keizer RJO, Schep NWL, Ubbink DT, Panneman MJM, Goslings JC
Epidemiology of extremity fractures in the Netherlands
Injury 2017 Jul; 48(7):1355-1362
5. Sinha AK, Boot DA, Gorman DF, Teanby DN
Severe motorcycle injury in Mersey region and North Wales
Injury. 1995;26(8):543-545. [\[PubMed\]](#)
6. Wells S, Mullin B, Norton R, Langley J, Connor J, Lay-Yee R, Jackson R.
Motorcycle rider conspicuity and crash related injury : case control study
British Medical Journal. 2004 Apr 10;328(7444):857.[\[PubMed\]](#)
7. Miki N, Martimbianco AL, Hira LT, Lahoz GL, Fernandes HJ, Dos Reis FB.
Profile of trauma victims of motorcycle accidents treated at hospital Sao Paulo.
ActaOrtop Bras. 2014;22(4):219-22. [\[PubMed\]](#)
8. Aare M, von Holst H.
Injuries from motorcycle and moped crashes in Sweden from 1987 to 1999.
Injury Control and Safety Promotion 2003 Sep;10(3):131-8. [\[PubMed\]](#)
9. Ankarath S, Giannoudis PV, Barlow I, Bellamy MC, Matthews SJ, Smith RM.
Injury patterns associated with mortality following motorcycle crashes.
Injury 2002 Jul;33(6):473-7. [\[PubMed\]](#)
10. Babak Haghpanah
Transforming phase of Fracture Epidemiology

Archives of Trauma Research 3(3): e23364 [\[PubMed\]](#)

11. Tham KY, Seow E, Lau G

Pattern of injuries in helmeted motorcyclists in Singapore

Emergency Medicine Journal 2004 Jul;21(4):478-82. [\[PubMed\]](#)

12. Russell WL, Sailors DM, Whittle TB, Fisher DF Jr, Burns RP

Limb salvage versus traumatic amputation. A decision based on a seven-part predictive index

Ann Surg. 1991 May;213(5):473-80; discussion 480-1. [\[PubMed\]](#)

13. Lil NA, Patel NB, Bhavsar NM, Adatia AA, Patel PR

Outcome of Calcaneal Plating after fracture: two year follow up.

International Journal of Medical Research and Review 2014; 2(2):102-109 [\[PubMed\]](#)

14. Monk JP, Buckley R, Dyer D

Motorcycle-related trauma in Alberta: a sad and expensive story

Canadian Journal of Surgery 2009 Dec;52(6):E235-40. [\[PubMed\]](#)

15. Kumar S, Chaudhary S, Kumar A, Agarwal AK, Misra MC

Trauma care- a participant observer study of trauma centres at Delhi, Lucknow and Mumbai.

Indian Journal of Surgery 2009 Jun;71(3):133-41 [\[PubMed\]](#)

16. Orsay E, Holden JA, Williams J, Lumpkin JR

Motorcycle trauma in the state of Illinois: Analysis of the Illinois department of public health trauma registry

Annals of Emergency Medicine 1995 Oct;26(4):455-60. [\[PubMed\]](#)

17. Santos AM, Moura ME, Nunes BM, Leal CF, Teles JB

Profile of motorcycle accident victims treated at a public hospital emergency department

Cadernos de Saude Publica. 2008 Aug;24(8):1927-38. [\[PubMed\]](#)

18. Koizumi MS

Injury patterns in motorcycle accident victims

Revista de SaudePublica. 1992 Oct;26(5):306-1. [\[PubMed\]](#)

19. Wui LW, Shaun GE, Ramalingam G, Wai KM

Epidemiology of trauma in an acute care hospital in Singapore

Journal of Emergency, Trauma and Shock 2014 Jul;7(3):174-9[\[PubMed\]](#)

20. DGU Annual report [Internet]. Available from:

http://www.traumaregister.de/images/stories/downloads/englisch/TR-DGU_annual_report_2013.pdf

21. Christensen MC, Ridley S, Lecky FE, Munro V, Morris S.

Outcomes and costs of blunt trauma in England and Wales

Critical Care 2008;12(1):R23[\[PubMed\]](#)

22. Ciesla DJ, Pracht EE, Tepas JJ 3rd, Cha JY, Langland-Orban B, Flint LM

The injured elderly: a rising tide

Surgery 2013 Aug;154(2):291-8[\[PubMed\]](#)

23. NTDB- Annual Report 2012 [Internet] Available from:

<http://www.facs.org/trauma/ntdb/ntdbannualreport2010.p>

24. Rockwood and green's fracture in adult edition eighth; Epidemiology of fracture and dislocation by Charles M. Court-Brown

25 Court-Brown CM, McBirnie J. The epidemiology of tibial fractures. J Bone Joint Surg Br. 1995; 77B:417–421.

26. Court-Brown CM, Caesar B. Epidemiology of adult fractures; A review. Injury. 2006; 30(11):691–697.

27. Dhanwal DK, Dennison EM, Harvey NC, et al. Epidemiology of hip fracture: Worldwide geographic variation. Indian J Orthop. 2011; 45:15–22.

28. Buhr AJ, Cooke AM. Fracture patterns. Lancet 1959; 1(7072):531–536.