

Evaluative Study of Orthopaedic Patients who Need ICU Admission

Dr. Rahul Janbandhu¹, Dr. Parikshit Patil²

^{1,2} Junior Resident, Department of Orthopaedics, Dr. Ulhas Patil Medical College, Jalgaon Maharashtra, India

Abstract: *Background:* Trauma is classified as bodily injury severe enough to pose a threat to life or to individual parts of the body such as a limb or an organ. Trauma remains a national and worldwide public health problem and is a leading cause of morbidity and mortality. The most of trauma care is carried out by orthopedic surgeons and is a major component of their practice. So it's important to understand the role and implementation of ICU's in practice. *Aim:* The aim of study is to evaluate the causes, numbers, demographic, and outcome of patients, who needed intensive care input during their inpatient stay. *Methods:* A retrospective, single-centred, non-randomised observational study of all elective and trauma patients admitted to ICU during their inpatient stay was undertaken. *Results:* patients were split into four groups: [mean age/median age] 1) Elective-17 patients 2) Trauma-28 patients [1 fracture] 3) Poly Trauma-12 patients [>2 fractures] 4) Transfer [Inter hospital] 3 patients. *Conclusion:* The majority of orthopaedic admissions are elderly patients undergoing elective surgery or acute trauma patients. This study highlights the latter as being markedly more likely to require ICU admission postoperatively. Mortality is higher in this group with infection being a significant cause.

Keywords: trauma, polytrauma, ICU admissions, surgically ill patients, septicemia

1. Introduction

An intensive care unit is place for comprehensive life saving care in critically surgically ill patient.¹ Current clinical opinion and available evidence suggests that the early appropriate referral of patients to ICU can significantly reduce early and possibly late mortality in the critically ill patients.² Trauma is classified as bodily injury severe enough to pose a threat to life or to individual parts of the body such as a limb or an organ.^{3,4}

Trauma remains a national and worldwide public health problem and is a leading cause of morbidity and mortality, especially among previously healthy, productive young people and among males in particular.³ The most of trauma care is carried out by orthopedic surgeons and is a major component of their practice. So it's important to understand the role and implementation of ICU's in practice.

As well as trauma patients, elective orthopaedic surgery also represents a significant proportion of patients requiring intensive care unit admission which is also vulnerable to a wide range of complications.⁵ To manage these complications requires understanding of pre operative status, intra-operative management and recognition of any signs and treatment of postoperative complications.⁶ These patients may be admitted to intensive care as a result of emergency surgery or elective procedures. It has long been recognized that admissions to the ICU can be due to complications caused by patient care rather than by patient illness⁷

Potential systemic complications include pneumonia, pulmonary embolism, sepsis or myocardial infarction whilst procedure specific or local complications such as neurovascular injuries are also possible. Modernised trauma systems, which have justified their service, are able to provide significantly improved healthcare and outcomes.^{8,9}

2. Aims & Objective

- The aim of study is to evaluate the causes, numbers, demographic, and outcome of patients, who needed intensive care input during their inpatient stay.
- Objective is to know importance of critical care role in ICU during inpatient stay.

3. Materials and Method

- The Department of Trauma and Orthopaedics at tertiary care Hospital is a busy unit for both trauma and elective cases. The group of patients analysed for the purposes of this study were taken between January 2021 and August 2022
- A retrospective, single-centred, non-randomised observational study of all elective and trauma patients admitted to ICU during their inpatient stay was undertaken.
- ICU records were cross-matched with an orthopaedic data to make a list of patients.
- This process identified 60 patients who were admitted under orthopaedic care and subsequently developed problems which required intensive care.²⁹ patients were male and 31 were female with the youngest of 18 years and the oldest being 80 years.
- These patients were then split into four groups: [mean age/median age] 1) Elective-17 patients 2) Trauma-28 patients [1 fracture] 3) Poly Trauma-12 patients [>2 fractures] 4) Transfer [Inter hospital] 3 patients.
- Information collected was biodata, the reason for admission & orthopaedic procedure, reason for ICU admission, ICU input, length of ICU stay & mortality inputed into proforma.

Volume 12 Issue 3, March 2023

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

4. Results

- In the Elective Surgery group, 17 patients were identified as having been transferred to ICU following their operations shown in Figure 1, the greatest number of patients requiring ICU input were those undergoing total hip replacements 50%, followed by spine procedures 25%.

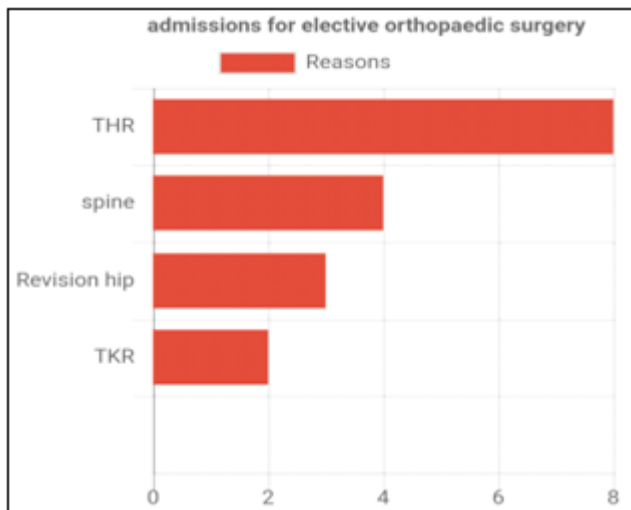


Figure 1: Graph showing the admission reasons for elective surgery

- Of the elective patients, 5 required ICU admission due to intraoperative complication while 12 patients suffered from postoperative complications.

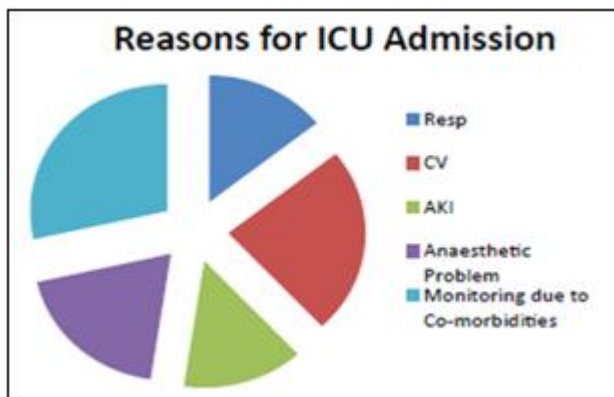


Figure 2: Chart Show the reasons for ICU admission for patients undergoing elective surgery

- The main reason for ICU admission was for monitoring reasons and respiratorycardio-vascular complications (figure 2)
- Once these patients were transferred to ICU they received mainly monitoring i 63% with smaller proportions receiving procedures 16% and inotropes 11% (Figure 3).

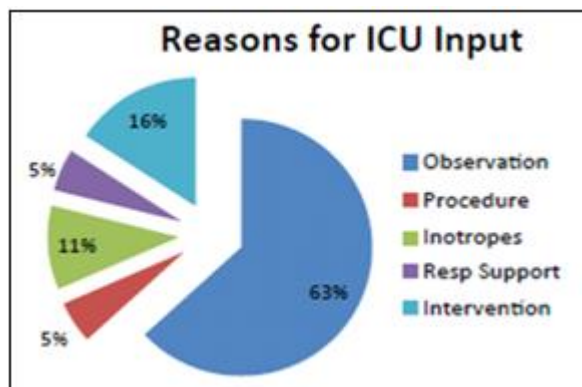


Figure 3: Chart Show the input from ICU for patients undergoing elective surgery

- The largest group of ICU admissions came from the trauma group of patients. This group consisted of 28 patients whom accounted for 47 percentage of all ICU admissions.

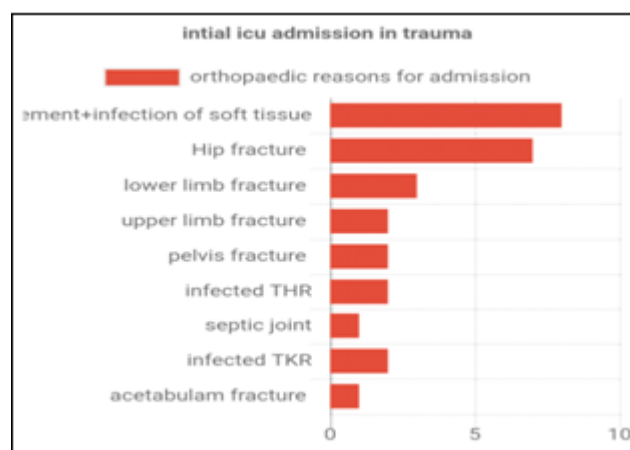


Figure 4: Chart Show orthopeddic reasons for initial admission

Two main groups of patients can be derived from the above data:

- 1. Hip fracture 25% 2. Infected cases [49%].7 patients undergoing hip fracture surgery were admitted to ICU with hemi-arthroplasty as the procedure with the major risk of post operative complications requiring ICU input.12 patients in total were admitted under orthopaedics due to either infected work or soft tissue infections.
- Infection was the primary reason [31%], these patients were treated on ICU (Figure 5) with antibiotics, monitoring and respiratory support as the mainstay of their treatment (Figure 6).

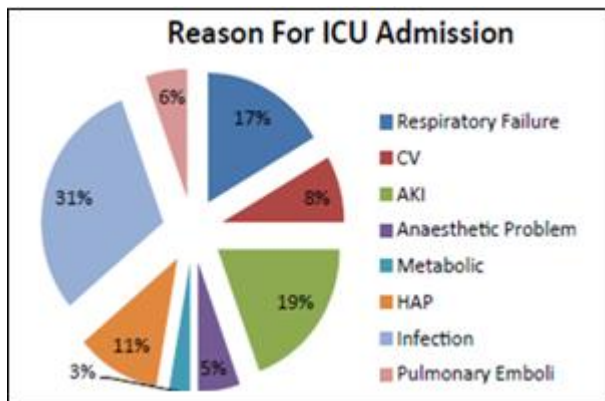


Figure 5: Chart Showing the reasons why trauma patients were treated on ICU

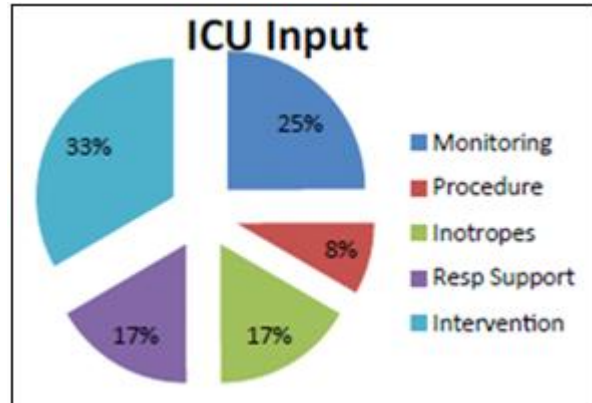


Figure 8: Chart Showing the input required from ICU for poly trauma patients

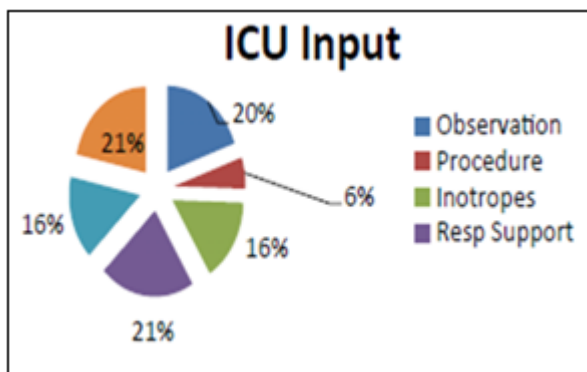


Figure 6: Chart Showing the input required from ICU for trauma patients

The poly-traumagroup (Figure 7) contained 12 patients with 6 of those patients admitted due to road traffic accidents. They were mainly treated with interventions such as chest drains, central lines [33%] etc and monitoring [25%] (Figure 8).

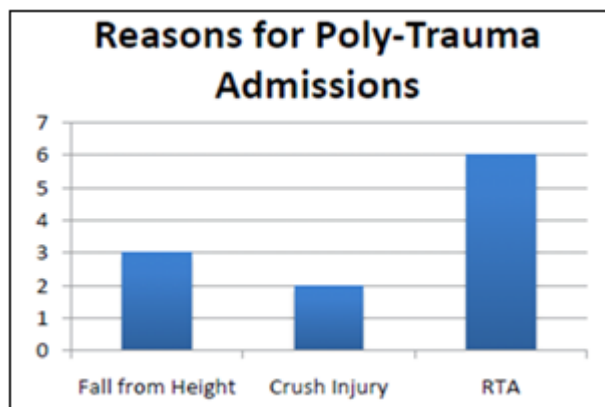
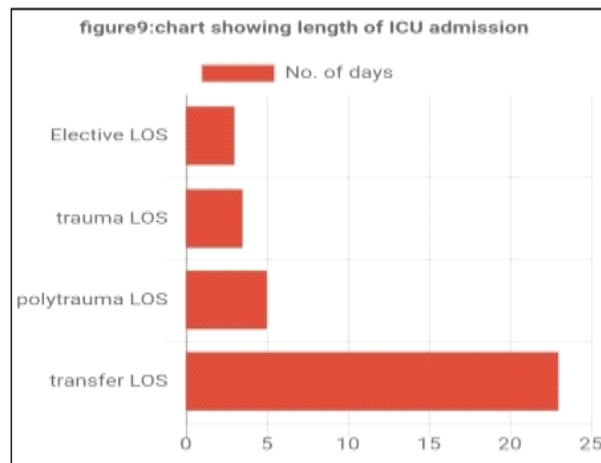


Figure 7: Chart Showing the patients admitted with poly-trauma and their sustained injuries

There were 3 patients transferred to our unit that required ICU admission. two of which were neurosurgical emergencies and were treated firstly by the neurosurgery.

The average Length of Stay [LOS] on ICU was also calculated. Figure 9 show that the Transfers category had the longest average LOS.



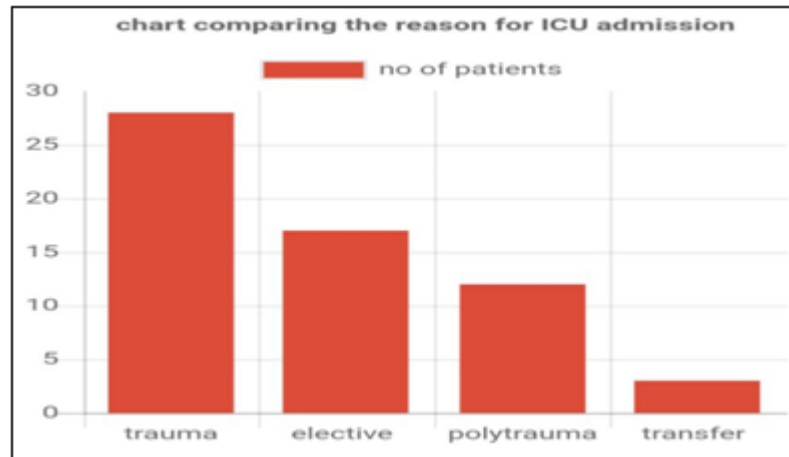
This result was skewed due to one neuro surgical patient staying for 80 days. Otherwise, between 5-7 days was the average LOS.

5. Discussion

- This study was undertaken to assess the causes for ICU admission in orthopaedic patients. Work has been done to concentrate on general surgical patients and their need for ICU consultation whereas minimal literature has been published commenting on orthopaedic patients.
- As elective orthopaedics generally involves the treatment of older patients with multiple co-morbidities and trauma with acutely injured patients, it is important to understand which patients are more likely to require intensive care post-operatively.
- Following Figure compares the total number of ICU admissions for each group. Unsurprisingly, almost half of the total patients [47%] were from the “trauma” group. This group also carried the highest mortality rate

with 67% of all mortalities from orthopaedic ICU admissions.

- Common causes included respiratory failure, acute kidney failure and septicaemia.



- A retrospective study by Tornetta et al.¹⁰ looked at 326 elderly patients who had sustained a traumatic injury and reported a mortality rate of 18% after combined orthopaedic and general surgical operations and 9% after isolated orthopaedic operations. It is clear that older trauma patients are more unstable due to multiple comorbidities and the severity of their injuries^{11, 12}
- Hip fractures are associated with increased morbidity and mortality.^{13, 14} Patients sustaining hip fractures were admitted more frequently to ICU than any other trauma injury in this study.
- The main causes were acute renal failure, respiratory failure and hospital acquired pneumonia; a trend also reflected in the literature.¹⁵⁻¹⁷
- Wound and soft tissue infection combined with infected metal work represented the largest proportion of ICU admissions from the trauma group.
- In our study, total hip replacements were responsible for 10 patients needing ICU input with a further 3 patients admitted to ICU following revision hip surgery. The majority of patients undergoing hip replacements are between 60-79 and will have associated with comorbidities¹⁸.
- The “elective surgery” group highlights the need for active monitoring on ICU of complex patients with comorbidities. Figure 2 shows that 29% of patients from this group required close monitoring while 24% had cardiac problems.
- During total hip replacement, identifiable myocardial ischemia occurs intraoperatively, indicating myocardial strain. Coronary Heart Disease [CHD] patients are at risk of developing further complications during this type of surgery¹⁹.
- Cardiac complications after THR occur at a rate of 2% to 10%²⁰.
- Baseline pulmonary function is a good indicator of postoperative pulmonary complications. Patients with Chronic Obstructive Pulmonary Disease [COPD] or abnormal pulmonary function tests have a 70% pulmonary complication rate²⁰. As increased age causes a reduction in Forced Expiratory Volume in 1 Second [FEV1] and loss of elasticity, we can assume that

patients undergoing arthroplasty surgery will have some degree of lung dysfunction²¹.

- General anaesthetic issues accounted for 19% of problems in the elective group. General anaesthesia decreases lung compliance, depresses cough reflex, and decreases cardiac contractility. Preexisting pulmonary disease magnifies these effects. The duration of general anaesthesia also plays a role in the incidence of postoperative respiratory problems²².
- 50% of patients admitted from the “poly-trauma” group were as a result of a road traffic accident. Monitoring for such injuries is essential due to cardio-respiratory compromise. These patients are more likely to need interventions such as chest drains and central lines when compared to their elective counterparts.

6. Conclusion

- Intensive care units are now seen as an essential part in the treatment of critically ill surgical patients.
- As there is an increasing elderly population, patients often present for surgery, with pre-existing comorbidities.
- These comorbidities have a direct correlation on increased morbidity and mortality rates highlighting the importance of the ICU team.
- The majority of orthopaedic admissions are elderly patients undergoing elective surgery or acute trauma patients.
- This study highlights the latter as being markedly more likely to require ICU admission postoperatively. Mortality is higher in this group with infection being a significant cause.²³
- Both groups of these orthopaedic patients require a greater level of care with several possible complications, increased vulnerability, potential cardio-pulmonary compromise and requirement of general anaesthesia.
- Major trauma continues to contribute substantially to high morbidity, mortality and long-term disabilities worldwide and it is therefore paramount that correct intensive care input is sought.^{24, 25}

Volume 12 Issue 3, March 2023

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

Acknowledgement

This study was not funded by any institute, person or authority.

References

- [1] Meziane, M. et al. Unplanned intensive care unit admission following elective surgical adverse events: Incidence, patient characteristics, preventability, and outcome. *Indian J. Crit. Care Med.* 21 (3), 127 (2017).
- [2] (2000) The Royal College of Surgeons of England and the British Orthopaedic Association. *Better Care for the Severely Injured*. London: RCSI, Professional Standards and Regulation.
- [3] Grossman M (1988) *Introduction to Trauma Care*; Philadelphia: Lippincott-Raven.
- [4] Mitchell V, Scarlett M, Amata A (2001) Trauma Admissions to the ICU of the University Hospital of the West Indies, Kingston, Jamaica. *Trauma Care* 2: 86-89.
- [5] Taylor JM, Gropper MA (2006) Critical care challenges in orthopedic surgery patients. *Crit Care Med* 34: S191-199.
- [6] Nazon D, Abergel G, Hatem CM (2003) Critical care in orthopedic and spine surgery. *Crit Care Clin* 19: 33-53.
- [7] Haller, G., Myles, P. S., Langley, M., Stoelwinder, J. & McNeil, J. Assessment of an unplanned admission to the intensive care unit as a global safety indicator in surgical patients. *Anaesth. Intensive Care* 36 (2), 190–200 (2008).
- [8] Kreis DJ Jr, Plasencia G, Augenstein D, Davis JH, Echenique M, et al. (1986) Preventable trauma deaths: Dade County, Florida. *J Trauma* 26: 649-654.
- [9] Gandham S Orthopaedic patients who require intensive care admission. *J Trauma Treat* 2: 169.
- [10] Tornetta P 3rd, Mostafavi H, Riina J, Turen C, Reimer B, et al. (1999) Morbidity and mortality in elderly trauma patients. *J Trauma* 46: 702-706.10. Moini M, Rezaishiraz H, Zafarghandi MR (2000) Characteristics and outcome of injured patients treated in urban trauma centers in Iran. *J Trauma* 48: 503-507.
- [11] Moini M, Rezaishiraz H, Zafarghandi MR (2000) Characteristics and outcome of injured patients treated in urban trauma centers in Iran. *J Trauma* 48: 503-507.
- [12] Duane TM, Rao IR, Aboutanos MB, Wolfe LG, Malhotra AK (2008) Are trauma patients better off in a trauma ICU? *J Emerg Trauma Shock* 1: 74-77.
- [13] Clayer MT, Bauze RJ (1989) Morbidity and mortality following fractures of the femoral neck and trochanteric region: analysis of risk factors. *J Trauma* 29: 1673-1678.
- [14] Abrahamsen B, van Staa T, Ariely R, Olson M, Cooper C (2009) Excess mortality following hip fracture: a systematic epidemiological review. *Osteoporos Int* 20: 1633-1650.
- [15] Roche JJ, Wenn RT, Sahota O, Moran CG (2005) Effect of comorbidities and postoperative complications on mortality after hip fracture in elderly people: prospective observational cohort study. *BMJ* 331: 1374.
- [16] Handoll HH, Farrar MJ, McBirnie J, Tytherleigh-Strong G, Milne AA, et al. (2002) Heparin, low molecular weight heparin and physical methods for preventing deep vein thrombosis and pulmonary embolism following surgery for hip fractures. *Cochrane Database Syst Rev* CD000305.
- [17] Browner WS, Pressman AR, Nevitt MC, Cummings SR (1996) Mortality following fractures in older women. The study of osteoporotic fractures. *Arch Intern Med* 156: 1521-1525.
- [18] Whittle J, Steinberg EP, Anderson GF, Herbert R, Hochberg MC (1993) Mortality after elective total hip arthroplasty in elderly Americans. Age, gender, and indication for surgery predict survival. *Clin Orthop Relat Res* 119 – 126
- [19] Peters KM, Nachtsheim B, Schuster CJ, Forst R (1997) Cardiac risks in total hip replacement. *Arch Orthop Trauma Surg* 116: 83-87.
- [20] Sheppard H, Cleak DK, Ward DJ, O'Connor BT (1980) A review of early mortality and morbidity in elderly patients following Charnley total hip replacement. *Arch Orthop Trauma Surg* 97: 243-248.
- [21] Stein M, Koota GM, Simon M, Frank ha (1962) Pulmonary evaluation of surgical patients. *JAMA* 181: 765-770.
- [22] Hole A, Terjesen T, Breivik H (1980) Epidural versus general anaesthesia for total hip arthroplasty in elderly patients. *Acta Anaesthesiol Scand* 24: 279-287.
- [23] American Academy of Orthopaedic Surgeons 77th Annual meeting Handout: Orthopaedic infection Prevention and Control: An Emerging New Paradigm.
- [24] Hofman K, Primack A, Keusch G, Hrynkow S (2005) Addressing the growing burden of trauma and injury in low-and middle-income countries. *Am J Public Health* 95: 13-17.
- [25] Park K (2000) Accidents. In *Textbook of Social and Preventive Medicine*. (17th edn), Banarsidas Co, India