

# Audit of Emergency Surgical Cases in a Tertiary Care Hospital in Urban India

Mahak Kakkar<sup>1</sup>, Surbhi Priya<sup>2</sup>, Charu Bamba<sup>3</sup>, Swati Jain<sup>4</sup>

## ABSTRACT

**Introduction:** In a country like ours, the increased number of surgical emergencies presenting to a hospital diverts majority of the resources towards the emergency department. Understanding this growing need makes it important to study and evaluate the distribution of these patients which shall help in developing a more efficient department.

**Material and methods:** We conducted a retrospective study on data of patients undergoing emergency surgeries between January 2018 till June 2018. Cases included for study were performed under department of general surgery, orthopedics, neurosurgery, paediatric surgery, maxillofacial department, otorhinolaryngology and urology surgery.

**Results:** Around 5351 cases were studied. Of these adults were 82.64% (n=4422), while male to female ratio was 1.65. Majority of these cases belonged to 3rd decade (24.1%), while most common cases were performed under orthopaedic department (41.5%) with lower limb fracture repair being the most common surgery (13.55% of all), followed by general surgery department (24.33%) with commonest procedure being exploratory laparotomy. Neurosurgery contributed 20.76% cases with craniotomy being commonest emergency procedure. Most common anaesthesia practised was general anaesthesia (59.71%) followed by spinal anaesthesia (22.05%). Approximately 8.8% cases required either intensive care unit (ICU) or high dependency unit (HDU) stay.

**Conclusion:** We discuss the need of resources required for betterment of provision of emergency services such as need of ICU/HDU care in emergency department as well as the underestimated requirement of better anaesthesia care. It highlights the required positive changes in current surgical and anaesthesia practice that maybe extrapolated to other such establishments within this geographic region.

**Keywords:** Emergency Surgery, Emergency Anaesthesia, Audit of Emergency Service, Anaesthesia Practice, Emergency Services.

## INTRODUCTION

In a country like ours, the increased number of surgical emergencies presenting to a hospital diverts majority of the resources towards the emergency department. The number of emergency cases presenting to hospitals have increased over years putting a lot of pressure on the hospital resources.<sup>1</sup> Safdarjung hospital being a tertiary care hospital located in Delhi receives a high volume of emergency surgeries. Understanding this growing need makes it important to study and evaluate the distribution of these patients which shall help in developing a more efficient department.

Information is generally available on the emergency cases

presenting to emergency area in various hospitals<sup>2-4</sup>, but not enough figures are available regarding wide spectrum of surgical emergencies considering various surgical departments. Although some studies have discussed facts about emergencies in general surgery department<sup>2-4</sup>, none provide detailed analysis into various surgical departments, which in fact helps to understand the resources needed to build up an efficient emergency block.

The aim of the study was to recognize the current patterns of presenting emergency surgical cases and existing practices of anaesthesia followed for the same in a tertiary care hospital in India. Secondary aim was to understand the type of post-operative care provided to the patients undergoing emergency surgeries. We also recorded the outcomes of patients undergoing general anaesthesia and the duration of these surgeries.

## MATERIAL AND METHODS

A retrospective data was collected from the New Emergency Block of Safdarjung hospital, New Delhi, India. The information was recorded from the post-operative emergency registry and patient record data over a six-month period from January 2018 till June 2018. We noted total number of patients presenting to our hospital for emergency surgeries, their demographic profile, department undertaking surgery, type of anaesthesia provided including use of any associated blocks, duration of surgery and the post-operative outcome of each patient.

Patients till 12 years of age were defined as paediatric age group. The age-groups divided for analysis were made into groups of 10 years interval, from 0 to 10 years, 11 till 20, 21 till 30 years and so on, till more than 80 years. A decade-wise analysis was then considered.

Obstetrical and Gynecological, ophthalmological, and burns emergencies were excluded from the study as these departments have separate surgical facilities at the institution.

<sup>1</sup>Assistant professor, Department of Anaesthesia, <sup>2</sup>Senior Resident, Department of Anaesthesia, <sup>3</sup>Consultant and Professor, Department of Anaesthesia, <sup>4</sup>Assistant Professor, Department of Anaesthesia, Safdarjung Hospital and Vardhmaan Mahavir Medical College, Delhi, India

**Corresponding author:** Dr Mahak Kakkar, G83, 2nd Floor, Ashok Vihar, Phase 1, Delhi 110052, India

**How to cite this article:** Mahak Kakkar, Surbhi Priya, Charu Bamba, Swati Jain. Audit of emergency surgical cases in a tertiary care hospital in Urban India. International Journal of Contemporary Medical Research 2020;7(8):H1-H6.

**DOI:** <http://dx.doi.org/10.21276/ijcmr.2020.7.8.25>



Any other non-surgical cases, or cases involving minor operation theatre (OT) procedures were not recorded. Patients requiring surgeries under more than one surgical department were excluded from the study to avoid confounding.

We studied patients coming for surgical procedures in various departments, including general surgery, orthopedics, neurosurgery, paediatric surgery, maxillofacial department, otorhinolaryngology (ENT) and urology surgery.

Requirement for post-operative Intensive Care Unit (ICU) care or High-Dependency Unit (HDU) care was also noted for the cases analyzed. Also, duration of these surgeries was noted and analyzed by dividing them into surgical duration either less than two hours, two to three hours, and similar groups of one hour intervals, till more than six hours.

All the data was compiled and analyzed statistically by using descriptive statistical methods, using IBM® SPSS software version 21.1.

## RESULTS

A total of 5547 patients were found to have been operated under various surgical departments in emergency under aforementioned group within the defined six months period. This suggests that everyday approximately more than 30 patients required major emergency surgery care. Of these, only 5351 patients were found to have relevant demographic data and department specific information that could be analyzed. Gender analysis of these patients revealed males forming 62.21% (n=3329) while females forming 37.79% (n=2022) of all undergoing major surgical procedures, giving male to female ratio of 1.65:1.

Of all cases, 17.36% cases (n=929) belonged to pediatric age group (defined as till 12 years of age), while other 82.64% (n=4422) patients were adults.

Out of 17.36% (n = 929) paediatric patients, 11.41%(n=561) were operated by paediatric surgeons. Rest paediatric patients were managed by concerned surgical departments.

The most common age group presenting to the emergency surgical operation theatre was between 21-30 years of age, which constituted about 24.1% (n=1289) of the total presenting population. Other age group-wise distribution suggests 832 cases (17.26%) in 0-10 years age, 734 cases (15.23%) in 11 to 20 years age, 858 cases (16.03%) in 31-40 years age group, 665 cases (12.43%) in 41-50 age group, 442 cases (8.26%) in 51-60 years, 245 cases (4.58%) in 61-70 years group, 88 cases (1.64%) in 71-80 years and 27 cases (0.5%) in over 80 years age group (Table 1).

Regarding various departments, maximum surgeries were performed under orthopedic emergencies accounting for 41.49% (n=2220) of the total emergency surgeries. General surgery emergencies accounted for 24.33% (n=1302) of the total surgical cases. Neurosurgical emergencies constituted 20.76% of total surgical cases with a total of 1111 total cases during a time period of 6 months. Apart from these, pediatric surgical emergencies totaled around 561 cases (10.48%), burns & plastic around 90 cases (1.68%), ENT emergency surgeries were 61 (1.14%) while urology emergency OT saw only 6 cases in total (0.11%) (Figure 1).

Orthopaedic emergencies constituted the greatest number of surgical cases to the operation theatre. Out of these 2220 operative cases, most common surgery performed was repair of fracture of lower limb, comprising of 725 cases, i.e, 35.56% of total orthopedic cases. Other common procedures performed were repair of fracture of upper limb with 483 cases (20.81%), amputations with 460 cases (19.83%), tissue debridement were 183 cases (7.89%), arthroscopic evaluation being done in 145 cases (6.25%), implant removal in 98 cases (4.23%) and about 82 cases of spine surgeries (3.53%) (Table 2).

Second busiest emergency OT was under general surgery care, where a total of 1302 cases were taken, out of which exploratory laparotomy was the most common type of emergency surgery done. It constituted about 56.83% of the total emergency general surgery cases. Surgical debridement was required in 247 cases (18.97%), appendicectomy was needed in 171 cases (13.13%), feeding jejunostomy was done in 30 cases (2.31%), while anal surgeries and hernia repair were required in 18 cases (1.38%) and 10 cases (0.77%), respectively (Table 3).

Neurosurgery emergencies were highlighted by the need of craniotomy (including decompression, repair and evacuation, SDH, EDH, tumor resection) as the most common procedure undertaken with a total of 590 cases (53.11%) out of 1111. More than a quarter of all neurosurgical emergencies required Ventriculo-peritoneal shunt procedure (n=289, 26.01%), while emergency spinal surgical intervention was needed in 119 cases (10.71%). Cranioplasty was done in about 50 emergency cases (4.50%), Excision and repair of meningomyelocele was done for 29 patients (2.61%) while aneurysmal emergency surgeries were only 17 (1.53%). Such low number of aneurysms was due to unavailability of operating microscopes in neurosurgery emergency department. The aneurysms were operated in elective neurosurgery OT whose data is not available to us.

Paediatric emergency surgery team performed around 561 total cases in a span of 6 months. Most of these surgeries involved repair of Tracheo-esophageal fistula, accounting for around 27.45% of the cases. An exploratory laparotomy for obstruction and perforation was done in 127 cases (22.63%), while surgery for ano rectal malformation was done in 20.50% (n=115). A Congenital Diaphragmatic Hernia repair was required for 64 patients (11.41%). Obstructed inguinal hernia repairs were done in 11.41% of the paediatric patients. 6.60% of the patients were operated for circumcision.

Maxillofacial emergencies constituted about 1.68%(n=90) of the total surgeries. Infected flap surgery was required in 32.22%(n=29) of the cases. Facial fractures constituted about 28.89% (n=26) of the total emergency maxillofacial surgeries followed by vascular repairs which were about 26.67% (n=24) of the total maxillofacial emergencies. Other surgeries included tendon repair (7.78%, n=7), degloving repair (2.22%, n=2), and embolectomy (2.22%, n=2).

ENT emergencies were about 1.14% (n=61) of the total emergencies. Tracheostomies constituted main bulk of the emergency ENT surgeries which was about 62.29% (n=38).

Age Group (in years)	Count of Age Group	Percentage
0-10	924	17.27%
11-20	813	15.19%
21-30	1289	24.09%
31-40	858	16.03%
41-50	665	12.43%
51-60	442	8.26%
61-70	245	4.58%
71-80	88	1.64%
Over 80	27	0.50%
Total	5351	

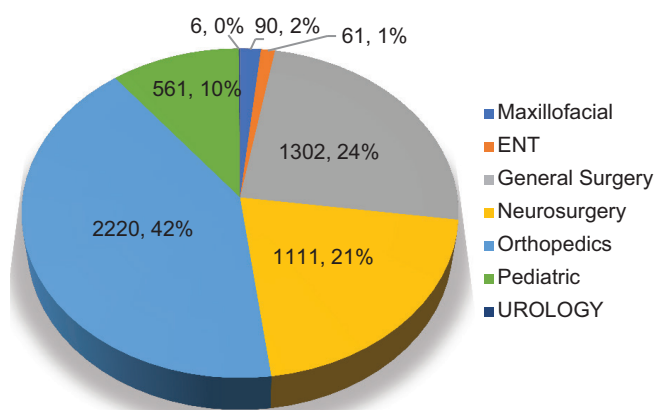
**Table-1:** Age-wise Distribution of cases undergoing emergency surgery during study duration

Type of surgery	Number of cases	Percentage of total
Fracture Lower Limb	725	35.56%
Fracture Upper Limb	483	20.81%
Amputation	460	19.83%
Arthroscopic Evaluation	145	6.25%
Spine	82	3.53%
Bankart's	7	0.30%
Debridement	183	7.89%
Implant Removal	98	4.23%
Miscellaneous	37	1.60%
Total	2220	

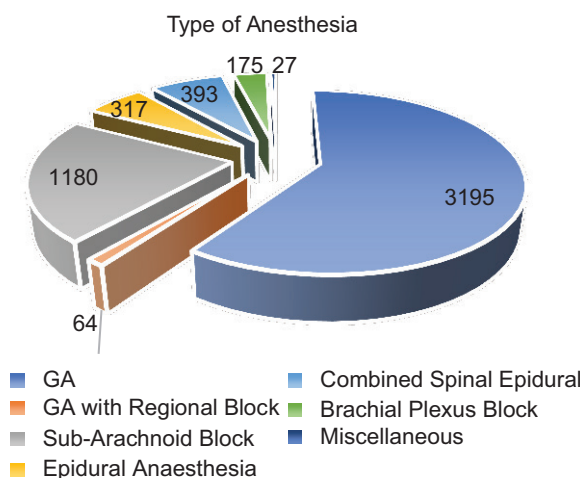
**Table-2:** Distribution of types of emergency surgeries in orthopaedic department.

Type of surgery	Number of cases	Percentage of total
Debridement	247	18.97%
Exploratory Laparotomy	740	56.83%
Appendicectomy	171	13.13%
Anal Surgery	18	1.38%
Feeding Jejunostomy	30	2.31%
Hernia Repair	96	7.37%
Total	1302	

**Table-3:** Distribution of types of emergency surgeries in surgery department



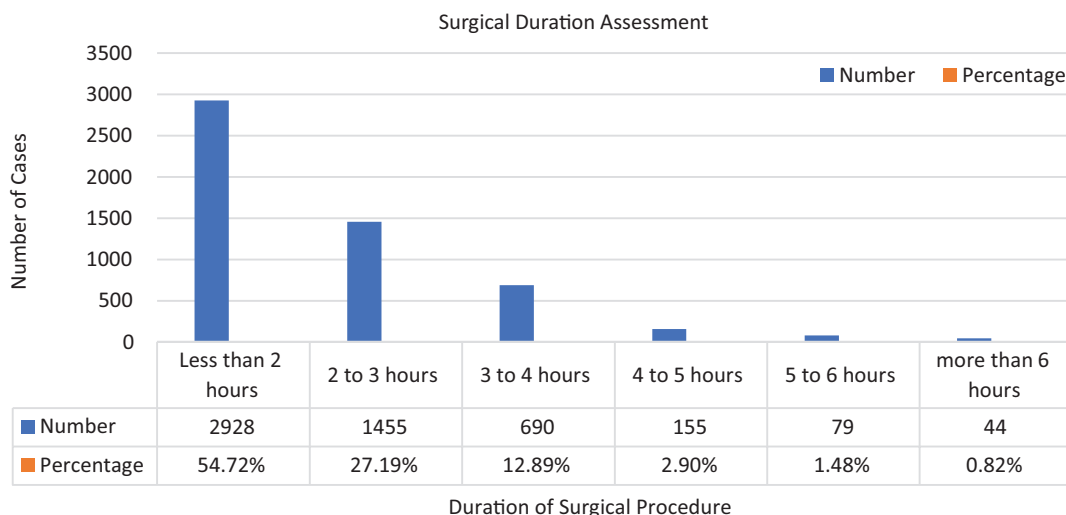
**Figure-1:** Department-wise distribution of emergency cases at Safdarjung Hospital, Delhi, India during study duration.



**Figure-2:** Type of Anaesthesia administered in emergency cases undertaken.

Foreign body removals were done in 29.51% (n=18). Cut throats repairs in form of neck cartilage repairs were done in 8.20% (n=5) patients.

Penile repair constituted about 83.33%(n=5) of the total urological surgeries. Only one case required surgical management of bladder rupture (16.67%).



**Figure-3:** Assessment of Surgical duration of emergency cases during study period.

The frequency distribution of type of anaesthesia was analysed. Most common form of anaesthesia required was general anaesthesia, given as either standalone in 3195 patients, i.e., 59.71% of all cases, or in conjunction with regional blocks like epidural or brachial plexus block in 64 patients (1.20%). Second commonly used anaesthesia was subarachnoid block (spinal anaesthesia) given in 1180 cases (22.05%). Epidural anaesthesia was practised in 317 patients (5.93%) alone while was used in combination with spinal anaesthesia in 393 cases (7.34%). Brachial plexus block was given to 175 patients (3.27%). Miscellaneous forms of anaesthesia including ankle block, intercostal block, monitored anaesthesia care, penile block, sciatic nerve block, total intravenous anaesthesia (TIVA) and wrist block was given to 27 patients (0.49%) (Figure 2).

Need for post-operative ICU care was noted in 275 patients (5.14%), while 195 patients (3.64%) required care in high-dependency unit after surgery. Rest of the patients (n=4881, 91.22%) were taken care of in their respective departmental wards. This suggests that approximately 8.80% of all emergency surgeries required need for intensive care or monitoring. This indicates that every 11<sup>th</sup> or 12<sup>th</sup> emergency surgical case required ICU/HDU care. Given that this tertiary care centre operates over 30 cases on an average each day, almost 3 patients would require these facilities each day, apart from the other incoming medical emergencies requiring these facilities.

Duration of surgical cases was also analysed and most of the 5351 cases required less than two hours, i.e., in 54.72% (n=2928) cases. About 1455 cases (27.19%) were completed within two to three hours, 690 cases (12.89%) required upto four hours, 155 cases (2.90%) needed close to five hours, 79 cases (1.48%) were finished by six hours, and about 44 cases needed more than six hours to be accomplished. Most of the long duration surgeries were performed by the orthopaedic department with up to 17 cases requiring more than six hours duration (Figure 3).

## DISCUSSION

In a larger volume setup and a tertiary care hospital, a major proportion of surgical resources are required within the emergency services. These resources can be in the form of human resources, most importantly, the treating surgeons and anaesthetists, paramedical staff and other support staff, infrastructural resources such as the operating rooms, preparation and post-operative areas, etc; medical and surgical resources such as the equipment and medicines essential for these treatments, apart from others. It is therefore important to audit the emergency care services being provided, of which the surgical emergency services form a major burden. In 2006, Debas and colleagues<sup>5</sup> published an expert-opinion estimate that 11% of the overall global burden of disease was treatable by surgery. On-the-ground assessments, however, suggest that this could be an underestimate: the prevalence of untreated surgical pathology is nearly 25% in Sierra Leone.<sup>6</sup> This underestimation is potentially important in planning for health systems—surgery has often been viewed

as a complex, expensive intervention with a potentially small impact

Our study elaborates the surgical workload being undertaken in a major, high-volume, urban tertiary care centre. This hospital provides care to over 30 cases each day in the emergency surgical area. It is therefore imperative to study the surgical cases and practice patterns of anaesthesia care, which is common for all the departments, and highlight the areas that require focus for better patient management. This study discusses surgical practices in about seven surgical departments including general surgery, paediatric surgery, orthopaedics, urology surgery, neurosurgery, ENT, and plastic surgery.

We found that our hospital had 5351 patients presenting to our emergency surgical department in a period of six months. There is a study conducted at the Lagos State University Teaching Hospital for a period of 1 year where they conducted a prospective analysis in their surgical emergency department.<sup>7</sup> They studied about 7536 patients of which 7122 patients were adults (95%) while rest were paediatric patients. In our study 82.64% (n=4422) patients were adults and rest 17.36% (n=929) cases were paediatric cases. Ibrahim et al. had only 5% paediatric cases with cut off up to 15 years while in our study children up to 12 years formed paediatric category which were more than three times their study. This could be due to higher paediatric population, better paediatric patients' services and better awareness regarding the need for medical care in urban India compared to African countries.

In our study, the male to female ratio was 1.65 which was almost similar to the study conducted by Ibrahim et al<sup>7</sup> in which the ratio was 1.7:1. This is suggestively similar to the pattern of trauma-related emergencies seen in various other studies.<sup>8</sup> This can also be attributed to preferred gender for seeking medical care.

Most of the emergency surgeries reported were orthopaedic cases suggesting probably higher incidence of referred cases being due to trauma, especially, road traffic accidents. Apart from orthopaedic, general surgery department was considered the second busiest handling almost quarter of all cases. Emergency laparotomies were the most common surgery, constituting more than half of all surgeries. This is in contrast to some studies mentioning appendicitis-related disorder being commonest followed by laparotomies in emergencies.<sup>9</sup>

Neurosurgery recorded most cases being emergency craniotomy (over 53%), which is in correspondence with other research articles suggesting subarachnoid and traumatic brain haemorrhage as the most important causes representing emergency craniotomies in neurosurgical departments.<sup>10</sup> VP shunt surgeries were also performed commonly in a quarter of all neurosurgical emergencies. These contribute to paediatric cases one in emergency.

In a study by Yadav et al which was carried out for a period of 18 months they had around 1007 paediatric emergency cases from a total of 4390 surgical admissions, constituting about 23% of the total surgical emergency admissions while

our data had only 10.48% of the total surgical emergencies.<sup>11</sup> This difference could be due to non-inclusion of any other type of surgical emergency other than general surgery in their study and also study was carried out for a longer duration than ours. The most common neonatal emergencies in our department was Tracheoesophageal fistula accounting for 27.45% of the total paediatric emergencies while in their set up ano rectal malformation was the most common emergency surgery performed (63.5%).<sup>11</sup>

Anaesthesia in emergency surgical conditions differs to a great deal from elective surgeries. In emergency conditions pre anaesthetic assessment and preparation of the patient is different owing to lack of time for pre-operative optimisation of patients, especially who are diabetics, hypertensive, septic, patients with pacemaker or with any other co morbidity. Staffing levels and seniority of anaesthetists should be adequate to assess the patient preoperatively and plan the type of anaesthesia according to the risk stratification.

Patients who are to undergo exploratory laparotomy or presenting for emergency craniotomies are generally administered general anaesthesia (GA). In our analysis, over 59% of all cases needed GA, either alone or in combination with other modes of anaesthesia, suggesting it to be the most common form of anaesthesia practised. General anaesthesia in these patients poses them to a risk of aspiration if patients are not adequately fasted. Adequate measures such Sellick's manoeuvre, use of antiemetics, use of cuffed endotracheal tubes, etc. must be taken to prevent aspiration. There should be a well-planned pathway to provide surgical care to these patients.<sup>12-13</sup>

Due to the above reasons and risks of complications, regional anaesthesia must be practised wherever possible. Patients presenting for orthopaedic surgeries were generally performed under central neuraxial blocks or peripheral blocks unless general anaesthesia was indicated or other modes of anaesthesia failed. Regional techniques reduce the risks associated with emergency GA like aspiration, handling difficult airway, variation in hemodynamic parameters, etc. The results for same can be increased by use of ultrasonography to assist regional blocks, better training of medical and paramedical staff and also by means of practice when supplementing analgesia in general anaesthesia.

Post-operative care is critical and must be practised for patients with pre-operative opioid use, central neurologic disease and intraoperative hemodynamic instability in the form of intensive care unit (ICU).<sup>14</sup> Such incidences are more prevalent in emergency settings. In our setup, about 5.14% of patients were shifted to ICU care while 3.64% required HDU care. Almost every day additionally three cases required these facilities. There should be provision to increase resources if necessary to manage fluctuating work load demands and still provide an acceptable standard of care. Therefore, it is advisable that the emergency department has its own ICU/HDU facility dedicated for such emergency surgical cases recovering post-operatively.

Most of the surgeries, about 54.7% of all, in emergency area were completed within 2 hours duration. This suggests

competent medical and paramedical staff. Longer duration surgeries require channelizing the staff and resources adequately so as to maintain the turnover and quality patient care. Increasing the number of available operating theatres plays an important role allowing multiple specialty care to be undertaken at the same time. Our hospital recently in 2018 increased its operating rooms from five to 13 in total, out of which this initial data has been analysed when only seven rooms are operational. This gives us advantage for future need of growing emergency services.

Blood bank facility should be situated near the emergency block in order to avoid any delays for blood transfusion in emergency cases. In our emergency department, we have a satellite unit to our main blood bank which keeps a stock of blood components for immediate emergency requirement.

Imaging modalities like CT, Ultrasound and X-RAY are available in our emergency set up. Also, Point-of-care (POC) testing is available in our emergency department which further reduces the delay in taking up the emergency cases by producing rapid lab reports facilitating quick decision making. We are unable to analyse these facility-related drawbacks and benefits due to lack of adequate data, yet we believe that improvement in quality of these integral facilities and their improved access in emergency area can help benefit the underestimated need of emergency surgical services.

## CONCLUSION

Urban Indian tertiary care centre encounters over 30 emergency surgeries each day with males from 3<sup>rd</sup> decade of life most commonly requiring therapy. Orthopedic and general surgery handle most surgical patients that are performed mostly under general anaesthesia. Most of the surgeries finish within a couple of hours and have good outcomes, though many patients require better post-operative care. Therefore, such centres need to improve upon providing better infrastructure to provide HDU or ICU care to these patients along with integrated 24-hour blood bank, radiology and point-of-care (POC) laboratory facilities. Audit in our emergency surgical block implies a professional commitment to improvement and involves a systematic approach highlighting opportunities for improvement and required positive changes in the current surgical and anaesthesia practice in our institution.

## REFERENCES

1. Campbell WB, Lee EJ, Van de Sijpe K, Goodicz J, Cooper MJ. A 25 years study of emergency surgical admissions. *Ann R Coll Surg Eng.* 2002;84 :273-7
2. Talwelkar HS, Chudasama PG. Study of emergency cases in Casualty. *Int. Jour Curr. Res* 2018;9:38182-38184.
3. Khalid S, Bhatti AA, Burhanulhuq. Audit of surgical emergency at lahore general hospital. *J Ayub Med Coll Abbottabad.* 2015;27:74-77.
4. Davies MG, Shine MF, Lennon F. Surgical emergencies in Ireland. An audit of the emergency surgical caseload of an Irish district general hospital. *Ir J Med Sci.*

- 1991;160:303–306.
5. Debas HT, Gosselin R, McCord C, Thind A. Surgery. In: Jamison DT, Breman JG, Measham AR, eds. Disease control priorities in developing countries, 2nd edn. Washington, DC: World Bank, 2006.
  6. Groen RS, Samai M, Stewart KA, et al. Untreated surgical conditions in Sierra Leone: a cluster randomised, cross-sectional, countrywide survey. *Lancet* 2012; 380: 1082–87.
  7. Ibrahim, Nasiru, Oludara, Mobolaji, Ajani, Abdulwahab, et al. Non-Trauma surgical emergencies in adults: Spectrum, Challenges and outcome of care. *Ann of Med and Sur.* 2015;4:10.1016.
  8. Kundavaram Paul Prabhakar Abhilash, Nilanchal Chakraborty, Gautham Raja Pandian, Vineet Subodh Dhanawade, Thomas Kurien Bhanu, and Krishna Priya. Profile of trauma patients in the emergency department of a tertiary care hospital in South India. *J Family Med Prim Care.* 2016;5: 558–563.
  9. Chinthnidhi, Akber AS, Karthikeyan CT, Kuberan. An analytical study of surgical emergencies in a tertiary care hospital-a retrospective study. *Int J Sc Res:* 8; 12, 24-25.
  10. Schuhmann MU, Rickels E, Rosahl SK, et al. Acute care in neurosurgery: quantity, quality, and challenges. *Journal of Neurology, Neurosurgery & Psychiatry* 2001;71:182-187.
  11. Yadav P, Mishra A, Raina VK. Neonatal surgical emergencies in a tertiary care center. *IJSS Journal of Surgery.* 2015;1:5-9.
  12. Findlay G, Goodwin A, Protopapa K et al. Knowing the Risk: A review of the peri-operative care of surgical patients. National Confidential Enquiry into Patient Outcome and Death, 2011.
  13. NELA project team. First organisational report of the National Emergency Laparotomy Audit. RCoA London, 2014
  14. Weingarten TN, Venus SJ, Whalen FX, et al. Postoperative emergency response team activation at a large tertiary medical center. *Mayo Clin Proc.* 2012;87:41–49.
  15. Jones D., Bellomo R., Bates S. Long term effect of a medical emergency team on cardiac arrests in a teaching hospital. *Crit Care.* 2005;9:R808–R815.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 23-06-2020; **Accepted:** 30-07-2020; **Published:** 31-08-2020