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### Original Article

## Study of factors associated with waiting time for patients undergoing emergency surgery in a tertiary care centre in Nepal.

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#### Abstract

**Background:** Emergency surgeries throughout the world are demanding earlier surgical times. In a developing country like Nepal this cannot be possible because of lot of factors. So we planned to study such factors that could interplay and increase the waiting time for emergency surgeries.

**Methods:** A prospective observational study was conducted over 45 days and all patients diagnosed with general surgical and orthopedic emergencies were followed till they were operated.

**Results:** Out of 1211 patients presenting to emergency department, 92 required emergency surgery. The mean age was 29.72 year and 76.1% of the patients were male. The mean time from presentation to the emergency department to the first surgical consultation was 170 minutes, from surgical consultation to decision of surgery was 28 minutes, from decision of surgery to transfer to operating room was 426 minutes, from arrival in operating room to anesthesia consultation was 18 minutes, and from anesthesia consultation to start of surgical incision was 75 minutes. The total average waiting time from arrival at emergency department to the start of surgery was 717 minutes. The factors were, viz., pre-occupancy of theatre (59.8%), special procedures/intervention required prior to surgery (23.9%), arrangement of logistics/finances by patient family (13%), arrangement of blood products (10.9%), consultations (9.8%), delay in giving consent by patients/family (5.4%), delay in arrangement of supplies (9.8%), and shift change of nursing staff (3.3%).

**Conclusion:** This study shows that various preventable factors increases waiting times for emergency surgeries that should be minimized so that waiting times can be reduced.

**Keywords:** Delaying Factors; Emergency surgery; waiting times.

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#### Introduction

The accessibility to prompt and appropriate health care is one of the components that reflect the efficiency of the health care delivery system in any institution. The emotional and psychological trauma following

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emergency admission can increase significantly if surgical intervention is unduly delayed. Although some surgical emergencies can and often should be dealt with some hours or even days after admission, there remains a group of conditions for which surgery should be available within hours or even minutes of arrival. In these patients, a delay could mean loss of life or permanent disability. In practice the timing of operative intervention is influenced by many factors including clinical diagnosis, investigations required, complications of disease, logistics required, workload of physicians, and availability of operation theatre.

Emergency surgeries performed in a handful of tertiary care centers in Nepal comprise a major segment of emergency surgeries performed throughout the country. Tribhuvan University Teaching Hospital (TUTH), one of such tertiary care center has the largest number of medical and surgical specialties among the hospitals in Nepal. The services provided range from basic medical and surgical problems to open heart surgery and renal transplant. Total number of emergency surgeries performed at TUTH in the year 2066 was 2069 compared to 3607 elective surgeries in the same period. Thus, the increasing demand for hospital services has led to longer waiting times, crowded conditions and highly variable care and outcomes as well as dissatisfaction among the patients. Thus this study was conducted to identify the waiting time for patient undergoing emergency surgeries so as to identify various factors governing the waiting time.

### Methods

A prospective observational study was conducted from 4th January 2011 to 20th February 2011 over a period of 45 days. All patients attending emergency department and diagnosed to have a surgical emergency were included in the study. The patient's details and required data were collected in a preformed data collection form, which was prepared after the studying past records of emergency surgeries. In depth interview guidelines was prepared separately for the patient/visitors and the concerned health care provider in cases where more information was required. All emergency surgeries performed on inpatients or outpatients, but not through the emergency department, were excluded. Those patients whose surgery was cancelled or postponed due to various reasons after shifting to Operation Theatre (OT) were also excluded. Emergency surgeries performed by the departments other than General Surgery and Orthopedics were excluded to maintain uniformity and to avoid various bias.

The waiting time was defined as the time interval between the times of presentation of patient at Emergency department to the time of start of surgery. To identify various factors, the waiting time was divided into five intervals as follows:

- From presentation to the emergency department to the first surgical consultation
- From surgical consultation to decision of surgery
- From decision of surgery to transfer to operation theatre
- From arrival in theatre to anesthetic consultation
- From anesthetic consultation to the start of surgical incision.

The factors contributing to each of the interval were identified & analyzed under following headings:

Patient factors: Age, sex, address, duration since first complain, logistic arrangement, time of consent.

Disease factors: Diagnosis, co-morbidities affecting patient's fitness for surgery, investigations required, surgery required, Special intervention including anesthetic procedures prior to surgery.

Hospital factors: Consultations from other departments, number of emergency surgeries performed on the same day, manpower available, availability of OT resources.

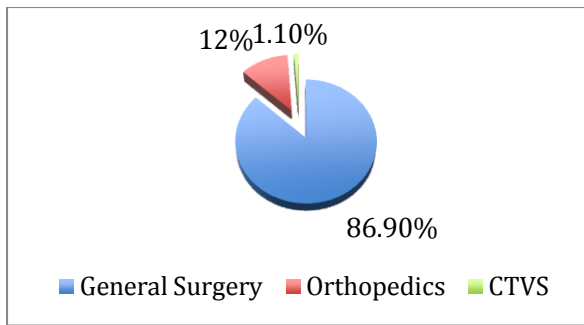
The data was entered in the database created in SPSS version 17 for Windows. Before analysis, all sets of data were rechecked, and after correcting entry error, data was transformed into variables and analyzed.

### RESULTS

During the study period of 48 days, total number of 92 cases requiring emergency surgery in main operating room was studied. Out of these cases, the age of patient ranged from 7 to 84 years with a mean age of 29.72 years. Seventy patients (76.1 %) were male and 22 (23.9%) patients were female.

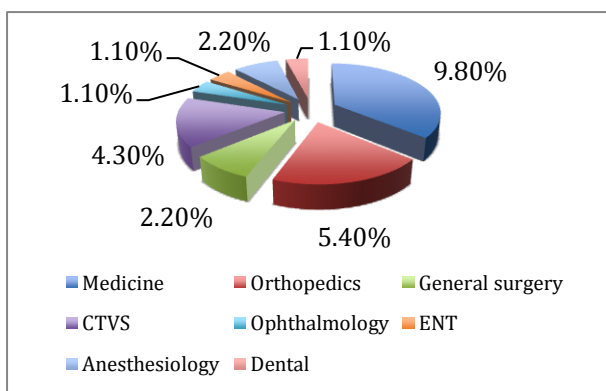
Out of the total cases, 86.9% cases were cases of General surgery, 12% of Orthopedics and the remaining 1.1% was of Cardio Thoracic and Vascular Surgery (CTVS) cases.

Figure 1. Distribution of ER Surgical Cases



Consultation with another department other than the concerned surgical department was required in only 23.9% of patients. The departments consulted were Medicine: 9.8%, Orthopedics: 5.4%, General surgery: 2.2%, CTVS: 4.3%, Ophthalmology: 1.1%, Anesthesiology: 2.2%, Ear Nose Throat & Head Neck Surgery (ENT-HNS): 1.1%, Dental: 1.1%. But 76.1% patients did not required consultation from other departments.

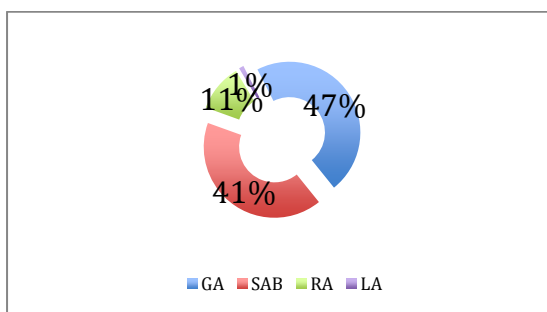
Figure 2: Consultation with other departments



Additional co-morbidities were present in 8.7% patients of the patients and special investigations (including CT Scan, MRIs) were done in 9.8% of patients.

Once in the OT, the anesthesia provided were: General Anesthesia (GA): 46.7%, Sub-arachnoid Block (SAB): 41.3%, Local Anesthesia (LA): 1.1% and Regional Anesthesia (excluding SAB) (RA): 10.9%. Procedures in anesthesia before the surgical procedure including arterial line insertion, central venous catheter insertion and epidural catheter insertion that also contributed to some delay occurred in 23.9% of cases. This was also considered as a delay as this also contributed as the time of incision was taken as the start of surgery.

Figure 3. Forms of Anesthesia applied

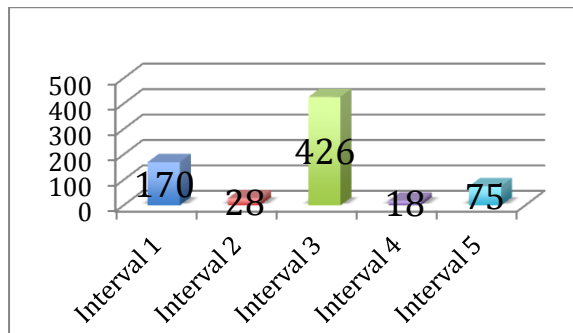


The mean time from presentation to the emergency department to the first surgical consultation (Interval 1) was 170 minutes. The mean time from surgical consultation to decision of surgery (Interval 2) was 28 minutes. The mean time from decision of surgery to transfer to operation theatre (Interval 3) was 426 minutes. The mean time from arrival in theatre to anesthetic consultation (Interval 4) was 18 minutes. The mean time from anesthetic consultation to start of surgical incision (Interval 5) was 75 minutes.

The total average waiting time from arrival to Emergency department to the start of surgery was 717 minutes (11 hours 57 minutes) whereas the average waiting time from the decision of surgery till start of surgical incision was 519 minutes (8 hours 39 minutes).

Figure 4. Average waiting time in minutes for various time intervals

(See text for time intervals)



Considering the factors associated with above-mentioned waiting time, the commonest factor resulting in delay were pre-occupancy of theaters in 59.8%, consultations with other departments prior to surgery in 23.9%, special interventions/procedures before the surgery in 23.9%.

Table 1. Factors associated with increased waiting times for ER surgery:

S.No	Causative Factor For Waiting Times	Incidence (%)
1	Patient Factors:	
	Delay in giving consent by patients	5.4%
	Arrangement of money and other logistics	13%
2	Arrangement of Blood products	10.9%
	Disease factor:	
	Consultations to other departments	23.9%
	Special investigations required	9.8%
3	Special intervention / procedures required prior to surgery	23.9%
	Hospital factor:	
	Pre-occupancy of theatre	59.8%
	Arrangement of OT supplies	9.8%
	Unavailability of nursing staff (Shift change)	3.3%

## Discussion

In any health service, the waiting time is an important tool to identify the demand and rectify adequacy of health care resources in government hospitals and publicly financed health care systems. However, most health care systems based on public financing are often criticized for having long waits even for emergency surgery, which may be because of various factors. Once these factors are identified, and if this could be used to reduce waiting times to surgery, this will facilitate quicker discharges from hospital, thereby increasing turnover.

Various studies have been conducted to identify these factors for waiting times and these studies have varied in terms of patient setting, main objectives, and methodology. Some studies have focused on waiting time for elective surgery in general whilst others have targeted specific groups. We targeted our study on emergency surgical population so that we will be able to trace them upto the Operating Rooms and find out the major reasons for delays.

Many studies have showed that the longer the waiting time for emergency surgery, the more is the morbidity and mortality.<sup>1-3</sup> Some studies have mentioned that all the preoperative examination and procedures for an emergency surgery must not be more than three hours.<sup>4-6</sup> The waiting time is an independent predictor of mortality and severity of morbidity. Prolonged delay would also influence the course of time-dependent

diseases as mentioned in some studies, where patients that presented with simple obstruction required resection and anastomosis of bowel because of gangrenous changes due to delayed surgical intervention.<sup>1,3,7</sup> Same trend was observed by another study from a district general hospital in United Kingdom.<sup>8</sup> In developing countries it is not unusual for emergency operations to be delayed even beyond 48 hours.<sup>1,3,7,9,10.</sup>

In most of the mentioned studies, the common causes of the delays were due to timing of admission and time taken to arrange blood followed by delay in investigations. These studies reported that most of delays were due to non-availability of Operating Room, admission timing, immediate non-availability of cross-match blood, and investigations reports.<sup>1-6</sup>

Another study from Libreville hospital center showed that 54.2% patients had some delays in the management of surgical emergencies.<sup>10</sup> In their study, the mean duration of surgical emergency management was 504.3 +/- 613.7 minutes. The most common cause of delays was waiting of complementary medical tests results (44.4%), followed by difficulties in supplies (31.1%) and by technical or staff problems (24.1%). They concluded that socio-economic problems were also very important and they found that it is necessary to organize surgical emergencies management in a specific structure and codify the prescription of complementary medical tests.

In some centers/countries, the main cause for emergency surgery delays is due to the absence of a dedicated emergency operating theater and staffs.<sup>11</sup> Data from 498 patients from the University College Hospital of Ibadan, Nigeria showed that only in 38%, surgery was carried out from amongst the cases booked for an emergency operation. In this study, the main reasons for cancellation were unavailability and inefficiency of the doctors of the surgical team and were major cause of poor emergency theatre time utilization. In such a situation, provision of a second emergency theatre at all times would be an effective solution which is present in our center where we conducted the study and this reducing problem of cancellation of emergency surgery.<sup>12</sup> Provision of a separate operating theater for Labor and Delivery Unit also reduces the waiting times for non-obstetric emergency surgeries as the operating room staffs are separate and this facility is also available at our center, which further reduced our waiting times. But sometimes, despite dedicated emergency theatre, emergency surgery can be often delayed due to competing urgencies, suggesting a need for innovative theatre time management.<sup>13</sup>

A report from Pakistan revealed that the most common cause of delayed surgical intervention in their patients (36.3%) was inefficiency of the surgical team.<sup>14</sup>

In a study by Adamu et al<sup>15</sup> in Zaria, Nigeria, the mean waiting time was 22.3 ± 10.0 SD hours which compares favorably to 39.5 to 44.0 hours reported from other African Region.<sup>3,7</sup> In this study, delayed resuscitation was usually due to inability of the patients to immediately purchase the materials for resuscitation because of financial constraint. This is similar to other reports from different regions.<sup>3,10,11</sup> But this was rather less important factor and was present only in 13% of patients in our study. Waiting for complementary investigations was the second most common cause of delay in these patients and accounted for 22.1% in Nigeria<sup>15</sup> whereas this was also a minor factor in our study and caused delay in only 9.8% of patients.

Even in developed countries like United Kingdom, The average time from review in Emergency to theatre was 15.7 hours and the average injury-to-theatre time was 58.6 hours. The average cancellation rate was 25%.<sup>16</sup>

Considering the waiting times, in our study, the mean waiting time from the decision of surgery till start of surgical incision was 519 minutes (8 hours 39 minutes) and mean waiting time from arrival to emergency department to the start of surgery was 717 minutes (11 hours 57 minutes). The average waiting time from arrival of patient to the theater facilities till start of surgical incision was only 93 minutes (1 hour 33 minutes) which is remarkable in comparison to other studies.

In a prospective study of 204 consecutive general surgical emergency operations in a district general hospital, following essential resuscitation, the median delay in operating was 3 hours.<sup>17</sup> Eighty-eight patients had to wait in excess of 1 hour, with 15% experiencing a delay of over 6 hour. In only 10% of cases was a theatre required after midnight, yet 26% of all emergency general surgical operating were performed between midnight and 8 am. The majority of delays were due to a combination of factors; theatre delay was mentioned in 47% of cases, anesthetic delay in 30% and the overrunning of routine lists in 14% of cases. Their results suggest that unnecessary theatre delay results in an unacceptable number of emergency general surgical operations occurring after midnight. In our study, Operating Room was preoccupied in 59.8% of cases, which is significantly higher than other studies. In a study by Wyatt et al, it was concluded that if both theatre and anesthetic availability could be ensured in the afternoon and early evening, the after midnight workload could be cut from 26% to 10%, and staff sleep deprivation reduced which will improve patient outcomes.<sup>18</sup> If two

emergency operations could be performed each weekday, the after midnight commitment could be significantly reduced and residents and staffs sleep deprivation could be reduced which will improve the standard of patient care and safety. It is also important that routine elective lists do not overrun to extra evening hours, as this has a 'knock on' effect, contributing significantly to evening delay. This also recommends for provision of another parallel running operating room in our tertiary care center.<sup>19</sup>

In conclusion, the increase in waiting time for emergency surgeries results primarily because of delay in transfer of patient to OR even after decision for surgery and secondarily because of delay in various consultation, delay in diagnosis, requirement of special investigations and secondarily because of which seems to be because of lots of preventable factors which can hasten the process and decrease waiting time.

Limitations of the study: The study was carried out almost one year ago and the preparation of manuscript got delayed because of various reasons. We feel that these factors might have changed over a period of one year.

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