

## ORIGINAL RESEARCH

### The Correlation between the Length of Time until Surgery and the Length of Postoperative Hospitalization for Neurosurgical Patients

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#### ABSTRACT

**Background:** Triage is performed for inpatient urgent surgery at the majority of hospitals and is determined by the degree of urgency as well as the time of surgical booking. It is possible that the postoperative course will be affected if, as a result of sharing resources among specialists, patients need to wait longer for semi-urgent surgeries. The purpose of this research is to investigate whether or not there is a correlation between the length of time before semiurgent surgery and the postoperative duration of stay in the hospital for neurosurgical patients.

**Materials and Methods:** A retrospective cohort study was carried out between June 2020 and May 2022 at the Guntur Medical College & General Hospital, and it included all of the adult patients who were admitted and placed on the semi-urgent surgery list during that time. A combination of linear and logistic regression analysis was carried out. The most important factor to consider for the exposure was the amount of time that passed between the surgical booking and the actual operation, whereas the most important factor to consider for the result was the amount of time that passed between the operation and the patient's discharge.

**Results:** The research looked at a total of 1,367 different instances of neurosurgical treatment. 54.3 years was the average age of the population. Before surgery, patients spent an average of 1.2 days in the hospital, whereas those recovering from surgery stayed there for an average of 12.5 days. In all, the amount of time that passed between the booking of the procedure and the actual discharge did not change. In the group of patients who were later transferred to another facility, a longer postoperative stay was related with increased age, a higher ASA score, and procedures done more than 24 hours after the initial patient booking.

**Conclusion:** Patients who neurosurgery procedures had scheduled to be performed within the next 24 hours had to wait longer for their procedures to be finished. Although there was an increase in postoperative stays among patients who were sent to another hospital and had their procedures conducted beyond 24 hours, there was not a significant association between the amount of time waiting for surgery and postoperative stay in the aggregate.

**Keywords:** Inpatient stays length, late surgery, early surgery and postoperative recovery.

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## INTRODUCTION

In the majority of hospitals in Canada, inpatient urgent surgery is triaged according to the level of urgency as well as the time that the surgical booking was made. Surgeons in hospitals use a variety of systems to determine which option is appropriate.<sup>[1-3]</sup> These normally contain three tiers: emergent, urgent, and semi-urgent. Emergent tasks have to be completed within one hour, while urgent tasks have to be completed within four to eight hours, depending on the institution (must be done within 24 h).<sup>[4]</sup> The fact that the first tier involves situations in which "life or limb is threatened" guarantees that they will be completed within the allotted hour.<sup>[5-7]</sup> A longer wait for semi-urgent surgery as a result of sharing resources between specialties might have an impact on the postoperative course: for instance, patients who harbour active surgical infections such as abscesses for a longer period of time might require more time to clear the infection and to recover from the effects of an infection.<sup>[8-12]</sup>

Additionally, longer periods of mandatory bed rest for certain conditions such as fractures might result in an increased risk of venous thromboembolism.<sup>[13]</sup> As a consequence of this, it is possible that they will ultimately have a worse clinical outcome, greater duration of postoperative stay, and overall increased expense associated with their presenting ailment.<sup>[14-18]</sup> When dealing with a system that has a limited amount of resources for health care, it is essential to make investments that are both efficient and economical.<sup>[19-21]</sup> The stress of an inpatient stay and the costs connected with it may be raised due to restricted access to semi-urgent surgical situations, despite the fact that surgery is a costly procedure.<sup>[22-25]</sup> To this day, it has not been established beyond a reasonable doubt; nevertheless, if it were, it could potentially bring with it huge financial ramifications within the framework of the health-care system in Canada.<sup>[26]</sup> The purpose of this investigation is to investigate the impact that the length of time spent on semi-urgent surgery has on the postoperative length of stay required for neurosurgical patients in the hospital.<sup>[27,28]</sup>

## MATERIALS & METHODS

All patients admitted to Department of Neuro Surgery, GMC, and Guntur over the age of 17 who were placed on the semi-urgent emergency surgical list at Guntur Medical College & Hospital between the years June 2020 and May 2022 were included in a retrospective cohort analysis. The most important factor to consider in the exposure was the amount of time, measured in hours, which passed between surgical booking and the time of skin incision. The most important factor to consider in the result was the average amount of time between surgery and discharge. In this study, we took into account potential confounding factors such as age, gender, the type of operation, and the ASA class of the patients. The combination of the surgical database and the admissions database yielded the necessary information for data collection (date of the booking, date of surgery, procedure type, surgical time, age, sex, and ASA class) (date of discharge and discharge disposition). A time to surgery of five days or longer was considered exceptional and was therefore included in its own category. Both linear and logistic regression analyses were carried out, with the length of time from operation to discharge serving as the dependent variable in each study. In addition, subgroup analyses were carried out according to age, ASA score, and discharge disposition.

## RESULTS

There were a total of 1367 cases requiring neurosurgical care, which is equivalent to 7.22 percent of all cases requiring surgical care; the operations were depicted in Figure 1. The average patient was 54.3 years old, and male patients made up 57% of the total. The average duration of stay following surgery was 12.5 days, with a standard deviation of 23 days. This length of stay was broken down according to the amount of time spent waiting before surgery [Table 1]. There were 351 patients who were transported to an acute care facility, 208 patients who were sent to a continuing care facility, 111 patients who were transferred home

with assistance, and 695 patients who were transferred home without assistance. [Figure 2] shows that the average length of stay following surgery was 6.78 days for patients who were discharged home and 21.23 days for patients who were discharged to another facility. In the regression model that included all of the patients, it was shown that the amount of time that passed between surgery and discharge was unaffected by the amount of time that passed between surgery and booking [Figure 3]. A longer postoperative stay was linked with both older age and a higher ASA score (P 0.001) in both males and females. Subgroup analysis revealed that operations carried out more than 24 hours after the time of booking were linked with a lengthier postoperative stay in the group of patients who were thereafter transferred to another facility [Table 2].

## DISCUSSION

According to the findings of this study, patients scheduled to undergo neurosurgery within the next 24 hours who ended up waiting longer to have their procedures finished. However, the subgroup analysis revealed an increase in postoperative stays in the group of patients who were discharged to another facility if their surgery was delayed for more than 24 hours. In general, after adjusting for confounding factors, there was not a significant association between the length of time waiting for surgery and postoperative stay. There have only been a few research that look into how postoperative outcomes are affected by delays in surgery.

**Table1: Mean length of stay after surgery by waiting time**

Sr. No.	Time to Surgery (days)	Number of patients	Mean time to Discharge (days)	Standard deviation
1.	0	9040	14	24
2.	1	6758	11	22
3.	2	1921	11	19
4.	3	689	11	19
5.	>3	518	13	22

The authors of the study by Munster and colleagues found that more aggressive and rapid surgical closure of the burn site led to a considerable decrease in the amount of time patients spent in the hospital receiving burn treatment. A shorter length of stay was discovered in another study that investigated the effect of early excision and grafting (defined as within 24 hours of admission). This study also indicated that there was no negative impact on clinical outcome. In the literature on orthopaedics, it has been demonstrated over and over again that delaying hip fracture treatment significantly increases the risk of death. For instance, Bellelli et al. discovered that patients with disabilities who waited for more than 48 hours for surgery had a mortality rate that was about six times higher than normal after 12 months. One investigation that investigated the economic cost of "untimely surgical intervention" revealed that delays occurred in 251 out of 342 cases, and the only reason for these delays was a lack of access to the operating room (OR). They calculated that a needless hospital stay and prolonged use of intravenous antibiotics would incur costs of around NZ\$195,000 that could have been avoided.

**Table 2: Age, ASA score, and discharge disposition subgroup analyses show waiting time before surgery affects postoperative hospital stay**

Sr. No.	Variable	Sig.	Odds ratios
1.	Age	<0.001	1.008
2.	ASA1	Reference	
3.	ASA2	<0.001	2.694

4.	ASA3	<0.001	9.559
5.	ASA4	<0.001	34.459
6.	ASA5	0.999	20.52
7.	Discharged home		
8.	Surgery performed within 24h of booking	Reference	
9.	Surgery was not performed within 24h of booking	0.151	0.929
10.	Transferred to another facility		
11.	Surgery performed within 24h of booking	Reference	
12.	Surgery was not performed within 24h of booking	<0.001	1.541

One of the objectives of the study was to identify the factors that are associated with longer hospital stays with the purpose of maybe focusing on those components in order to realise cost reductions. However, the amount of time it takes for a patient to be ready for release is an essential component that should be included in any future studies, as this could accurately indicate the actual amount of postoperative care that is required. This should be included in any studies that are conducted in the future. There was a substantial association between certain surgeries, higher ASA classes, and increased ages, which resulted in longer postoperative stays. This was the case for longer postoperative stays.

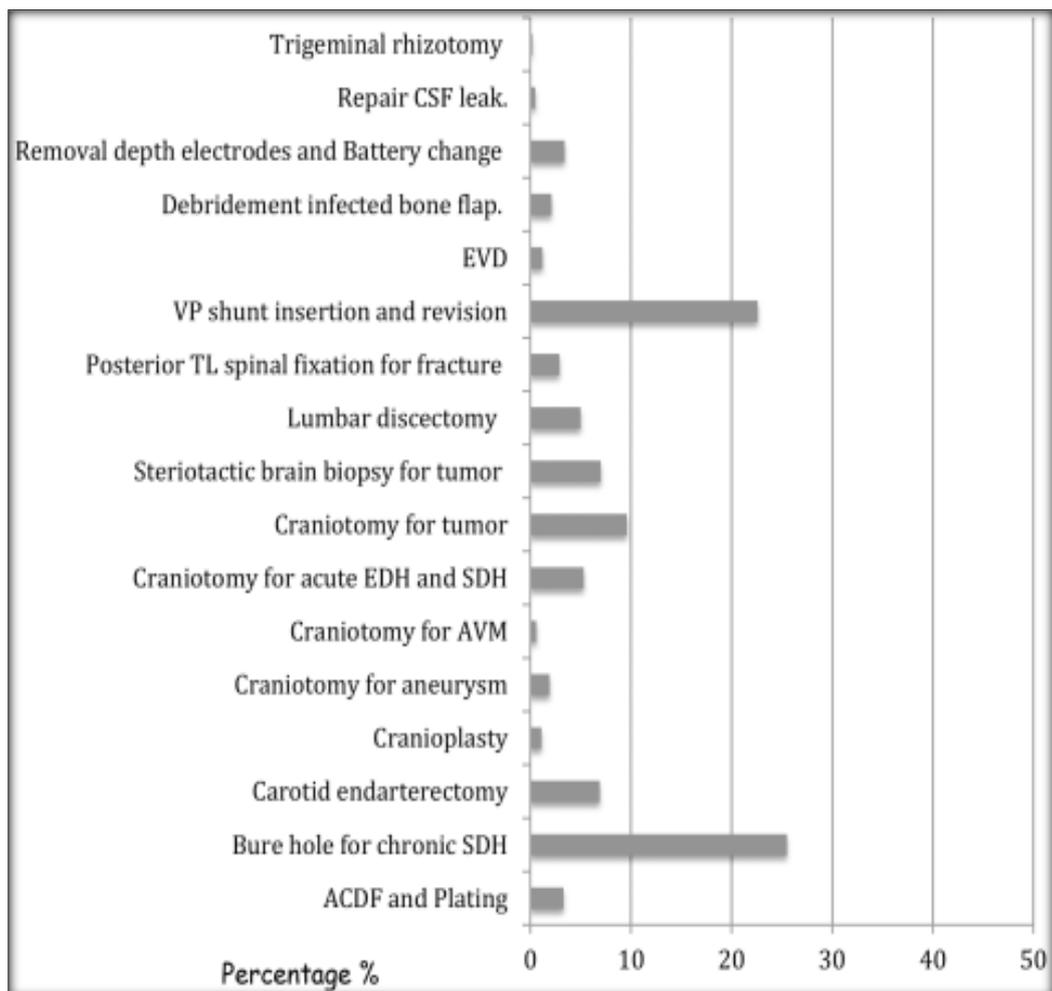


Figure 1: E 24 neurosurgery distribution

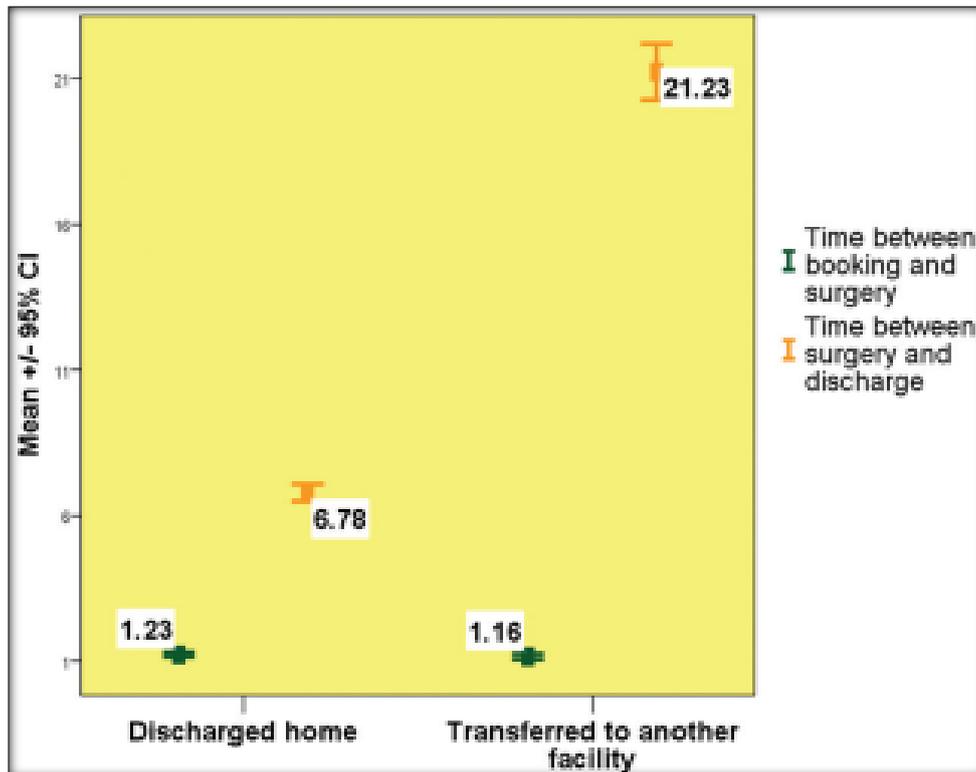


Figure 2: The average length of stay following surgery varies by discharge location

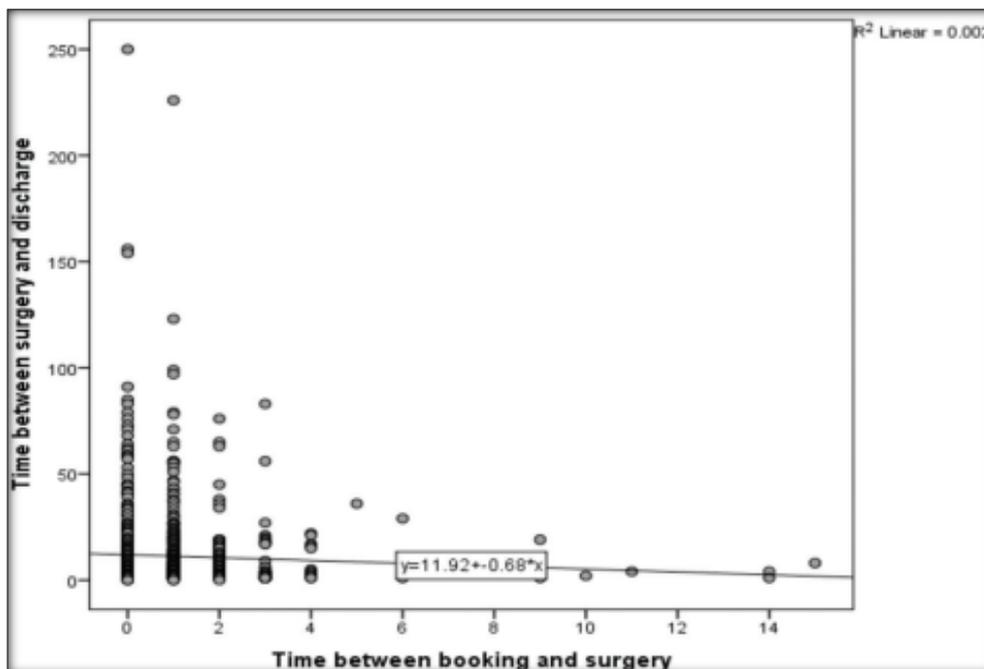


Figure 3: Linear regression model studies waiting time before surgery on postoperative hospital stay for all patients

## CONCLUSION

Patients who were scheduled to undergo neurosurgical procedures over the following 24 hours were required to wait for their procedures to be completed for longer than originally anticipated. However, there was a significant increase in the length of postoperative stays among the patients who were discharged to another institution and had their procedures conducted after 24 hours. These patients had their surgeries after they had already been

admitted to another facility. In spite of the fact that there was no significant correlation between the amounts of time spent waiting for surgery and the length of postoperative stays, there was a substantial rise in the number of postoperative stays among that group. There was a significant correlation between having a higher ASA class and having a longer postoperative stay. This correlation was strengthened as age increased.

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