

# Study finds surgeries performed later in the day have more complications

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Credit: Lynn Greyling/public domain

A new study published in *Neurosurgery* finds that patients who undergo a

neurosurgical procedure with surgical start times between 9 pm and 7 am are at an increased risk of developing complications compared to patients with a surgical start time earlier in the day.

Neurosurgical procedures are necessary at all times of day. Previous studies have documented the relationship between surgical and medical management of diseases at night leading to worse outcome and it has particularly been exemplified in those undergoing: coronary angioplasty, orthopedic surgery, transplant surgery, colorectal surgery, and cardiac arrest [patients](#). Other surgical specialties have examined the effect of surgical start time on morbidity and mortality; however, a similar study has not been performed for neurosurgical procedures.

Researchers here analyzed all patients undergoing neurological surgery between 2007 and 2014 in the University of Michigan Health System. This study included 15,807 patients. 785 complications were identified through the self-reported morbidity and mortality reports created by faculty and resident neurosurgeons.

The study showed that the odds of a complication were increased by more than 50% for procedures with start times between 9 pm and 7 am. When accounting for the length of the surgery, the odds of a complication were even greater for later time periods. The only statistically significant factor that predicted severity of the complication was if the operation was an emergency compared to an elective surgery.

The researchers believe that it is of the utmost importance to understand whether surgical start time might be related to neurosurgical procedural complications. Other surgical specialties have studied the negative relationship between late surgical start times and clinical outcome. The goal with this [retrospective cohort study](#) was to understand the relationship of surgical start time to the development of neurosurgical morbidity and mortality.

Research indicates that the time an activity begins is important; if a task is accomplished outside the "normal" timeframe for completing the task (i.e. after-hours or on the weekend) then the outcomes from that task are statistically worse.

Demographic comparisons across start time groups revealed that the average age of the patient population varied across the surgical day with higher ages earlier in the day, and lower ages later in the day. While other patient factors varied over the course of the day, the magnitude of variation was unlikely to be clinically significant.

As would be expected, as it got later in the day, the percentage of elective cases decreased while emergency cases predominated.

The analysis demonstrated that a patient's odds of having a surgical complication increased significantly between 9 pm and 7 am even after accounting for whether the case was an emergency versus elective procedure or if the patient had co-morbid conditions. When accounting for the length of the surgery, the odds of a complication more than doubled. In other words, after-hour complications are not any more or less severe than non-after hour complications; however, they are much more common. The authors acknowledge that while the after-hour effect is a potential explanation for the increased odds of complications with later surgical start times, there could be other explanations. For example, it could be that patients treated after normal business hours are inherently sicker than patients treated during normal business hours in ways that the authors were unable to measure, leading to increased complications rates.

"We need to continue to study this relationship as we aim to minimize [surgery](#) related complications," said lead author Aditya Pandey. "Could it mean that health systems need to invest more with respect to increasing the number of surgical teams and operating rooms to allow

for greater proportion of surgeries to be performed during day hours and that urgent cases should be stabilized and performed during day hours? These are important questions that must be raised as we continue to solidify the relationship between surgical start time and [surgical complications](#)."

**More information:** "The Effect of Surgical Start Time on Complications Associated with Neurological Surgeries" *Neurosurgery* (2017). [academic.oup.com/neurosurgery/ ... 0.1093/neuros/nyx485](https://academic.oup.com/neurosurgery/.../0.1093/neuros/nyx485)

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