

# Anxiety's Impact on Length of Stay Following Lumbar Spinal Surgery

Hollis Floyd; Mazen Sanoufa, MD; Joe Sam Robinson, MD

Perm J 2015 Fall;19(4):58-60

<http://dx.doi.org/10.7812/TPP/15-022>

## ABSTRACT

**Introduction:** Despite some evidence that anxiety may affect length of stay (LOS), relatively little inquiry exists regarding this in neurosurgical literature.

**Objective:** To determine the influence of anxiety on LOS after elective lumbar decompression and fusion (LDF) surgery.

**Methods:** The medical records of 307 patients who consecutively underwent elective LDF surgery from October 1, 2010, through September 30, 2013, were retrospectively reviewed. Each patient's medications and comorbidities were determined using the medical history. The impact of their medications on LOS was studied using multivariate analysis. Linear regression was also used to assess the relationship between anxiolytic use and LOS. An independent sample *t* test was used to compare the mean LOS of the group of patients receiving muscle relaxants with that of the group who were not.

**Results:** Those with a diagnosis of anxiety who were taking anxiolytics (*n* = 32) stayed 1.8 days longer than those with no diagnosis of anxiety and who were not taking anxiolytics (*n* = 224) after LDF surgery (*p* = 0.003). Those with a diagnosis of anxiety who were taking anxiolytics (*n* = 32) stayed 1.9 days longer than those with no diagnosis of anxiety and who were taking anxiolytics (*n* = 24) after LDF surgery (*p* = 0.003).

**Conclusion:** Our study suggests that those with a diagnosis of anxiety who take medications for that condition have a longer LOS than those with no diagnosis of anxiety and who are not medicated for the condition. This could be because these patients are more vulnerable to states of anxiety when required to be nil per os for 12 hours before surgery.

## INTRODUCTION

It is well established that psychological factors affect spinal surgery outcomes.<sup>1,2</sup> Surgical literature suggests that anxiety may affect length of stay (LOS).<sup>3,4</sup> However, in a time of increasing number and cost of spinal procedures, relatively little inquiry exists regarding the influence of anxiety on LOS in neurosurgical literature. By way of inquiry we conducted the following retrospective study and our cohort was not subjected to any treatments or implementations. Institutional review board approval was not necessary.

## METHODS

At our institute, medical records of all patients (consecutively selected) who underwent elective lumbar decompression and fusion surgery from October 1, 2010, through September 30, 2013, were retrospectively reviewed. Exclusion criteria were staying for more than 20.4 days, 3 standard deviations (SDs) above the mean LOS (5.7 days, SD = 4.9), and a pre-operative history of taking baclofen (chlorophenibut), used for advanced muscular disorders.

A total of 55 variables were collected from each patient (Table 1). Variables that were related to psychiatric problems included a history of anxiety, depression, and anxiolytic use. Anxiolytic medications were benzodiazepines, buspirone, and selective serotonin reuptake inhibitors (SSRIs). We divided our patients into 4 cohorts on the basis of their history of anxiety and anxiolytic use (Table 2).

LOS was measured from the first day of the procedure until time of discharge, measuring the days up to the first decimal place.

All collected variables (Table 1) were entered into a linear regression analysis (using SPSS software, version 19 [SPSS, IBM, Armonk, NY]), and the variables that showed an independent impact on LOS were identified and considered to be confounding variables (see Sidebar: Variables Identified Using Linear Regression and Multivariate Analysis Showing Significant Independent Impact on Hospital Length of Stay). To better isolate the impact of the 4 anxiety cohorts on LOS from the effect of the confounding variables, we used multivariate analysis.

### Variables Identified Using Linear Regression and Multivariate Analysis Showing Significant Independent Impact on Hospital Length of Stay<sup>a</sup>

- Postoperative urinary retention
- Dural tear/cerebrospinal fluid leak
- Severe respiratory problems
- Postoperative pulmonary embolism
- Postoperative anemia severity
- Other mild postoperative problems
- Fever

<sup>a</sup> *p* < 0.001 for each of these variables.

Hollis Floyd is a Research Assistant at the Georgia Neurosurgical Institute in Macon. E-mail: hollisfloyd@gmail.com. Mazen Sanoufa, MD, is a Research Fellow at the Georgia Neurosurgical Institute in Macon. E-mail: mazensanoufa@gmail.com. Joe Sam Robinson, MD, is a Neurosurgeon at the Georgia Neurosurgical Institute in Macon. E-mail: jrobinson@ganeuroandspine.com.

Table 1. Collected variables	
General characteristics	Variables
Patient Measures	Age Sex Number of operated levels Payer class Postoperative hemoglobin level Preoperative hemoglobin level Pre- to postoperative hemoglobin drop Race Need for blood transfusion
Comorbidities	Asthma Arrhythmia Body mass index Chronic obstructive pulmonary disease Congestive heart failure Constipation Coronary artery disease Diabetes mellitus Hearing loss Hypertension Hypothyroidism Inflammatory arthritis Major depression Memory loss Morbid obesity Neuromuscular disorders Noninflammatory arthritis Obesity Peptic ulcer disease Preoperative anemia Renal failure Seizure Sleep apnea Stroke Total comorbidity number Transient ischemic attack Vision loss Vitamin D deficiency
Medications	Anticoagulant use Antidiabetic medications Anxiolytic use Steroids Total number of medications used on daily basis
Intra-/Postoperative complications	Asthma/chronic obstructive pulmonary disease exacerbation Constipation Dural tear/cerebrospinal fluid leak Dysphagia Fever with no clear infection Infection Postoperative anemia severity Psychiatric symptoms Pulmonary embolism Total number of complications Urinary tract infection Urinary retention Wound infection

Table 2. The 4 patient cohorts based on history of anxiety and anxiolytic use				
History	Cohort 1	Cohort 2	Cohort 3	Cohort 4
Anxiety	Yes	No	Yes	No
Anxiolytic use	Yes	Yes	No	No

Table 3. Detailed description of total study cohort	
Patient characteristic	N = 307
Age, mean (years)	58 ± 10.7
Female sex, n (%)	178 (58)
Male sex, n (%)	129 (42)
White race, n (%)	210 (68)
African American race, n (%)	91 (30)
Other race, n (%)	6 (2)
Body mass index, mean (kg/m <sup>2</sup> )	31 ± 6.5
Length of stay, mean (days)	5.0 ± 2.9

## RESULTS

After applying the exclusion criteria, the total number of patients considered in this study was 307 (see Table 3 for a detailed cohort description). The mean (standard deviation) LOS was 5.0 (2.9) days. For more details about the 4 anxiety cohorts see Table 2.

Of the 55 variables considered in the linear regression analysis, the variables that showed an impact on LOS, the confounding variables, were number of operated levels ( $p = 0.033$ ), postoperative hemoglobin levels ( $p < 0.001$ ), dural tear ( $p < 0.001$ ), postoperative pulmonary embolism ( $p < 0.001$ ), and postoperative urinary retention ( $p = 0.012$ ).

Studying the LOS difference between the 4 anxiety cohorts using multivariate analysis and considering the confounding variables attained the following results: The LOS in cohort 1 was significantly longer than that of cohort 3 (mean difference, 1.9 days;  $p = 0.012$ ) and cohort 4 (mean difference, 1.8 days;  $p = 0.003$ ), with no differences between cohort 2 and the other cohorts.

## DISCUSSION

Some of our study limitations were that the collection of variables, including comorbidity history, was taken from the patients' medical charts and not determined by diagnostic testing methods; also, LOS is always a weak outcome indicator because it can be affected by numerous and complicated factors.

Despite their both having histories of anxiety, cohort 1 stayed significantly longer than cohort 3. We believe cohort 3 possibly experienced situational as opposed to chronic anxiety, because they were not receiving any medications, making their psychological states similar to those of cohort 4. Cohort 2 did not significantly stay longer than any of the other groups. This is probably because their anxiolytic medications may have been taken for mental disorders other than anxiety.

Pursuant to the observed impact of psychological variables upon hospital LOS, several suggestions arose:

### Better Preoperative Psychological Assessment

Several studies have proved successful in using the Minnesota Multiphasic Personality Inventories test preoperatively to categorize patients as having anxiety.<sup>5</sup> These studies suggest that the lower the anxiety score, the more successful the patient's recovery. So, performing preoperative psychological tests would be of significant benefit.

On the basis of the patient's anxiety score, interventions could be implemented (ie, anxiolytic medications or education about the surgery) to help lower anxiety titers and thus decrease LOS. The cost of performing this test is approximately \$25, according to our institute's psychologist; however, an extra day at the hospital costs approximately \$2000.<sup>6</sup>

### Better Preoperative Counseling

We further suggest providing preoperative education about the surgery that the patient is about to undergo to help ease anxiety. Despite preoperative education's ability to decrease anxiety before surgery, its effects on LOS are still unclear.<sup>7</sup>

### Better Assessment of Preoperative Medications

Patients receiving psychotropic medications for long periods before the surgery may be getting extra pain medications. Their pain protocols need to be further investigated. If patients taking psychotropic medications are getting extra pain medications and this is affecting their ability to ambulate, this could be prolonging their LOS. Still, further prospective studies in this regard are warranted.

### CONCLUSION

Our study suggests that those with a diagnosis of anxiety who are medicated for that condition have a longer LOS than those with no diagnosis of anxiety and who are not medicated for the condition. Further prospective perioperative studies appear warranted. ❖

### Disclosure Statement

*The author(s) have no conflicts of interest to disclose.*

### Acknowledgment

*Mary Corrado, ELS, provided editorial assistance.*

### References

1. Menendez DE, Neuhaus V, Bot AG, Ring D, Cha TD. Psychiatric disorders and major spine surgery: epidemiology and perioperative outcomes. *Spine (Phila Pa 1976)* 2014 Jan 15;39(2):E111-22. DOI: <http://dx.doi.org/10.1097/BRS.0000000000000064>.
2. Adogwa O, Verla T, Thompson P, et al. Affective disorders influence clinical outcomes after revision lumbar surgery in elderly patients with symptomatic adjacent-segment disease, recurrent stenosis, and pseudarthrosis: clinical article. *J Neurosurg Spine* 2014 Aug;21(2):153-9. DOI: <http://dx.doi.org/10.3171/2014.4.SPINE12668>.
3. Bot AG, Menendez ME, Neuhaus V, Ring D. The influence of psychiatric comorbidity on perioperative outcomes after shoulder arthroplasty. *J Shoulder Elbow Surg* 2014 Apr;23(4):519-27. DOI: <http://dx.doi.org/10.1016/j.jse.2013.12.006>.
4. Fox JP, Philip EJ, Gross CP, Desai RA, Killelea B, Desai MM. Associations between mental health and surgical outcomes among women undergoing mastectomy for cancer. *Breast J* 2013 May-Jun;19(3):276-84. DOI: <http://dx.doi.org/10.1111/tbj.12096>.
5. Marek RJ, Block AR, Ben-Porath YS. The Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF): incremental validity in predicting early postoperative outcomes in spine surgery candidates. *Psychol Assess* 2015 Mar;27(1):114-24. DOI: <http://dx.doi.org/10.1037/pas0000035>.
6. Stranges E, Kowlessar N, Elixhauser A. Components of growth in inpatient hospital costs, 1997-2009. Statistical brief #123 [Internet]. Rockville, MD: Agency for Health Care Research and Quality; 2011 Nov [cited 2015 Apr 20]. Available from: [www.hcup-us.ahrq.gov/reports/statbriefs/sb123.jsp](http://www.hcup-us.ahrq.gov/reports/statbriefs/sb123.jsp).
7. Rhodes L, Nash C, Moisan A, et al. Does preoperative orientation and education alleviate anxiety in posterior spinal fusion patients? A prospective, randomized study. *J Pediatr Orthop* 2015 Apr-May;35(3):276-9.

## Anxiety

[The physician] realizes that a state of acute or chronic anxiety induces important physiological reactions, as well as destructive and interpersonal ones.

— Philip A Tumulty, 1912-1989, professor of medicine, Johns Hopkins University