

# Navigating Risk in a Capitated or Bundled Payment Model for Spine Surgery: Introduction of the Carolina - Semmes Prediction Tool

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## Introduction

Extended length of hospital stay(LOS), unplanned hospital readmission, and need for inpatient rehabilitation following spine surgery contribute significantly to variation in surgical healthcare cost. As novel payment models shift, the risk of cost over runs from payers to providers, understanding patient-level risk of these events is critical. We set out to develop a grading scale that stratifies risk of these costly events after elective surgery for degenerative lumbar pathologies.

## Methods

6,921 cases prospectively enrolled into the QOD registry were queried (elective 1-3 level lumbar surgery for degenerative pathology). The association between pre-operative patient variables and extended LOS(=7 days), discharge status (inpatient facility vs. home), and 90-day hospital readmission were assessed by step-wise multivariate logistic regression. Carolina-Semmes grading scale was constructed using the independent predictors for LOS (0-8 points), discharge to inpatient facility (0-10 points), and 90-day re-admission (0-8), its performance was assessed in the QOD dataset and then confirmed separately after applying to the Carolina Neurosurgery & Spine Associates[CNSA] and

## Results

290 (4.2%) patients required extended LOS, 654 (9.4%) required inpatient facility rehab, and 474 (6.8%) 90-day hospital readmission. Variables independently associated with these unplanned events in multivariate analysis are summarized in Table 1. Increasing point totals in the Carolina-Semmes scale effectively stratified the incidence of extended LOS, discharge to facility, and re-admission in both the aggregate QOD dataset(Fig 1) and when subsequently applied to two practice groups(Fig 2).

## Conclusions

For patients undergoing first time elective 1-3 level degenerative lumbar spine surgery, we introduce the Carolina-Semmes grading scale that effectively stratifies risk of prolonged hospital stay, need for post-discharge inpatient facility care, and 90-day hospital readmission. This scale may be helpful in identifying high-risk patients who may benefit from preventative health services strategies and education as well as help structure capitated/bundled care contracts to minimize risk on the provider.

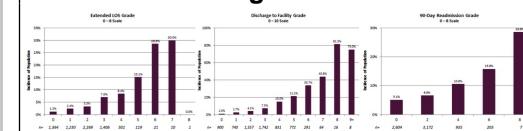
## Learning Objectives

We introduce a novel grading scale to risk-stratify the patients based on their need for extended LOS, discharge to inpatient rehabilitation facility and 90-day readmission. Analyses such as these can allow hospitals and surgeons to risk stratify their practices to allow for more appropriate third party evaluations of patient outcomes. Furthermore, understanding and accurately predicting which patients may require additional resource utilization within a global period after surgery may help facilitate the creation and implementation of risk-adjusted bundled payment systems that would more fairly compensate surgeons and hospitals for advanced services. Regular use of such a predictive model based grading scale can lead to more informed decision-making when discussing treatment options and expectations with patients

## References

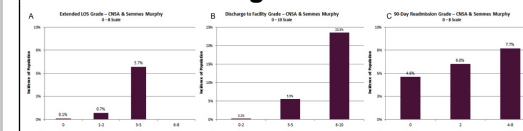
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Figure 1.



Bar chart incidence rates of extended length of stay (LOS >7days), discharge to facility, and hospital readmission after elective 1-3 level lumbar surgery per the Carolina-Semmes grading scale within the QOD dataset.

Figure 2.



Bar chart incidence rates of extended length of stay, discharge to care facility, and 90-day hospital readmission after elective 1-3 level lumbar surgery per the Carolina-Semmes grading scale for patients treated at Carolina Neurosurgery & Spine Associates (Charlotte, NC) and Semmes-Murphy Clinic (Memphis, TN).