

# Preoperative Pain Intensity and Chronicity and Postoperative Analgesia Markers of Length of Stay in Patients Undergoing Spinal Fusion

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## Abstract

**Introduction:** Pain medication use is enormous in those looking for relief of chronic back pain. The impact of long-term analgesia use might serve as a marker for prolonged hospitalization due to undertreating postoperative pain, which could ultimately result in higher health care costs.

**Methods:** We studied preoperative pain intensity and chronicity and the amount of postoperative analgesia as a marker of length of stay (LOS) in patients undergoing spinal fusion. The charts of patients undergoing cervical or lumbar spinal fusion were reviewed, and data on their intensity of pain at admission and length of pain was documented, as was the amount of morphine used.

**Results:** Regression analysis revealed statistical significance only between LOS and surgical site (neck or lumbar spine). It showed no significance between LOS as the dependent variable and preoperative pain parameter, postoperative morphine per kilogram, sex, or age as predictors.

**Conclusion:** Postoperative pain management continues to be a challenge because of the need to balance satisfactory analgesia in patients with the fear of adverse effects due to overdosing. This challenge is even greater in patients with long-term narcotic use. Anecdotally, patients undergoing spinal fusion show an inverse relationship between LOS and amount of use of postoperative pain medication. A more extensive scientific review of current postoperative pain control protocols is warranted in patients undergoing spinal fusion.

## Introduction

Chronic back pain is a common problem, with a high impact on work productivity and quality of life.<sup>1,2</sup> The long-term use of pain medication in Americans is enormous in those looking for symptomatic pain relief for this ongoing, debilitating problem. The impact of long-term analgesia use might serve as a marker for prolonged hospitalization due to the increased risk of undertreating postoperative pain and ultimately resulting in higher health care costs. In this research, we studied preoperative pain intensity and chronicity and the amount of postoperative analgesia as a marker of length of stay (LOS) in patients undergoing spinal fusion.

## Methods

The charts of 24 patients undergoing cervical spinal fusion and 52 patients undergoing lumbar spinal fusion were reviewed. Data on the patients' intensity of pain at admission on a 0 to 10 scale

and their length of preoperative pain in months was documented as well as whether the patient had a patient-controlled analgesia (PCA) pump, the amount of morphine used via PCA pump, and the patient weight. The patients were selected consecutively among those operated on by 5 surgeons in our center.

The cap on morphine dosage was 1 mg every 10 minutes with lockout at 6 mg/hour. The concentration of morphine used with the PCA pump was 5 mg/mL. The PCA pump was discontinued at 6 am on the day after the operation, and the patient was given 1 or 2 hydrocodone-acetaminophen (Norco) 5-mg tablets by mouth every 4 hours as needed for pain for 3 days. For nonopioid control of pain in the postoperative period, ketorolac was given intravenously at a dosage of 15 mg every 8 hours scheduled for 24 hours for patients older than age 65 years, or 30 mg every 6 hours scheduled for 48 hours for patients younger than age 65 years. Also given postoperatively, as a muscle relaxant, was either cyclobenzaprine (Flexeril), a 10-mg tablet orally 3 times a day for 3 days, or carisoprodol (Soma), a 350-mg tablet orally 4 times a day for 4 days.

## Results

In the whole cohort, the average pain intensity score at admission was 8.1 (range, 3 to 10). The average length of preoperative pain was 28.5 months (range, 1 week to 30 years). Of the 76 patients, 52 had a PCA pump. The average amount of morphine used via PCA was 20.8 mL (range, 1 to 49 mL).

Approximately half of the patients (52.3%) used 20 mL or less of morphine, 43.1% used between 20 mL and 40 mL, and 4.6% used more than 40 mL. The average weight of patients was 93.8 kg (standard deviation [SD], 23.9 kg). The average amount of morphine per kilogram of body weight was 0.23 mL/kg (SD, 0.16 mL/kg) where 50.7% of the patients received 20 mL/kg or less, 43.1% received between 20 and 50 mL/kg, and 6.2% received more than 50 mL/kg. Those who had the highest milliliters per kilogram of morphine had a preoperative average pain intensity of 9 and a length of pain of 37 months compared with 8.2 pain intensity and 26.7 months of pain for patients who used a low amount of morphine per kilogram of weight.

Patients undergoing cervical spinal fusion had an average pain intensity at admission of 7.5 (range, 4 to 10). The average length of pain before surgery was 12.9 months (range, 1 month to 10 years). The average amount of morphine administered was 23.6 mL (range, 5 to 48 mL). Their average LOS was 59.7 hours (SD, 64.9 hours).

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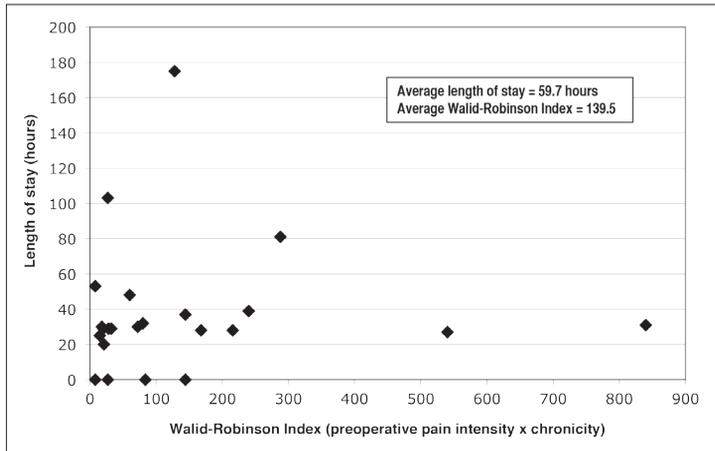


Figure 1. Regression analysis of length of stay (dependent variable) and preoperative pain parameter (intensity at admission times chronicity as predictor variable) in patients undergoing cervical spinal fusion.

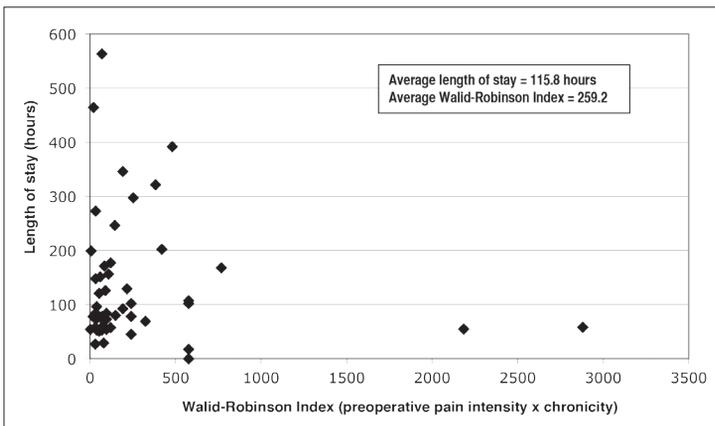


Figure 2. Regression analysis of length of stay and preoperative pain parameter in patients undergoing lumbar spinal fusion.

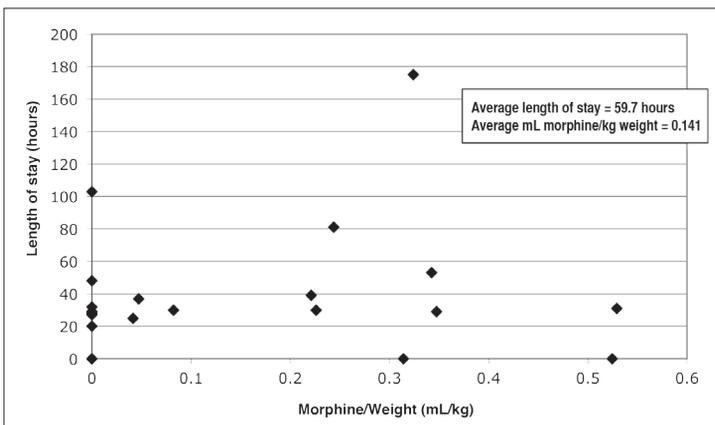


Figure 3. Regression analysis of length of stay and postoperative milliliters of morphine per kilogram of body weight in patients undergoing cervical spinal fusion.

Patients undergoing lumbar spinal fusion had an average pain intensity at admission of 8.4 (range, 3 to 10). The average length of preoperative pain was 35.7 months (range, 1 week to 30 years). The average amount of morphine given was 20.1 mL (range, 1 to 49 mL). The average LOS was 115.8 hours (SD, 86.3 hours).

Regression analysis was performed with LOS as the dependent variable and a preoperative pain parameter (Walid-Robinson Index<sup>3</sup>: intensity at admission times chronicity; Figures 1 and 2), postoperative morphine per kilogram of weight (Figures 3 and 4), surgical site (neck or lumbar spine), sex, and age as predictors. The only statistically significant variable was surgical site ( $t = 3.268, p = 0.002$ ). Otherwise, there was no significant impact on LOS from preoperative pain parameters ( $t = -1.039, p = 0.302$ ), the amount of postoperative analgesia per weight ( $t = 0.781, p = 0.438$ ), sex ( $t = 0.184, p = 0.855$ ), or age ( $t = 1.522, p = 0.132$ ).

**Discussion**

A substantial portion of patients who presented for lumbar and cervical spinal fusions have a history of long-term use of pain medication. Our patient population had high average pain intensity for an extensive time, which supports this longtime use. A review of the literature supports what was observed. Patients undergoing spinal procedures often have preoperative pain, which serves as a major source of distress.<sup>4</sup> Most of these patients rely on high, sometimes massive, doses of narcotics to experience pain relief. The current study examined whether long-term analgesia use might serve as a marker for prolonged hospitalization.

No statistical significance between LOS as the dependent variable and preoperative pain parameter, postoperative morphine per kilogram of weight, sex, or age as predictors was observed in our patient population. Significance was observed only between LOS and surgical site.

Postoperative pain management is a challenge because of the need to balance satisfactory analgesia in a patient with the fear of respiratory depression or other side effects. This challenge is even greater in those with long-term narcotic use because of the need for higher levels of medication to achieve the same level of analgesia. The question arises about the amount and duration of pain medication use postoperatively to help with comfort, quicker recovery, and consequently shorter LOS. Postoperative pain control with the use of the PCA pump provides better pain control and greater patient satisfaction than conventional parenteral as-needed analgesia.<sup>5</sup> The PCA pump is set with a cap on the morphine dosage of 1 mg per 10 minutes and a lockout at 6 mg/hour (concentration of morphine at 5 mg/mL). The restricted amount of morphine in the postoperative period could limit pain control and lead to a greater length of stay. However, the patients in this study never “maxed out” on morphine use. This possibly could be accounted for by other analgesia use during the hospital stay if overlapping with PCA pump use. Although not significant, patients with spinal fusion showed an inverse relationship between LOS and amount of postoperative pain medication use.

The small number of patients in the study serves as a limitation, and increasing this number could help confirm these results

or possibly lead to different results. A more extensive scientific review of current postoperative pain control protocols in spinal fusion patients is warranted because of the possible implications.

Each patient has different factors affecting the amount of morphine that is adequate, such as weight, tolerance based on past pain medication use, and genetics. Risk factors for postoperative pain after spinal surgery should also be considered. These risk factors include psychologic, social profile, and preoperative pain severity.<sup>6-8</sup> Tailoring the postoperative pain medication to the individual at least by considering preoperative pain medication use, weight, and risk factors should help achieve satisfactory analgesia and decrease the LOS. Shorter LOS will help decrease hospital expenses and better combat the continuing decreases in reimbursements while concurrently providing better patient care. ❖

#### Disclosure Statement

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

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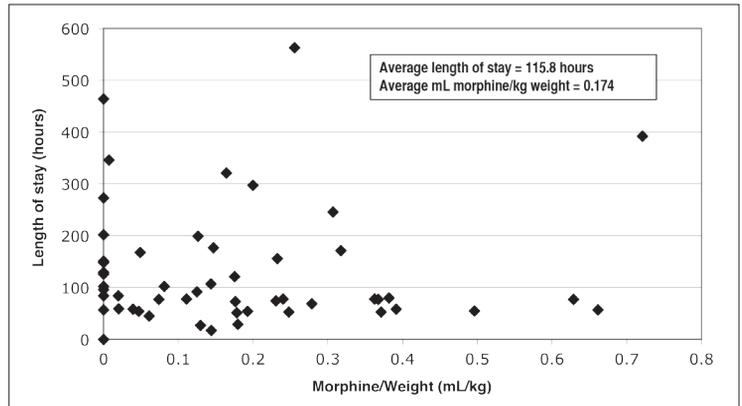


Figure 4. Regression analysis of length of stay and postoperative milliliters of morphine per kilogram of weight in patients undergoing lumbar spinal fusion.

## Pain

Pain insists upon being attended to. God whispers to us in our pleasures,  
speaks in our consciences, but shouts in our pains.  
It is his megaphone to rouse a deaf world.

— CS Lewis, 1898 – 1963, British theologian, writer, and critic