



## ARTICLE OF THE MONTH

### Impact of a Perioperative Protocol on Length of ICU and Hospital Stay in Complex Spine Surgery

*Ayrian E et al; JNA Jan 2021*

Welcome to another session of Article of the Month, February 2021. This month, we discuss the impact of a perioperative protocol on the length of ICU and hospital stay in complex spine surgery, commentary by Dr. Letha Mathews.

As always, readers are welcome to join us for further discussion and feedback on the SNACC [Twitter](#) feed, or on [Facebook](#).

- Shilpa Rao, MD, Amie Hoefnagel, MD, Oana Maties, MD, and Nina Schloemerkerper, MD

#### **Dr. Letha Mathews Biographical Sketch**

Dr. Letha Mathews is currently a Professor of Clinical Anesthesiology at Vanderbilt University Medical Center (VUMC) in Nashville, TN, USA. She serves as the Division Chief and Clinical Director of Neuroanesthesiology at VUMC.

Dr. Mathews obtained her medical degree, M.B.B.S from Gauhati Medical College, Gauhati University, Assam, India. She then moved to United Kingdom and completed four years of anesthesia training in the South Manchester University Hospitals, UK and obtained the FFARCS (I) degree before immigrating to Nashville, TN. Dr. Mathews subsequently completed one year of residency and a Pain fellowship from Vanderbilt University Medical Center. She also obtained a fellowship in Neuroanesthesiology from University of Louisville. After completing her training Dr. Mathews joined VUMC as an Asst. Professor in the Department of Anesthesiology in 1994. She got her board certification in Anesthesiology in 1995 and Pain management certification in 1996.

During her tenure at Vanderbilt she has focused her clinical practice primarily providing perioperative care for complex neurosurgical patients. In her role as Division Chief she provides leadership and direction for the division of Neuroanesthesiology. She has helped develop numerous clinical protocols and several quality improvement projects involving neurosurgical population such as surgical site infection and perioperative pressure ulcer reduction. She led the development of Enhanced Recovery after Surgery (ERAS) for patients undergoing spine surgery.

She is also a passionate educator who has trained and mentored numerous residents and medical students and allied health professionals. Dr. Mathews has codirected the development of the curriculum for basic and advanced rotation for the residents undergoing neuroanesthesia training at VUMC. She is on the education committee of the Society of Neurosciences in Anesthesiology and Critical Care (SNACC) and is actively involved in the society.

She has authored several book chapters and peer reviewed publications and presented at the national level. Her clinical research interests are in the area of anesthetic implications for spinal cord injury, opioid sparing techniques during spine surgery and craniotomy and functional neurosurgery.

# Commentary

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The number of spine surgeries have increased exponentially over the past few decades across the world. A recently published study found that there was a 26.0% increase in annual lumbar fusion procedure volume in the Medicare population in the USA from 2012-2017, with a compound annual growth rate (CAGR) of 4.7% (1) with increased cost and resource utilization. The complexity of spine surgeries has also increased, which when combined with preexisting medical conditions in an elderly population, can lead to a higher rate of perioperative complications. It is therefore, imperative that physicians and other perioperative care team members be invested in evidence based care practices to improve outcomes, decrease length of stay, and improve patient satisfaction. Many institutions have developed enhanced recovery after surgery (ERAS) protocols for a variety of surgical specialties following successful implementation in colorectal surgery published in 2001 by Kehlet H et al (2)

Ayrain et al. presented a retrospective cohort study conducted by chart review of elective, complex spine surgeries in an academic setting, over a 5- year period ending in 2017. The authors hypothesized that instituting a standardized protocol would decrease hospital and ICU length of stay (LOS) in elective complex spine surgery. The protocol included guidelines for preoperative optimization, intraoperative management, laboratory utilization, and transfer of care to ICU team after surgery. Preoperative optimization was a major part of the protocol which included bi-monthly interdisciplinary meetings to discuss patients scheduled for surgery.

In this study they included 201 patients in total, 107 in the before-protocol group and 94 in the protocol group. Inclusion criteria were 1 or more of the following: surgery involving 6 or more vertebral levels, 6 or more hours of surgical duration, predicted blood loss > 2 L, combined anterior posterior approach, staged procedure, procedure classified as high risk by the spine surgeon, patients with significant co-morbidities, and patients over 70 years of age. All trauma spine patients and those with known coronary artery disease (except those who were symptom free and had revascularization surgery within 5 years) were excluded from the study.

The primary outcome of the study was hospital LOS which was measured from the day of surgery to discharge.

The secondary outcomes were ICU LOS, number of complications during hospitalization, and 30-day mortality. For the list of “complications” I refer the reader to the article. The demographics of the patients in the two groups were similar. The mean age of the before-protocol group was 63± 12 with 37.4 % being male. The mean age of the protocol group was 65 ± 15 with 42.6 % male. There was no difference in the ASA physical status score and co-morbidities in the two groups. Notable exception between the two groups was that there were significantly more patients who underwent spine surgery for tumor in the before-protocol group compared to the protocol group (25.2% vs 7%) respectively.

The results of the study showed that mean (SD) hospital LOS was lower in the protocol group than the before protocol group which was significant (10±10.7 vs. 14.8 ± 10.8; P <0.001). Mean ICU LOS was also lower in the protocol group compared to before-protocol group (4.2±6.3 vs.6.3±7.3d; P=0.011). There were no significant differences in the postoperative complications between the groups (P= 0.231) although there was a trend towards reduction in some complications such as respiratory failure and sepsis. It is important to note that the study was not powered enough to detect differences in secondary outcomes.

This study has several limitations. This is a retrospective study which is prone to errors in measurement and recall biases as the authors have stated in the paper. The study was underpowered and adherence to protocol was not confirmed. The protocol had no formal postoperative component at the time of the study although there was some consistency in the level of postoperative care as the ICU physicians and hospitalists caring for these patients were involved in the preoperative planning.

In conclusion, this study supports some of the previously published studies which suggested that perioperative protocols can decrease LOS in high risk spine surgery. Large scale prospective studies are warranted.

The authors have to be commended on the preoperative management and implementation of the multidisciplinary perioperative care strategy as well as continuous communication among all the providers. The authors also mention that no cases were cancelled due to patients' medical condition. This in itself is a “win” as day of surgery cancellation comes at a high cost to patients and the hospitals. Lastly, the consistency of teams of anesthesiologists and surgeons and nurses

and other physicians working together in a familiar setting can contribute to improved communication (3) and better patient outcomes.

## References

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2. Wilmore DW, Kehlet H: Management of fast track surgery *BMJ* 2001; 322:473
3. Zeeni C, Carabini LM, Gould RW et al The implementation and efficacy of the Northwestern High Risk Spine Protocol *World Neurosurg* 2014 ;82: e815-e823