Enhanced Surgical Recovery for Thoracolumbar Spine Surgery is Associated with Decreased Opioid Consumption, Length of Hospital Stay, and Hospital Readmissions: Evaluation of 51,236 Cases

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INTRODUCTION:
Evidence-based enhanced surgical recovery (ESR) programs integrate a multidimensional approach to optimize patients during the pre-, intra-, and post-operative phases of surgery. Smaller studies show benefits of spine surgery ESR; this study evaluates the effects of ESR for thoracolumbar (TL) surgery on a national scale. We hypothesize that ESR is associated with a reduction in daily morphine milligram equivalents (MME), length of hospital stay (LOS), and 30-day readmission (READMIT) rates.
METHODS:
This is a retrospective case-control study of a prospectively adopted large healthcare system ESR program. Data from TL spine fusion procedures were extracted from hospital-based electronic medical records. Patients were divided into two cohorts, ESR or non-ESR, based upon enrollment into an ESR program defined by (1) preoperative patient education, (2) multimodal analgesia, (3) intraoperative fluid optimization, (4) opioid-sparing anesthesia, and (5) early postoperative nutrition and ambulation. Study exclusion criteria were: unknown ESR status, age<18 yrs, and/or surgery for tumor, infection, or trauma. Impact of ESR upon postoperative MME, LOS, and READMIT was evaluated for single-level TL fusions, multi-level TL fusions, and all TL fusions using multivariable linear and logistic regression models.
RESULTS:
51,236 TL fusion cases were identified from 2018 to 2021: 24,391 participated in an ESR program and 26,845 did not. ESR and non-ESR groups were demographically similar. For single level TL fusions, ESR was associated with decreased MME (β= -8.76, p<0.001), LOS (β= -8.85, p<0.001), and READMIT (OR=0.77, 95% CI: 0.67-0.88). For multi-level TL fusions, ESR was associated with decreased MME (β= -7.32, p<0.001) and LOS (β= -12.14, p<0.001), and for all TL fusions, ESR was associated with decreased MME (β= -7.94, p<0.001), LOS (β= -10.54, p<0.001), and READMIT (OR=0.91, 95% CI: 0.84-0.98; Table).
DISCUSSION AND CONCLUSION:
This national healthcare system analysis of over 50,000 TL spine fusion cases by over 1,350 surgeons at 138 centers across the United States confirms that ESR adoption is associated with decreased daily MME, LOS, and 30-day READMIT rates. Surgeons should consider adoption of ESR programs to improve patient care.

Table: Regression results showing outcomes associated with ESR by surgical cohort

	ASSOCIATION WITH ESR					
	Linear Regression				Logistic Regression	
	MME (daily)		LOS (hours)		READMIT	
	β	ρ	β	ρ	OR	95% CI
Single-level fusions	-8.76	<0.001	-8.85	<0.001	0.77	0.67-0.88
Multi-level fusions	-7.32	<0.001	-12.14	<0.001	0.99	0.90-1.09
All TL fusions	-7.94	<0.001	-10.54	<0.001	0.91	0.84-0.98

ESR enhanced surgical recovery, MME morphine milligram equivalents, LOS length of stay, READMIT 30-day hospital readmission rate, β beta coefficient, ρ p-value, OR odds ratio, CI confidence interval, TL thoracolumbar