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2020

## Reduced Length of Stay in Major Hepatectomy Surgery After Implementation of an Enhanced Recovery Pathway in the United States Veteran Population

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### Recommended Citation

1. Greer NL, Gunnar WP, Dahm P, Lee AE, MacDonald R, Shaukat A, Sultan S, Wilt TJ. Enhanced Recovery Protocols for Adults Undergoing Colorectal Surgery: A Systematic Review and Meta-analysis. *Dis Colon Rectum*. 2018;61:1108–1118 2. Thornblade, Lucas W et al. "Enhanced Recovery via Peripheral Nerve Block for Open Hepatectomy." *Journal of gastrointestinal surgery: official journal of the Society for Surgery of the Alimentary Tract* vol. 22,6 (2018): 981-988. doi:10.1007/s11605-017-3656-y 3. Bruns H, Krätschmer K, Hinz U, et al. Quality of life after curative liver resection: a single center analysis. *World J Gastroenterol*. 2010;16(19):2388-2395. doi:10.3748/wjg.v16.i19.2388 4. Greer N, Sultan S, Shaukat A, et al. Enhanced Recovery After Surgery (ERAS) Programs for Patients Undergoing Colorectal Surgery [Internet]. Washington (DC): Department of Veterans Affairs (US); 2017 Aug. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK519374/>

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# Reduced Length of Stay in Major Hepatectomy Surgery After Implementation of an Enhanced Recovery Pathway in U.S. Veterans

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## Background

Enhanced Recovery After Surgery (ERAS) protocols have been shown to improve the postoperative recovery of patients undergoing many types of surgeries[1]. However, evidence is lacking for ERAS pathways in major liver surgery, which is associated with significant postoperative pain and complications [2, 3]. This data is especially lacking in the United States (U.S.) veteran population [4].

Estimated number of new cases in 2018, worldwide, males, all ages

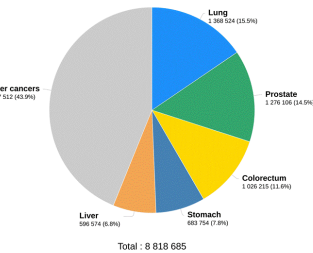


Figure 1: Incidence of Cancer in Males

Estimated age-standardized mortality rates (World) in 2018, worldwide, males, all ages

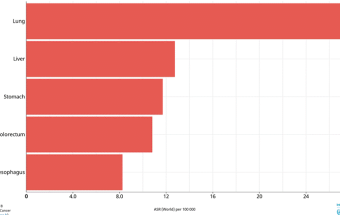


Figure 2: Cancer Related Mortality Rates in Males

## Purpose

This study aimed to evaluate the impact of an ERAS pathway in U.S. veterans undergoing major hepatectomy surgery. We hypothesized that the adoption of an ERAS pathway reduces decreased length of stay (LOS) and perioperative narcotic usage.

## Materials and Methods

After approval from the Hunter Holmes McGuire VA Medical Center IRB, we compared data from consecutive patients undergoing elective open hepatectomy within an ERAS pathway (January 2019-December 2019) to a previous cohort of patients before introduction of ERAS (July 2016-December 2017). One surgeon performed all the procedures.



Image 1: Hunter Holmes McGuire VA Medical Center

## Materials and Methods Continued

Our inclusion criteria incorporated all patients over the age of 18 who underwent an open hepatectomy. Exclusion criteria were procedures with additional non-hepatobiliary resections and death during hospital course. A total of 24 patients were evaluated. Nine completed the ERAS pathway versus fifteen in the traditional group. Patient demographic information was collected including age (years) and American Society of Anesthesiology Class (ASA 1-4).

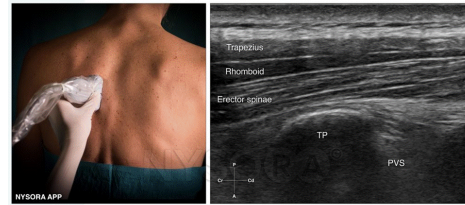


Image 2: Ultrasound approach to ESP

Pre-operative components of the protocol included patient education, avoidance of bowel preparation, and consumption of clear carbohydrate drinks until two hours prior to surgery. All patients without contraindication received regional anesthesia. Patients received bilateral continuous erector spinae plane (ESP) blocks. Intraoperative measures included standardized anesthetic management, goal directed fluid therapy, and minimizing the use of intravenous opiates. Post-operative components included avoidance of nasogastric tubes, encouragement of liquids immediately after surgery, and early ambulation. The primary outcome was postoperative LOS. Secondary outcomes were perioperative oral morphine equivalents. We tested for differences between patients using two-tailed Mann-Whitney U tests.

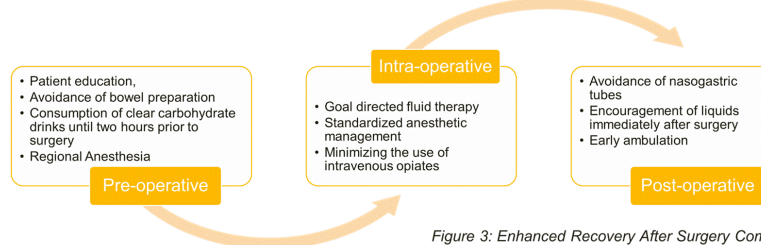


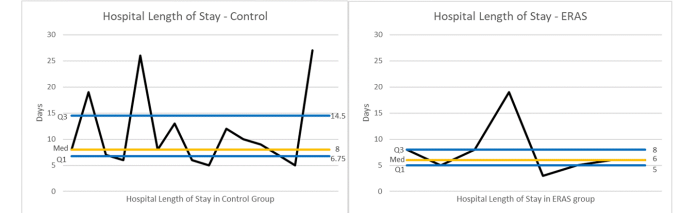
Figure 3: Enhanced Recovery After Surgery Components

## Results

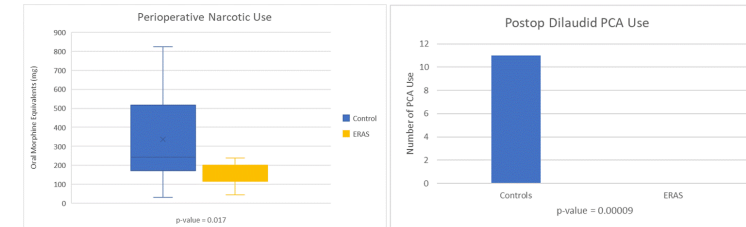
There was a clinically significant reduction in LOS in the ERAS group (7.2 days +/- 4.7) compared to traditional care (11.2 days +/- 7.2, p=0.06). Patients in the ERAS group used significantly less intraoperative opioids(63.9 mg +/-34.3) than the control group (104.7mg +/- 38.7, p=0.01).

## Results Continued

The ERAS group also used significantly less postoperative narcotics (152.7 mg +/- 60) than the control group (335.9 mg +/- 240, p= 0.03). Patient controlled analgesia (PCA) was required for 73% of the traditional patients compared to 0% in the ERAS group (p=-0.00009).



Graph 1: Length of Stay, Controls vs ERAS Groups



Graph 2: Perioperative Narcotic Use

Graph 3: Postoperative Dilaudid PCA use

## Conclusions

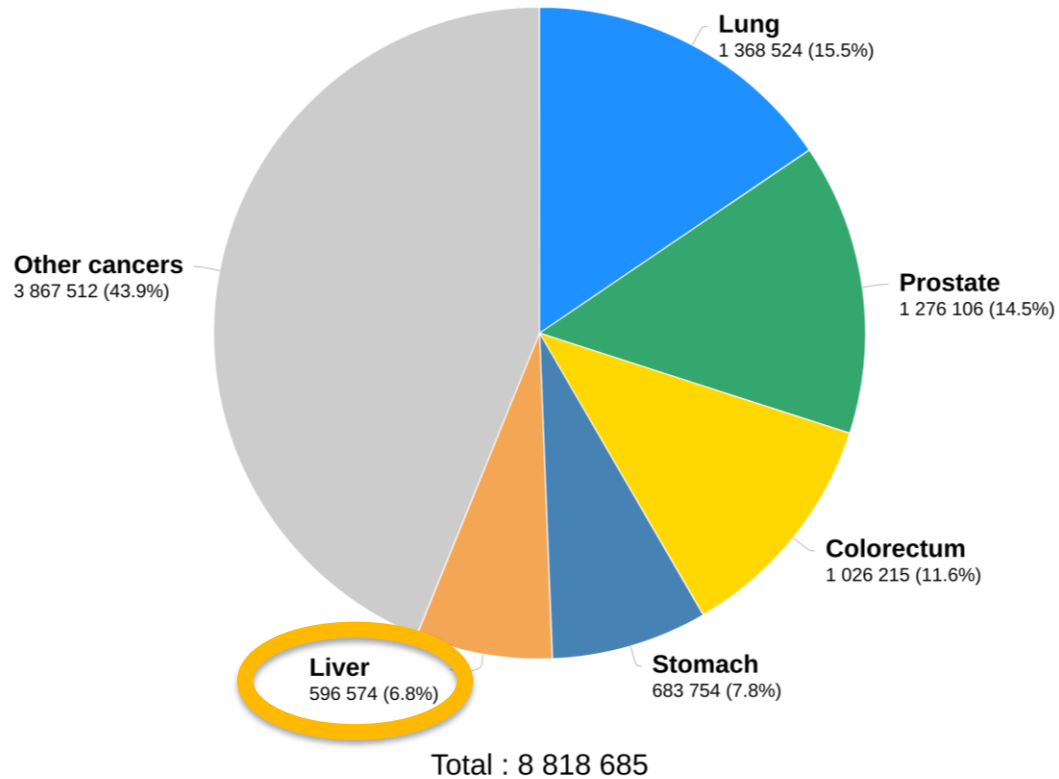
The implementation of ERAS for major hepatectomy in a U.S. veteran population translates into decreased hospital LOS and perioperative opioid consumption. This not only represents a novel use of ERAS in this population but also provides some of the first evidence that continuous ESP catheters can be effective for open hepatectomy within an ERAS pathway. Future directions include expanding this ERAS pathway on a larger scale to compare the benefit of continuous ESPs versus thoracic epidural for pain control.

## References

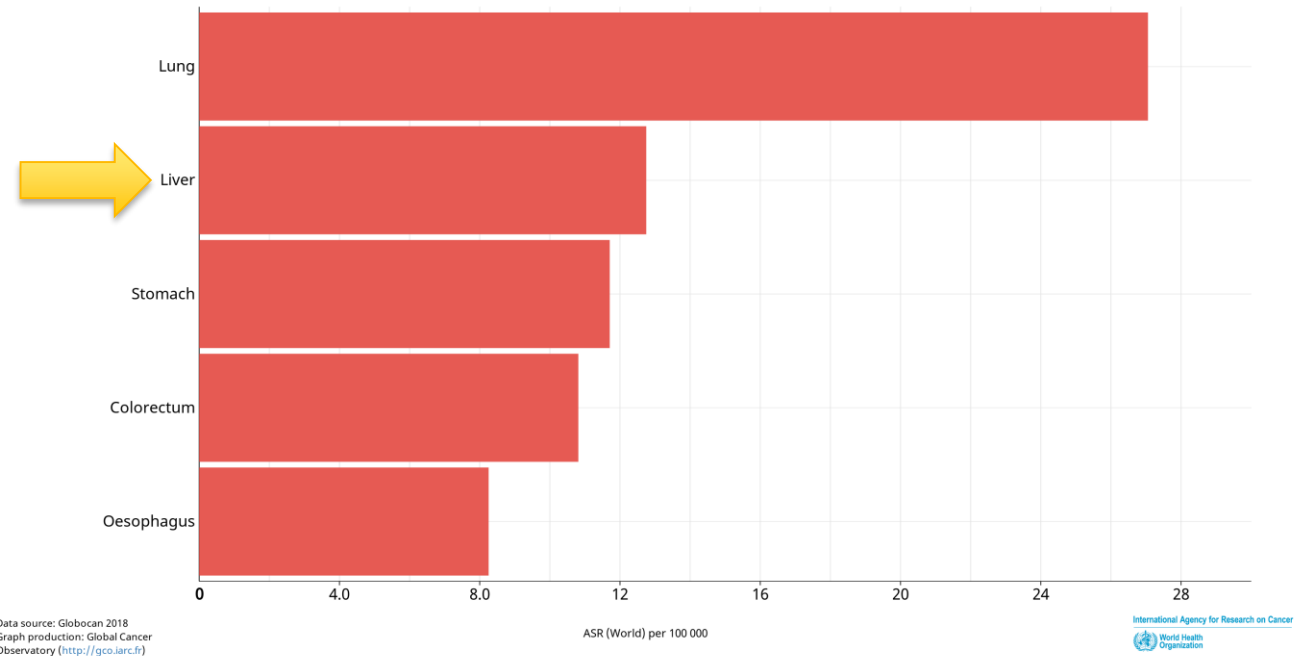
- Greer NL, Gunnar WP, Dahm P, Lee AE, MacDonald R, Shaikat A, Sultan S, Witt TJ. Enhanced Recovery Protocols for Adults Undergoing Colorectal Surgery: A Systematic Review and Meta-analysis. *Dis Colon Rectum*. 2018;61:1108-1118.
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# Introduction/Background

Estimated number of new cases in 2018, worldwide, males, all ages



Estimated age-standardized mortality rates (World) in 2018, worldwide, males, all ages



**Purpose:** Impact of an ERAS pathway in U.S. veterans undergoing major hepatectomy surgery

# Methods

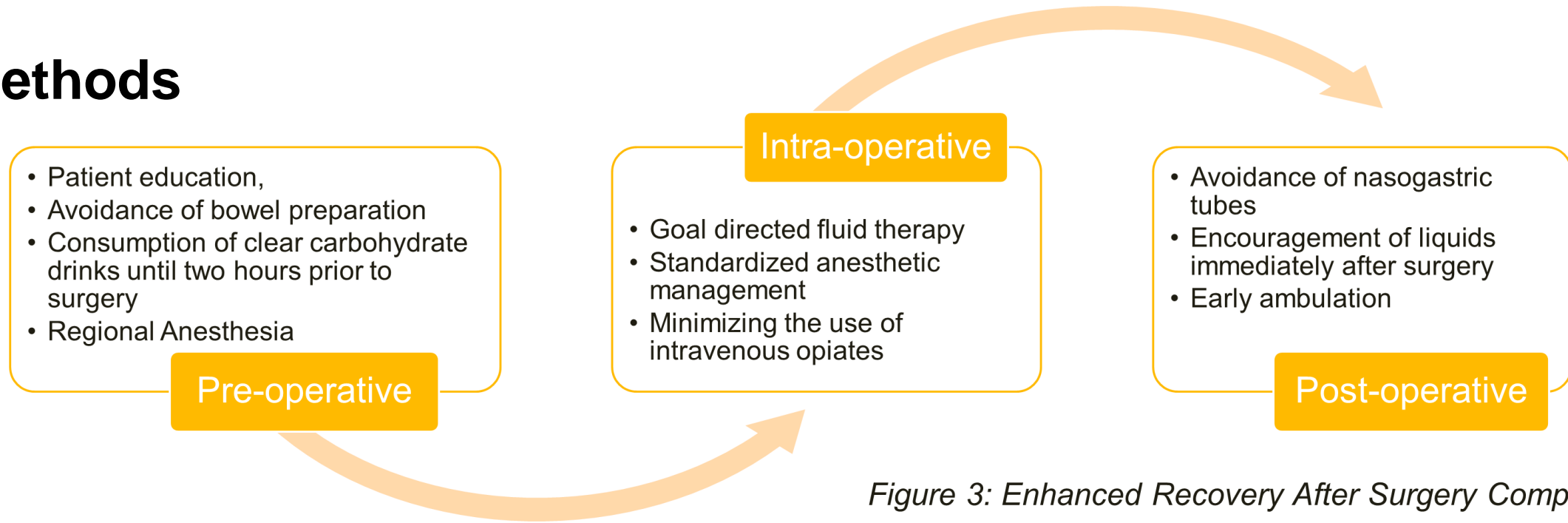


Figure 3: Enhanced Recovery After Surgery Components

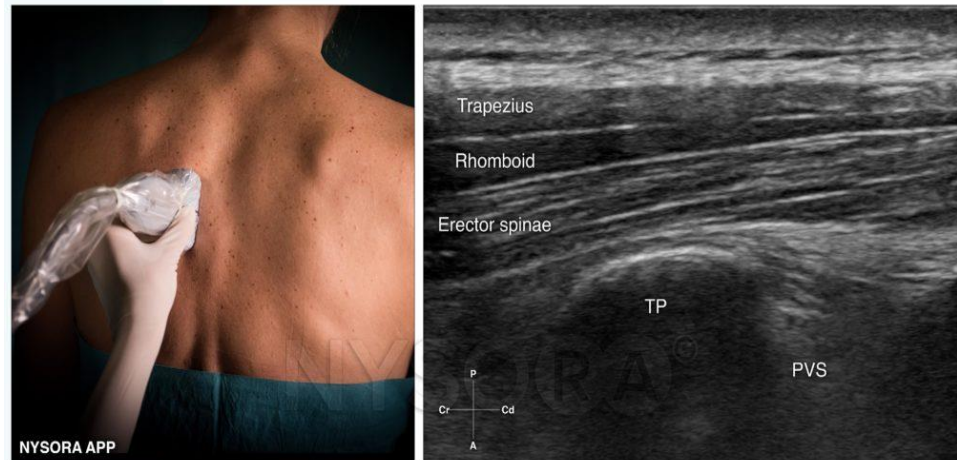
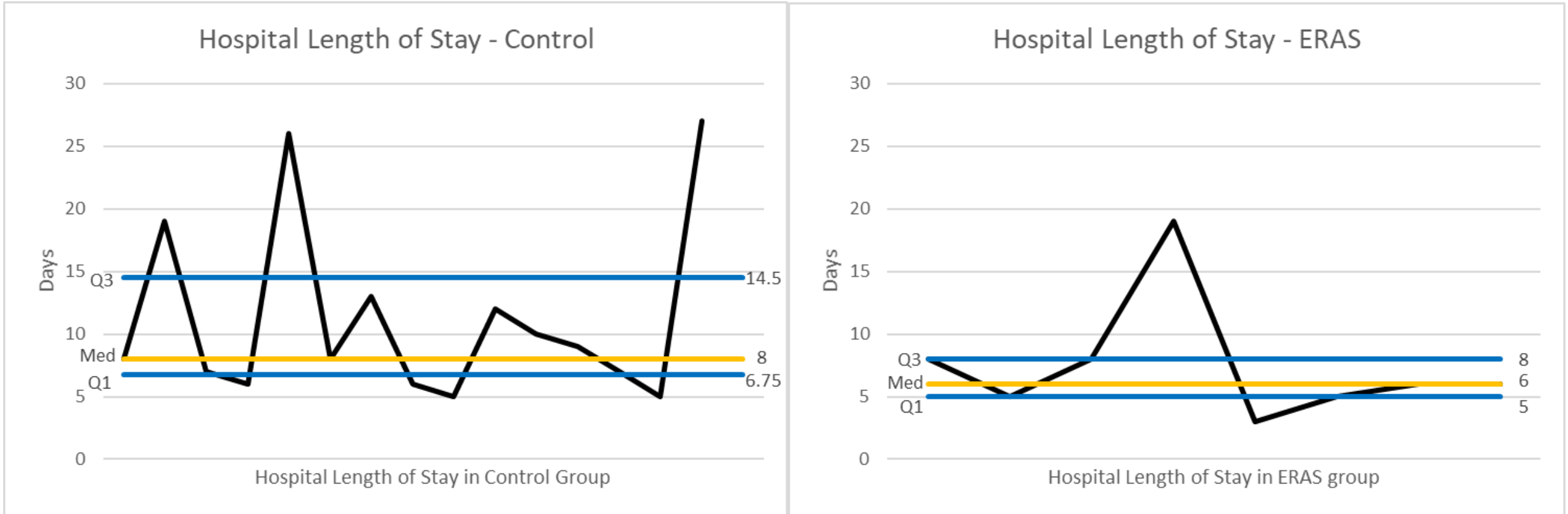


Image 2: Ultrasound approach to ESP

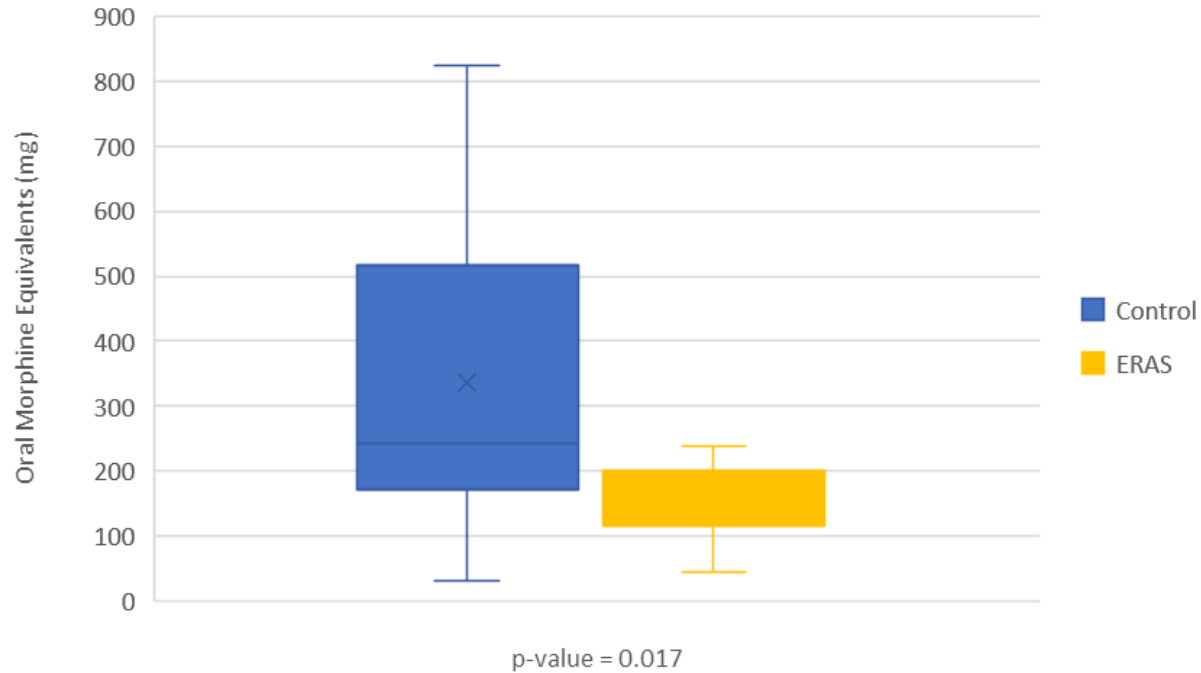
# Results



*Graph 1: Length of Stay, Controls vs ERAS Groups*

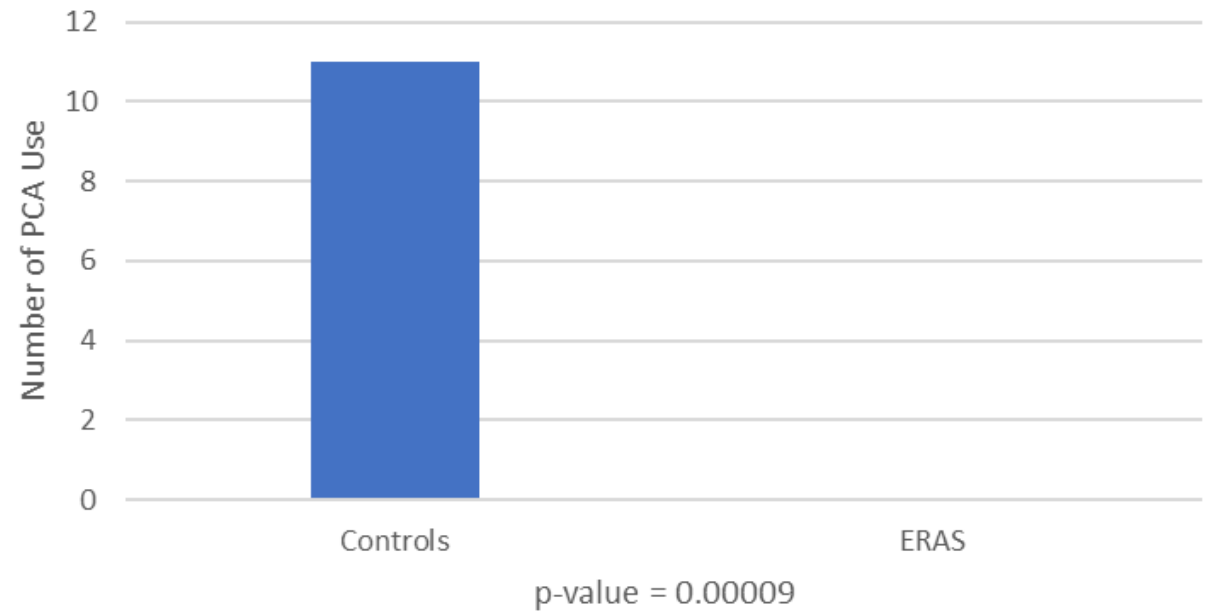
# Results

### Perioperative Narcotic Use



*Graph 2: Perioperative Narcotic Use*

### Postop Dilaudid PCA Use



*Graph 3: Postoperative Dilaudid PCA use*

# Discussion and Conclusion

- Decreased hospital LOS
- Decreased perioperative opioid consumption
- Novel use of ERAS in US veteran population
- Quality Improvement
- Continuous ESP catheters for open hepatectomy

