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Journal Title: JPRAS Open

Volume: Volume 31

Publisher: Elsevier Ltd | 2022-03-01, Pages 22-28

Type of Work: Article | Final Publisher PDF

Publisher DOI: 10.1016/j.jpra.2021.10.006

Permanent URL: https://pid.emory.edu/ark:/25593/vtqpf

Final published version: http://dx.doi.org/10.1016/j.jpra.2021.10.006

Copyright information:

JPRAS Open 31 (2022) 22–28

Contents lists available at ScienceDirect

JPRAS Open

journal homepage: www.elsevier.com/locate/jpra

Original Article

Does An ERAS Protocol Reduce Postoperative Opiate Prescribing in Plastic Surgery? ☆

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ARTICLE INFO

Article history:
Received 18 August 2021
Accepted 20 October 2021
Available online 26 October 2021

Keywords:
ERAS
plastic surgery
pain control
opiate use
prescribing

ABSTRACT

Background: Enhanced recovery after surgery (ERAS) protocols are effective at reducing inpatient opiate use. There is a paucity of studies on the effects of an ERAS protocol on outpatient opiate prescriptions. The aim of this study was to determine whether an ERAS protocol for plastic and reconstructive surgery would reduce opiate use in the outpatient postoperative setting.
Methods: A statewide (Massachusetts, USA) controlled substance prescription monitoring database was retrospectively reviewed to assess the prescribing patterns of a single academic plastic surgeon performing common plastic surgical outpatient operations. The time period prior to implementation of the ERAS protocol was then compared with the time period following protocol implementation. An additional three months of post-implementation data were then compared with those of each of the previous time periods to investigate whether the results were sustained.
Results: A comparison of opiate prescriptions in pre-ERAS, immediate post-ERAS procedures, and follow-up ERAS implementation

☆ Other disclosures: Presented as an e-poster at the virtual Plastic Surgery Research Council 2020 meeting.

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https://doi.org/10.1016/j.jpra.2021.10.006

procedures revealed a statistically significant decrease in opiate prescriptions after ERAS protocol implementation. This decrease in the quantity of opiates prescribed was sustained over time.

Conclusions: ERAS protocols are effective at reducing outpatient opiate prescriptions after a variety of plastic surgery operations. Appropriate patient and physician education is paramount for success.

Introduction

Enhanced recovery after surgery (ERAS) protocols have become one of the most impactful changes in surgical care.[1] ERAS protocols are, at their core, a compilation of best practices that allow patients to move through perioperative spaces faster, with less cost, experiencing fewer complications, and with improved outcomes such as shorter length of stay and lower infection rates.[2,3,4]

The implementation of ERAS pathways is particularly complex, whose success requires coordination and consensus among a variety of providers. From initial interactions with the operative team before surgery to exchanges with nurses, anesthesiologists, and surgical providers on the day of surgery to discussions with healthcare providers in the postoperative period, ERAS protocols rely on a multidisciplinary team to achieve maximal impact. Pain management has particularly benefitted from such an approach; protocols are ideally formulated in conjunction with anesthesiology and nursing input to enhance postoperative pain control with the use of strategies such as multimodal analgesia, regional anesthesia, and preoperative non-narcotic analgesia.[5,6,7,8]

Over the past several years, the correlation between ERAS protocols and decreasing opiate administration in aesthetic and reconstructive surgeries has been recognized. Initial data from studies on ERAS in free tissue transfer for breast reconstruction showed a decrease in the use of parenteral narcotics, earlier ambulation, and shorter length of stay without an increase in patient-reported pain.[9,10] More recently, the sentinel paper by Kennedy et al. demonstrated that ERAS protocols are associated with a reduction in both length of stay and inpatient opioid administration.[11] As approximately 90 Americans die from an opioid overdose each day, this reduction is an important finding and deserves further study, particularly with regard to whether this benefit is maintained in postoperative opioid prescribing.[12,13]

While opiate use disorder is a growing international problem, it is important to recognize that opiates are prescribed more frequently and routinely in the United States and approximately 25% of drug-related deaths worldwide occur in the United States.[14,15] The prescribing practice variance in the United States relative to other countries is likely multifactorial, with cultural differences as well as stringency of regulatory oversight and lack of care centralization being the contributing factors.

While there are many studies examining the relationship between ERAS protocols and inpatient narcotic use, there are limited data on whether this benefit is also seen in the outpatient postoperative setting.[16,17] As many plastic surgery operations are performed on an outpatient basis, the aim of this study is to determine whether the implementation of an ERAS protocol reduced opioid prescribing after commonly performed plastic surgery operations.

Patients and Methods

Creation of Protocol

To create an ERAS protocol for Plastic and Reconstructive Surgery, in 2017, we performed a literature review of published peer-reviewed ERAS protocols. The applicable elements were then incorpo-

Table 1
Age-Based Preoperative ERAS Gabapentin Dosing

Age (years)	Dose*
< 65	600 mg
65– 70	300 mg
> 70	200 mg

* Preoperative GFR within normal limits

rated into a new pathway for plastic and reconstructive surgery patients in our institution with the primary goal of reducing postoperative narcotic prescriptions.[9,18] Heavy emphasis was placed on maximizing non-narcotic analgesia use in the preoperative and immediate postoperative periods. To preemptively treat perioperative pain, patients received a single preoperative dose of oral acetaminophen and gabapentin (dosed for age) and regimented postoperative oral acetaminophen (scheduled administration for 24 hours followed by as-needed dosing), low-dose twice-daily gabapentin for 7–14 days, ibuprofen as needed, and oxycodone when necessary (Table 1).[19,20,21,22,23] Patients who were undergoing mastectomy with immediate reconstruction underwent preoperative paravertebral blocks, which was the standard of care in the practice prior to the implementation of this ERAS protocol.[24] Operative cases performed included: breast reduction, mastopexy, immediate prosthetic breast reconstruction, revision breast reconstruction, breast augmentation, panniculectomy, abdominoplasty, and gender-affirming chest/breast surgery.

Protocol Implementation

After the protocol was designed, surgical staff, including the surgical nurse practitioner and the clinic nursing staff who were assigned to the single academic surgeon who participated in this study were educated on the different elements of the protocol. Advanced practice providers (APPs) performing discharges and writing prescriptions after outpatient surgery received highly specific instructions from the plastic surgeon about medication types, doses, and number of tablets to dispense. In-service education was also provided for floor nursing staff who participated in the care of these ERAS patients. ERAS plastic and reconstructive surgery was officially implemented on October 1, 2018.

As part of the new protocol, patients were educated on their perioperative pain management plan, and the expectation that patients would be prescribed fewer opiates was set. In addition, after the protocol was implemented, all patients undergoing any operation (reconstructive and cosmetic, inpatient and outpatient) by a single academic plastic surgeon were deemed to be ERAS Plastic and Reconstructive Surgery patients. By classifying all patients as ERAS patients, there was no confusion about patient participation in the ERAS protocol, which ensured uniformity of care.

Data and Analysis

The Massachusetts Prescription Monitoring Program (MA-PMP) database provides quarterly reports on individual provider prescribing of Schedule II–V drugs. The academic plastic surgeon whose practice is the focus of this study writes prescriptions for most outpatient cases, most postoperative clinic patients, and some inpatients (prescriptions upon discharge from the hospital or in clinic may be written by an APP). The plastic surgeon does not treat nonoperative conditions requiring opiate prescriptions. Prescribing for this plastic surgeon was compared in the time period before (pre-ERAS) and after ERAS protocol institution (post-ERAS interval 1). Comparison was also performed between pre-ERAS and a second post-ERAS interval (post-ERAS interval 2) to determine whether prescribing pattern changes and ERAS implementation were sustained over time. Data were analyzed using Stata/IC 15.1. Two-sample *t*-tests were used for mean comparison. Alpha was set at the standard of 0.05. Table values are reported in a rounded form.

Table 2
Pre-ERAS Versus Post-ERAS Interval 1.

	Pre-ERAS Mean (SD)	Post-ERAS Interval 1 Mean (SD)	Absolute Difference (% change)	*p* (95% CI)
MME	68.5 (31.0)	45.2 (3.0)	−23.3 (−34.0%)	0.0015 (9.6–37.1)
Prescription duration (days)	7.6 (5.9)	3.1 (0.6)	−4.5 (−59.2%)	0.0012 (1.9–7.2)
Quantity prescribed	32 (26)	13.7 (1.2)	−18.3 (−57.2%)	0.0025 (6.8–29.8)
Number of prescriptions	1.3 (0.2)	1.1 (0.1)	−0.2 (−15.4%)	<0.001 (0.15–0.31)

Table 3
Pre-ERAS Versus Post-ERAS Interval 2.

	Pre-ERAS Mean (SD)	Post-ERAS Interval 2 Mean (SD)	Absolute Difference (% change)	*p* (95% CI)
MME	68.5 (31.0)	48.4 (7.4)	−20.1 (−29.3%)	0.0063 (6.0–34.3)
Prescription duration (days)	7.6 (5.9)	2.7 (0.1)	−4.9 (−64.5%)	0.0005 (2.3–7.6)
Quantity prescribed	32 (26)	13.4 (1.1)	−18.6 (−58.1%)	0.0023 (7.1–30.0)
Number of prescriptions	1.3 (0.2)	1.2 (0.1)	−0.1 (−7.7%)	<0.001 (0.09–0.24)

Results

The ERAS protocol was implemented on all patients starting on October 1, 2018. The pre-ERAS interval (July 1–September 30, 2018) was compared with the same time period (July 1–September 30, 2019) to examine one year of data following ERAS protocol implementation (post-ERAS interval 1). A second 3-month interval was chosen for additional comparison (December 1, 2019–February 29, 2020, post-ERAS interval 2). The report generated by the MA-PMP contained prescribing data for the plastic surgeon and contained 19 patients in the pre-ERAS interval (54% of case volume), 21 patients in post-ERAS interval 1 (52.5% of case volume), and 21 patients in post-ERAS interval 2 (42% of case volume). The remainder of the prescriptions for patients undergoing surgery during these time periods were written by APPs under the direct supervision of the plastic surgeon.

Comparison of the pre-ERAS interval to the post-ERAS interval 1 revealed a 34% reduction in mean daily morphine milligram equivalent (MME) per patient (p=0.0015), a 59.2% reduction in the mean duration of opiate prescription per patient (p=0.0012), a 57.2% reduction in the mean quantity of opiates prescribed per patient (p=0.0025), and a 15.4% reduction in the number of opiate/controlled substance prescriptions per patient (p<0.001). Comparison of the pre-ERAS interval with the post-ERAS interval 2 showed a 29.3% reduction in the mean daily MME per patient (p=0.0063), a 64.5% reduction in the mean opiate prescription duration (p=0.0005), a 58.1% reduction in the quantity of opiates prescribed (p=0.0023), and a 7.7% reduction in the number of prescriptions per patient (p<0.001). Details of the comparisons are listed in Table 2, Table 3, and Figure 1.

Discussion

This study shows that implementation of an ERAS protocol is associated with a statistically significant reduction in outpatient opiate prescriptions within a varied academic plastic surgery practice in the United States. This reduction was evident in the short term after implementation of an ERAS protocol and was found to be sustained in the long term. This study expands on the work by Rendon et al. that specifically focused on the reduction of opiate prescriptions in patients who underwent autologous breast reconstruction.[25] In addition, a study by Chu et al. indicated that a significant number of patients who underwent plastic surgery operations had been prescribed opiates that were unused, indicating that overprescribing may be occurring.[26]

In addition to the short-term benefits of opiate use reduction, reducing opiate prescriptions has long-term benefits. By reducing opiate use in the immediate post-operative period, the rate of future opiate dependence and abuse can theoretically be decreased. This is evidenced in a study of orthopedic surgery patients where the number of opiate pills prescribed after surgery was predictive of

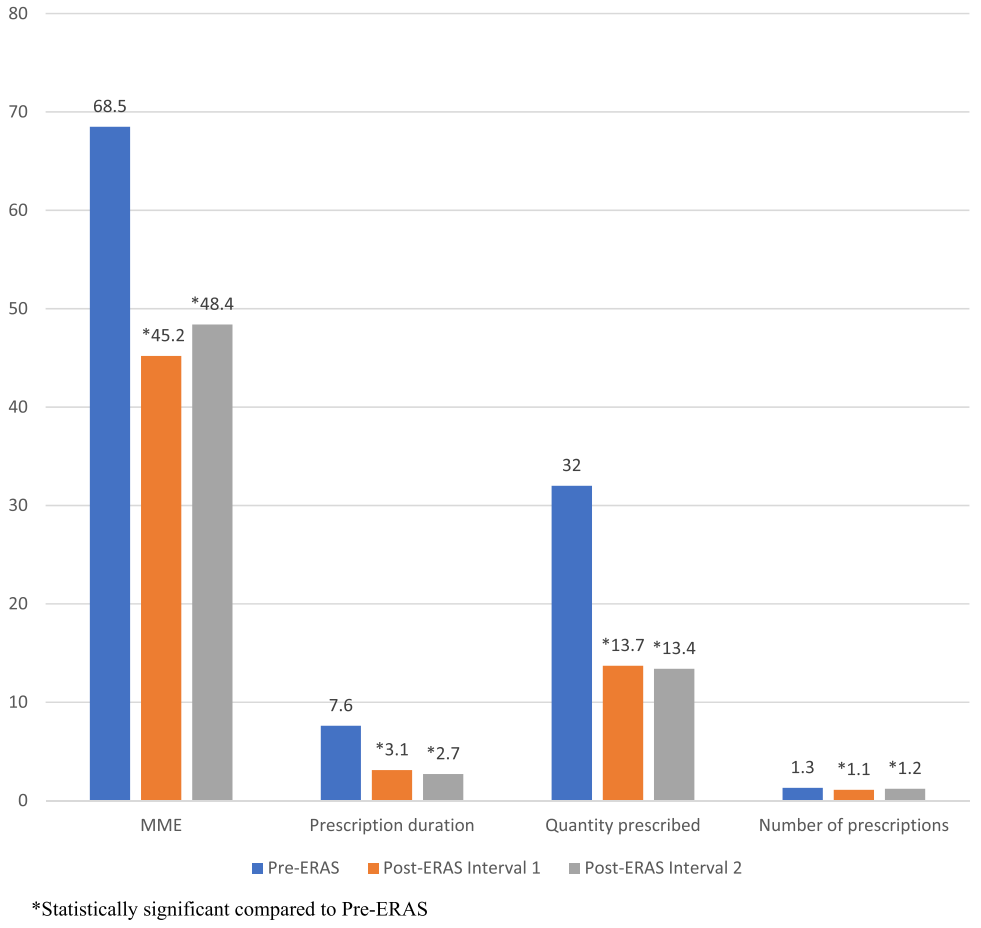

Figure 1. Pre-ERAS Interval Compared with Post-ERAS Intervals (absolute values)
*Statistically significant compared with Pre-ERAS

long-term use.[27] ERAS protocols and multimodal analgesia regimens are now becoming more widely used within the field of plastic surgery and can be tailored to specific operations and individual patient needs.[28,29]

The strengths of this study include the fact that we examined the impact of ERAS on opiate prescribing in a highly controlled population of patients of a single surgeon using a reliable state prescribing database. Limitations of this study include the small sample size, the variation of operations performed, and the lack of patient-specific data such as pain scores and patient satisfaction since this study utilizes a statewide database cataloguing provider prescribing. In addition, we could not track medication refills. However, the reduction in opiate prescribing catalogued by this study encompasses all prescriptions written, including refills.

Implementation of an ERAS protocol is known to be beneficial in the reduction of opiate use in the inpatient setting. We now understand it to also be a viable method of reducing opiate prescriptions for patients undergoing commonly performed plastic surgical (reconstructive and aesthetic) operations. The successful use of an ERAS protocol requires the education of physicians, providers, and staff in addition to patients. Provider education regarding opiate prescribing has been shown to be effective in reducing opiate prescribing.[30,31] This is one preventive strategy that, if more widely adopted, could assist in combating the current opiate crisis in the United States.

Declaration of Competing Interest

Heather R. Faulkner, MD, MPH: None
Suzanne B. Coopey, MD: None
Rachel Sisodia, MD: None
Bridget N. Kelly, BA: None
Lydia R. Maurer, MD: None
Dan Ellis, MD: None

Ethical approval

Not required

Funding

None

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