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RESEARCH QUESTION

Do adults undergoing elective spine surgery in the two years following the implementation of the new ERAS protocol (July 2018 – March 2020) demonstrate better clinical outcomes, in comparison to patients who were treated using the original ERAS protocol? Furthermore, do these cohorts differ quantitatively in (1) hospital readmission rates, (2) infection rates, and (3) hospital length of stay?

BACKGROUND

The ERAS protocol was initially implemented in 2012 at our quaternary medical facility. Our original ERAS program was developed based on current standards in surgical ERAS research 2 and included four major sections: Preadmission, Preoperative, Intraoperative, and Postoperative guidelines. In addition, this protocol included guidelines for patient education, pre-anesthesia testing, preoperative diet, and medications (intraoperative and postoperative). Further modification of this ERAS protocol was made in May 2018 (Figure 1) with the addition of a preoperative high-carbohydrate drink (HCD) and multimodal analgesic regimen (MAR).

Nutrition is a significant independent, modifiable risk factor for unplanned re-admission within 30 days of discharge. Blood glucose balance is critical as drops in blood glucose result in lower energy and a recovery capability. Additionally, a multi-modal analgesia approach was outlined to better modulate the post-surgical stress response than any single drug or modality. With the addition of an HCD (the night before and 3 hours preoperatively) and a MAR, our old ERAS protocol was modified to reflect these two adoptions.

There have been ample studies evaluating the benefits of an ERAS protocol versus the control, non-ERAS protocol; however, there is a paucity of evaluating changes made to already established ERAS protocols. Our research serves as a preliminary study to evaluate changes made to an existing ERAS protocol and how those changes affect several endpoints. Only very recently has the need for a unified ERAS protocol in neurosurgery been formally discussed. We believe this framework can additionally serve as a starting point for a unified ERAS protocol for elective spine surgeries, and perhaps expanded to all of neurological surgery in the near future.

METHODS

This retrospective case-control study reviewed electronic medical records of neurosurgical patients at a quaternary referral center for trends and variances. The analysis focused on the recent changes (the addition of a multimodal analgesic regimen (MAR) and preoperative high-carbohydrate drink (HCD) to our ERAS protocol (July 2018- March 2020). Using IBM SPSS version 27, parametric and nonparametric analyses were conducted to assess for differences in infection rates, hospital length of stay (LOS), and readmission rates.

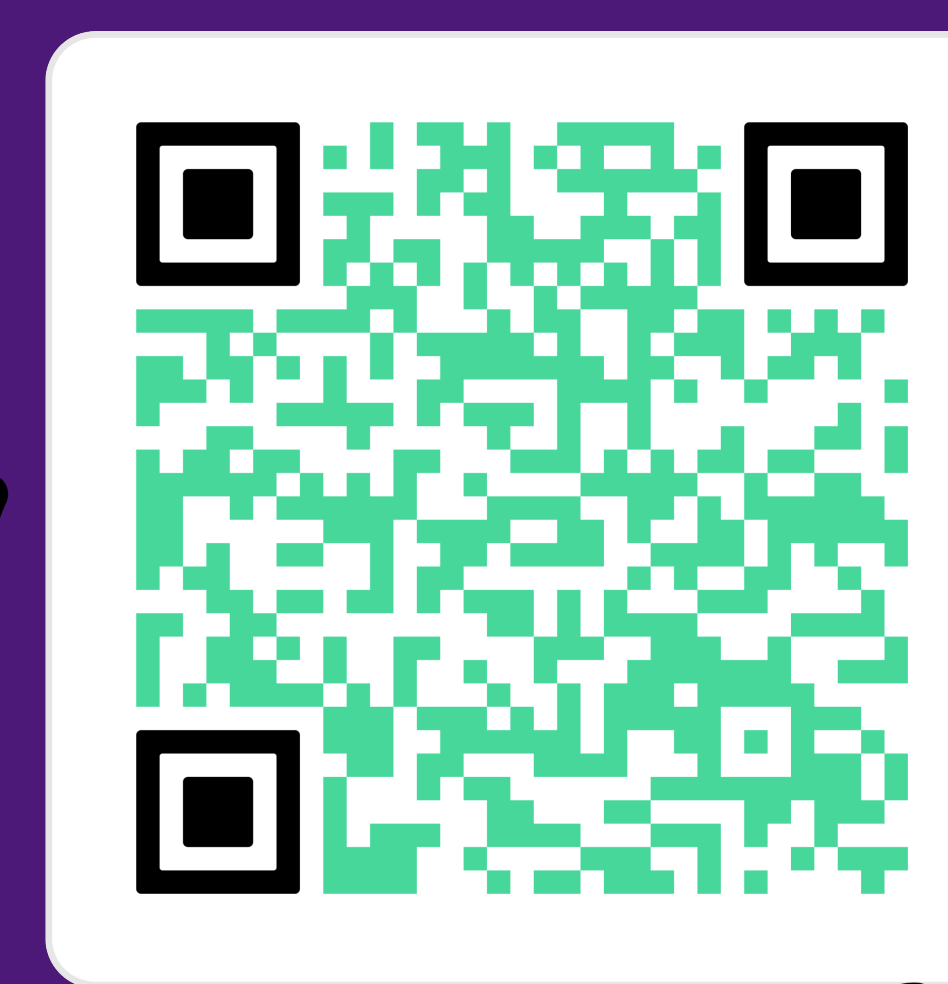
With the Addition of a High-Carbohydrate Drink (HCD) and Multimodal Analgesia Regimen (MAR), there was a statistically significant reduction in Length of Stay (LOS)

Figure 1: Current ERAS Protocol



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RESULTS

The patients' ages ranged from 16 to 91 years, with an average age of 60. In addition, 1788 of the patients were females (53%), and 1582 were males (47%). Regarding race, the sample was pretty homogeneous, consisting of 2918 white patients (87%), 332 black patients (10%), and 120 patients with other races (3%).

A total of 3370 participants were included in the study—1901 in the BEFORE group (Controls) and 1469 in the AFTER group (Cases). The annual surgical volume at our facility was equivocal between 2016 and 2020. Whereas 110 patients were readmitted (within thirty days from surgery) in the BEFORE group, only 83 patients were readmitted in the AFTER group. Likewise, 18 patients had a postoperative surgical site infection (SSI) in the BEFORE group, while only 12 patients had an SSI in the AFTER group.

As readmission status and infection rate are nominal and dichotomously measured, chi-square tests of independence were computed to determine if there is a relationship between ERAS status and readmission rates and ERAS status and infection rates. Neither analysis was significant, $\chi^2 = .029$, $p = .866$ and $\chi^2 = .159$, $p = .69$, respectively.

A between-subjects t-test was conducted to compare the BEFORE group to the AFTER group on length of stay in hours. Results showed a statistically significant difference between the groups. The BEFORE group ($M = 68.45$, $SD = 58.08$) spent significantly more hours in the hospital than the AFTER group ($M = 62.22$, $SD = 52.36$), $t(3264) = 3.19$, $p < .001$. The effect of the difference was small ($d = .18$).

FUTURE DIRECTIONS

We are working on future directives to delineate our results as they apply to elective spine surgery subtypes

FIGURE 1