# Improved Immediate Postoperative Mental Status and Decreased PACU Times as a Result of an ERAS Clinical Pathway

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## BACKGROUND

- Excessive drowsiness in the PACU leads to:
  - Prolonged PACU recovery time [1, 2]
  - Increased resource utilization [1, 2]
- Contributing risk factors for excessive drowsiness in the PACU:
  - Excessive depth of general anesthesia [3]
  - Opioid administration [4, 5]
  - Benzodiazepine administration [4, 5]
- During the pilot phase of our ERAS pathway for pancreatic surgery, our team observed that elderly patients, age 60 and over, were:
  - Less drowsy in PACU
  - Recovered faster in the PACU than historically observed
- Study Objective
  - Quantify the observed trend toward heightened mental acuity and associated shortened PACU time for pancreatic surgical patients (specifically Whipple procedures) managed before and after implementation of an ERAS pathway tailored to geriatric patients by comparing phase I PACU recovery times.

## MATERIALS AND METHODS

- Geriatric best practice recommendations added to ERAS protocol:
  - Avoidance of benzodiazepines & highly anticholinergic drugs [6]
  - Avoidance of sevoflurane [6]
  - Avoidance of deep anesthesia by maintaining a goal bispectral index (BIS) between 50 and 60 [3]
- PACU Phase I recovery time (PRT)
  - Time from anesthesia provider sign-out to PACU nursing staff until an Aldrete score >9 was obtained, see Table 2.
- Retrospective chart review, patients age >/= 60
- Statistical analysis
  - One-tailed, two sample t- test

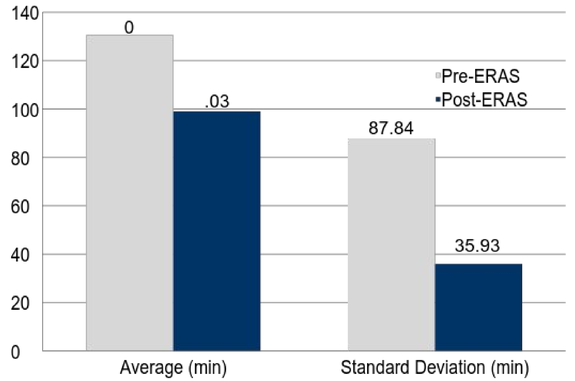
## Table 1: Enhanced Recovery After Surgery (ERAS) Protocol for Whipple Patients

| PREOPERATIVE | INTRAOPERATIVE |
|---|---|
| Carbohydrate drink | Maintenance: Isoflurane titrated to BIS 50-60 |
| Multimodal analgesia | Analgesia: Minimize liberal opioid use through use of continuous thoracic epidural (for select patients) or ketamine and/or dexmedetomidine for select patient |
| Preop fluid bolus | Goal Directed Fluid Therapy |
| Avoidance of benzos for patients >60 yrs old | Mechanical Ventilation Guidelines |
| | Blood Transfusion Guidelines |

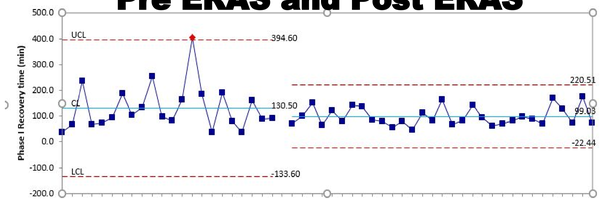
## Table 2: Aldrete Scoring System

| Criteria | Scoring System |
|---|---|
| Activity | 0 = unable to move extremities voluntarily or on command<br>1 = able to move 2 extremities voluntarily or on command<br>2 = able to move 4 extremities voluntarily or on command |
| Respiration | 0 = apnea<br>1 = dyspnea or limited breathing<br>2 = able to breathe and cough freely |
| Circulation | 0 = blood pressure 50% of pre-anesthesia level<br>1 = blood pressure 20-50% of pre-anesthesia level<br>2 = blood pressure within 20% pre-anesthesia level |
| Consciousness | 0 = not responding<br>1 = arousable on calling<br>2 = fully awake |
| Oxygen Saturation | 0 = SaO2 less than 90% with supplemental oxygen<br>1 = needs supplemental oxygen to maintain SaO2 >90%<br>2 = able to maintain SaO2 above 92% on room air |

## Chart 1: Post Anesthesia Care Unit (PACU) Phase I Recovery Time (PRT)




## Chart 2: Control Chart for PACU PRT Pre ERAS and Post ERAS




## RESULTS

- 31 ERAS Whipple patients
  - July 2014 - February 2016
- 22 historical control Whipple patients
  - August 2013 - May 2014
  - P value = 0.06
- Average PACU PRT decreased from an average of 130.50 minutes Pre-ERAS to 99.03 minutes Post-ERAS, see Chart 1 and 2.

## DISCUSSION

- Delirium → prolonged length of stay in the PACU
  - PRT may serve as a surrogate marker for the incidence of delirium in postoperative patients
- Implementation of an ERAS pathway → statistically significant decrease in PRT
  - Shortened PACU recovery time may be attributable to improved early postoperative mental status as well as improved analgesia
- Further study is warranted
  - Specifically measure and quantify the improvement in mental status
  - Assess the impact of this effect on the remainder of the patient's postoperative recovery

## REFERENCES

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