Enhanced Recovery and Patient Reported Outcomes

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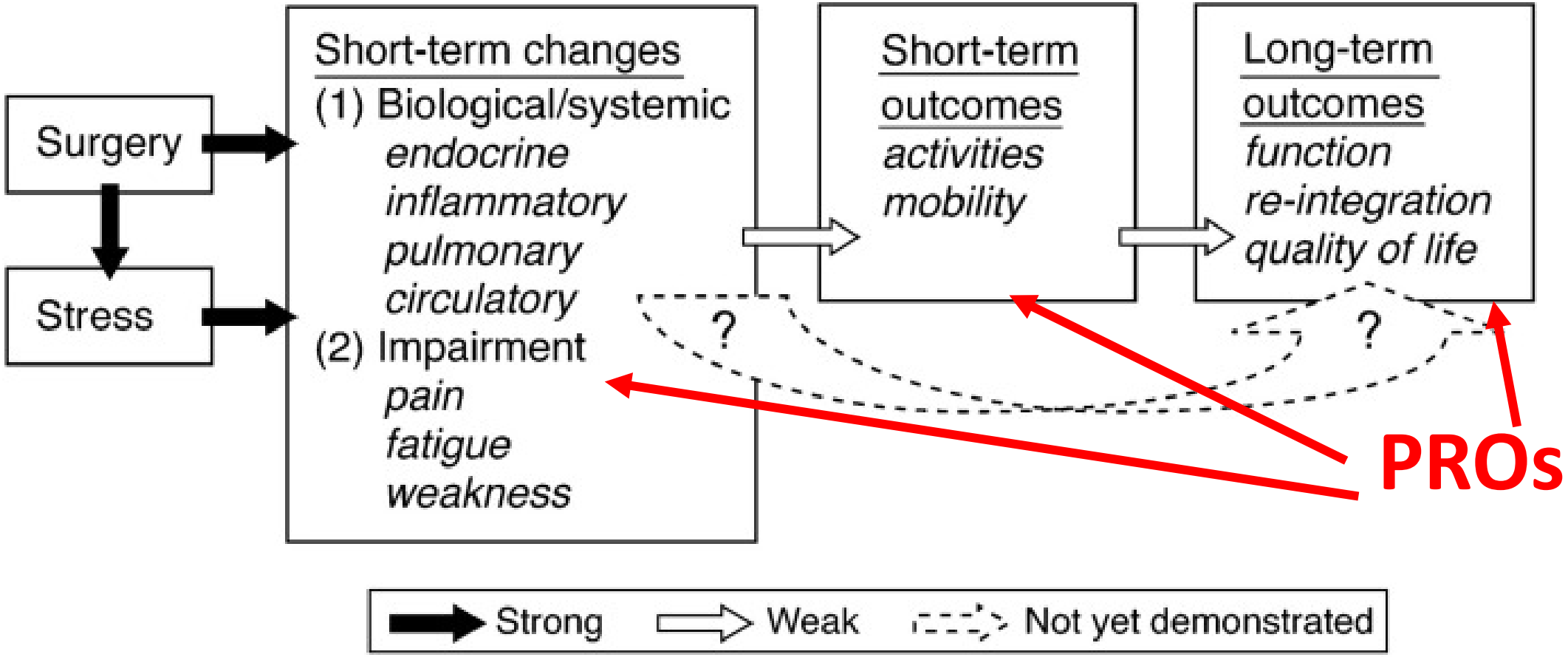
What does postoperative recovery mean?

- **An energy requiring process**
- **A return to a state of normality and wholeness by comparative standards**
- **Regaining control over physical, psychological, social and habitual functions**
- **Returning to preoperative levels of independence in ADLs**
- **Regaining one's optimal level of well being**

Allvin, 2007

Measurement of Surgical Recovery



Causal model for measuring outcomes after surgery proposed by Carli, British J Anaesth, 2001

The Challenge

- **No consistent definition of postoperative recovery**
- **Recovery means different things to different stakeholders**
- **Recovery is a complex construct that crosses multiple domains and timeframes**

Selection of PRO instruments

- **What are you trying to measure?**
  - **Evaluate the specific content and purpose of the instrument**
  - **What is the responsivity in a surgical population?**
  - **What is the designed recall period?**
  - **What are the minimally important differences?**
  - **What will the timing of administration?**
    - **Thoughtful design based on an a priori hypothesis**
    - **Balance patient burden with expected fluctuations in PRO responses**

Stages of Recovery

Phase of Recovery	Definition	Time frame	Threshold	Outcomes	Examples of existing instruments
Early	From OR to PACU discharge	Hours	Safety	Physiologic and biologic	Aldrete Post-anes. Recovery Score
Intermediate	PACU discharge to discharge from hospital	Days	Self-care	Symptoms and impairment in ADLs	Quality of Recovery Score; Abdominal Surgery Impact scale
Late	From hospital discharge to return to usual function	Weeks to months	Return to normal (baseline or population norms)	Function and health-related QOL	6-min walk test, Short Form-6D, (CHAMPS)

ADL, Activities of daily living; *OR*, operating room; PACU, postanesthesia care unit

Lee L, et al. Surgery 2014; 155:211-6

Construct Validity and Responsiveness of the Abdominal Surgery Impact Scale in the Context of Recovery After Colorectal Surgery

- **N=100 pts in an RCT evaluating the staff-directed facilitation of early mobilization to an ERAS pathway impacted post-op recovery after colorectal surgery.**
- **Setting: Canadian university hospital between 2014-2015**
- **ASIS questionnaire (18 items, responses given on a 7-point Likert scale (from strongly disagree to strongly agree)**
- **Time points: baseline, POD 2 (hospital), 2 weeks, 4 weeks**

Saba, et al. March 2019, Diseases of the Colon and Rectum

Construct Validity and Responsiveness of the Abdominal Surgery Impact Scale in the Context of Recovery After Colorectal Surgery

- **The ASIS is one of the few PROMs that has been specifically devised to assess postoperative recovery from the perspective of patients undergoing abdominal surgery**
- **This study demonstrated that both overall and subscale scores had *limited ability to differentiate between some groups of pts* that are expected to have different patterns of recovery.**
  - **This lack of discriminatory ability was evident especially at postoperative time points beyond hospital discharge.**
  - **Furthermore, responsiveness of ASIS overall and subscale scores was generally supported up to 2 weeks after surgery but not on POW4**

Saba, et al. March 2019, Diseases of the Colon and Rectum

Rationale for a new instrument

- **Current instruments lack sensitivity**
- **A single comprehensive instrument to measure all relevant domains of postoperative recovery does not currently exist**
  - **Administration of multiple instruments may lead to overburdened patients and decreased compliance**
- **Cancer population may have more confounders**
  - **Symptoms from the disease itself**
  - **Symptoms from adjuvant therapy**

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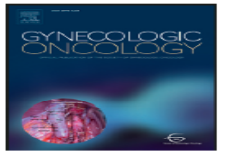

Validation and application of a module of the MD Anderson Symptom Inventory for measuring perioperative symptom burden in patients with gynecologic cancer (the MDASI-PeriOp-GYN)☆

Xin Shelley Wang [a,*], Qiuling Shi [a], Loretta A. Williams [a], Charles S. Cleeland [a], Araceli Garcia-Gonzalez [a], Ting-Yu Chen [a], Denita R. Shahid [a], Pedro T. Ramirez [b], Maria D. Iniesta [b], Ashley M. Siverand [b], Larissa A. Meyer [b]

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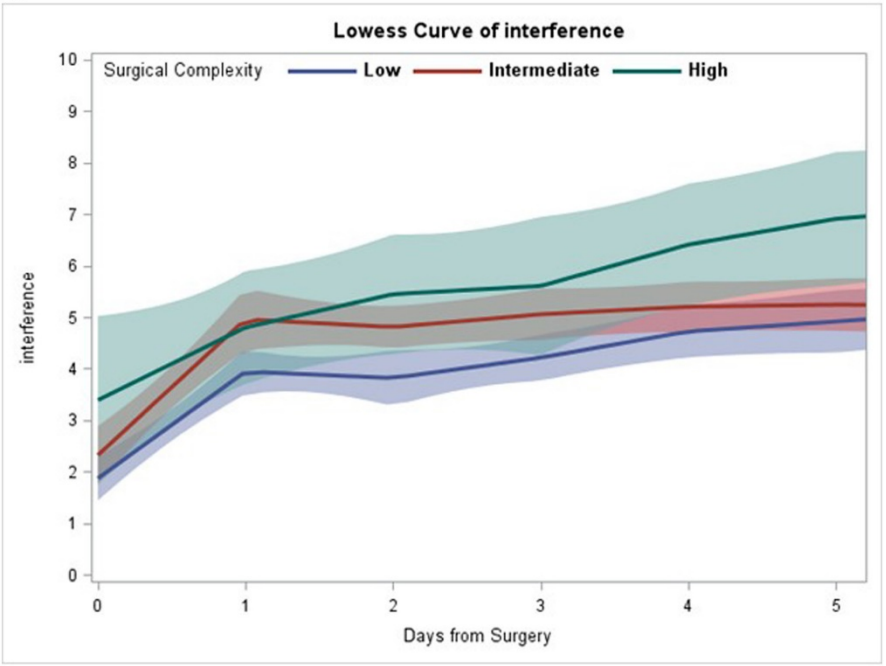
Example of sensitivity of the MDASI

- **Ovarian cancer cytoreductive surgeries can be classified by surgical complexity**
- **The MDASI demonstrated sensitivity in differentiating key symptoms between low, intermediate and high complexity cases as well as functional recovery (Composite interference scores) both in hospital and longitudinally after discharge**
- **During hospitalization: compared to low surgical complexity cases, women with intermediate ($p = 0.01$) and high surgical complexity cases ($p = 0.007$) had significantly increased nausea.**
- **Pts in intermediate complexity surgery reported significantly higher pain ($p = 0.02$) and fatigue ($p = 0.005$)**

a



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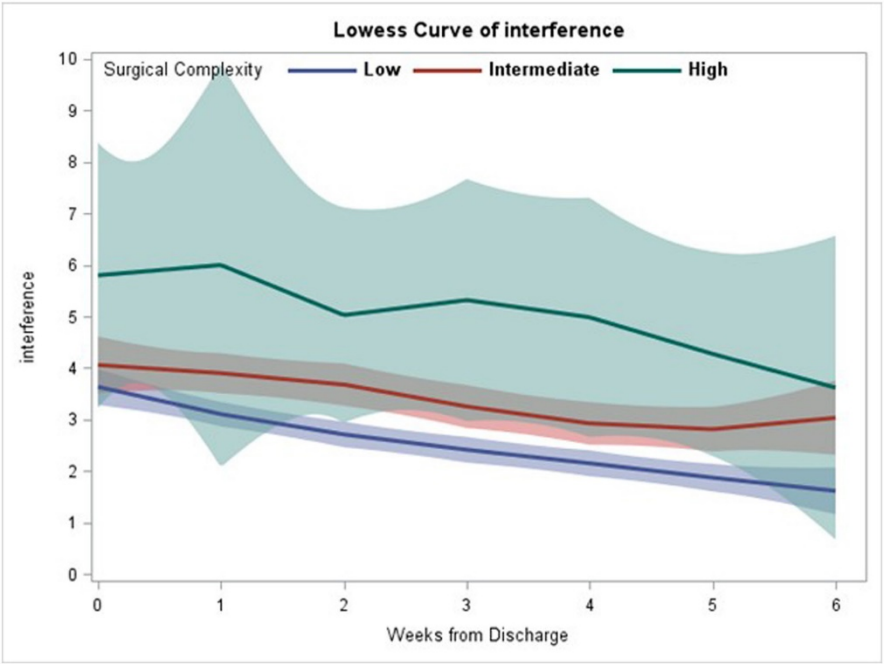


Meyer, et al., March 2019, Gynecologic Oncology

Applications of PROs to measurement of different aspects of surgical recovery

- **Measuring changes in clinical practice: QI initiatives**
  - **ERAS vs pre-ERAS controls**
  - **Symptom burden and functional recovery**
  - **Opioid related adverse symptoms**
- **Estimating differences in surgical approach**
  - **Minimally invasive surgery vs. Open abdominal gynecologic surgery**

Background

- **ERAS programs aim to:**
  - **minimize surgical stress and improve the response to stress**
  - **minimize fluid shifts**
  - **avoid traditional care elements with documented harm**
- **ERAS Gynecology guidelines: “MIS is recommended for appropriate patients when expertise and resources are available”**

Ljungqvist, O. JAMA Surgery, 2017 Mar 1;152(3):292-298 Nelson, G. Gynecologic Oncology 140 (2016) 313–322

Why change our practice?

- **Published benefits**
  - **Decreased length of hospital stay**
  - **Decreased perioperative morbidity**
  - **Faster return of bowel function**
  - **Cost effectiveness**
- **Hypothesized benefits**
  - **Attenuation of the surgical stress response**
  - **Improved patient functional recovery**
  - **Shorter time to oncologic therapy**

Previous Practice vs. ERAS

Pre-op	Previous Practice	ERAS-GYN
Diet	NPO @ MN until surgery	Nutritional counseling No solids after midnight Clear liquids- 2 hours prior to surgery Carbohydrate Loading
Bowel preps	Physician discretion	None
Pre-medication	Anesthesia discretion	Tramadol Pregabalin Celecoxib Acetaminophen PO Heparin
IVF therapy	Fluids after IV placed	Saline lock IV

Previous Practice vs. ERAS

Intra-op	Previous Practice	ERAS-GYN
Antibiotics	Prophylaxis per ACOG guidelines	Neomycin PO* Metronidazole PO* Ertapenem IV
Anesthesia	Anesthesia discretion	TIVA** No epidurals Local wound infiltration
IVF therapy	Anesthesia discretion	Goal-directed (non-invasive cardiac monitoring)
NGT/drain placement	Surgeon discretion	None
Foley catheter	Physician discretion	Remove POD1

*Anticipated Bowel Procedures
**Total Intravenous Anesthesia

Previous Practice vs. ERAS

Post-op	Previous Practice	ERAS-GYN
IVF therapy	IVFs 100cc/h KVO when tolerating oral	IVFs 40cc/h Saline lock when tolerating 500cc oral
Analgesia	PCA vs. Epidural	Acetaminophen Ibuprofen Pregabalin Oxycodone Hydromorphone IV
Diet	Gradual advancement @ physician discretion	Dietitian Counseling Regular diet POD 0 Oral hydration
Ambulation	Patient & physician discretion	Ambulate 8x/day All meals in chairs Out of bed 8h/daily
Transfusions	Physician discretion	Restrictive Transfuse for Hb $\leq$ 7

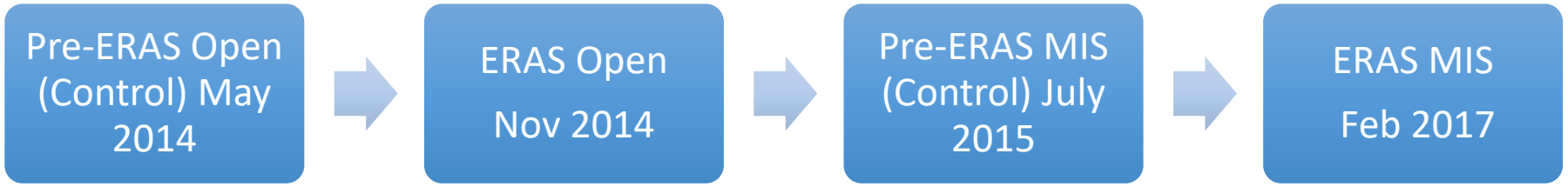
MD Anderson Symptom Inventory

- **MDASI-Ovarian Cancer module is a 27-item tool**
- **13 symptoms from the MDASI core**
  - **pain, fatigue, nausea, disturbed sleep, distress, shortness of breath, difficulty remembering, lack of appetite, drowsiness, dry mouth, sadness, vomiting, numbness/tingling**
- **8 specialty questions for ovarian cancer**
  - **abdominal pain, feeling bloated, constipation, difficulty paying attention/concentrating, urinary urgency, pain/burning with urination, back pain, leg cramps**
- **6 core interference questions:**
  - **usual daily activity, work, walking**
  - **enjoyment of life, mood, relationships with others**

Sailors, MH Gynecol Oncol 2013 Aug;130(2):323-8

Methods

- **MD Anderson Symptom Inventory-Ovarian Cancer (MDASI-OC)**
  - **Open: baseline, daily in hospital, days 3 &7 after discharge, weekly x 8 weeks**
  - **MIS: baseline, daily x7 days, weekly x 6 weeks**

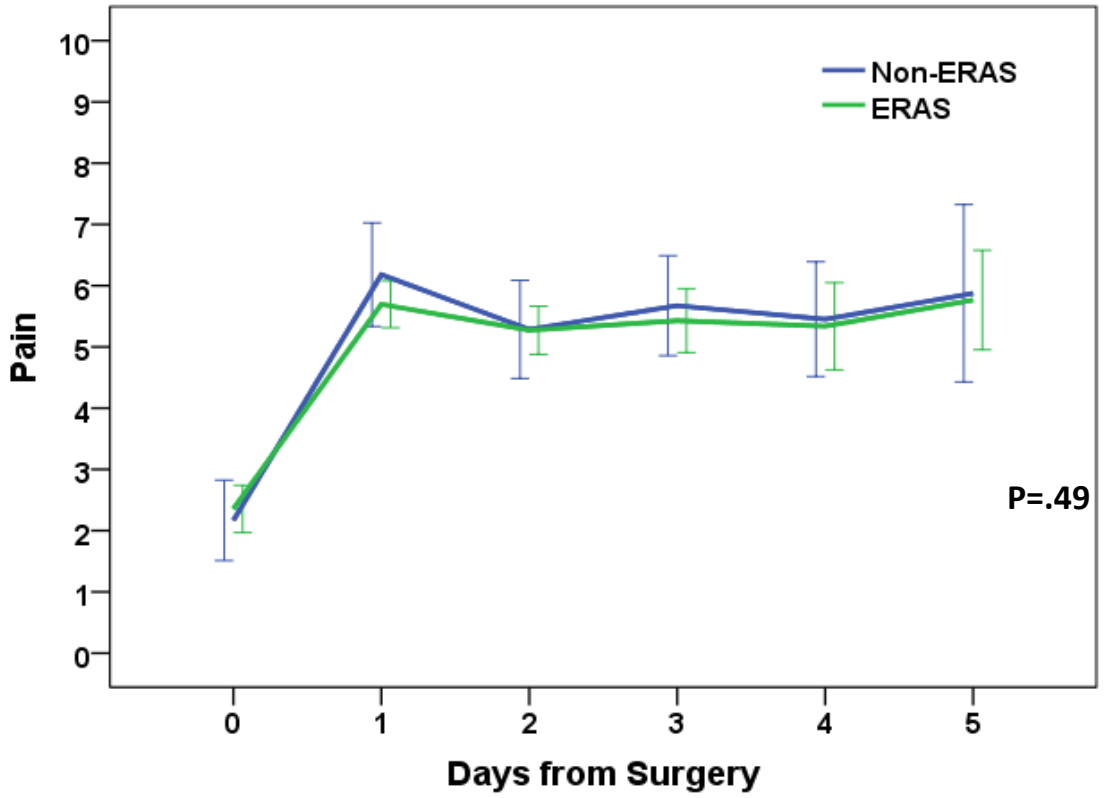


Statistical Methods

- **Sample size estimation: 64 pts needed per group to detect a moderate effect size (0.5 SD) difference**
- **Linear mixed-effect modeling**
- **LOWESS curves- locally weighted polynomial regression.**
- **Kaplan-Meier curves: estimate median time to return to mild/no symptom burden.**

No change in pain scores despite significant reduction in opioid intake

In hospital: Pain scores



Meyer, et al. Obstet Gynecol, 2018

Morphine equivalent dose

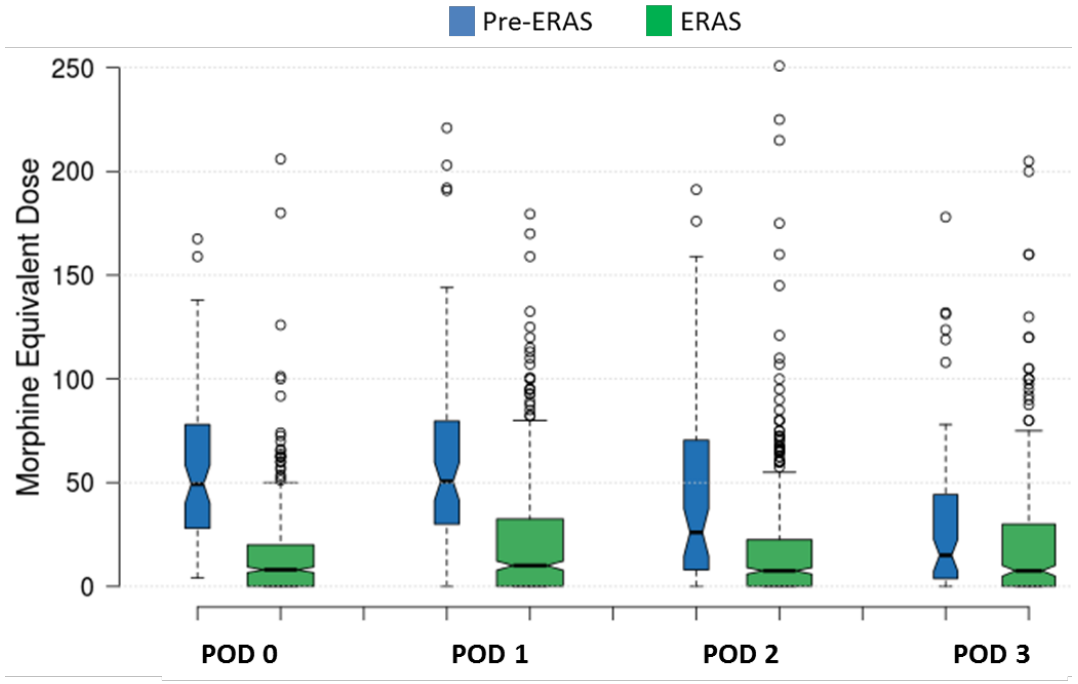
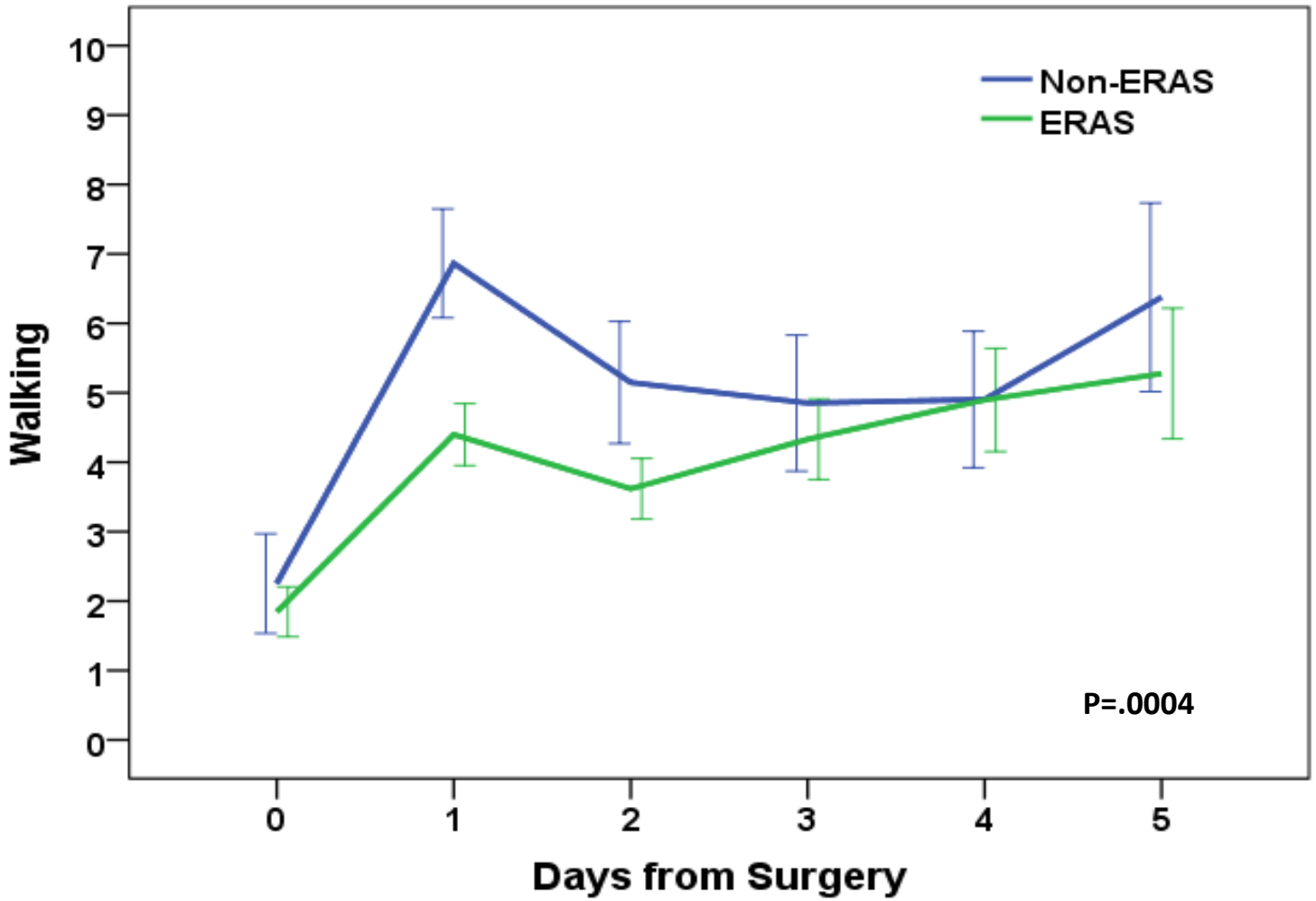


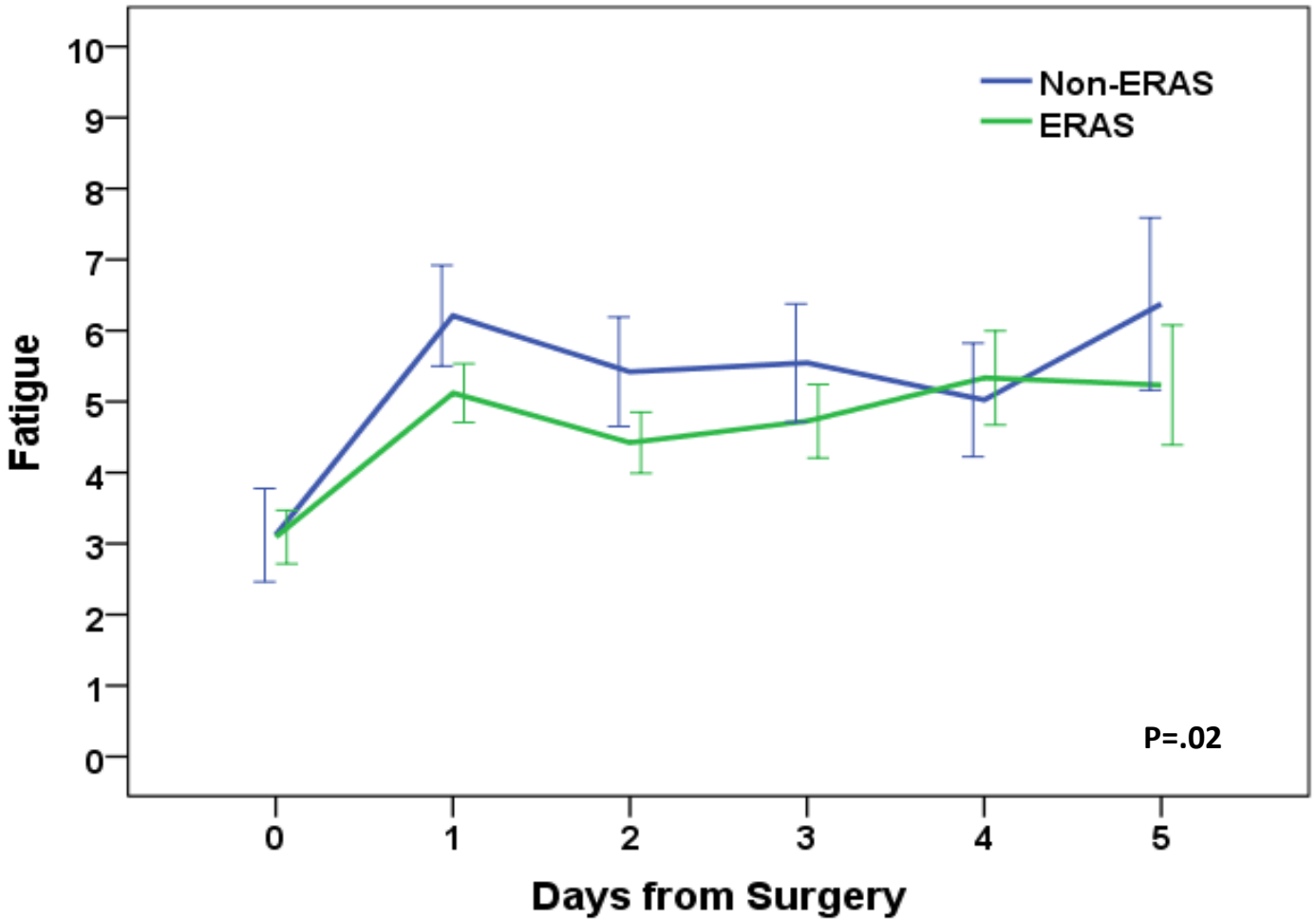
Figure 1a. Morphine Equivalent Dose (PACU + Floor)

73% reduction in median morphine equivalent daily dose

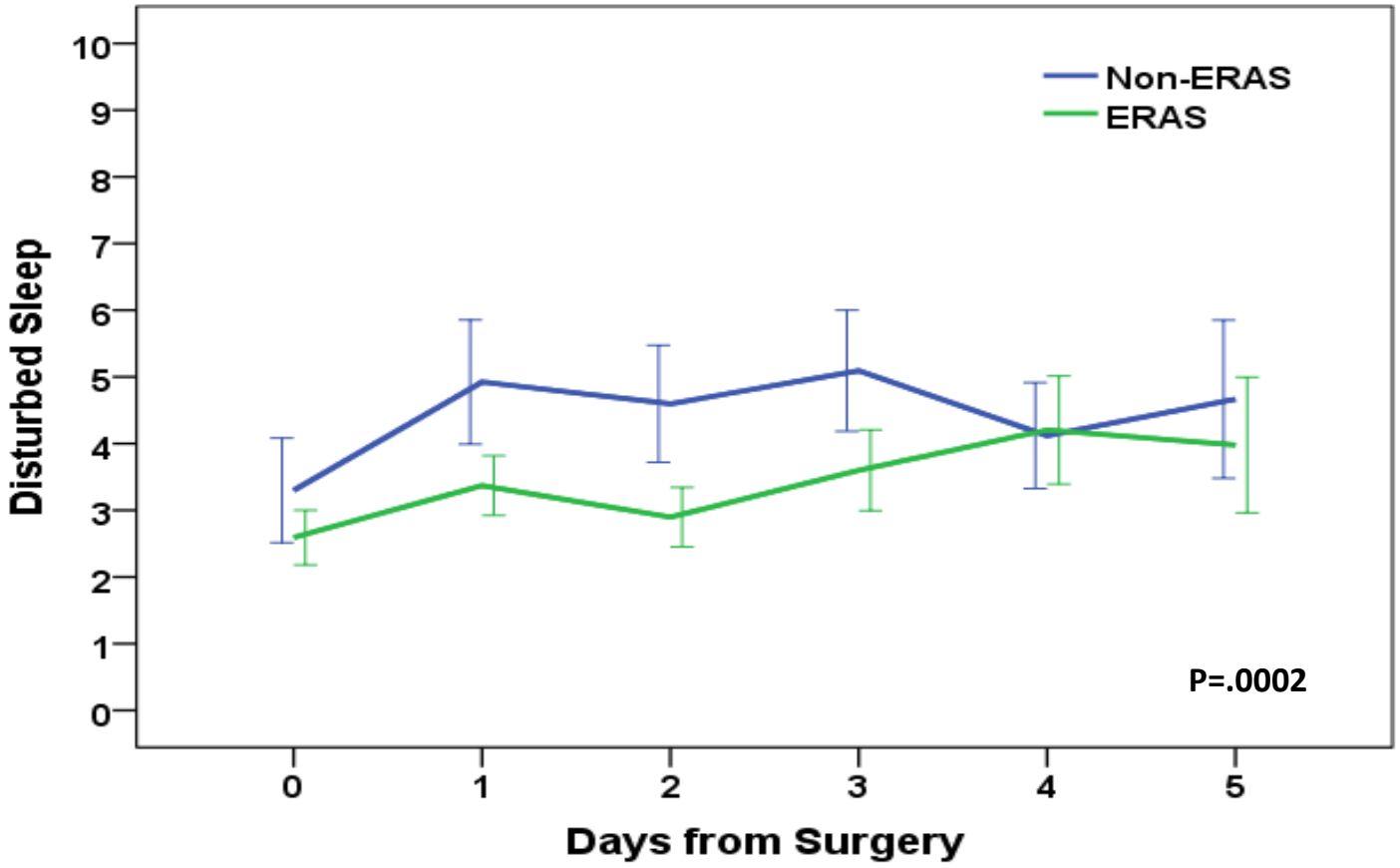
In hospital: Walking



In hospital: Fatigue

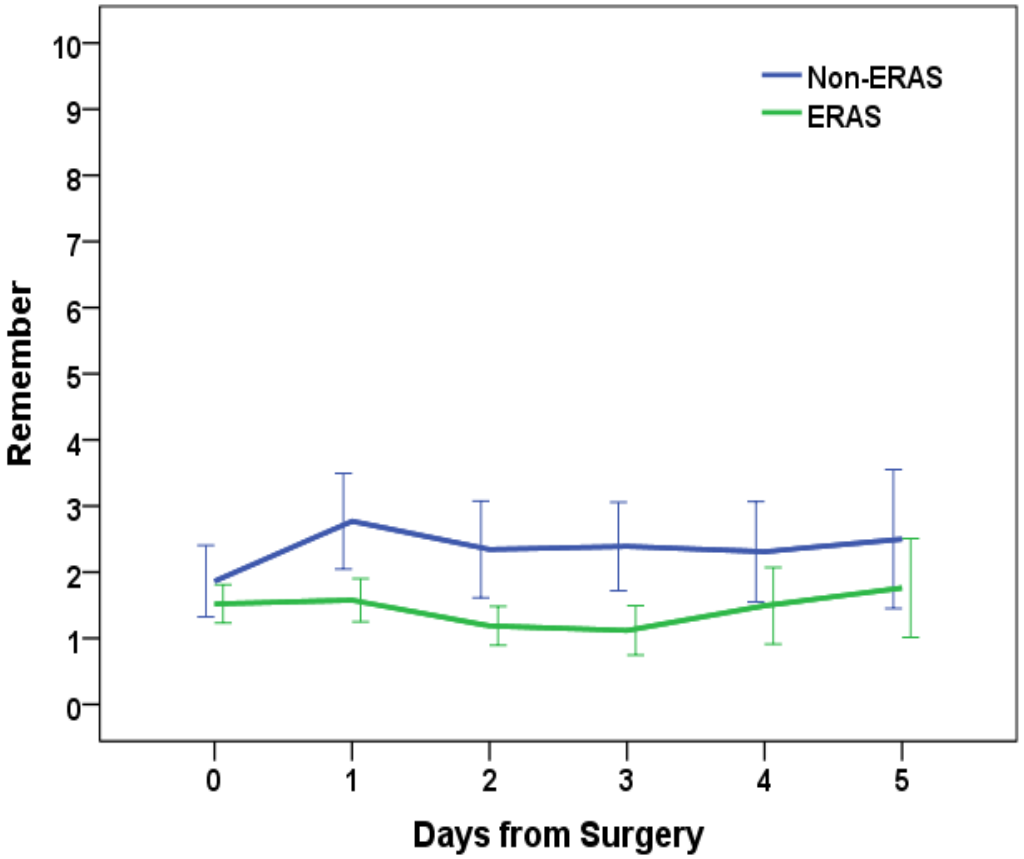


In hospital: Disturbed sleep

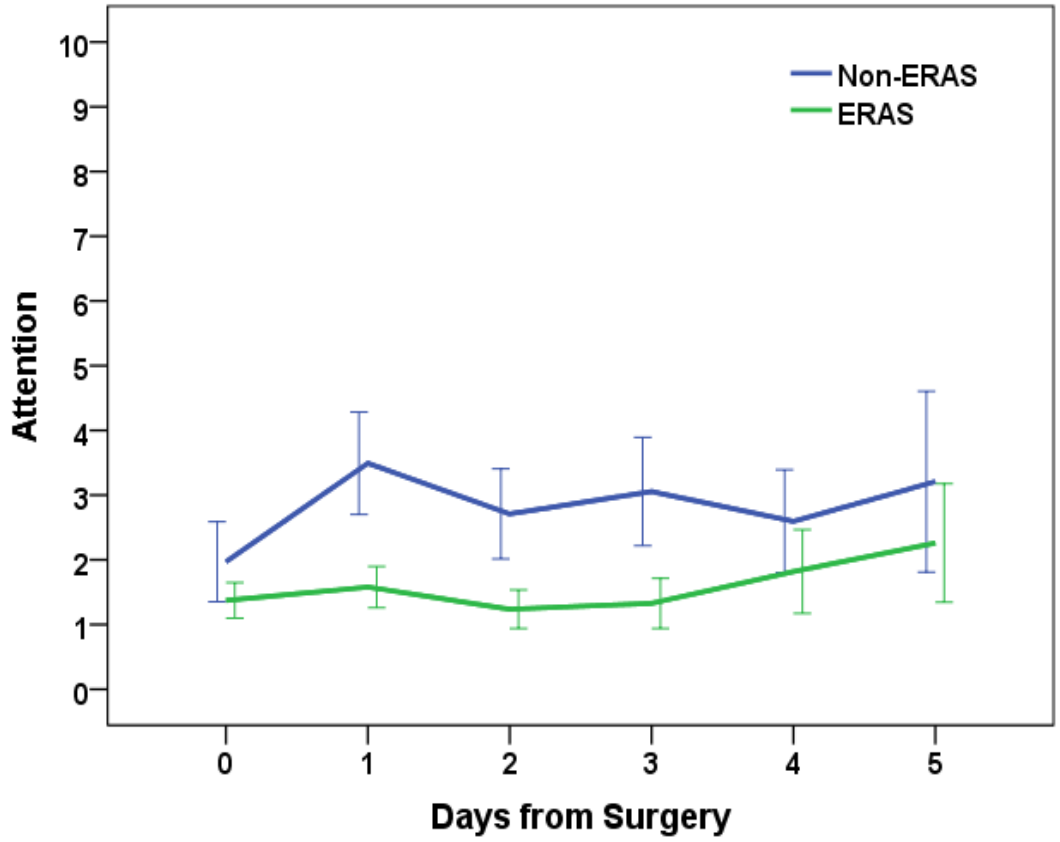


Patient reported cognitive impairments

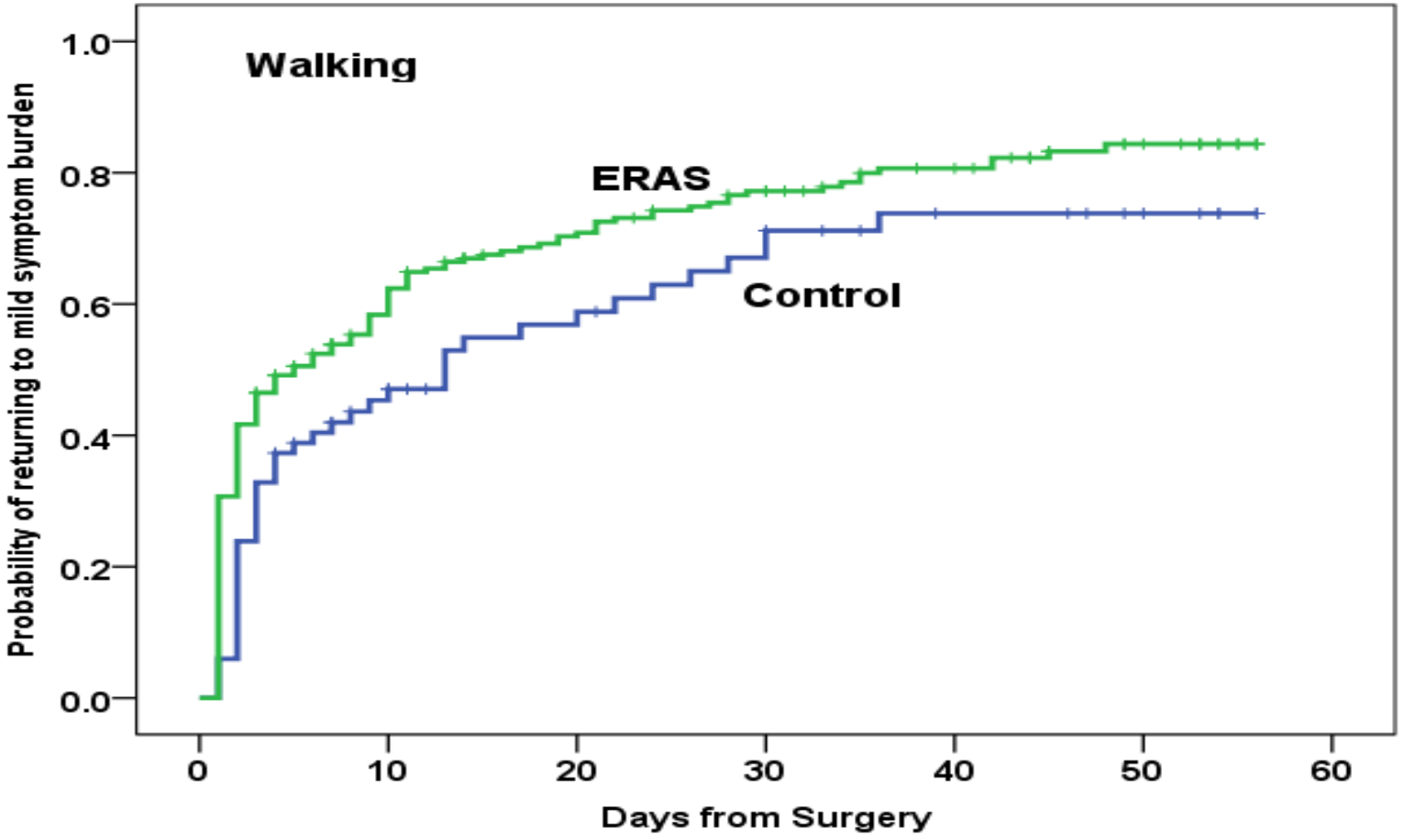
Difficulty Remembering



Problem paying attention



After discharge: Time to recovery (Return to mild/none)(<4)

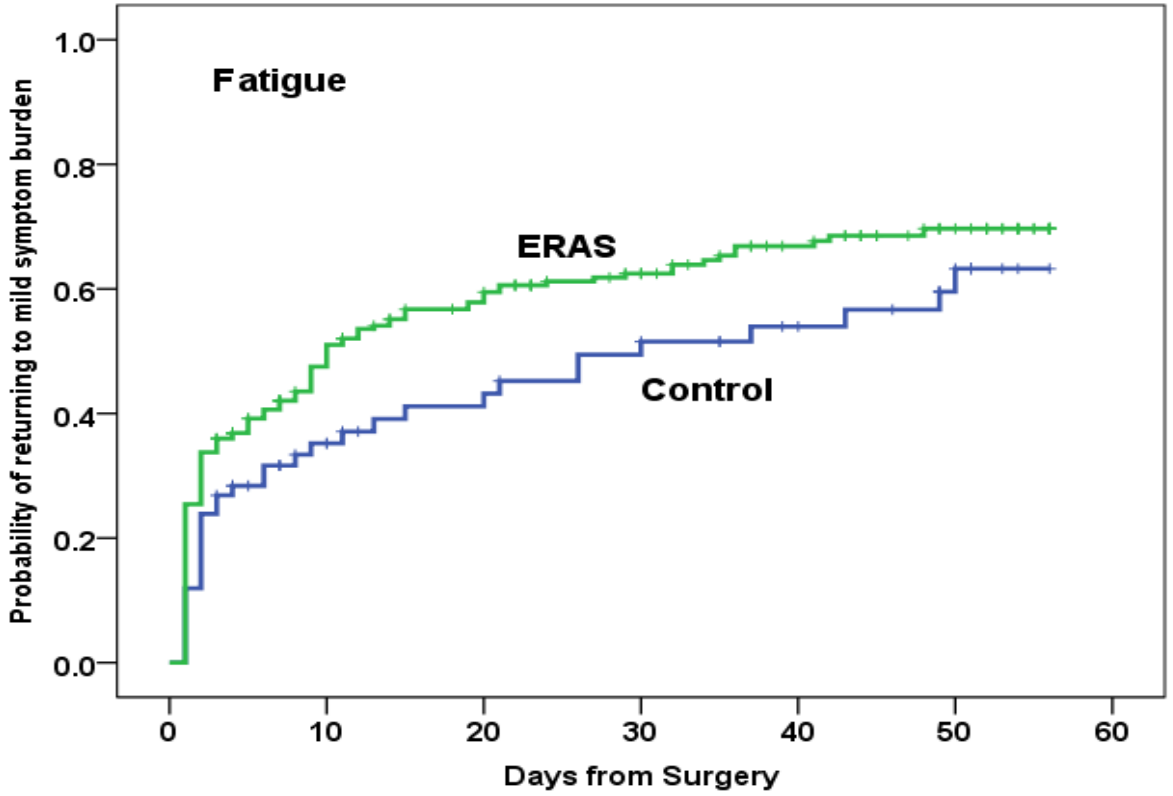


5 days vs. 13 days

p=.003

	Median			
		Std.	95% Confidence Interval	
Peri-operative care	Estimate	Error	Lower Bound	Upper Bound
Non-ERAS	13.0	4.3	4.5	21.5
ERAS	5.0	1.4	2.2	7.8

After discharge: Time to recovery (Return to mild/none)(<4)

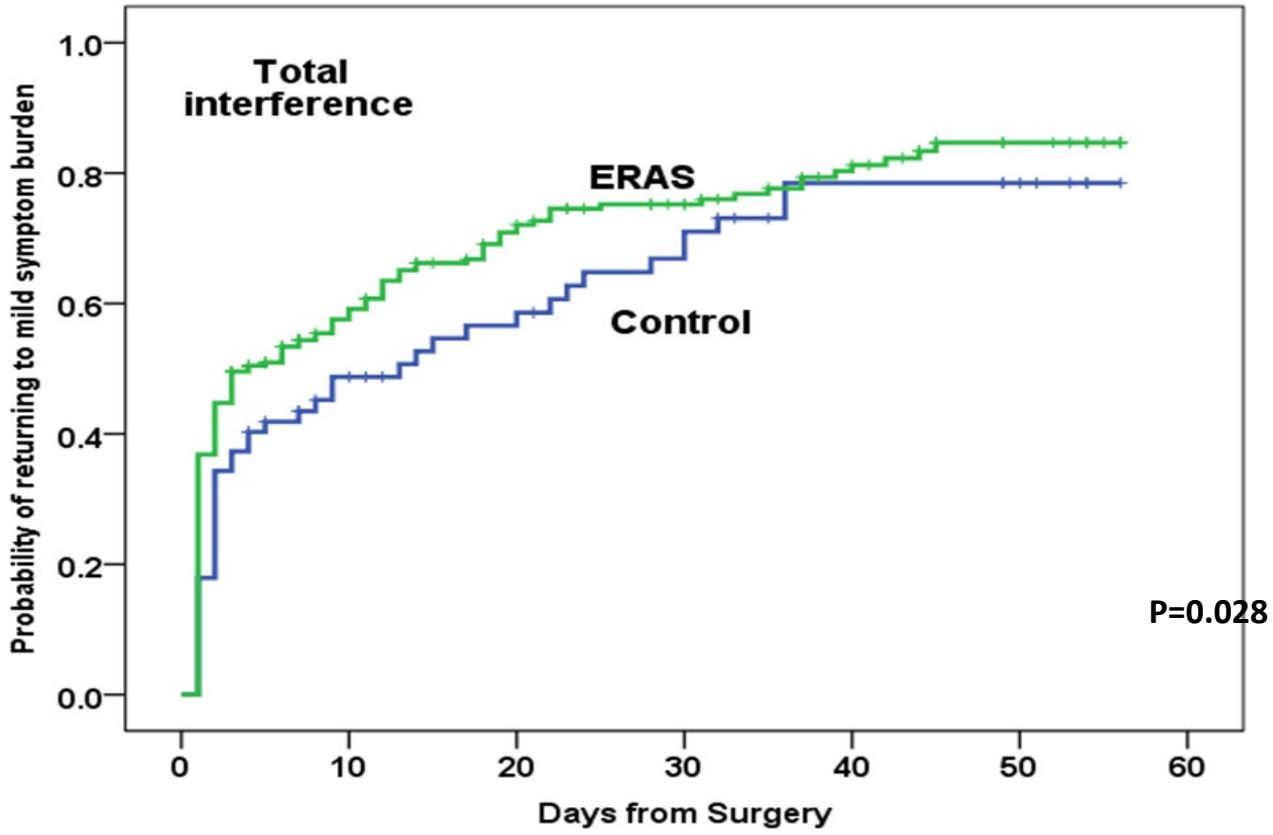


P=0.028

10 days vs. 30 days

Peri-operative care	Median			
	Estimate	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Non-ERAS	30.0	11.4	7.6	52.4
ERAS	10.0	1.7	6.6	13.4

After Discharge: Time to recovery (Return to mild/none)(<4)



3 days vs. 13 days

Peri-operative care	Median			
			95% Confidence Interval	
	Estimate	Std. Error	Lower Bound	Upper Bound
Non-ERAS	13.0	4.8	3.6	22.8
ERAS	3.0	1.2	.57	5.4

Objective

- **To compare patient reported outcomes (PROs) and self-reported functional recovery longitudinally between pts who underwent gynecologic surgery (open vs MIS) before and after implementation of ERAS**

Is ERAS the “great equalizer”?

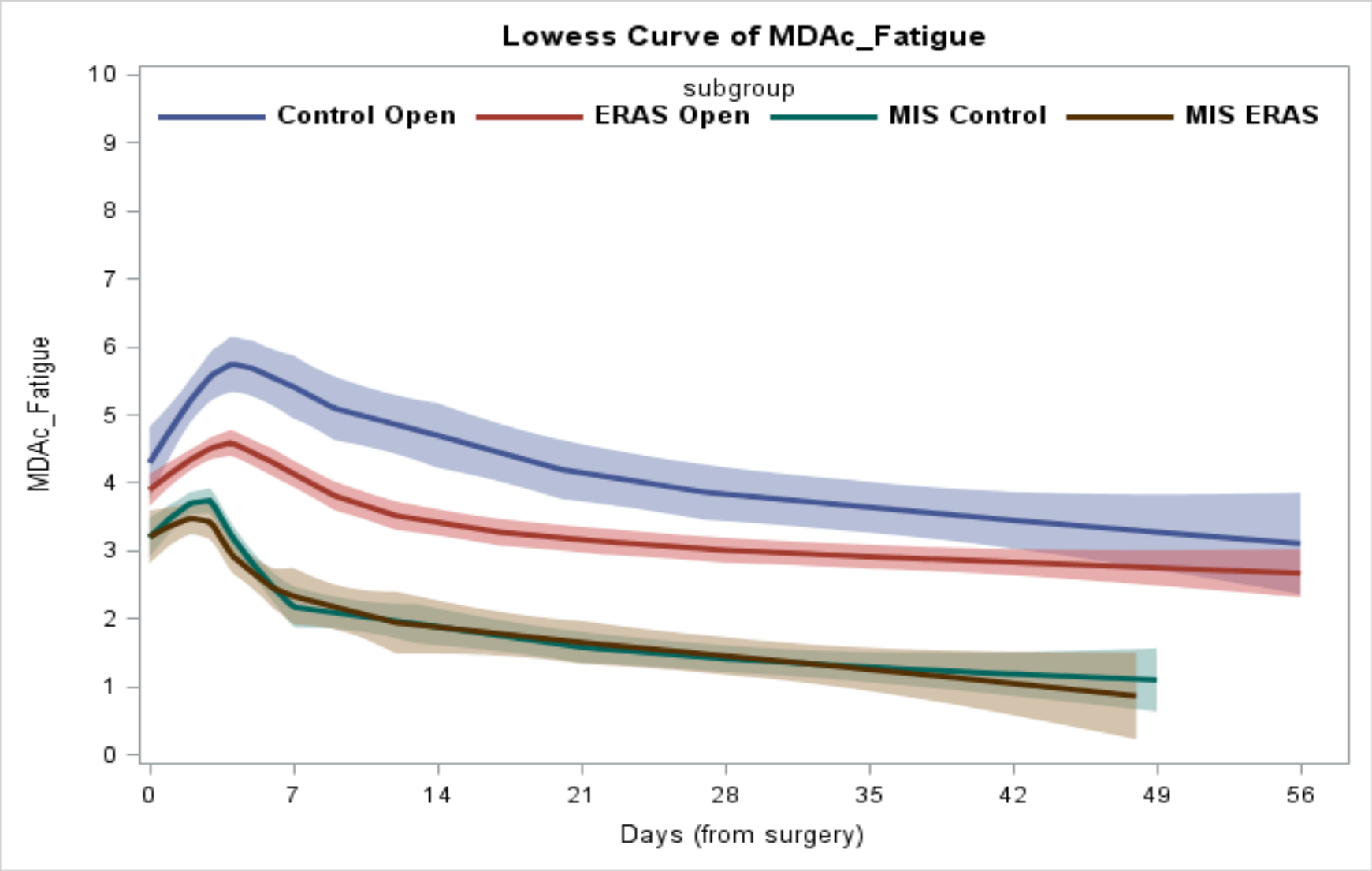
Results

	Open- Control (n=65)	Open ERAS (n=267)	MIS-Control (n=147)	MIS- ERAS (n=76)
Age (range)	58 (32-85)	58 (18-87)	51 (18-76)	55(27-78)
LOS (days)	4	3	0	0
Surgical time (min)	231	219	111	121
BMI (min-max)	27.6(17.7-55.5)	27.3(18.2-66.1)	29.2(18.1-58.8)	31.9(18.8-52.3)
Surgical Complexity Score				
low	52.5%	62.9%		
intermediate	42.5%	32.6%		
high	5%	4.5%		

Five most highly rated symptoms

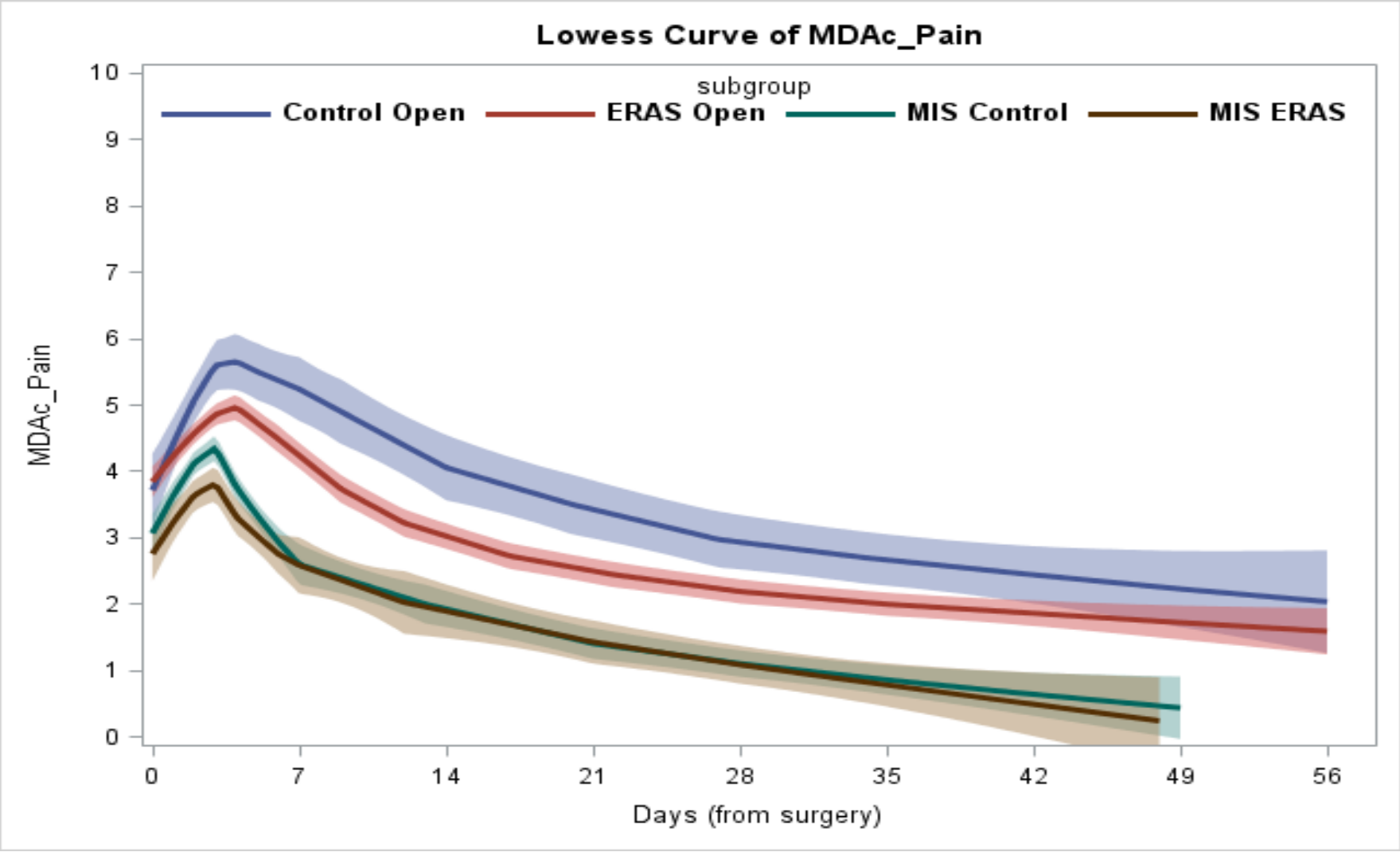
- **Fatigue**
- **Pain**
- **Abdominal pain**
- **Disturbed sleep**
- **Drowsiness**

Fatigue



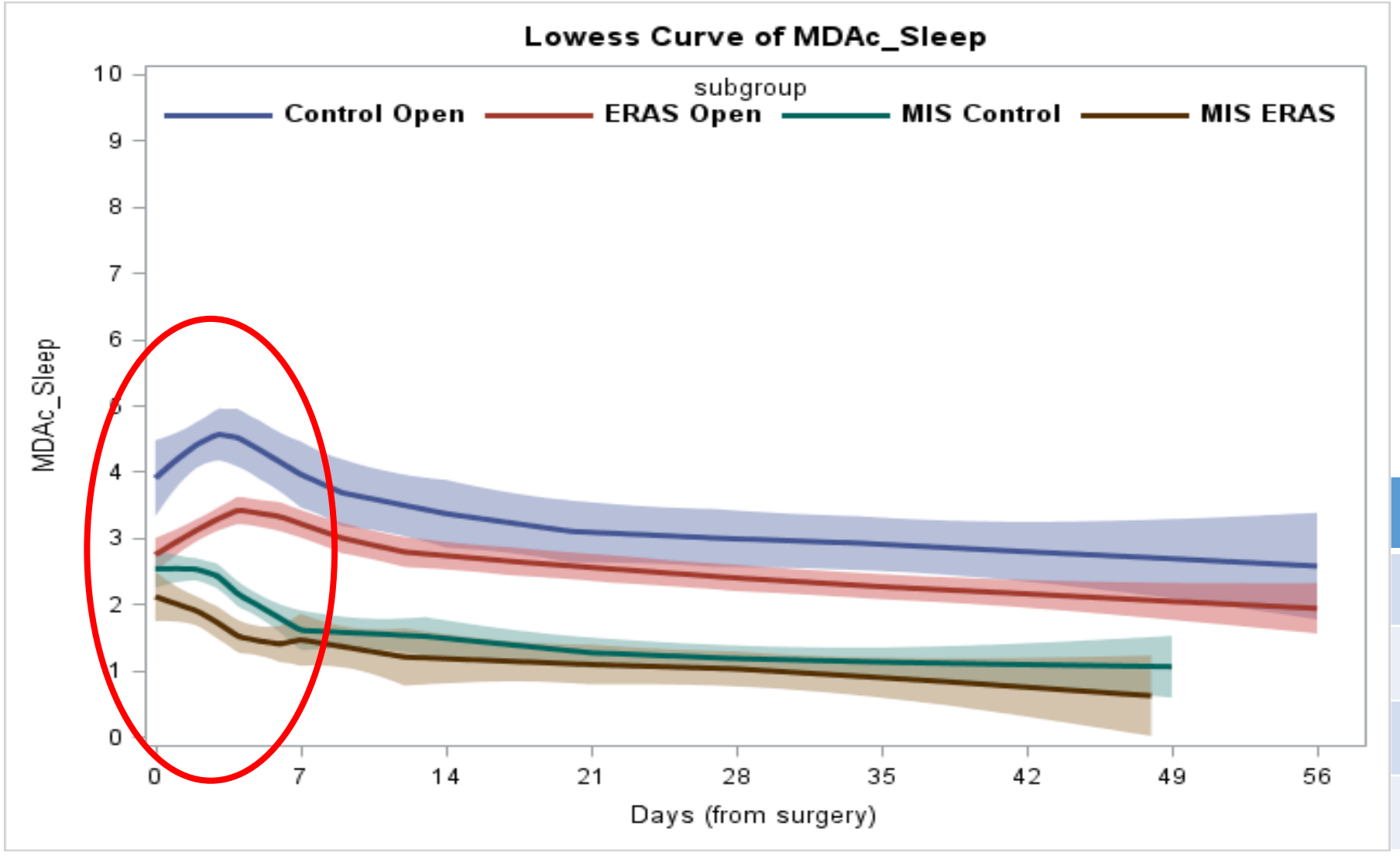
Subgroup	P-value
Control Open	<.0001
ERAS Open	<.0001
MIS Control	0.33
MIS ERAS	ref

Pain



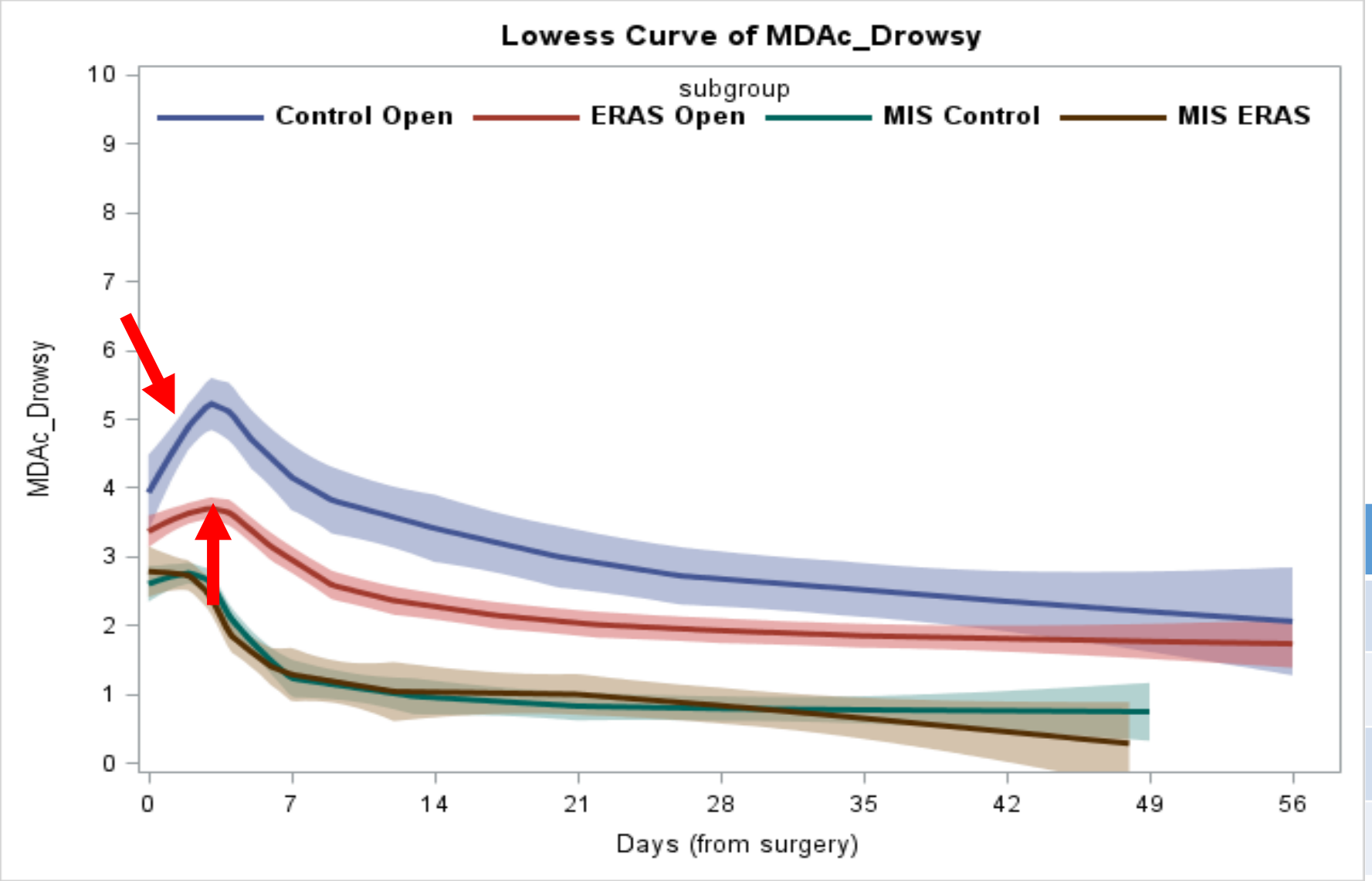
Subgroup	P-value
Control Open	<.0001
ERAS Open	0.0014
MIS Control	0.22
MIS ERAS	ref

Disturbed Sleep



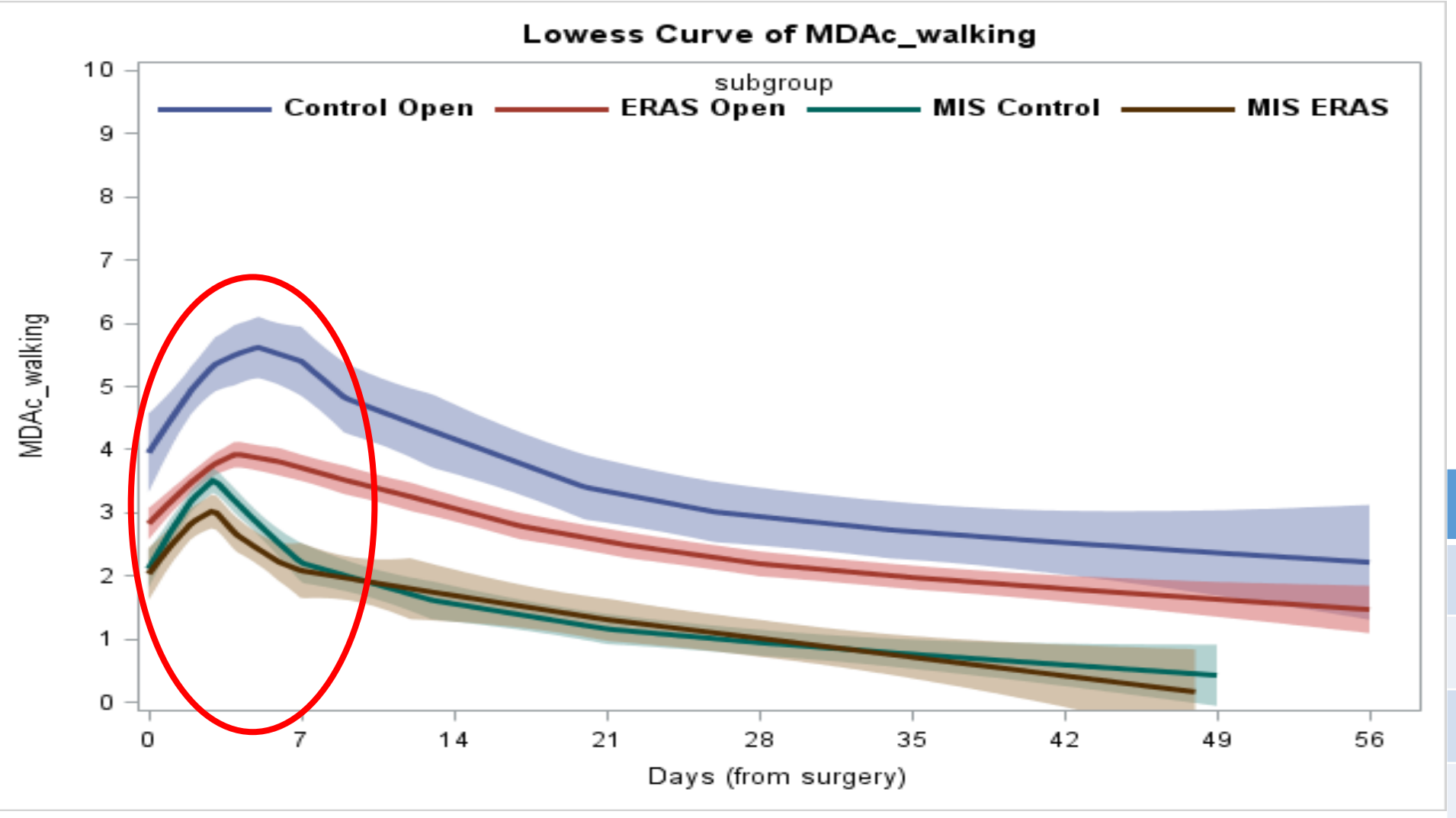
Subgroup	P-value
Control Open	<.0001
ERAS Open	<.0001
MIS Control	.028
MIS ERAS	ref

Drowsiness



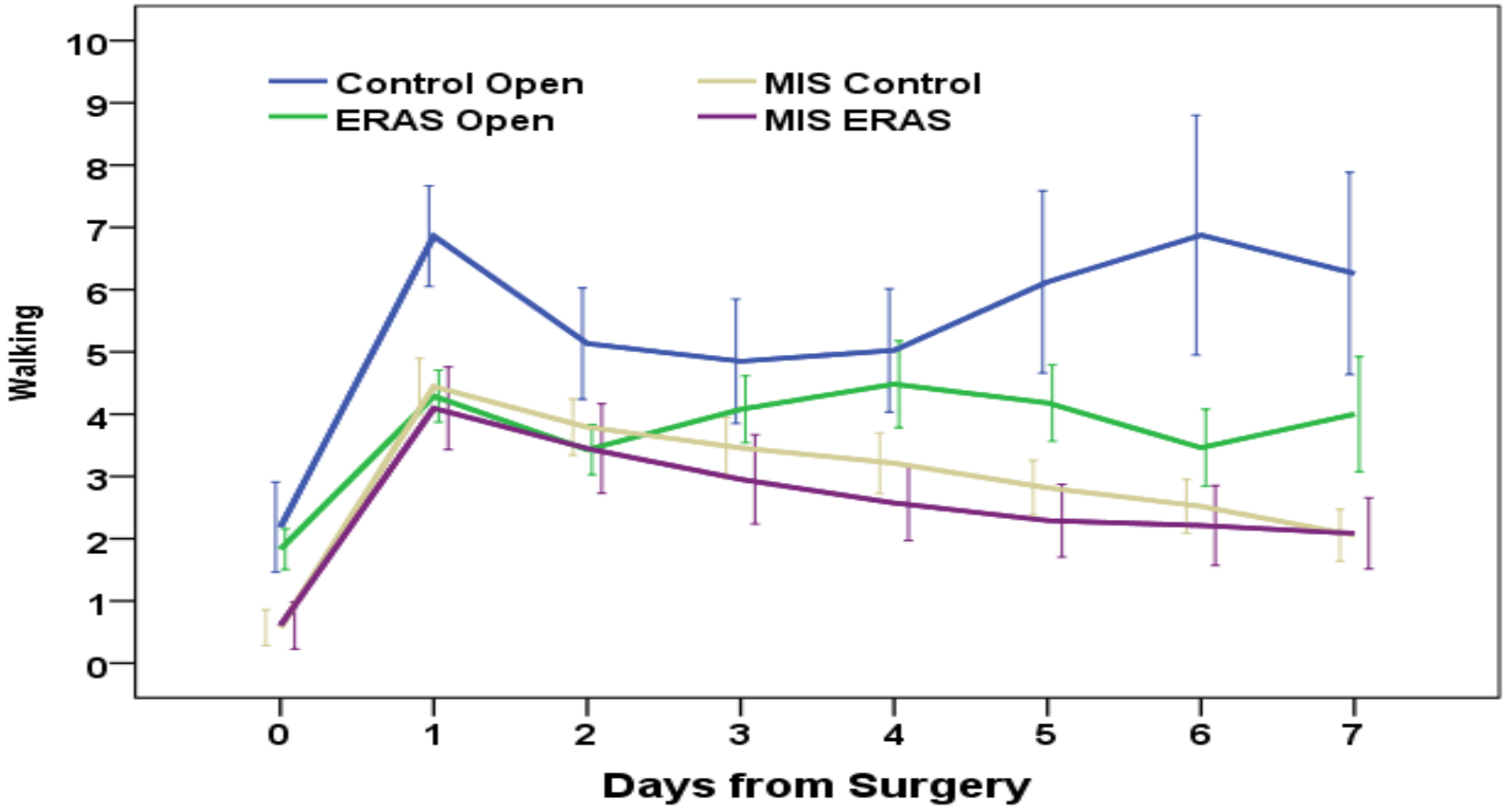
Subgroup	P-value
Control Open	<.0001
ERAS Open	<.0001
MIS Control	0.98
MIS ERAS	ref

Interference with Walking



Subgroup	P-value
Control Open	<.0001
ERAS Open	0.003
MIS Control	0.12
MIS ERAS	ref

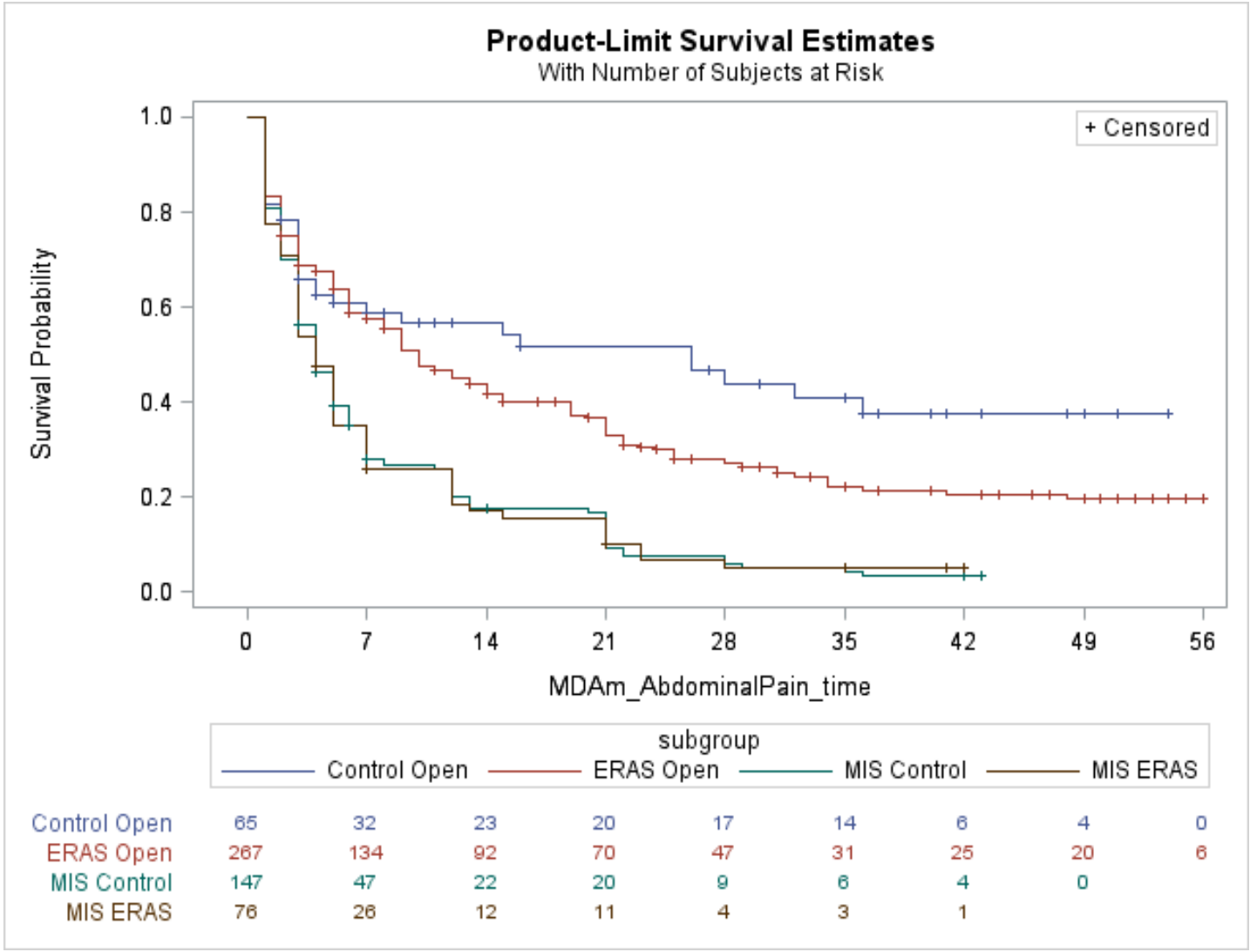
Interference with Walking: POD-0-7



MIS ERAS (ref)	P-value
Control Open	<.0001
ERAS Open	0.0001
MIS Control	0.39
Control open vs. ERAS Open	<.0001

Return to mild/no Abdominal Pain

	Median time (days)	P-value (adj.)
Control Open	**26**	**<.0001**
ERAS Open	**10**	**<.0001**
MIS Control	**4**	**0.2**
MIS ERAS	**4**	**Ref.**



Time to return to mild/none: top 5 symptoms

Symptom	Median number of days to return to low/none symptom burden (days)				P-value open vs. MIS ERAS
	Open control	Open ERAS	MIS control	MIS ERAS	
Fatigue	30	9	3	3	<.0001
Pain	16	11	4	4	<.0001
Abdominal Pain	26	10	4	4	<.002
Disturbed sleep	8	2	2	1	<.002
Drowsiness	8	4	2	2	≤0.0003
Interference: Walking	13	5	3	2	≤.01

Lessons learned:

- **Implementation of ERAS in open gynecologic surgery improved many patient reported symptoms and functional recovery**
- **MIS contributes to decreasing symptoms and improving functional recovery after surgery and remains an important tenant of enhanced recovery**
- **From a PRO standpoint, ERAS is not the equalizer**

Conclusions:

- Patient reported outcomes are a useful adjunct to further our understanding of surgical recovery, especially after hospital discharge
- Collecting PROs is possible in a complex surgical population
- PROs provide a unique way to measure improvement initiatives

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- **Symptoms Research team**
- **Our patients**