



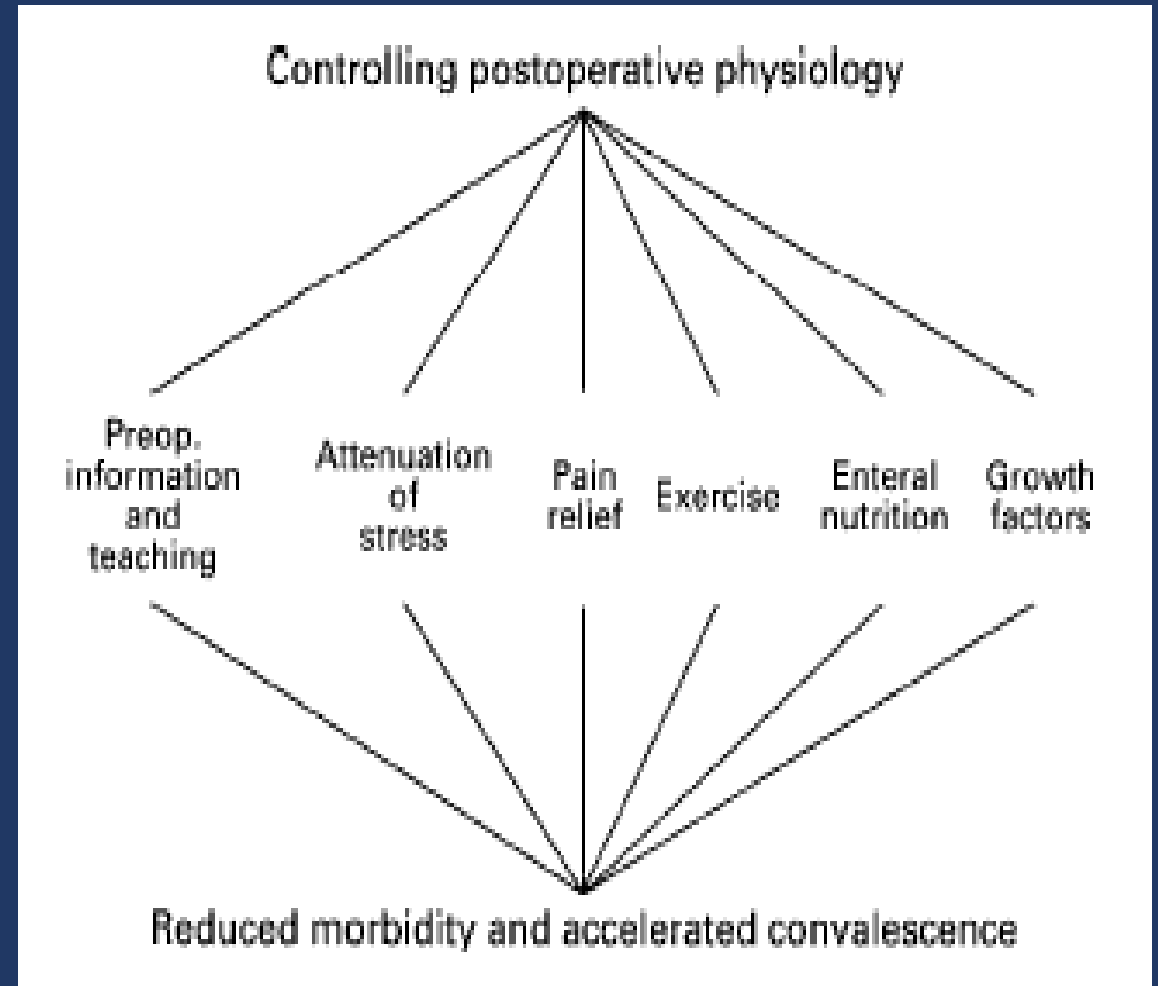
# A high-volume surgical unit experience with enhanced recovery after surgery (ERAS)

**Catalina Mosquera**, Nicholas J. Koutlas, Nasreen A. Vohra, Emmanuel E. Zervos, Timothy L. Fitzgerald

East Carolina University, Brody School of Medicine, Division of Surgical Oncology  
Greenville, NC, USA.

# Enhanced recovery after surgery

- 1997
  - Dr Henrik Kehlet
  - Fast track
- 2001
  - Multimodal, Evidence based
  - Improve recovery after surgery
  - ERAS



# Perioperative pathway

## Preoperative

Comorbidity optimization  
Carbohydrate loading  
Immunonutrition

## Intraoperative

Goal-directed fluid resuscitation  
Maintenance of normothermia  
Multimodal pain management  
Prevention of post-op ileus

## Postoperative

Early enteral nutrition  
Avoidance of tubes and drains  
Early ambulation

Surgery. 2011 Jun;149(6):830-40. doi: 10.1016/j.surg.2010.11.003. Epub 2011 Jan 14.

Acta Obstet Gynecol Scand. 2014 Aug;93(8):749-56. doi: 10.1111/aogs.12423. Epub 2014 Jun 13.

## **Implementing a structured Enhanced Recovery After Surgery (ERAS) protocol reduces length of stay after abdominal hysterectomy.**

Wijk L<sup>1</sup>, Franzen K, Ljungqvist O, Nilsson K.

World J Surg. 2013 Oct;37(10):2372-8. doi: 10.1007/s00268-013-2135-1.

BJU Int. 2014 Sep;114(3):375-83. doi: 10.1111/bju.12644. Epub 2014 Jul 27.

## **Evolution of the Southampton Enhanced Recovery Programme for radical cystectomy and the aggregation of marginal gains.**

Smith J<sup>1</sup>, Meng ZW, Lockyer R, Dudderidge T, McGrath J, Hayes M, Birch B.

Awad S<sup>1</sup>, Carter S, Purkayastha S, Hakky S, Moorthy K, Cousins J, Ahmed AR.

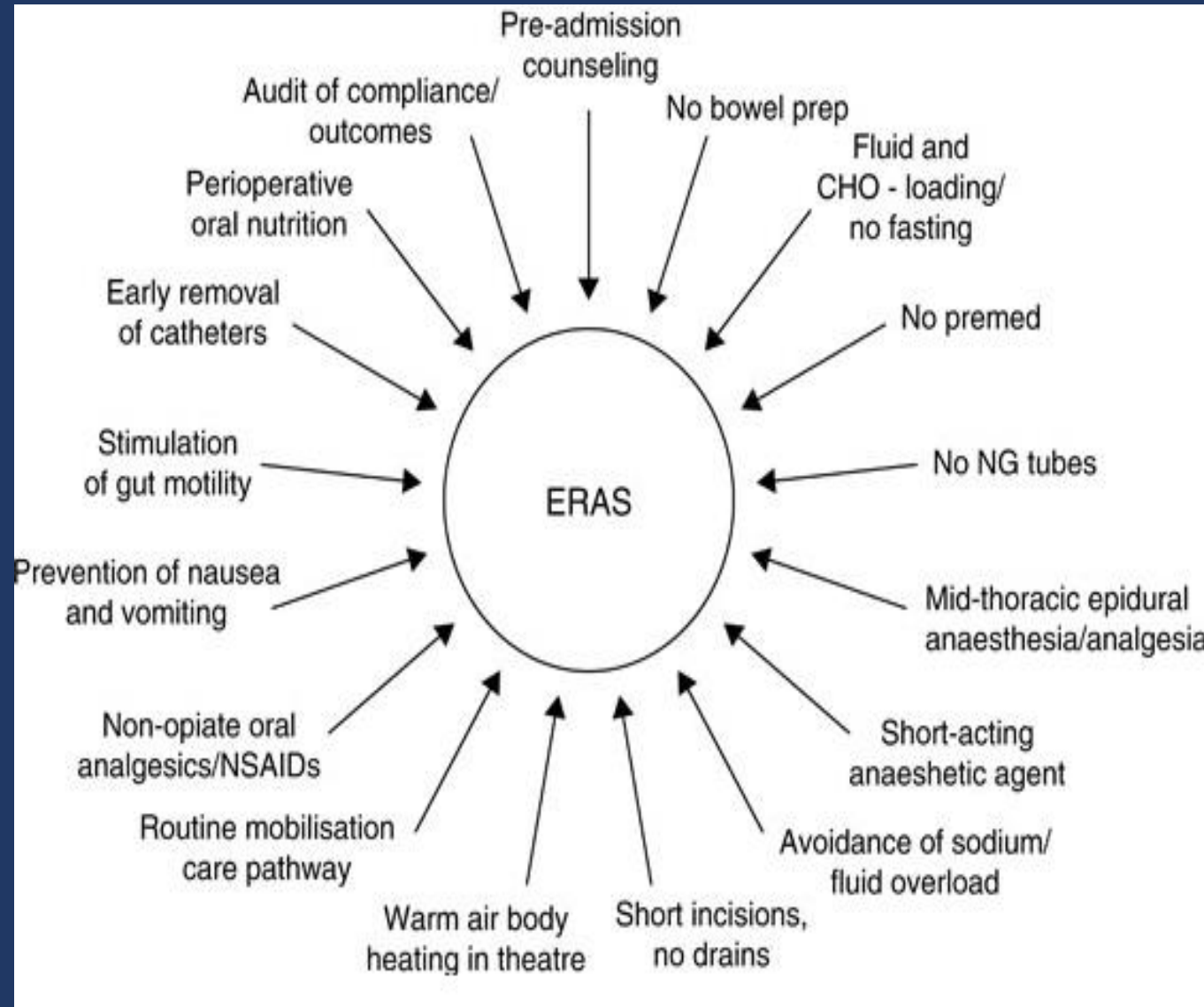
J Cardiothorac Vasc Anesth. 2015 Dec;29(6):1489-97. doi: 10.1053/j.jvca.2015.03.003. Epub 2015 Mar 5.

## **Association of Robotic Totally Endoscopic Coronary Artery Bypass Graft Surgery Associated With a Preliminary Cardiac Enhanced Recovery After Surgery Program: A Retrospective Analysis.**

Zaouter C<sup>1</sup>, Imbault J<sup>2</sup>, Labrousse L<sup>3</sup>, Abdelmoumen Y<sup>4</sup>, Coiffic A<sup>4</sup>, Colonna G<sup>3</sup>, Jansens JL<sup>5</sup>, Ouattara A<sup>6</sup>.

Braga M<sup>1</sup>, Pecorelli N, Ariotti R, Capretti G, Greco M, Balzano G, Castoldi R, Beretta L.

# ERAS Schema



# ERAS Environment

Institutional investment

**New protocols**

In service training

Monitor

- The idea of implementing such a protocol for a single surgeon may be daunting

## PURPOSE

- Determine feasibility in designing an optimal pathway for a single surgeon performing a variety of complex abdominal procedures

A single surgeon experience with  
enhanced recovery after surgery  
(ERAS) : An army of one



# ERAS Pathway

## Preoperative Factors

<b>High protein Diet</b>	Starting at appointment date	Up to 1 gr/kg, protein/day
<b>Inmunonutrition</b>	Five days prior to surgery	Ensure complete liquid 1 can BID, Juben power BID
<b>Clear liquids only</b>	After midnight on day prior to surgery	Gatorade lemon-lime 20 Oz, No cream, no red drinks
<b>Last intake</b>	Three hours prior to surgery	Gatorade lemon-lime 20 Oz

## Intraoperative Factors

<b>Pain control</b>	Throughout the case	Epidural (Optional), Gabapentin 600 mg once
<b>Normothermia</b>	Throughout the case	Bair Huger
<b>Fluid resuscitation</b>	Throughout the case	Lidco monitor

## Postoperative Factors

<b>Pain control</b>	Throughout postoperative time	Avoid narcotic use, Gabapentin 600mg PO q8hrs x 3, Toradol 15mg IV q 6hrs x 4, Tylenol 1,000mg PO q 6hrs
<b>Bowel regimen</b>	Until return of bowel function	Colace 100mg PO q12hrs, Dulcolax suppository 10mg PR q24hrs
<b>Diet</b>	Early enteral nutrition	Inmunonutrition X 5 days, diet as tolerated on POD1
<b>Early convalescence</b>	Postop day 0	Up to chair 6-8 hrs, ambulation in the halls 5 times a day.
<b>Drain Management</b>	Post op day 0-1	NGT removed on post-operative day0- 1, (for pancreas surgery check effluent amylase on POD3, if <300 remove drain)

# Methods

- Retrospective study including patients undergoing major abdominal surgery from June 2013 to April 2015
- UHC, EMR
  - Demographic factors
  - Comorbidities
  - Diagnosis and procedure performed
  - Outcomes

# Results

Factor	(%), Number, Mean (+/-SD)
<b>Female</b>	(53.6)96
<b>Age</b>	62.3 (+/- 13.9)
<b>Race</b>	
White	(61.5) 110
Black	(34.6) 62
<b>Charlson comorbidity scores</b>	
0-2	(45.8)82
3-5	(32.4)58
>5	(21.8)39
<b>ERAS</b>	(48.6) 87
<b>Post-operative length of stay</b>	7.9 (+/- 7.7)
<b>Cost</b>	26,149 (+/- 20,694)
<b>Complications</b>	
Grade 0-I	(60.1)109
Grade II-V	(39.1) 70
<b>Readmissions</b>	(16.5) 29
<b>In-hospital mortality rate</b>	(1.7) 3

Patients were similar in age, gender, race, admission diagnosis , comorbidities and procedure performed

Factor	ERAS %	NO ERAS %	P value
<b>Postoperative LOS</b>	6.2 (+/-4.9)	9.6 (+/-9.3)	0.024
<b>Complications</b>			
Grade 0-I	67.8	54.4	0.064
Grade II-V	32.2	42.6	
<b>Cost</b>	21,674 (+/-12,118)	30,380 (+/-25,723)	0.029
<b>Readmissions</b>	11.5	21.4	0.076
<b>Mortality</b>	0	3.3	0.044

# Conclusions

- Implementation and successful execution of an ERAS program by a single surgeon is possible
- Requires a broad interdisciplinary coalition
- Although significant barriers exist to implementation, surgeons who can successfully orchestrate such a program will achieve the benefits
  - Decreases in LOS, readmission rates, cost, and mortality

- To better understand the application of ERAS in a diverse patient population and influence of shifting expectations on non-ERAS patient

## HYPOTHESIS

- Education of an ERAS team and changes in postoperative expectation would improve the outcomes in the unit's control (NON-ERAS) patients

Enhanced recovery after surgery  
(ERAS) on a single high-volume  
surgical oncology unit: Details  
matter

# Methods

- Retrospective study including patients undergoing major abdominal surgery from June 2013 to April 2015 at Vidant Medical Center, East Carolina University
  - One surgeon (test surgeon) implemented program
  - Two surgeons (control surgeons) continuing standard practice
- UHC, EMR
  - Demographic factors
  - Comorbidities
  - Diagnosis and procedure performed
  - Outcomes



# ERAS provider vs. NON ERAS providers

- Patients were similar in age, gender, race, admission diagnosis , comorbidities and procedure performed

Factor	Eras %	Non-Eras %	p value
LOS mean	6.0 (+/-4.9)	8.0 (+/- 7.3)	0.016
Complications			0.31
Grade 0-I	67.8	61,9	
Grade II- V	32.2	38.1	
Cost	21,674 (+/- 12,118)	25,994 (20,092)	0.060
Readmission rate	11.5	16.9	0.21
Mortality rate	0	2.9	0.033

# Pre ERAS vs. Post ERAS in control Provider

- Patients were similar in age, gender, race, admission diagnosis , comorbidities and procedure performed

<b>Factor</b>	<b>Pre ERAS %</b>	<b>Post ERAS %</b>	<b>p value</b>
LOS mean	7.6 (+/- 5.9)	7.1 (+/-6.3)	0.51
Complications			0.20
Grade 0-I	61.3	69.8	
Grade II- V	38.7	30.2	
Cost	23,235 (+/- 13,960)	25,210 (+/- 19,893)	0.40
Readmission rate	15.1	15.1	0.99
Mortality rate	2.5	3.1	0.79

# Conclusion

- Benefits of ERAS can not be attributable to changes in providers education and recovery expectation
- Details matter; benefit of protocol stems from pathway implementation and not from a shift in expectation

# Summary

- ERAS protocol improve patient outcomes
- However strict pathway implementation is required to obtain protocol benefits :
  - Decrease LOS
  - Decrease hospital cost
  - Decrease in hospital mortality



This data should demystify the ERAS implementation for the general surgeon and promote its adoption in mixed surgical practice