

Sleep Disordered Breathing Influences Early Postoperative Recovery – Pro!

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SASM

Boston, October 20, 2017

In the Next 20 Minutes ...

- Introduction to Enhanced Recovery After Surgery (ERAS)
- Rationale for ERAS in patients with sleep disordered breathing (SDB)
- Evidence review : components of care that can affect outcomes
- ERAS can improve outcomes, minimize complications and enhance satisfaction in patients with SDB

Introduction to ERAS

British Journal of Anaesthesia 1997; 78: 606–617



Multimodal approach to control postoperative pathophysiology and rehabilitation

H. KEHLET



Q: *Why are there complications after surgery?*

**A: ORGAN DYSFUNCTION
=
STRESS RESPONSE**

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To understand recovery, understand the stress response

Surgery → **predictable changes**

Physical trauma → inflammation; sympathetic surge

Catabolic state → insulin:glucagon; GH

Immobility → wasting; weakness

Immunosuppression → infection; poor healing

Pain → impairs all recovery

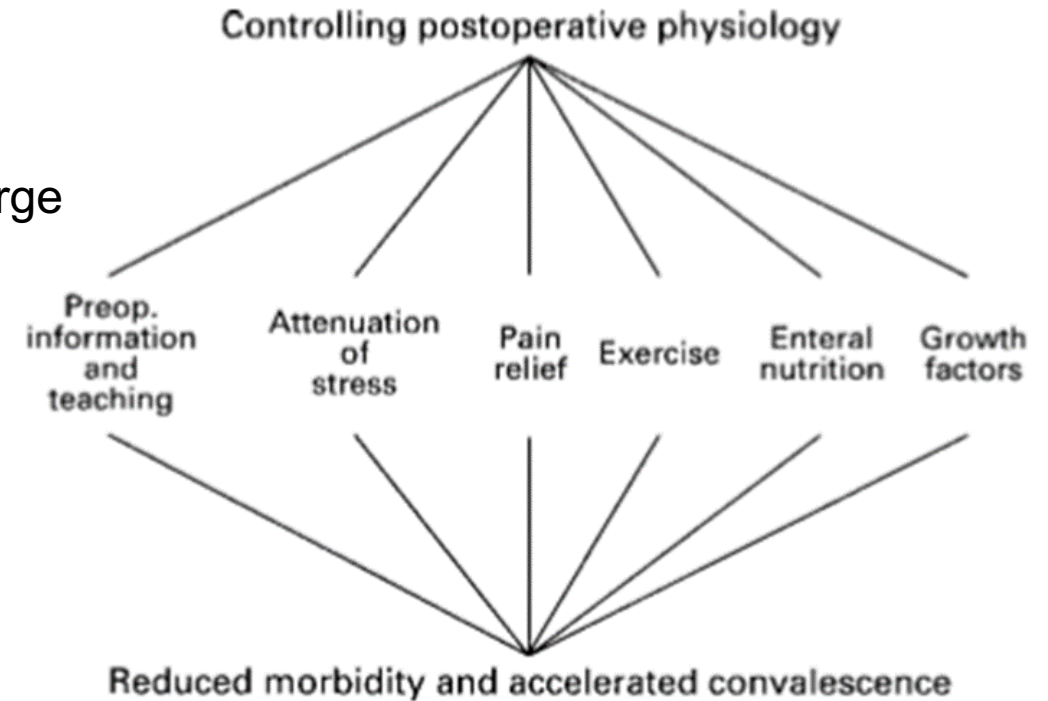


Figure 2 Multimodal interventions towards control of the postoperative period.

“...it is unlikely that any single intervention will affect recovery ...”

Fundamental ERAS Goal: Ensuring Best Practice

Reducing variation in surgical care

Requires innovative methods for getting evidence into surgical practice

Papers p 1420

Variations in surgical care have been recognised since the early 1980s and are generally interpreted as evidence of uncertainty among practitioners regarding optimal care. The prescription for remedying variations in surgical practice has generally included development of better medical evidence to identify best practices, dissemination of medical evidence to surgeons, and use of practice guidelines and care pathways to streamline care. More than 20 years later, there is still abundant evidence that surgical care varies substantially. Why do variations in surgical care persist? And what can be done about them?

In this issue of *BMJ*, Lassen et al (p 1420) report the results of a survey of lead surgeons in five north European countries regarding processes of care for colorectal surgery.¹ These processes included use of preoperative bowel preparation, routine postoperative

nasogastric decompression, and use of epidural analgesia in the postoperative surgical ward. The survey identified substantial international variation in the use of such perioperative interventions. In many cases, this variation occurred in spite of abundant, high quality medical evidence.

Surgery and evidence based medicine have had turbulent relations of late. There is broad recognition that much of current surgical practice is not informed by solid medical evidence² and that the application of methods such as randomised controlled trials to surgical questions is often difficult or impractical.³ However, there is growing uniformity of opinion in the surgical community that the quality of evidence supporting surgical care must be improved and that we need innovative methods for disseminating evidence into practice.⁴

BMJ 2005;330:1401-2

BMJ VOLUME 330 18 JUNE 2005 bmj.com

1401

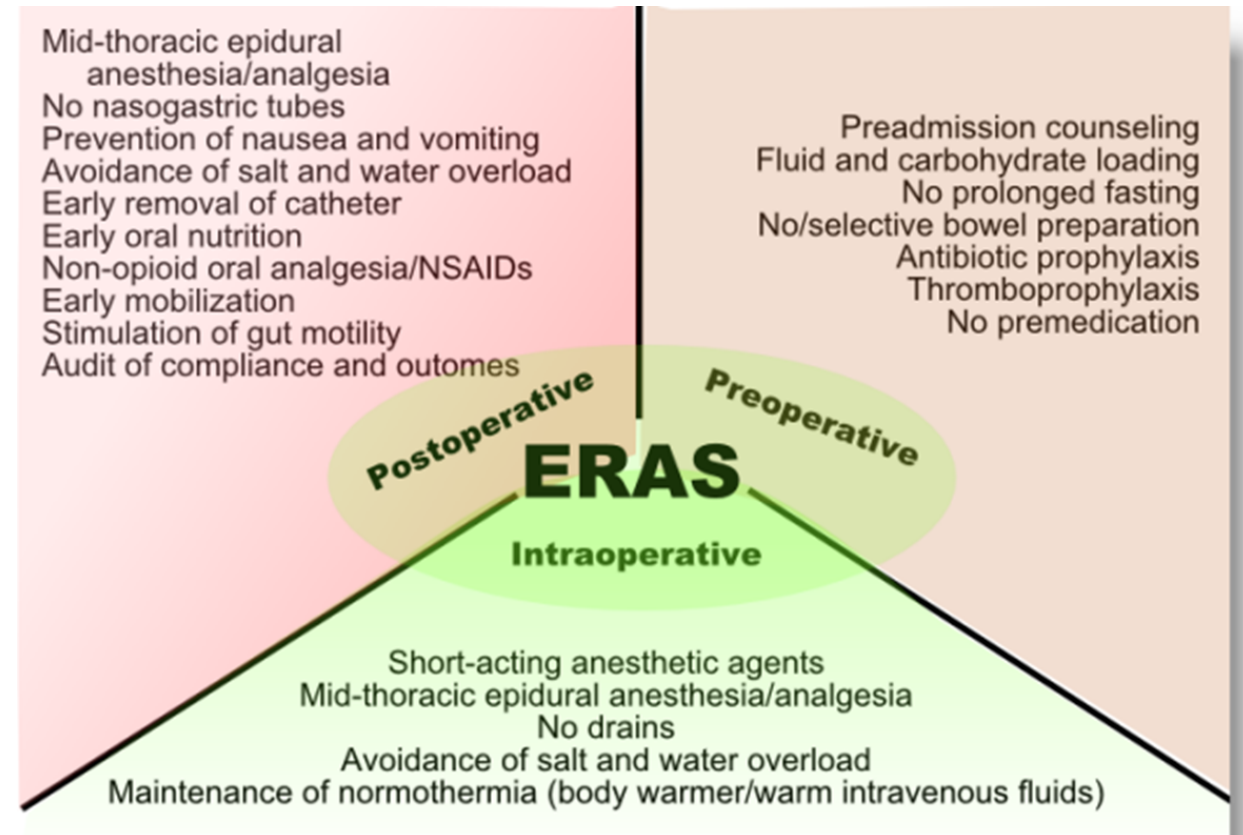
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“...the immediate challenge to improving the quality of care is not discovering new knowledge, but rather how to integrate what we already know into practice.”

[Urbach, D.R. & Baxter, N.N.]

Introduction to ERAS

Multimodal
Multidisciplinary
Standardized (Pathway-Based)
Evidence Based
Audited



ERAS And Postoperative Outcomes

Consistently associated with improved outcomes, fewer complications, and higher patient satisfaction:

Colorectal (Gustafsson 2013; Nygren 2013)

Urology (Cerantola 2013)

Gastric (Mortensen 2014)

Hepatobiliary (Lassen 2013)

Gynecology (Nelson 2016)

Bariatric (Thorell 2016)

The Rationale for ERAS and Sleep Disordered Breathing

- No reports of ERAS for SDB
- ERAS has been implemented by surgical subspecialty
- Why should ERAS “work” for patients with SDB?
 1. Mechanistic argument
 2. Biochemical argument

The Rationale for ERAS and Sleep Disordered Breathing: ERAS as a mechanism

- ERAS can be viewed as a mechanism to improve care
- Demonstrated efficacy for increasing adherence with best practice
- **For example**: opioid minimization in patients with Obstructive Sleep Apnea (OSA)

SPECIAL ARTICLES

Practice Guidelines for the Perioperative Management of Patients with Obstructive Sleep Apnea

*An Updated Report by the American Society
of Anesthesiologists Task Force on Perioperative
Management of Patients with Obstructive Sleep Apnea*

*Multimodal analgesia & regional
anesthesia/analgesia should be
considered (or are recommended)*

The Rationale for ERAS and Sleep Disordered Breathing: ERAS as a mechanism

BJA

British Journal of Anaesthesia, 115 (S2): ii57–ii67 (2015)

doi: 10.1093/bja/aev381
Regional Anaesthesia

Epidemiology, trends, and disparities in regional anaesthesia for orthopaedic surgery

C. Cozowicz^{1,2}, J. Poeran³ and S. G. Memtsoudis^{1,2,*}

- 20% of TKA performed under neuraxial anesthesia
- 25% of TKA featured peripheral nerve block

Variations in the Use of Perioperative Multimodal Analgesic Therapy

Karim S. Ladha, M.D., M.Sc., Elisabetta Paterno, M.D., Dr.P.H., Krista F. Huybrechts, M.S., Ph.D., Jun Liu, M.D., M.S., James P. Rathmell, M.D., Brian T. Bateman, M.D., M.Sc.

(**ANESTHESIOLOGY** 2016; 124:837-45)

- Wide variation in use of MMA
- Mean probability of receiving 2 or more agents 54%

The Rationale for ERAS and Sleep Disordered Breathing: ERAS as a mechanism

Preserved Analgesia With Reduction in Opioids Through the Use of an Acute Pain Protocol in Enhanced Recovery After Surgery for Open Hepatectomy

Grant, Michael C. MD^{*}; Sommer, Philip M. MD^{*}; He, Cathy MD^{*}; Li, Sylvia MD^{*}; Page, Andrew J. MD[†]; Stone, Alexander B. BA^{*}; Hobson, Deborah BSN[‡]; Wick, Elizabeth MD[§]; Wu, Christopher L. MD^{*}

Regional Anesthesia & Pain Medicine: [July/August 2017 - Volume 42 - Issue 4 - p 451–457](#)

- An ERAS protocol featuring multimodal analgesia minimized opioid consumption up to 72 hours post-hepatectomy, and pain scores up to 24 hours.
- Over 72% of patients received epidural analgesia under the new protocol

The Rationale for ERAS and Sleep Disordered Breathing: Biochemistry

The biochemistry of OSA

An inflammatory state: cytokines,
adipokines, CRP, homocysteine



Often accompanied by obesity; insulin
resistance; metabolic syndrome; CV
disease

The biochemistry of ERAS

Surgery creates an inflammatory state



ERAS modulates the inflammatory
(SIRS) response to surgery



Improves insulin resistance; protects
against CV complications/
hypercoagulability state

The Rationale for ERAS and Sleep Disordered Breathing: Biochemistry

Medicine®

SYSTEMATIC REVIEW AND META-ANALYSIS

OPEN

Enhanced Recovery After Surgery: Which Components, If Any, Impact on The Systemic Inflammatory Response Following Colorectal Surgery?

A Systematic Review

*David G. Watt, MB, ChB, Stephen T. McSorley, MB, ChB, Paul G. Horgan, PhD,
and Donald C. McMillan, PhD*

Abstract: Enhanced Recovery or Fast Track Recovery after Surgery

(*Medicine* 94(36):e1286)

- 19 studies/ 1898 patients
- Included ERAS-Colorectal surgery & effects of protocol components on IL-6 or CRP
- Data limited, but supports a laparoscopic approach in mediating inflammatory markers

The Rationale for ERAS and Sleep Disordered Breathing

- No reports of ERAS for SDB
- ERAS has been implemented by surgical subspecialty
- What is the best evidence that ERAS may be effective for SDB?
From subspecialty surgeries with high incidence of OSA?

= Bariatric surgery

The Rationale for ERAS and Sleep Disordered Breathing: Evidence from bariatric surgery


- 2 SR/MAs associate ERAS with shorter length of hospital stay without affecting readmission rates or overall complications

OBES SURG (2017) 27:226–235
DOI 10.1007/s11695-016-2438-z



REVIEW ARTICLE

Enhanced Recovery after Bariatric Surgery: Systematic Review and Meta-Analysis

Piotr Malczak^{1,2} · Magdalena Pisarska^{1,2} · Major Piotr^{1,2} · Michał Wysocki^{1,2} ·
Andrzej Budzyński^{1,2} · Michał Pędziwiatr^{1,2} 



[Obesity Surgery](#)

February 2017, Volume 27, [Issue 2](#), pp 489–501 | [Cite as](#)

Efficiency and Safety Effects of Applying ERAS Protocols
to Bariatric Surgery: a Systematic Review with Meta-
Analysis and Trial Sequential Analysis of Evidence

The Rationale for ERAS and Sleep Disordered Breathing: Evidence from bariatric surgery

- Discharge on POD 1 after bariatric surgery does not increase complications, readmission, or post-discharge resource use. (**retrospective studies)

Fast track bariatric surgery: safety of discharge on the first postoperative day after bariatric surgery

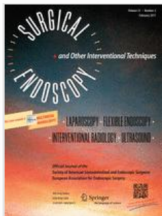
[Zhamak Khorgami](#), M.D., [Jacob A. Petrosky](#), M.D., [Amin Andalib](#), M.D., M.S., [Ali Aminian](#), M.D., [Philip R. Schauer](#), M.D., [Stacy A. Brethauer](#), M.D. 

Bariatric and Metabolic Institute, Cleveland Clinic, Cleveland, Ohio

Predictors of later discharge
include:

Age >50

BMI >50




[Surgical Endoscopy](#)

February 2017, Volume 31, [Issue 2](#), pp 618–624 | [Cite as](#)

Early discharge in the bariatric population does not increase post-discharge resource utilization

Authors

[Authors and affiliations](#)

Joshua Rickey, Keith Gersin, Wayne Yang, Dimitrios Stefanidis, Timothy Kuwada 

The Rationale for ERAS and Sleep Disordered Breathing: Evidence from bariatric surgery

- Full consensus guidelines for ERAS-Bariatric Surgery (ERAS Society and International Association for Surgical Metabolism and Nutrition)

World J Surg (2016) 40:2065–2083
DOI 10.1007/s00268-016-3492-3



SCIENTIFIC REVIEW

Guidelines for Perioperative Care in Bariatric Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations

A. Thorell¹ · A. D. MacCormick^{2,3} · S. Awad^{4,5} · N. Reynolds⁴ · D. Roulin⁶ ·
N. Demartines⁶ · M. Vignaud⁷ · A. Alvarez⁸ · P. M. Singh⁹ · D. N. Lobo¹⁰

The Rationale for ERAS and Sleep Disordered Breathing: Evidence from bariatric surgery

- Includes recommendations for patients with/without OSA:

Table 1 continued

Element	Recommendation	Level of evidence	Recommendation grade
Postoperative oxygenation	<i>Obese patients without OSA, should be supplemented with oxygen prophylactically in head-elevated or semi-sitting position in the immediate postoperative period</i>	<i>Prophylactic oxygen supplementation: Low (only retrospective data)</i>	Strong
		<i>Positioning in the postoperative period: High</i>	Strong
	<i>Uncomplicated patients with OSA should receive oxygen supplementation in a semi-sitting position. Monitoring for possible increasing frequency of apnoeic episodes should be diligent. A low threshold for initiation of positive pressure support must be maintained in the presence of signs of respiratory distress</i>	High (14 RCTs and 1 meta-analysis)	Strong
Postoperative analgesia	<i>Multimodal systemic medication and local anaesthetic infiltration techniques should be combined. Thoracic epidural analgesia should be considered in laparotomy</i>	<i>Multimodal intravenous medication, local anaesthetic infiltration: High</i>	<i>Multimodal intravenous medication, local anaesthetic infiltration: Strong</i>

Other Components of Care Which May Positively Influence Outcomes

- Preoperative CPAP therapy to optimize outcomes
- Intraoperative fluid management

Other Components of Care Which May Positively Influence Outcomes: CPAP Therapy

Respiration and Sleep Medicine

Section Editor: David Hillman

■ SPECIAL ARTICLE

OPEN

Society of Anesthesia and Sleep Medicine Guidelines on Preoperative Screening and Assessment of Adult Patients With Obstructive Sleep Apnea

Frances Chung, MBBS, FRCPC,* Stavros G. Memtsoudis, MD, PhD,† Satya Krishna Ramachandran, MD,‡ Mahesh Nagappa, MD,§ Mathias Opperer, MD,|| Crispiana Cozowicz, MD,¶# Sara Patrawala, MD,**†† David Lam, BSc,* Anjana Kumar, BSc,‡ Girish P. Joshi, MD,‡‡ John Fleetham, MD,§§ Najib Ayas, MD,||| Nancy Collop, MD,¶¶ Anthony G. Doufas, MD, PhD,## Matthias Eikermann, MD, PhD,*** Marina Englesakis, HBA, MLIS,††† Bhargavi Gali, MD,‡‡‡ Peter Gay, MD,§§§ Adrian V. Hernandez, MD, PhD, ||||| Roop Kaw, MD,¶¶¶ Eric J. Kezirian, MD, MPH, ### Atul Malhotra, MD,**** Babak Mokhlesi, MD,†††† Sairam Parthasarathy, MD,‡‡‡‡ Tracey Stierer, MD,§§§§ Frank Wappler, MD,|||||¶¶¶¶ David R. Hillman, MD,#### and Dennis Auckley, MD*****

www.anesthesia-analgesia.org

August 2016 • Volume 123 • Number 2

Other Components of Care Which May Positively Influence Outcomes: CPAP Therapy

3.0 Evidence of the Efficacy of CPAP for Surgical Patients in the Perioperative Period

9 studies/8029 patients (4380 with OSA/perioperative CPAP; 3649 diagnosed or suspected and untreated)

- Patients with OSA:
 - CPAP may reduce postoperative AHI
 - trend to reduction in length of hospital stay (0.4 days)
- Undiagnosed OSA:
 - preoperative CPAP reduced CV adverse events
- Untreated OSA:
 - significantly greater incidence of MI and unplanned reintubations.

Other Components of Care Which May Positively Influence Outcomes: Goal Directed Fluid Therapy

- GDFT is an important component of ERAS pathways
- Over administration of iv fluids is associated with:
 - cardiac, pulmonary & renal dysfunction
 - inhibition of gastrointestinal function
 - delayed recovery (prolonged length of stay)(Holte 2002; Cecconi 2013)

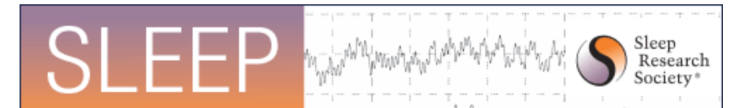
Other Components of Care Which May Positively Influence Outcomes: Goal Directed Fluid Therapy

- OSA is more prevalent in “fluid-retaining” states
- Experimentally inducing a volume overload state may exacerbate OSA

INFLUENCE OF SALINE INFUSION ON SLEEP APNEA SEVERITY IN MEN

A Randomized, Double Crossover Study to Investigate the Influence of Saline Infusion on Sleep Apnea Severity in Men

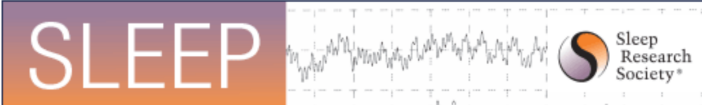
Azadeh Yadollahi, PhD^{1,2}; Joseph M. Gabriel, MSc^{1,3}; Laura H. White, MBChB^{1,4,5}; Luigi Taranto Montemurro, MD^{1,4}; Takatoshi Kasai, MD, PhD^{1,4}; T. Douglas Bradley, MD^{1,4,5}



SLEEP, Vol. 37, No. 10, 2014

Other Components of Care Which May Positively Influence Outcomes: Goal Directed Fluid Therapy

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- OSA is more prevalent in “fluid-retaining” states
- Experimentally inducing a volume overload state may exacerbate OSA
- Compared to younger men, infusion of similar amounts of saline in older men (>40) caused a greater increase in neck circumference and AHI
- Fluid balance could be a risk factor for sleep disordered breathing after surgery

Summary

- ERAS is associated with financial and clinical benefits in multiple surgical subspecialties
- There is a paucity of data directly addressing the potential benefits of ERAS for patients with SDB
- Several arguments can be advanced that ERAS will benefit patients with SDB
 - ERAS as a framework to ensure delivery of best evidence
 - ERAS as a plausible biological substrate to improve outcomes
 - Data from surgical cohorts with high probability of SDB benefit from ERAS
 - Common goals link ERAS with care of patients with SDB