L'osservazione degli **esiti** per le famiglie professionali: le reti cliniche in **chirurgia generale e vascolare**

La chirurgia ERAS: l'anestesista e la medicina perioperatoria. **Federica Marini, Duccio Conti**

10 dicembre 2024 ore 9.30-17.00

Azienda USL Toscana sud est
Servizio Sanitario della Toscana

British Journal of Anaesthesia, 128 (3): 434–448 (2022)

Prehabilitation, enhanced recovery after surgery, or both? A narrative review

Chelsia Gillis[1,*], Olle Ljungqvist[2] and Francesco Carli[1]

[1]Department of Anesthesia, McGill University Health Center, Montreal, QC, Canada and [2]Faculty of Medicine and Health, School of Health and Medical Sciences, Department of Surgery, Örebro University, Örebro, Sweden

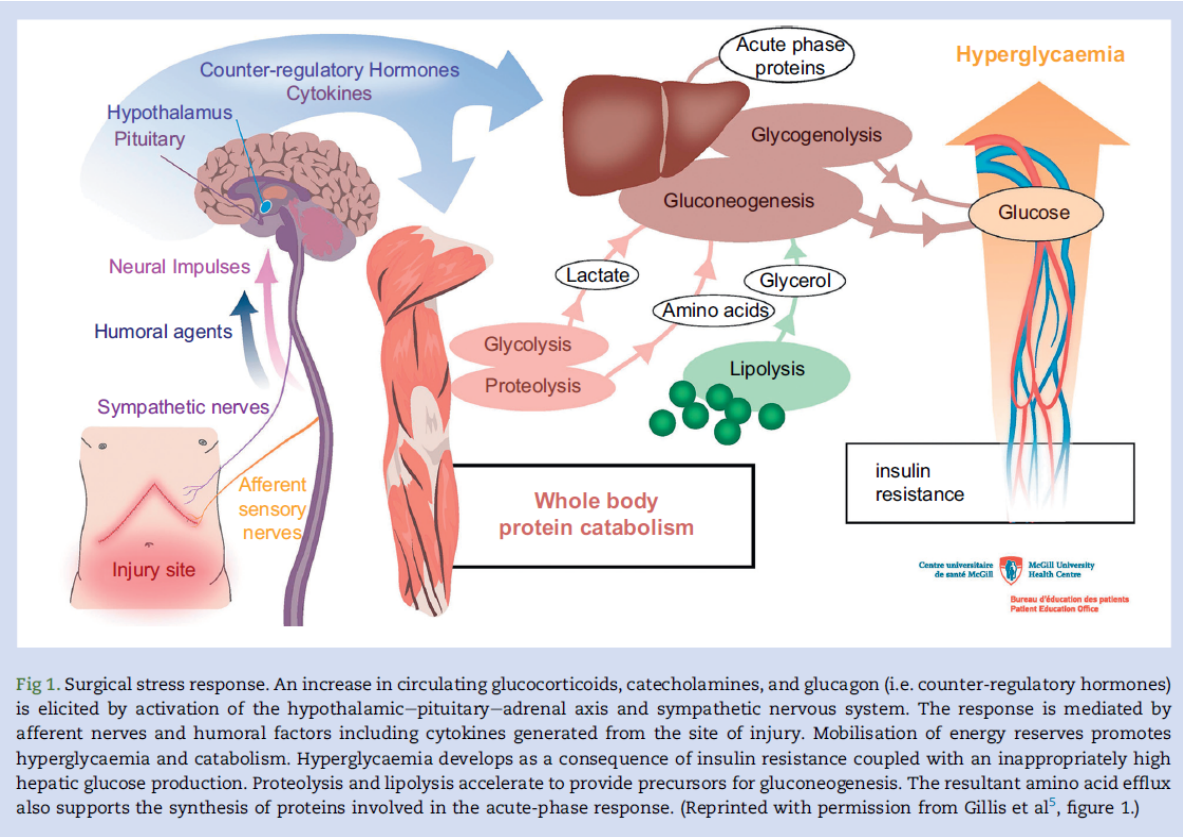


Fig 1. Surgical stress response. An increase in circulating glucocorticoids, catecholamines, and glucagon (i.e. counter-regulatory hormones) is elicited by activation of the hypothalamic–pituitary–adrenal axis and sympathetic nervous system. The response is mediated by afferent nerves and humoral factors including cytokines generated from the site of injury. Mobilisation of energy reserves promotes hyperglycaemia and catabolism. Hyperglycaemia develops as a consequence of insulin resistance coupled with an inappropriately high hepatic glucose production. Proteolysis and lipolysis accelerate to provide precursors for gluconeogenesis. The resultant amino acid efflux also supports the synthesis of proteins involved in the acute-phase response. (Reprinted with permission from Gillis et al[5], figure 1.)

Modern perioperative interventions ***aim to moderate the surgical stress response*** to ***minimise the negative effects produced***, including catabolism, while maintaining the natural purpose of the stress response, which is to return the body to a state of 'normal' structure and function (i.e. homeostasis)

Prehabilitation complements Enhanced Recovery After Surgery (ERAS)

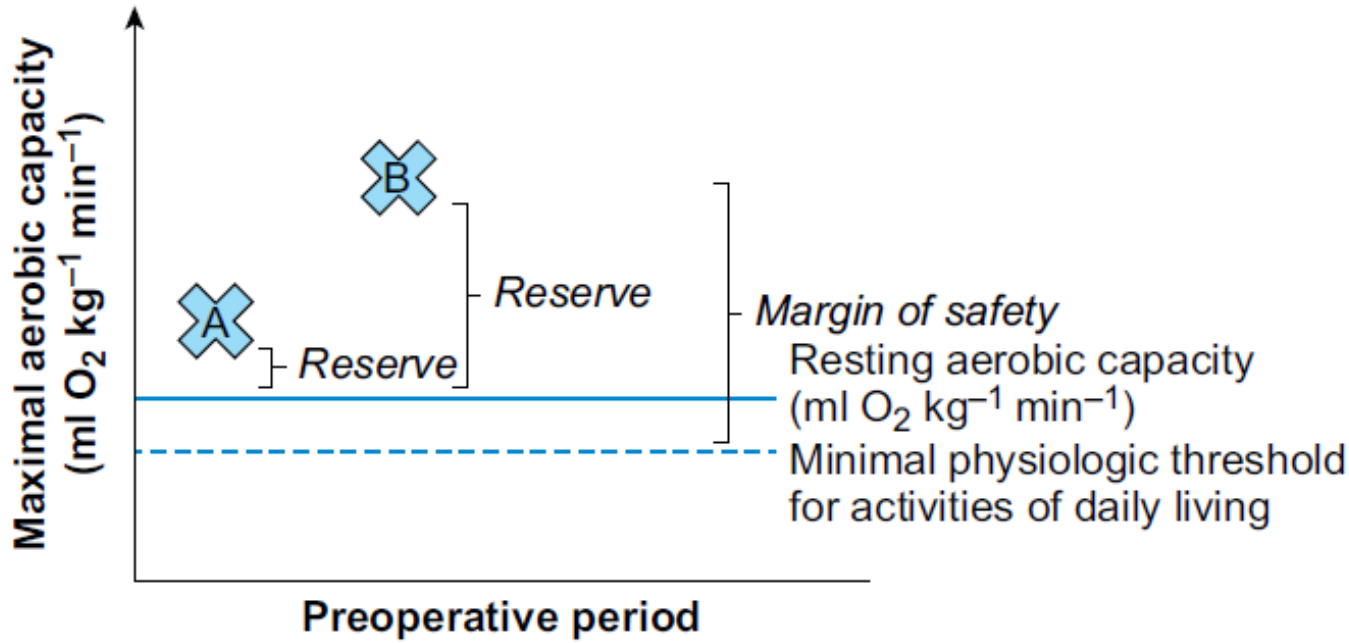
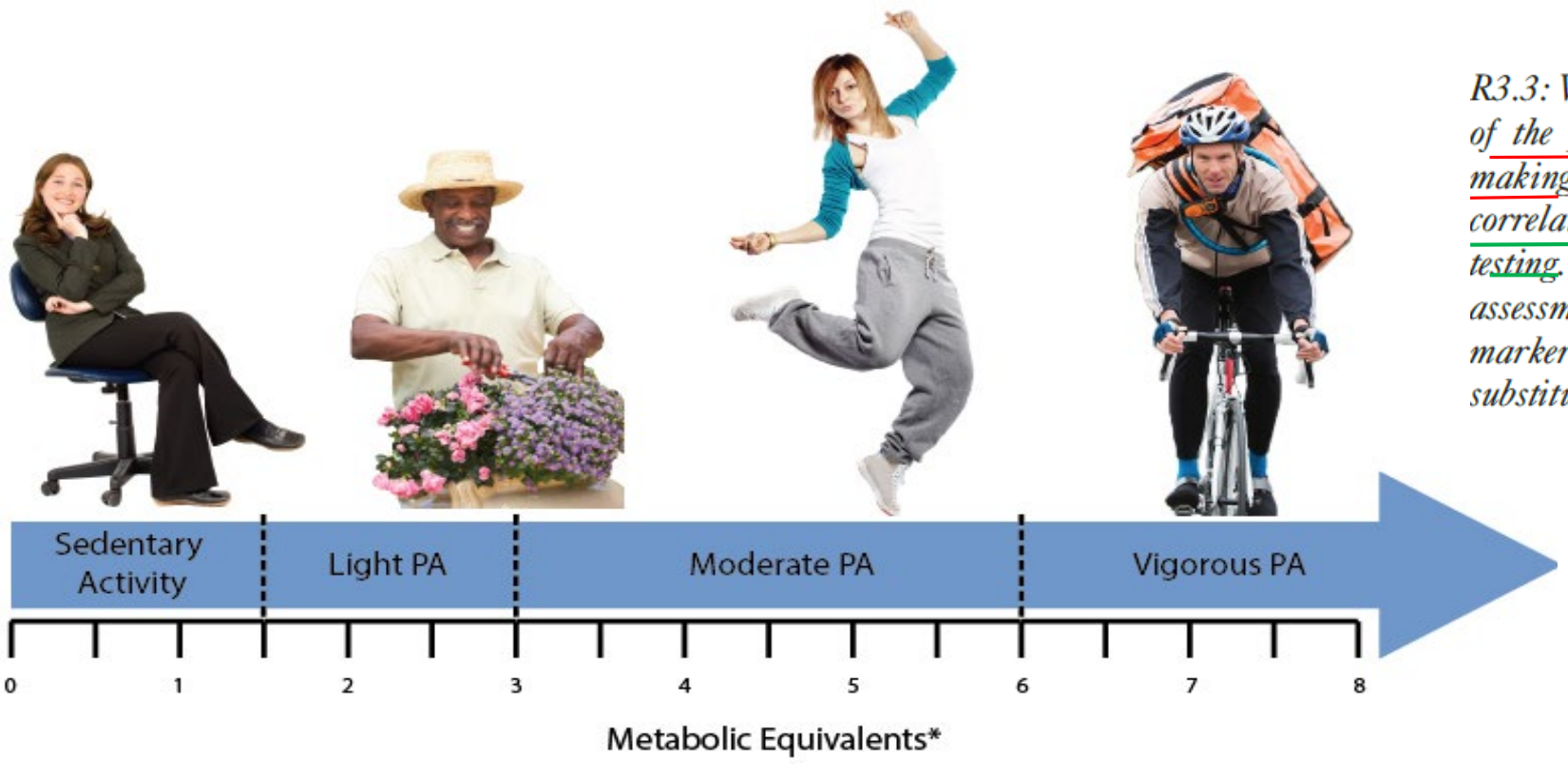


Fig 2. Cardiopulmonary reserve and exercise capacity. Hypothetical patients (patients A and B) participate in cardiopulmonary exercise testing before surgery. Patient A exhibits poor exercise capacity, has little cardiorespiratory reserve (resting – maximal), and is perilously close to the minimal physiological threshold required for functional independence. For this patient, a decompensating event as simple as bed rest after surgery could threaten functional independence. Patient B has excellent exercise capacity and cardiorespiratory reserve, contributing to a margin of safety that would likely permit this patient to withstand surgical stress without compromising functional independence. Ideally, patient A would improve their cardiorespiratory status before surgery, to be similar to patient B, and thus be a better candidate for surgery who is more likely to experience an uneventful postoperative course (described further in section 'Pre-habilitation and functional capacity').

Prehabilitation, enhanced recovery after surgery, or both?
A narrative review
Chelsia Gillis[1,*], Olle Ljungqvist[2] and Francesco Carli[1]
[1]Department of Anesthesia, McGill University Health Center, Montreal, QC, Canada and [2]Faculty of Medicine and Health, School of Health and Medical Sciences, Department of Surgery, Örebro University, Örebro, Sweden

……Quali sono i nostri pazienti

METs equivalente metabolico



GUIDELINES

Preoperative assessment of adults undergoing elective noncardiac surgery

Updated guidelines from the European Society of Anaesthesiology and Intensive Care

Massimo Lamperti, Carolina S. Romero, Fabio Guarracino, Gianmaria Cammarota, Luigi Vetrugno, Boris Tufegdzic, Francisco Lozsan, Juan Jose Macias Frias, Andreas Duma, Matthias Bock, Kurt Ruetzler, Silvia Mulero, Daniel A. Reuter, Luigi La Via, Simon Rauch, Massimiliano Sorbello and Arash Afshari

Eur J Anaesthesiol 2024; **41:**1–35

R3.3: We discourage using METs as a subjective measurement of the patient's functional capacity before medical decision-making. The preoperative patient-subjective estimate of METs correlates poorly with the METs measured by exercise stress testing. Nonetheless, in selected individuals, the preoperative assessment of patient-subjective METs is used as a surrogate marker of preoperative performance even if this is not seen as a substitute for preoperative cardiopulmonary testing. (1A)

Table 3 **Revised Cardiac Risk Index score**

Variable	Points
High-risk surgery	1
History of ischaemic heart disease	1
History of congestive heart failure	1
History of cerebrovascular disease	1
Preoperative treatment with insulin	1
Preoperative serum creatinine >2 mg dl^{-1}	1

The interpretation of the Revised Cardiac Risk Index score is generally as follows: 0 points, low risk; 1–2 points, intermediate risk; 3 or more points, high risk.

CURRENT OPINION

Prehabilitation is better than cure

Simone Gurlit[a] *and Manfred Gogol*[b]

Volume 32 • Number 1 • February 2019

KEY POINTS

- Prehabilitation is an approach to prepare patients for an intervention in order to reduce complications, enhance and accelerate recovery, improve quality of life, and reduce costs.
- Prehabilitation is a multidimensional and multidisciplinary approach that has shown effectiveness in various outcomes and different indications.
- Prehabilitation still lacks a common concept, common procedures and common measurements.
- Prehabilitation trials must include old (octogenarians and older) and frail patients.
- Prehabilitation should be understood as a key element on the patient's trajectory from surgery indication to long-term outcome.

Table 1. Elements of prehabilitation

Exercise
Endurance training
Resistance training
Inspiratory muscle training
Proprioceptive and balance training
Stretching and flexibility
Nutrition
Councelling
Supplements
Psychosocial
Anxiety reduction
Stress management
Risk factor reduction
Cessation of smoking
Cessation of heavy alcohol consumption
Other interventions
General and specific counselling/education
Advance directives/power of attorney
Stabilizing severe diseases, for example, chronic heart failure (CHF), chronic obstructive pulmonary disease (COPD), anaemia
Drug evaluation
Planning transitional care
Planning postprocedure care, for example, rehabilitation

PREABILITAZIONE

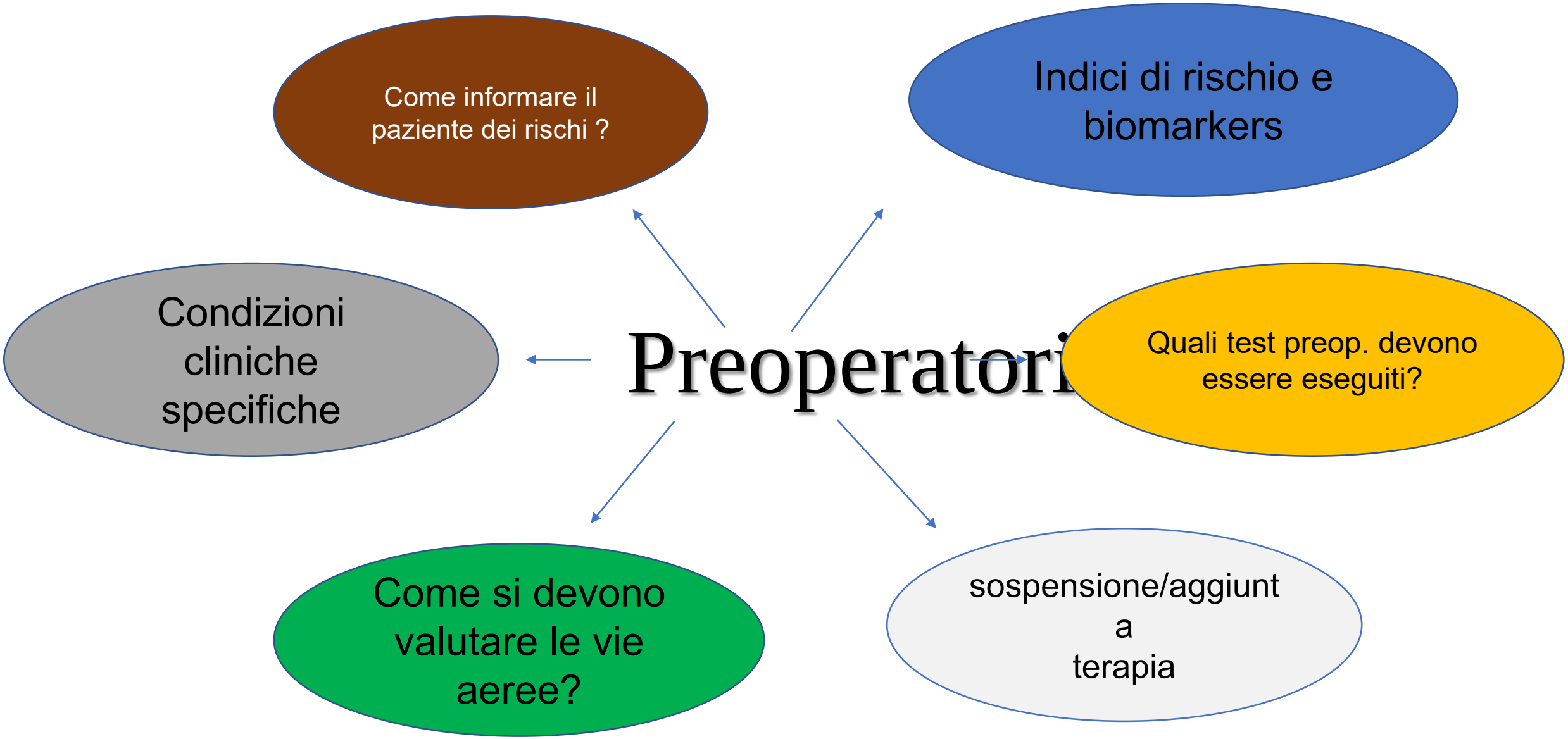
Interventi preoperatori

multidisciplinari

(valutazione dello **stato fisico, nutrizionale e psicologico**)

volti a determinare la capacità funzionale di base e intervenire al fine di **migliorare la riserva funzionale** preoperatoria dei pazienti per prevenire o attenuare le conseguenze causate dall'intervento chirurgico

…….richiede tempo!!!!!!



Eur J Anaesthesiol 2018; **35**:407–465

Almeno il 50% dei pazienti sottoposti ad intervento chirurgico assumono terapie domiciliari regolarmente

Aging Clinical and Experimental Research (2020) 32:1647–1673
https://doi.org/10.1007/s40520-020-01624-x

CONSENSUS DOCUMENT

Perioperative Management of Elderly patients (PriME): recommendations from an Italian intersociety consensus

Paola Aceto[1,2] · Raffaele Antonelli Incalzi[3] · Gabriella Bettelli[4] · Michele Carron[5] · Fernando Chiumiento[6] · Antonio Corcione[7] · Antonio Crucitti[1,2] · Stefania Maggi[8] · Marco Montorsi[9] · Maria Caterina Pace[10] · Flavia Petrini[11] · Concezione Tommasino[12] · Marco Trabucchi[13] · Stefano Volpato[14] on behalf of Società Italiana di Anestesia Analgesia Rianimazione e Terapia Intensiva (SIAARTI), Società Italiana di Gerontologia e Geriatria (SIGG), Società Italiana di Chirurgia (SIC), Società Italiana di Chirurgia Geriatrica (SICG) and Associazione Italiana di Psicogeriatria (AIP)

EJA

Eur J Anaesthesiol 2024; **41**:1–35

GUIDELINES

Preoperative assessment of adults undergoing elective noncardiac surgery

Updated guidelines from the European Society of Anaesthesiology and Intensive Care

Circulation

CLINICAL PRACTICE GUIDELINES

2024 AHA/ACC/ACS/ASNC/HRS/SCA/SCCT/SCMR/SVM Guideline for Perioperative Cardiovascular Management for Noncardiac Surgery: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

In chirurgia di elezione occorre programmare un planning perioperatorio per ridurre i rischi e minimizzare cambiamenti nelle terapie domiciliari

Il controllo perioperatorio dei fattori di rischio cardiovascolari includono l'ipertensione, la dislipidemia e il diabete

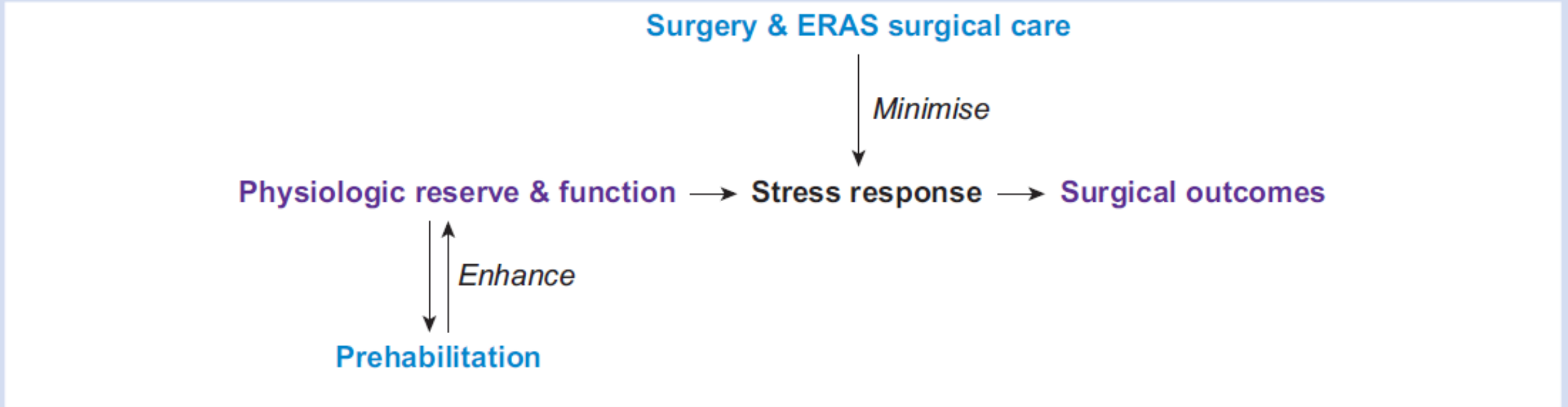


Fig 3. Perioperative interventions modify surgical outcomes through mediation of the surgical stress response. Patients present to surgery with unique *physiological reserves* and *physiological capacities* that influence *surgical outcomes*. A patient's physiological reserve can alter (i.e. mediate) *surgical stress*: a patient with adequate physiological reserve will likely generate a typical surgical stress response, whereas a patient with inadequate physiological reserve is likely to generate an impaired stress response (overexpressed or underexpressed responses to injury). Enhanced recovery after surgery (ERAS) and prehabilitation interventions can modify surgical outcomes in complementary ways through mediation of the surgical stress response. ERAS interventions minimise the surgical stress response, whereas prehabilitation interventions enhance physiological reserve and functional capacity. Having poor physiological reserve and functional capacity (e.g. malnutrition, frailty) can make full participation and adherence to prehabilitation challenging, potentially limiting the intervention's efficacy.


PREPARATION
IS THE KEY

L'osservazione degli **esiti** per le famiglie professionali: le reti cliniche in **chirurgia generale e vascolare**

La chirurgia ERAS: l'anestesista e la medicina perioperatoria. **Federica Marini, Duccio Conti**

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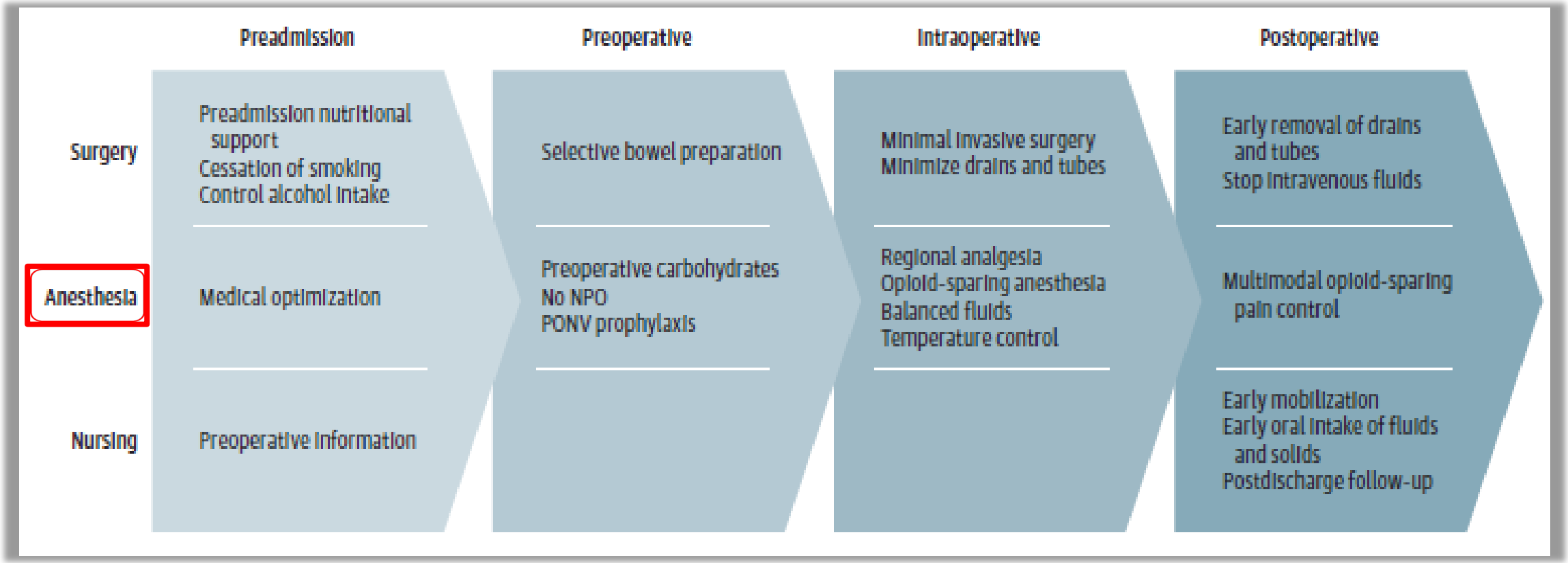
JAMA Surgery | Review

'Enhanced Recovery After Surgery
A Review

Olle Ljungqvist, MD, PhD; Michael Scott, MD; Kenneth C. Fearon, MD, PhD†

ERAS (Enhanced recovery after surgery) flowchard



Barriers to and Facilitators of Implementing Enhanced Recovery Pathways Using an Implementation Framework
A Systematic Review

Figure 2. PRISMA Flowchart for Study Selection

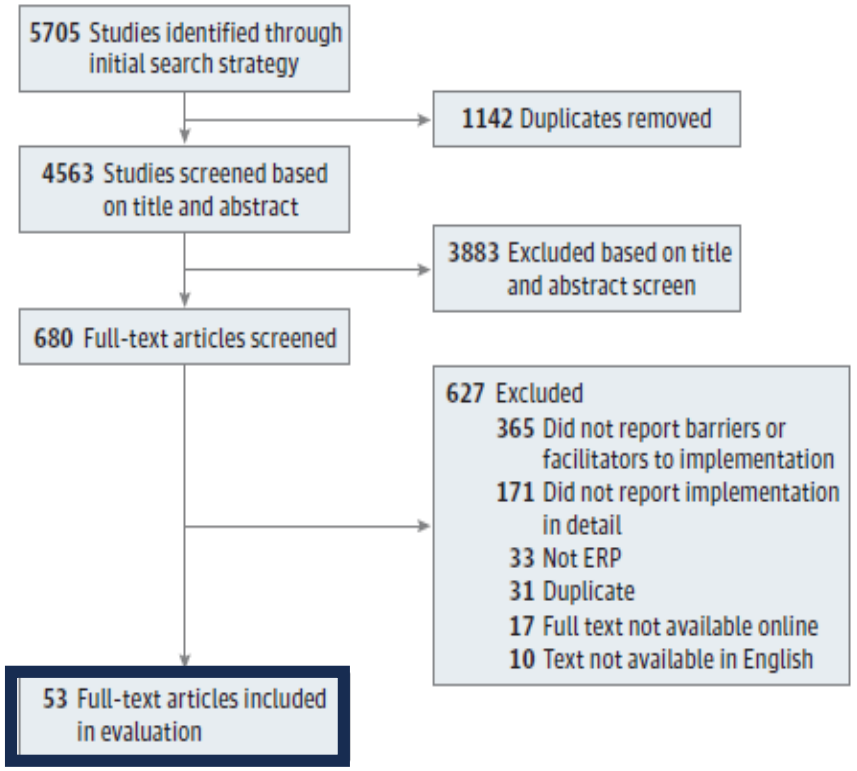


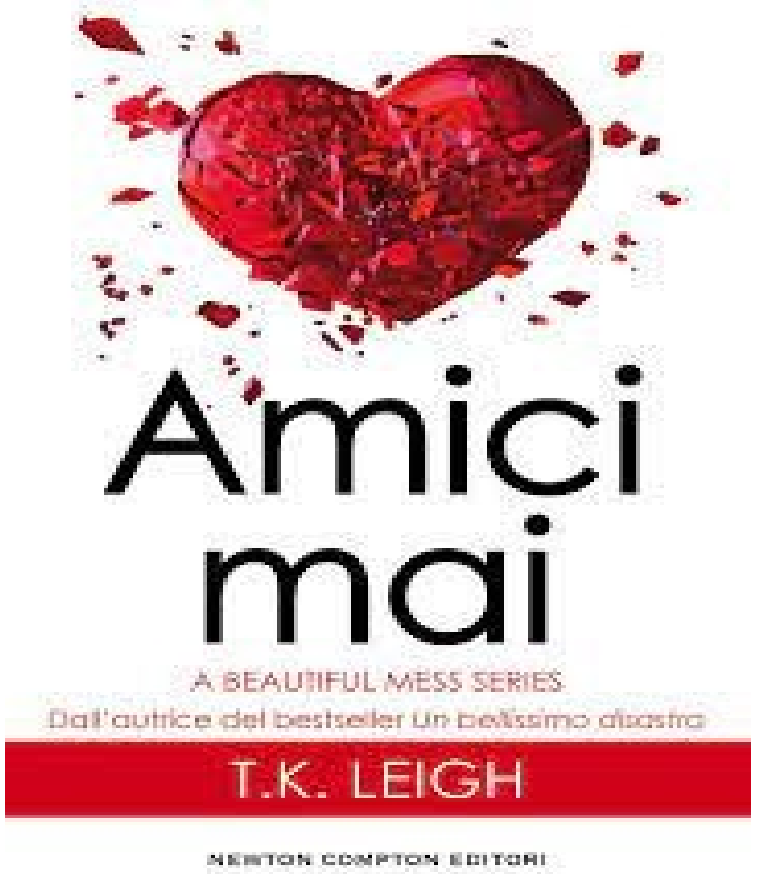
Figure 3. Summary of Commonly Discussed Facilitators and Barriers to Enhanced Recovery Pathway (ERP) Implementation

	Facilitators of implementation	Barriers to implementation
More frequently discussed	Ongoing education about ERP for clinicians and staff members	Resistance from health care professionals
	Strong multidisciplinary team with good communication	Resistance from patients
	Patient engagement and education	Limited resources
	Continuous auditing and feedback of results to frontline clinicians	Rotating staff and residents
	Hospital leadership and administration support for ERP	Belief that implementation would be too difficult
	Alignment of ERP program design with current hospital practices	Perceived lack of evidence
	Effective supporters	
	Involvement of a full-time ERP coordinator	
	Regularly scheduled ERP team meetings	
Less frequently discussed	Standardization of protocol elements within a hospital	

Each of these factors was discussed in 5 or more of the selected articles; they are ordered from most frequently to least frequently mentioned.

Stone AB et al. JAMA surgery (2018)

Anestesista e Chirurgo

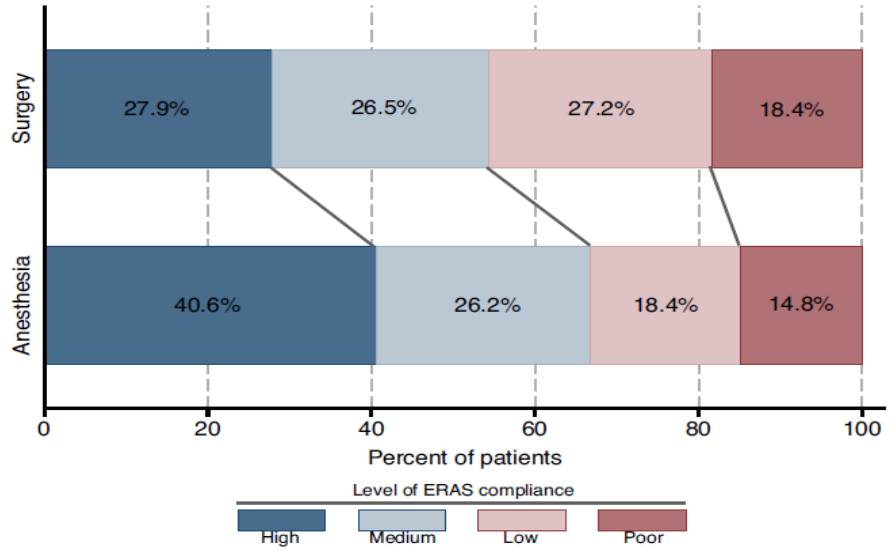


«.....è una roba da chirurghi»

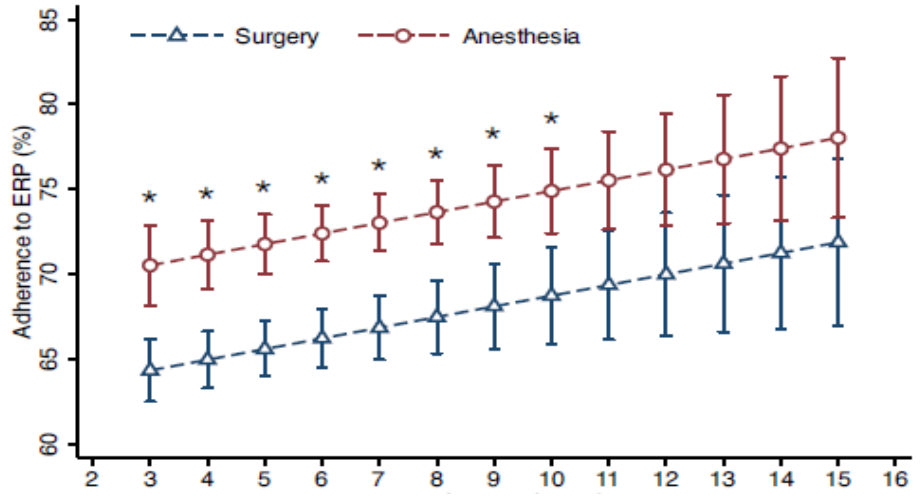
Original Contribution

Institutional factors associated with adherence to enhanced recovery protocols for colorectal surgery: Secondary analysis of a multicenter study

Zorrilla-Vaca A, et al. J Clin Anesth. (2021)



Bar plot comparing the proportion of each level of ERP adherence stratified by program leadership discipline.



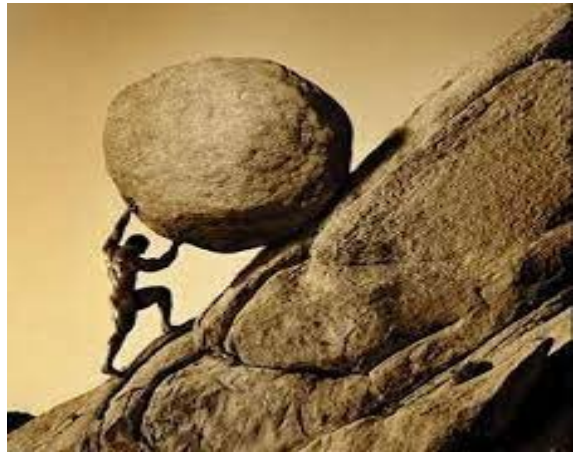
'ationship between years of ERP implementation and adherence among programs led by anesthesiology versus surgery.

Our findings suggested that facilitators of adherence include anesthesiology leadership, scheduled multidisciplinary meetings, and program duration; whereas case volume and number of anesthesia providers were barriers to adherence with ERP guidelines.

Personale anestesiologico dedicato

UOC Anestesia e Terapia intensiva

ERAS



The Impact of Anesthesia-Influenced Process Measure Compliance on Length of Stay: Results From an Enhanced Recovery After Surgery for Colorectal Surgery Cohort

Table 2. Anesthesia Process Measure Compliance Rates Based on ERAS Enrollment

	Overall Cohort	Pre-ERAS	ERAS	*P* Value
Preop CHO drink	136 (11.9)	0 (0.0)	136 (21.7)	<.001
Preop pain meds	320 (28.1)	8 (1.6)	312 (49.7)	<.001
Epidural/TAP	404 (35.4)	143 (27.5)	261 (43.1)	<.001
Forced warming	455 (39.9)	212 (41.4)	243 (38.6)	.36
TIVA/no inhaled	456 (40.0)	37 (7.2)	419 (66.7)	<.001
PONV prophylaxis	244 (21.7)	3 (0.6)	244 (38.9)	<.001
24 h IV fluids	794 (69.6)	288 (56.3)	506 (80.6)	<.001
Postop NSAID	766 (67.2)	260 (50.8)	506 (80.6)	<.001
Opioid protocol	259 (22.7)	26 (5.1)	233 (37.1)	<.001
Avg. no. of measures	3.0 (1.3)	1.9 (0.9)	4.6 (1.8)	<.001

Abbreviations: CHO, carbohydrate; ERAS, enhanced recovery after surgery; IV, intravenous; NSAID, nonsteroidal anti-inflammatory drug; PONV, postoperative nausea and vomiting; postop, postoperative; preop, preoperative; TAP, transversus abdominus plane; TIVA, total intravenous anesthesia.

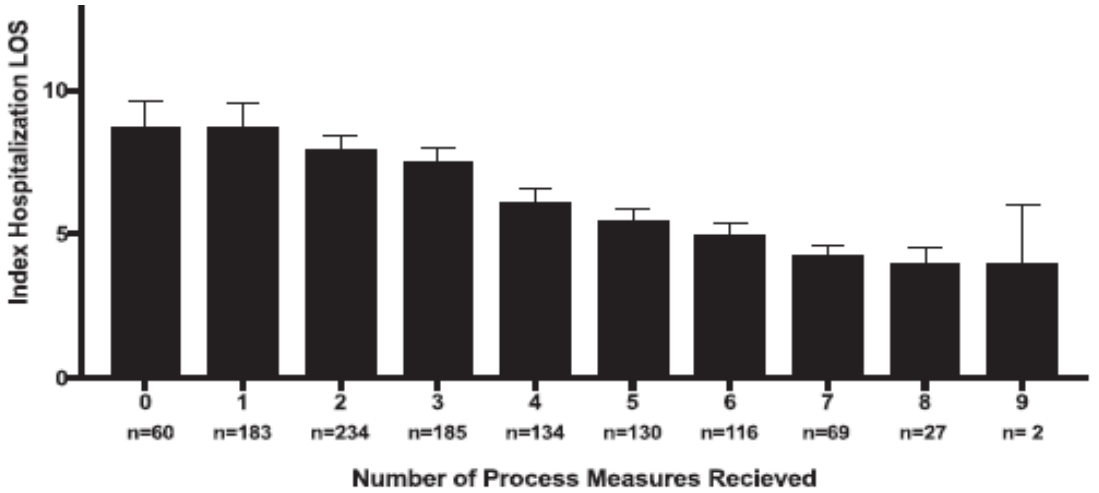


Figure 1. Relationship between number of anesthesia process measures received and index hospitalization LOS.

Grant, Michael C. et al. Anesthesia & Analgesia (2019).

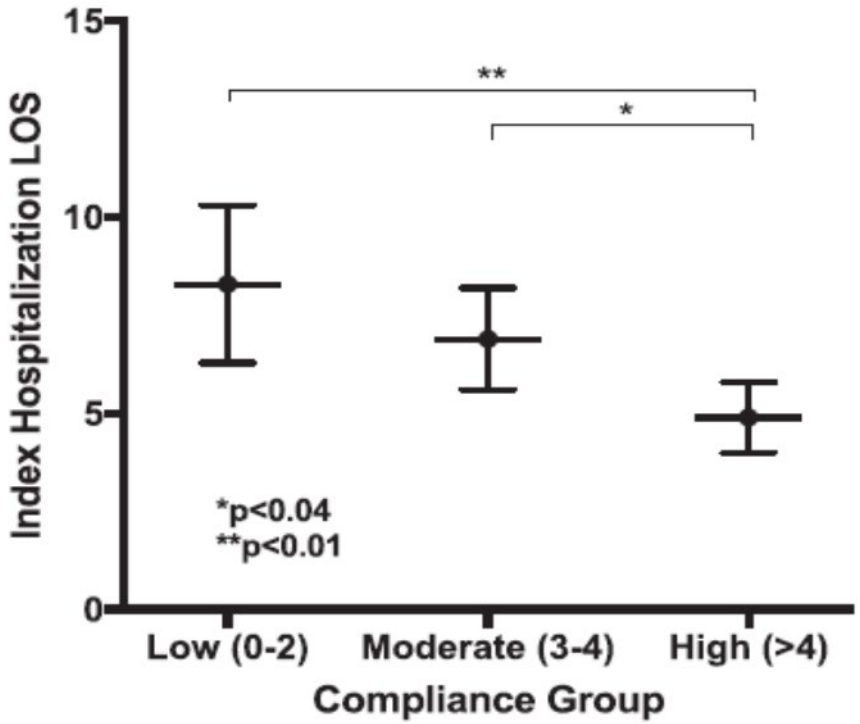


Figure 2. Stratification of anesthesia compliance and associated index hospitalization LOS.

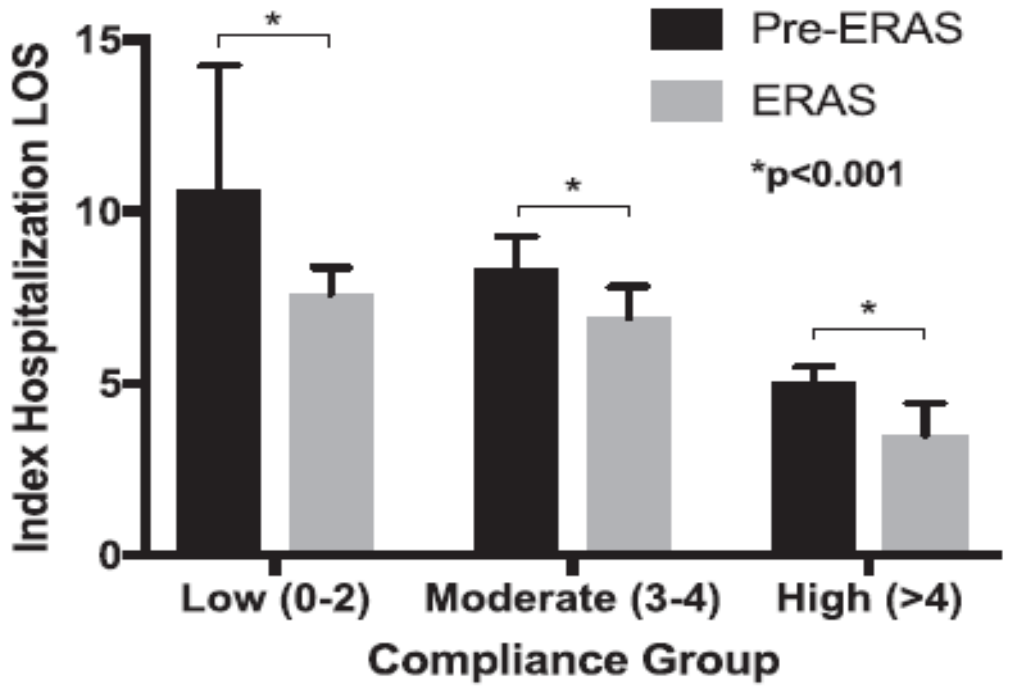


Figure 3. Relationship between anesthesia process measure compliance and index hospitalization LOS as a function of ERAS status. ERAS indicates enhanced recovery after surgery.

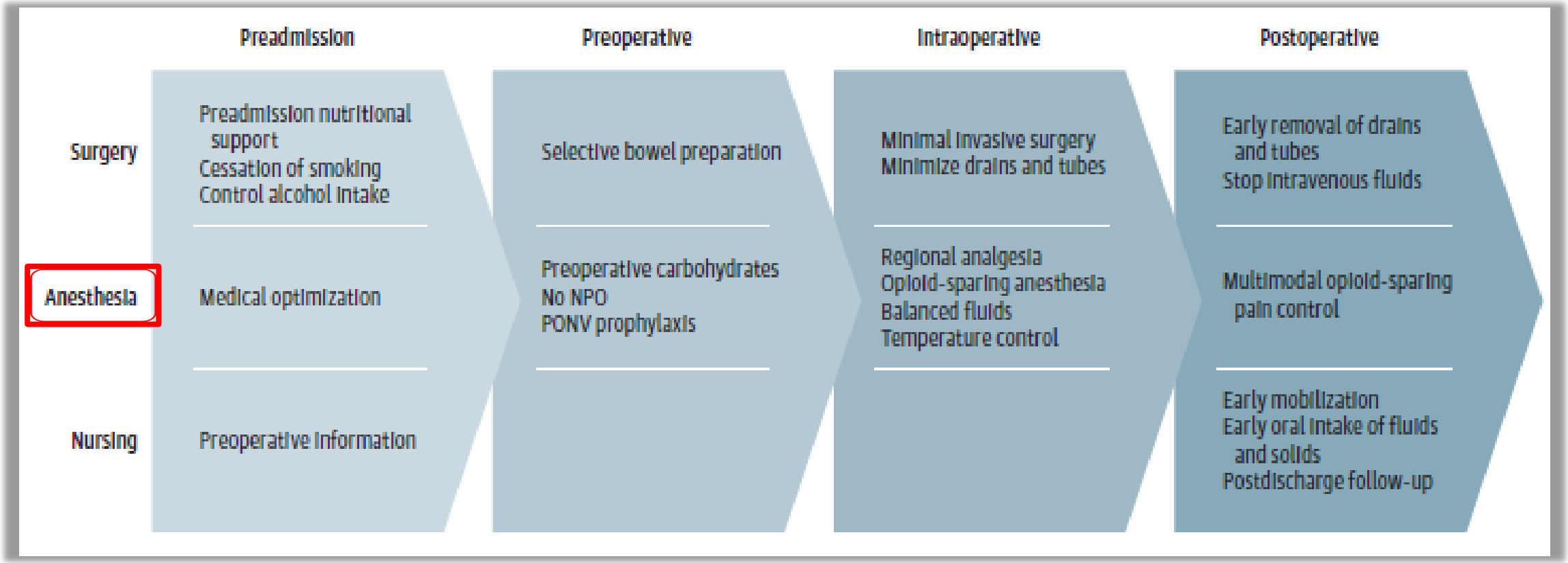
Grant, Michael C. et al. Anesthesia & Analgesia (2019).

JAMA Surgery | Review

'Enhanced Recovery After Surgery
A Review

Olle Ljungqvist, MD, PhD; Michael Scott, MD; Kenneth C. Fearon, MD, PhD†

ERAS (Enhanced recovery after surgery) flowchard



Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations: 2018

E.R.A.S.

(Enhanced Recovery After Surgery)

25 items

↓

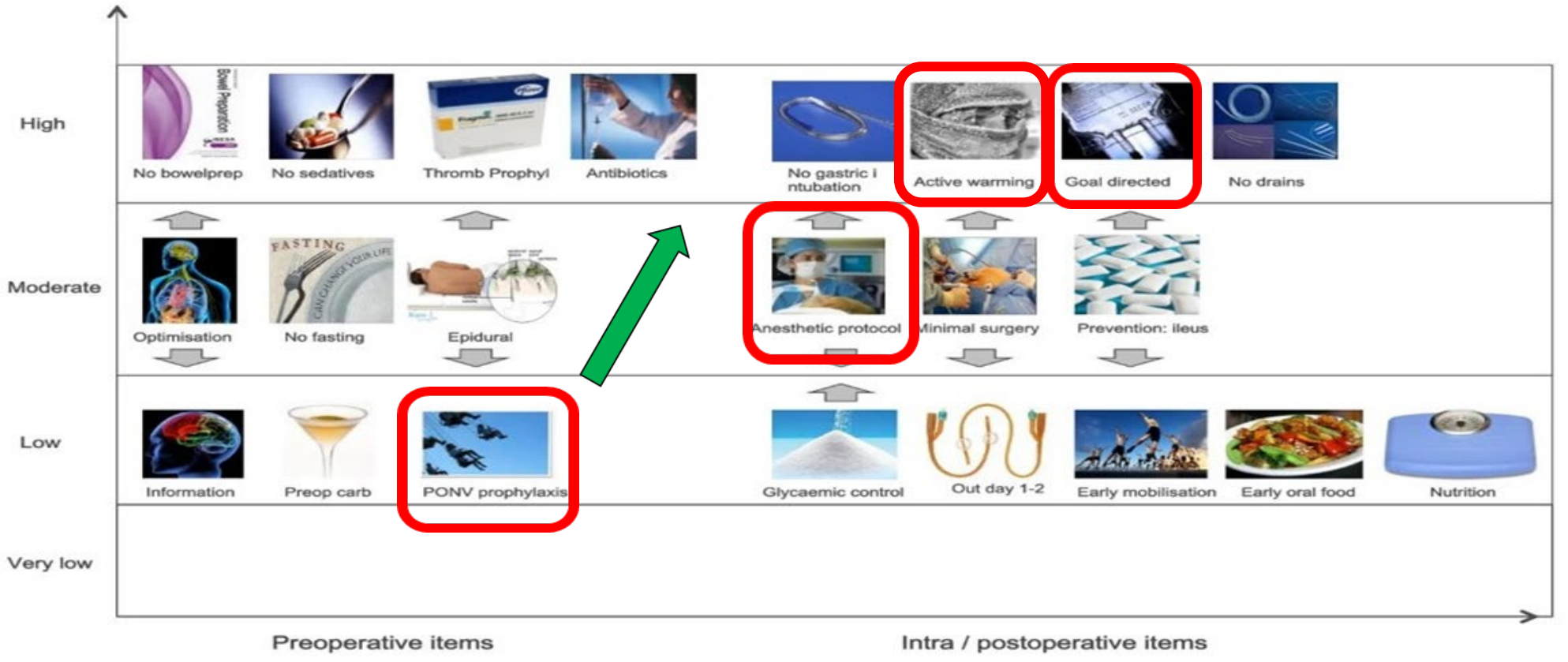
7 items

HqE

HgR

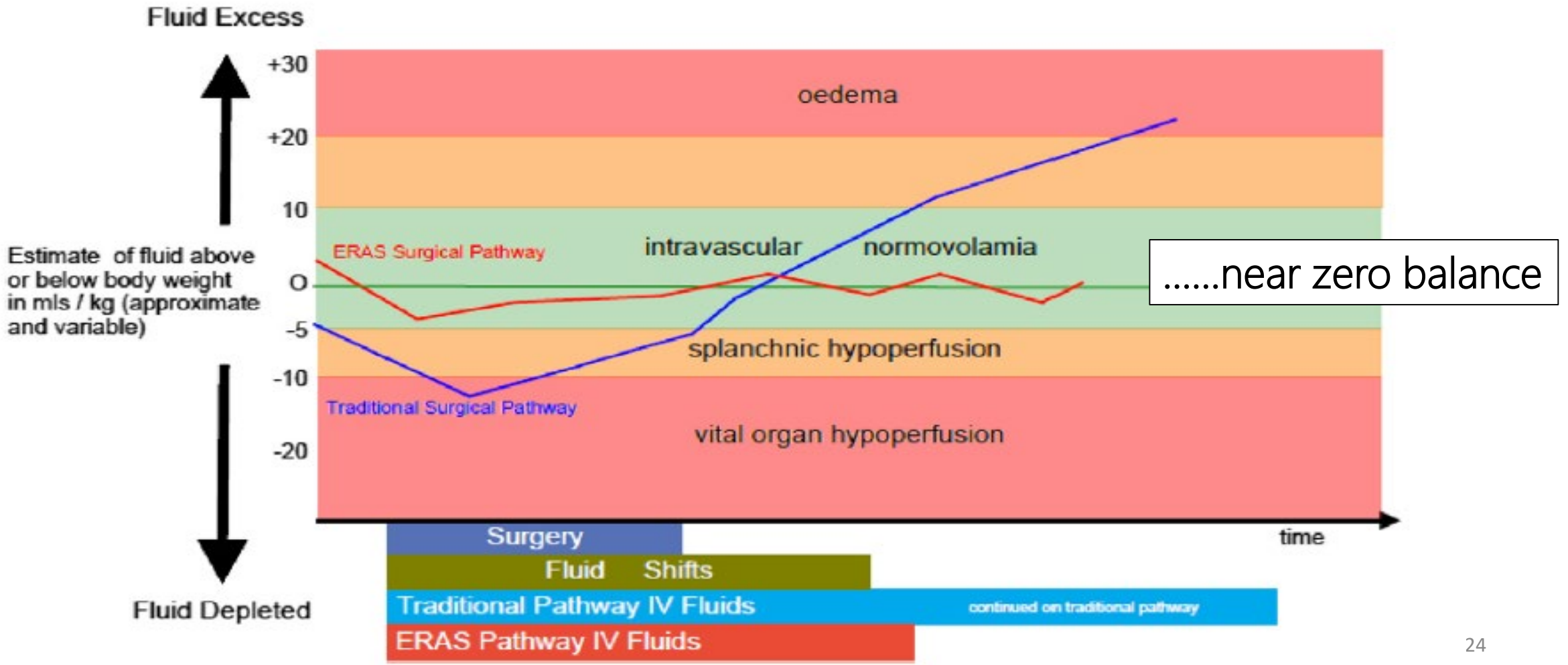
ERAS-ITEMS AND EVIDENCE LEVEL

Grading of Recommendations, Assessment, Development and Evaluation (GRADE) system



Monitoring Needs and Goal-directed Fluid Therapy Within an Enhanced Recovery Program

Gary Minto, MB ChB, FRCA[a,*], Michael J. Scott, MB ChB, MRCP, FRCA, FFICM[b], Timothy E. Miller, MB ChB, FRCA[c]

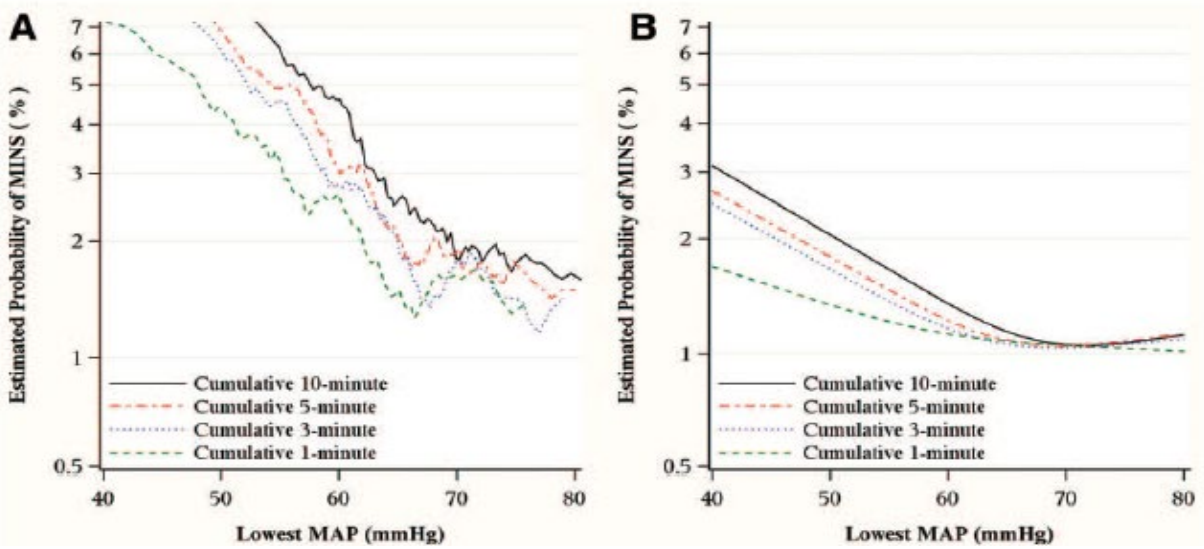


.....near zero balance

Relationship between Intraoperative Hypotension, Defined by Either Reduction from Baseline or Absolute Thresholds, and Acute Kidney and Myocardial Injury after Noncardiac Surgery

A Retrospective Cohort Analysis

MAP below absolute thresholds of 65 mmHg or relative thresholds of 20% were progressively related to both myocardial and kidney injury.



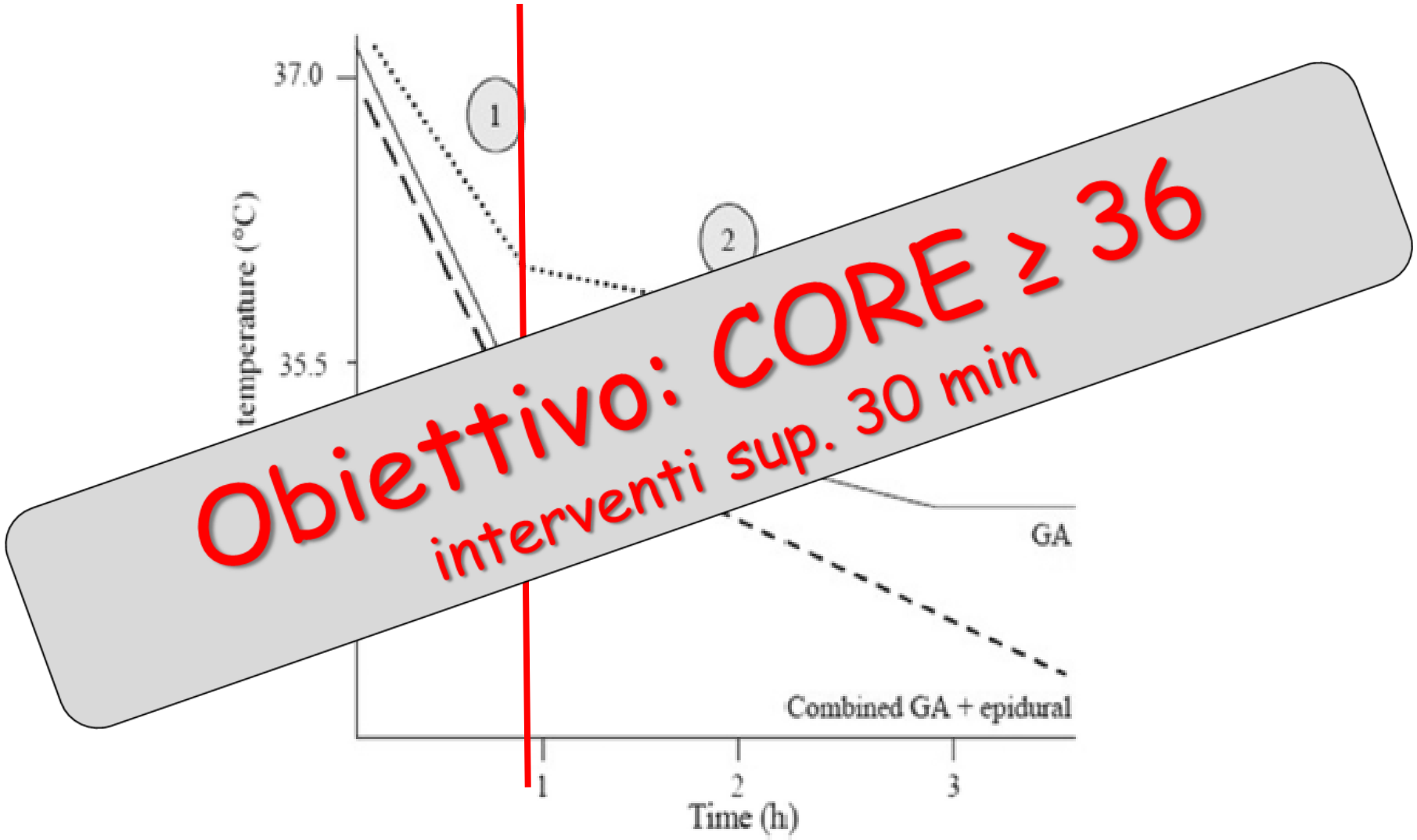
MAP less than **65 mmHg** for greater than equal to **13 min** was associated with significantly higher odds of myocardial and kidney injury.

Salmasi V et al. Anesthesiology (2017) 126:47-65

Unintentional perioperative hypothermia is associated with severe complications and high mortality in elective operations

Adrian T. Billeter, MD, PhD,[a,b] Samuel F. Hohmann, PhD,[c] Devin Druen, MS,[a,b]
Robert Cannon, MD, MS,[a,b] *and* Hiram C. Polk, Jr, MD,[a,b] *Louisville, KY, and Chicago, IL*

- incidenza di infezioni della ferita chirurgica
- perdite ematiche
- trasfusioni
- eventi cardiaci (aritmie, MI,..)
- vasocostrizione e flusso splacnico
- riduzione metabolizzazione farmaci



Obiettivo: CORE ≥ 36

interventi sup. 30 min

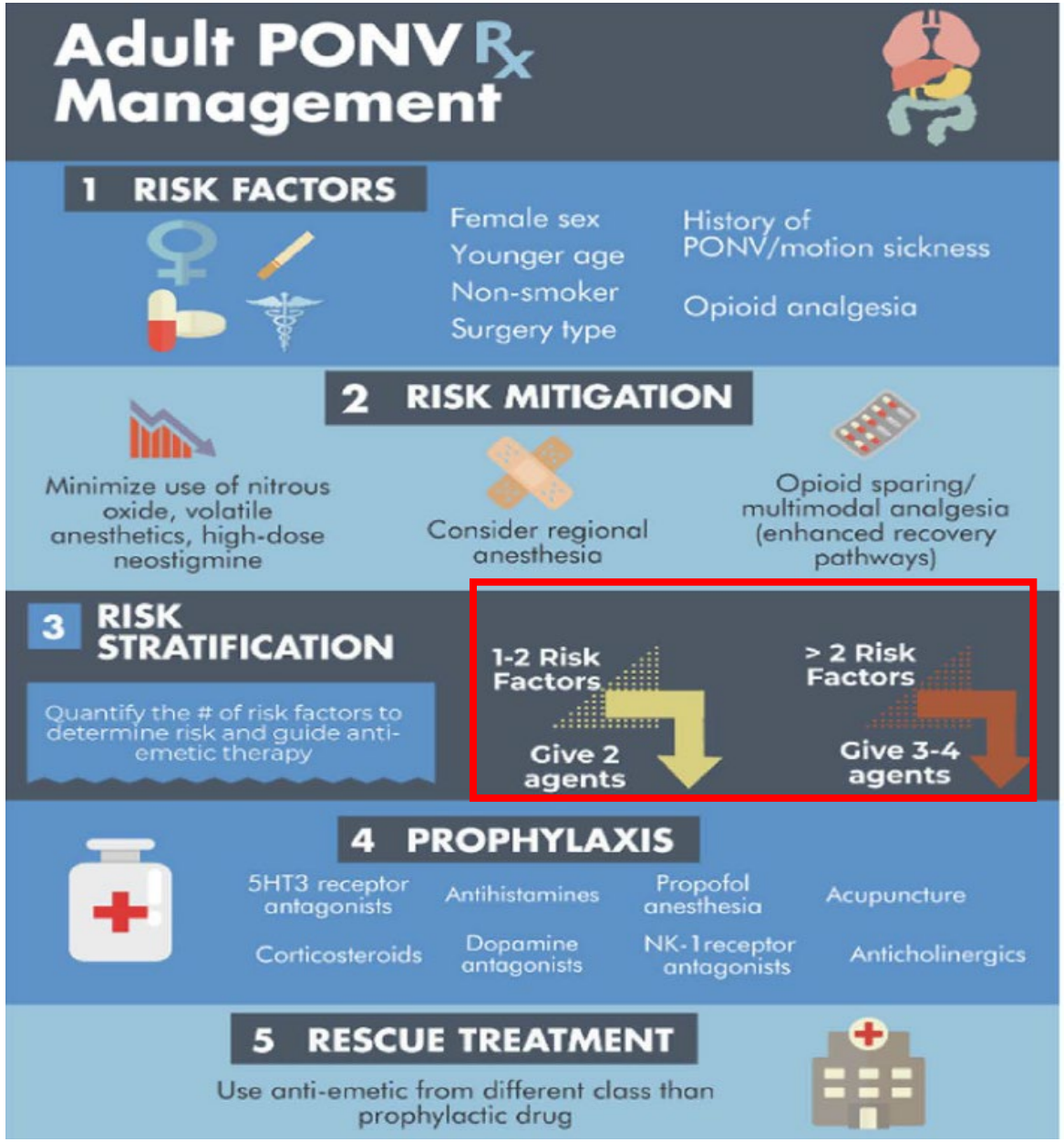


Table 5. Pharmacologic Combination Therapy for Adults and Children

- Adults
  - 5-HT_3 receptor antagonists + dexamethasone
    - Ondansetron: (A1)[158,159]
    - Palonosetron: (A2)[160–164]
    - Ramosetron: (A2)[165,166]
    - Granisetron: (A3)[167]
    - Tropisetron: (A3)[168]; with methylprednisolone (A3)[169]
  - 5-HT_3 receptor antagonists + aprepitant
    - Ondansetron: (A2)[170,171]
    - Ramosetron: (A3)[172]
    - Palonosetron: (A3)[173]
  - Aprepitant + dexamethasone: (A2)[174,175]
  - 5-HT_3 + droperidol
    - Ondansetron + droperidol: (A3)[176]
    - Granisetron + droperidol: (A3)[177]
    - Palonosetron + droperidol: (A3)[178]
  - Other 5-HT_3 combination therapies:
    - Ondansetron + haloperidol: (A3)[179]
    - Haloperidol + dexamethasone + ondansetron: (A3)[180]
    - Ondansetron + betahistine: (A2)[181,182]
    - Ramosetron + gabapentin: (A3)[183]
    - Midazolam + ramosetron: (A3)[184]
  - Other antidopaminergic combination therapies
    - Dexamethasone + haloperidol: (A2)[185,186]
    - Metoclopramide + dimenhydrinate: (A3)[187]
    - Amisulpride +1 nondopaminergic antiemetic: (A3)[188]
    - Haloperidol + midazolam: (A2)[189,190]
  - Acupoint stimulation + pharmacoprophylaxis: (A2)[191,192]
  - Others
    - Propofol + dexamethasone: (A3)[193]
    - Dexamethasone + dimenhydrinate:[194] (A3)
    - Gabapentin + dexamethasone: (A3)[195]
- Children
  - Ondansetron + dexamethasone: (A1)[196]
  - Ondansetron + droperidol (A3)[197]
  - Tropisetron + dexamethasone (A3)[198]

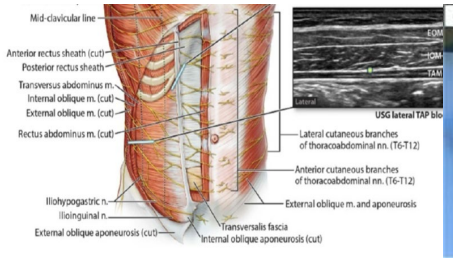
Abbreviation: 5-HT_3, 5-hydroxytryptamine 3.

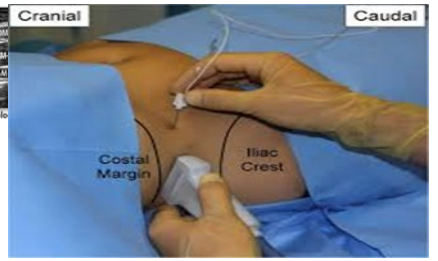
Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. Anesth Analg. 2020

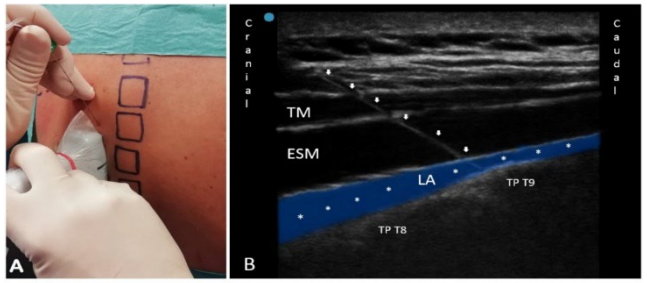
Before

ERAS

After







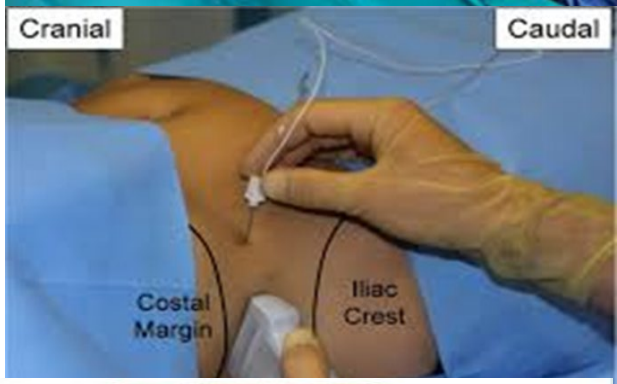
LA: local anesthetic . *: local anesthetic spread. TM: trapezius muscle. ESM: erector spine muscle. TP : transverse process
White arrow: needle path

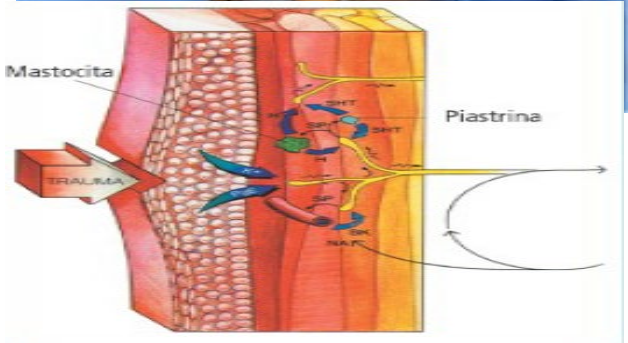
...The resistance to change by the working staff is a main barrier and requires again a lot of information with time and investment to get through.....

Roulin D. et al. Adv Surg Tech A. 2017

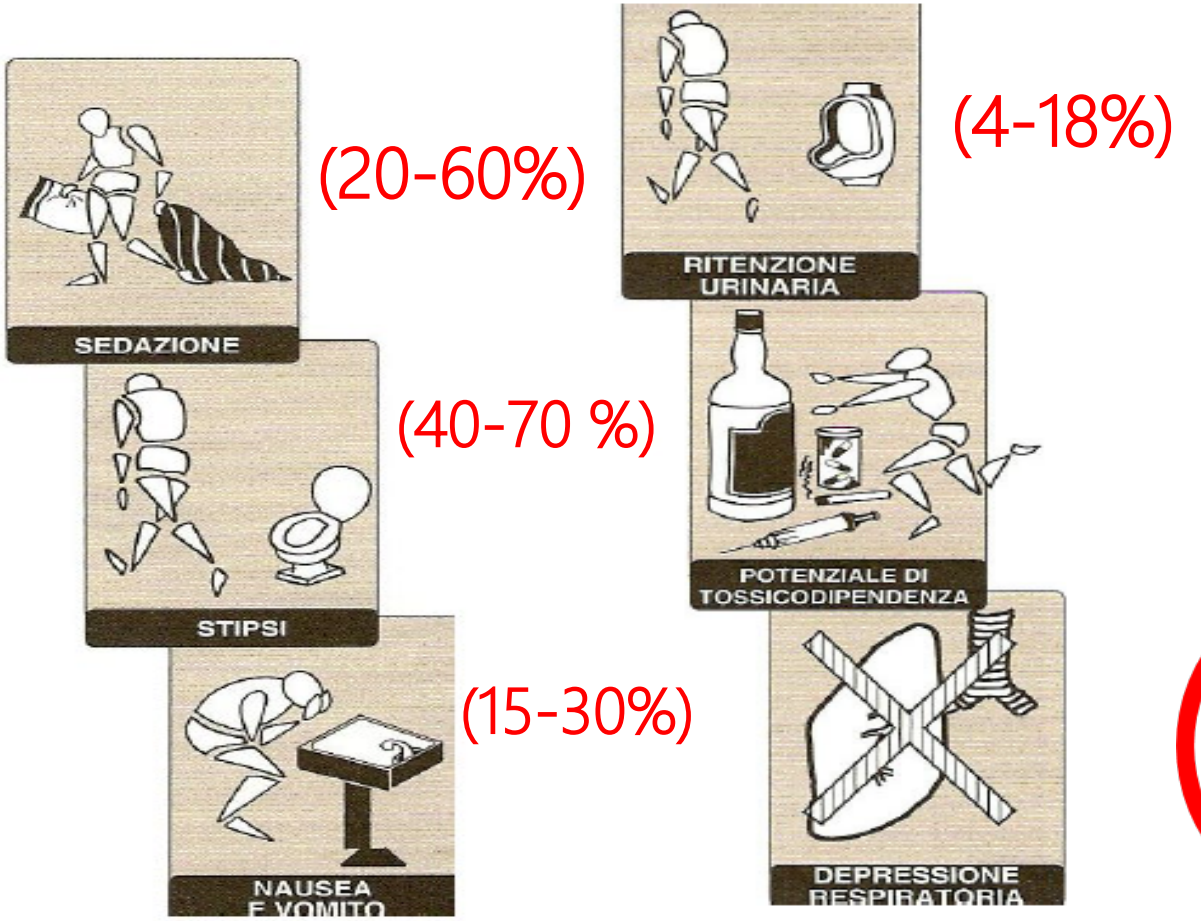
Enhanced recovery after surgery

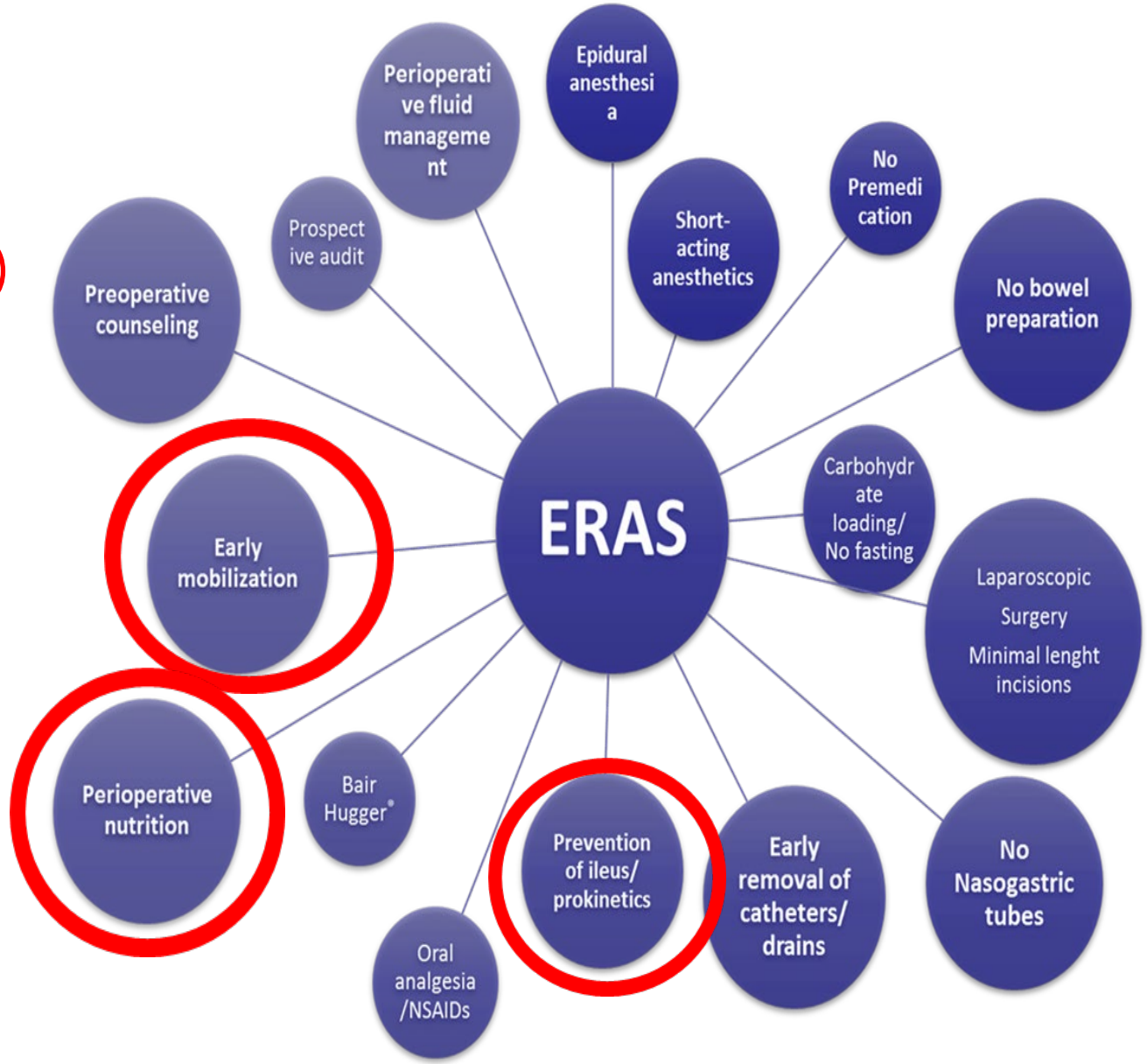
Multimodal interdisciplinary pain management





Thota RS,et al. J Anaesthesiol Clin Pharmacol (2019)


SEDAZIONE
(20-60%)
RITENZIONE URINARIA
(4-18%)
STIPSI
(40-70 %)
POTENZIALE DI TOSSICODIPENDENZA
NAUSEA E VOMITO
(15-30%)
DEPRESSIONE RESPIRATORIA


ERAS
Perioperative fluid management
Epidural anesthesia
Prospective audit
Short-acting anesthetics
No Premedication
Preoperative counseling
No bowel preparation
Early mobilization
Carbohydrate loading/ No fasting
Laparoscopic Surgery Minimal lenght incisions
Perioperative nutrition
Bair Hugger®
Prevention of ileus/ prokinetics
Early removal of catheters/ drains
No Nasogastric tubes
Oral analgesia /NSAIDs

PACU (Post anesthesia care unit)

Gruppo di Studio SIAARTI per la Sicurezza in Anestesia e Terapia Intensiva

RACCOMANDAZIONI PER L'AREA DI RECUPERO E L'ASSISTENZA POST-ANESTESIOLOGICA

Gruppo di Lavoro per l'assistenza post-anestesiologica

Coordinatore: Calderini E
Membri: Arena G, Astuto M, Bettelli G, Lorenzini L, Leykin Y, Murabito P, Petrini F, Pietrini D, Pontecorvo C, Salvo I, Sammartino M, Solca M, Torri G, Trevisan PL

una zona logisticamente inserita nell'ambito di un Blocco Operatorio, o nelle immediate vicinanze dello stesso, dotata di personale qualificato e attrezzature idonee al monitoraggio e trattamento postoperatorio dei pazienti sottoposti ad intervento chirurgico. Funzione caratterizzante la PACU è la possibilità di ricovero temporaneo di tutti i pazienti provenienti dalle sale operatorie per un periodo di tempo variabile…….

PACU (Post anesthesia care unit)

- Mobilizzazione
- PONV
- Controllo ipotermia
- Dolore postoperatorio
- Fluidoterapia per os a 2h

The Role of the Recovery Room in Improving Adherence During an Enhanced Recovery After Surgery (ERAS) Implementation Program for Colorectal Surgery: A Single Center Retrospective Analysis

Perioperative ERAS Items and Adherence in the 2 Study Groups

	NRR n (%)	RR n (%)	$P < .05$
Preoperative phase			
Preoperative optimisation and anaemia management	27 (90%)	112 (94.1%)	.421
Multidisciplinary Counseling	17 (56.7%)	83 (69.8%)	.173
Nutritional evaluation	27 (90%)	114 (95.8%)	.208
Immunonutrition	7 (23.3%)	112 (94.1%)	.421
Preoperative fasting and carbohydrate loading	24 (80%)	110 (82.1%)	.043
Bowel preparation	7 (23.3%)	17 (14.3%)	.228
Intraoperatory Phase			
Antibiotics prophylaxis	30 (100%)	119 (100%)	—
No anaesthetic premedication	30 (100%)	119 (100%)	—
Preanaesthetic medication and anesthetic technique	30 (100%)	119 (100%)	—
Preventing hypothermia	30 (100%)	119 (100%)	—
Fluid management	30 (100%)	119 (100%)	—
PONV prophylaxis	30 (100%)	119 (100%)	—
Laparoscopic surgery	27 (90%)	111 (93.3%)	.540
No abdominal drain	15 (50%)	74 (62.9%)	.185
No nasogastric tube	106 (90.6%)	11 (9.2%)	.877
Postoperatory phase			
Thromboprophylaxis	30 (100%)	119 (100%)	—
Bladder catheter removal	22 (73.3%)	100 (82%)	.300
Early mobilization	19 (63.3%)	118 (99.2%)	.000
Early feeding and oral liquids intake	18 (60%)	98 (82.4%)	.008

Conti et al. Journal of perianesthesia Nursing (2022)

Peri-operative care pathways: re-engineering care to achieve the 'triple aim'

Prehab + ERAS pathways

'**Triple aim**':

1. Improving patients' experience of care (including quality and satisfaction);
2. Improving population/public health (chronic diseases and organization);
3. Reducing the per capita costs of healthcare.

The US Institute for Healthcare Improvements

Grocott et al. Anaesthesia 2019, 74 (Suppl. 1), 90-99

Enhanced Recovery in practice

Referral from Primary Care

Pre-Operative

- Optimised medical conditions
- Nutrition
- Fasting time
- Carbohidrate drinking
- Pre-anesthestic medication
- Anti-thrombotic prophylaxis

Admission

Operative

- Antimicrobial prophylaxis
- Multimodal analgesia
- PONV
- Optimal fluid therapy
- Hypotermia prophylaxis

Post-Operative

- Fluid management
- Postoperativ glycaemic control
- Postoperative nutrition
- Early mobilisation
- Rapid hydration / nourishment
- Appropriate iv therapy
- Catheters removed early
- Regular oral analgesia
- Avoid opiates

Follow-up

"we are now entering
a new era in medicine where differences in
patient-centered outcomes will determine what
constitutes medical success or failure, not only
doctors' perceptions of success."

Cor J. Kalkman,et al *Anesthesiology* (2015)

Grazie!!!!!

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