UNIVERSITÀ DEGLI STUDI DI PADOVA

Dipartimento di Scienze Chirurgiche,
Oncologiche e Gastroenterologiche
U O C Chirurgia Generale
Direttore: Prof. R. Bardini

AZIENDA OSPEDALIERA UNIVERSITA' PADOVA

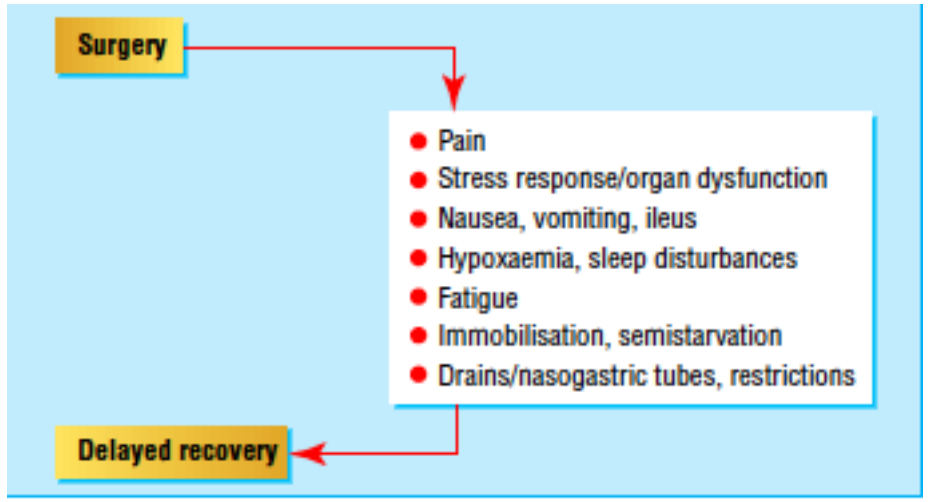
IBD and surgery
Enhanced recovery after surgery

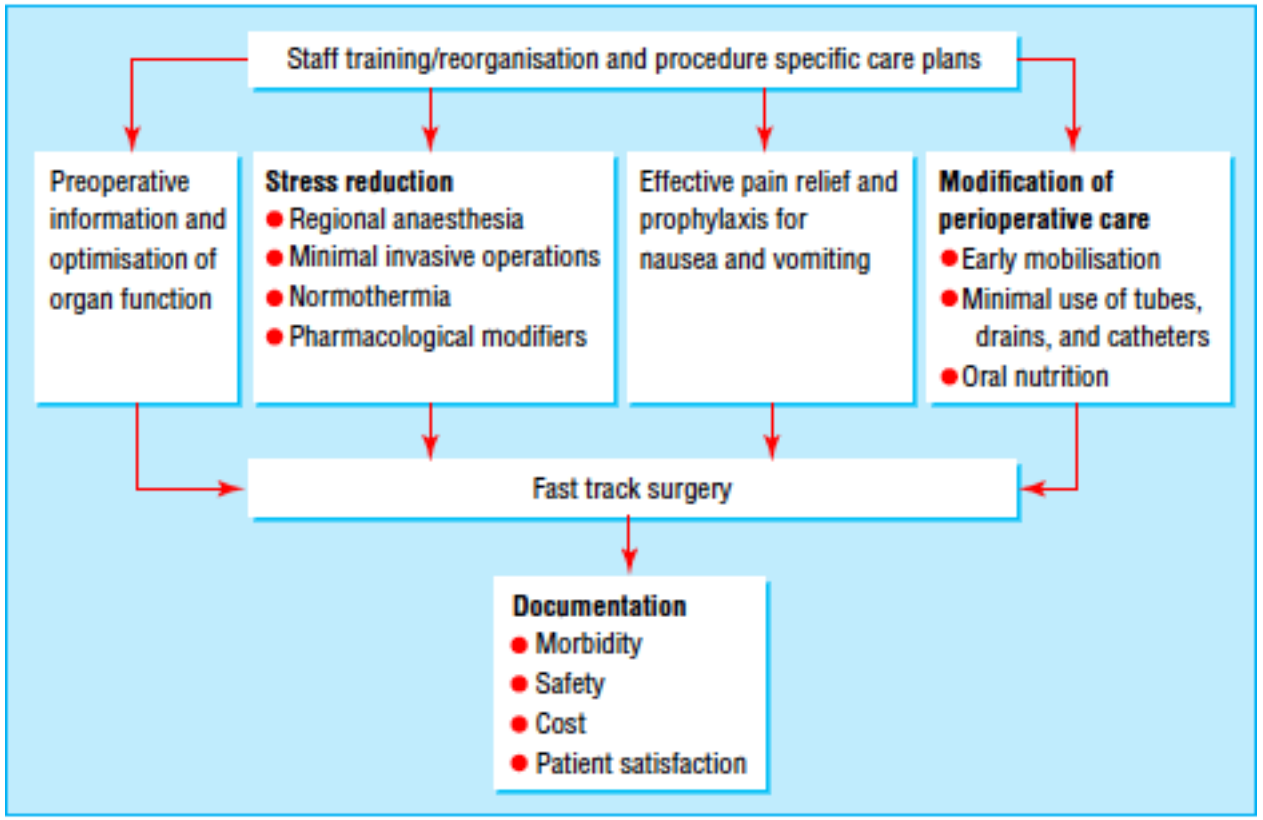
I. Angriman

IBD surgery enhanced recovery background

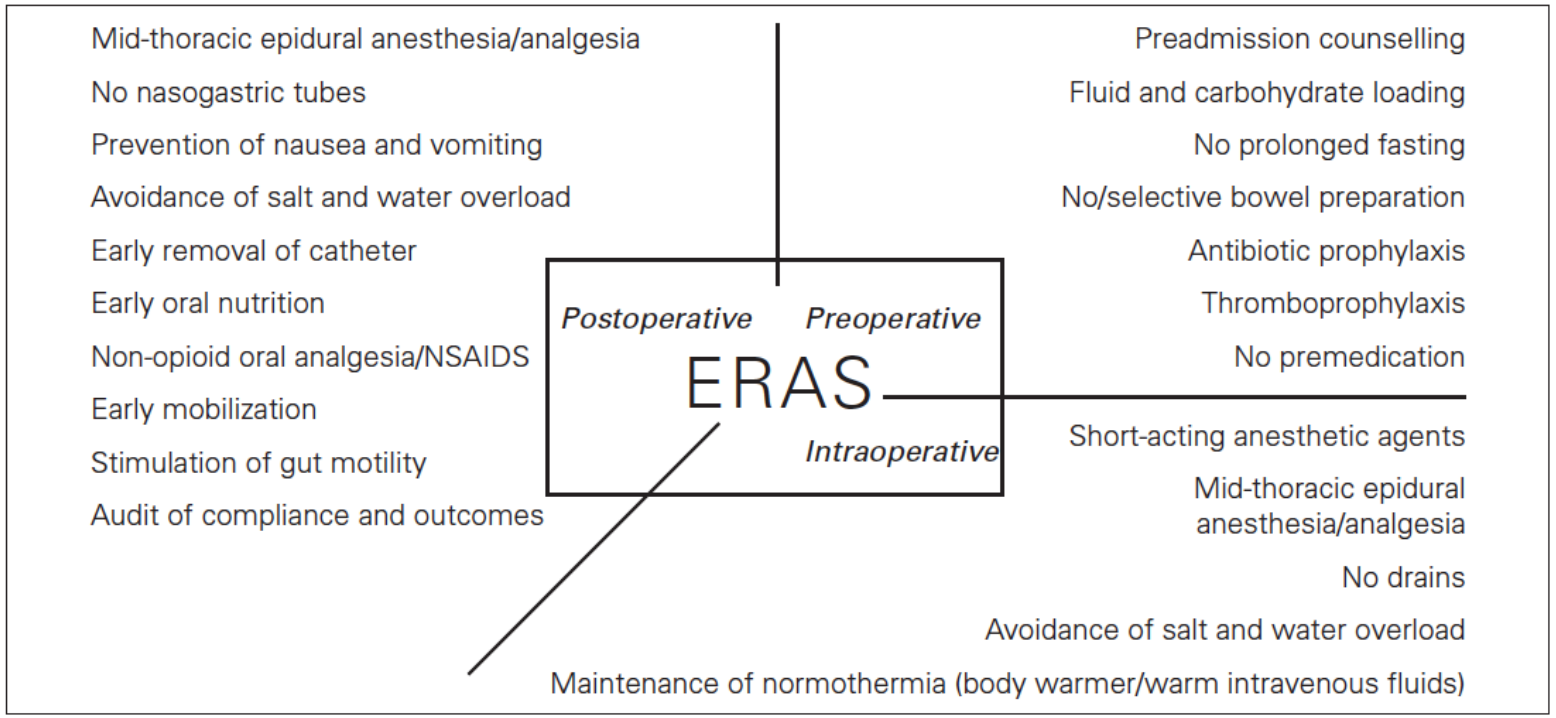
Management of patients in fast track surgery

Douglas W Wilmore, Henrik Kehlet BMJ 2001





IBD surgery enhanced recovery background



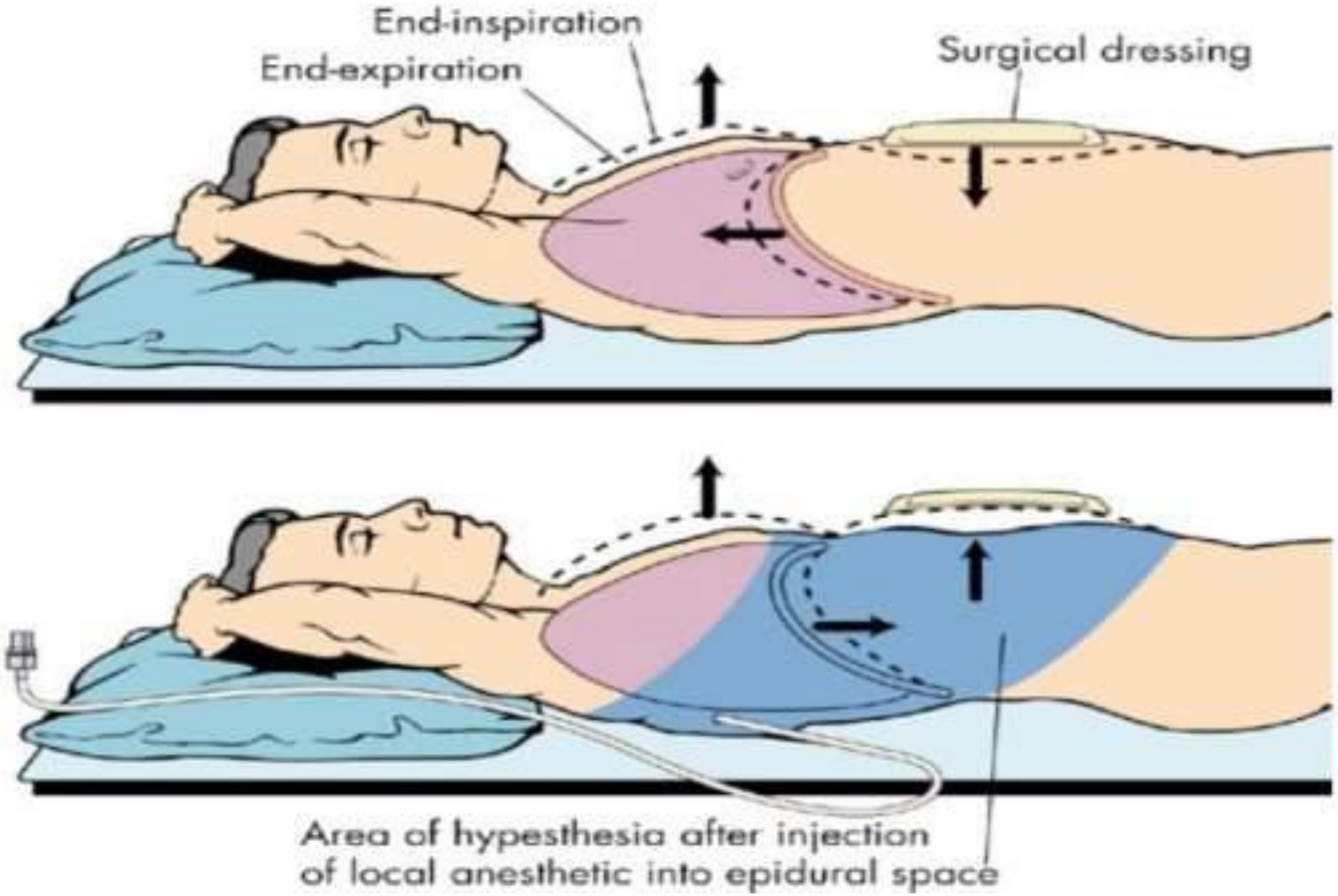
Una combinazione di strategie perioperatorie derivate dall’EBM finalizzate a ridurre la degenza post-operatoria.

IBD surgery enhanced recovery

Patient Pathway for Colectomy

	Day of Surgery	Post-Op Day 1	Post-Op Day 2 (HOME!)	After Discharge
Nutrition	Ice Chips/Clear Liquids 	Soft diet	Advance diet as tolerated 	Diet as directed by Doctor
Activity	Walk with help. Sit in chair every 2 hours  Use incentive spirometer every 2 hours while awake	Walk without help 5 times a day. Out of bed for 6 hours. Cough and deep breath frequently while awake Use incentive spirometer every 2 hours while awake	Walk without help 5 times a day. Out of bed for 6 hours. Cough and deep breath frequently while awake Use incentive spirometer every 2 hours while awake	Short, frequent walks 
Medication	PCA pump, epidural or pain pills for pain control	PCA pump, epidural or pain pills for pain control 	Pain pills as needed	Pain pills as needed
Treatments	Compression hose Urinary Catheter Chew gum Wound care	Remove urinary catheter Chew gum Wound care	Chew gum Wound care 	Wound care
Planning for Home Care		Discharge planning	Discharge home when passing gas or stool	Home or skilled nursing facility

L’anestesia e il controllo del dolore



Fluido terapia nel protocollo ERAS

	Standard group (n=10)	Restricted group (n=10)	Difference (95% CI)	p
Total intravenous sodium input (mmol)	1440 (1330 to 1620)	520 (315 to 645)	915 (740 to 1100)	<0.0001
Total water input (L) (intravenous + oral)	18.0 (16.4 to 19.3)	11.6 (10.4 to 12.2)	6.4 (4.8 to 8.1)	<0.0001
Total water output (L) (urine + vomitus / nasogastric aspirate)	10.5 (8.7 to 11.8)	7.7 (6.4 to 8.6)	2.5 (0.8 to 4.5)	0.008

	Standard group (n=10)	Restricted group (n=10)	Difference (95% CI)	p
Endpoints				
Day on which				
flatus first passed	4.0 (4.0 – 5.0)	3.0 (2.0 – 3.0)	2 (1 - 2)	0.001
stool first passed	6.5 (5.8 – 8.0)	4.0 (3.0 – 4.0)	3 (2 - 4)	0.001
intravenous infusion discontinued	6.0 (4.8 – 6.3)	4.0 (3.8 – 4.0)	2 (1 – 3)	0.001
solid food intake resumed	6.5 (5.5 – 7.0)	4.0 (4.0 – 4.3)	2 (1 – 3)	0.002
Postoperative hospital stay (days)	9.0 (7.8 – 14.3)	6.0 (5.0 – 7.0)	3 (1 – 8)	0.001

K.Holte, H.Kehlet :Am.College of Surgeons 2006

Lobo DN et al.: Lancet 2002

IBD surgery enhanced recovery

e Oral Feeding
ectal Surgery:
cal Trials

Qian-Tong Dong[a]

Dig Surg 2013

Study or subgroup	Early mear
Hartsell et al. [16]	7.2
Stewart et al. [17]	9.36
El Nakeeb et al. [19]	6.2
da Fonseca et al. [21]	4
Dag et al. [22]	5.55
Subtotal (95% CI)	
Heterogeneity: τ^2 = 1.24; χ^2 =	
Test for overall effect: Z = 2.6	

Fig. 2. EOF versus TOF for len

Study or subgroup	Early events	Early total	Traditional events	Traditional total	Weight %	Risk ratio M-H, fixed (95% CI)	Year
Anastomotic dehiscence							
Hartsell et al. [16]	0	29	1	29	10.1	0.33 (0.01–7.86)	1997
Stewart et al. [17]	1	40	0	40	3.4	3.00 (0.13–71.51)	1998
Lucha et al. [18]	1	26	0	25	3.4	2.89 (0.12–67.75)	2005
El Nakeeb et al. [19]	1	60	2	60	13.5	0.50 (0.05–5.37)	2009
da Fonseca et al. [21]	0	24	4	26	29.2	0.12 (0.01–2.12)	2011
Dag et al. [22]	2	99	6	100	40.3	0.34 (0.07–1.63)	2011
Subtotal (95% CI)		278		280	100.0	0.47 (0.19–1.15)	
Total events	5		13				
Heterogeneity: χ^2 = 3.67, d.f. = 5 (p = 0.60); I^2 = 0%							
Test for overall effect: Z = 1.65 (p = 0.10)							
Pneumonia							
Hartsell et al. [16]	1	29	0	29	3.7	3.00 (0.13–70.74)	1997
Stewart et al. [17]	1	40	1	40	7.4	1.00 (0.06–15.44)	1998
Lucha et al. [18]	0	26	1	25	11.3	0.32 (0.01–7.53)	2005
El Nakeeb et al. [19]	2	60	7	60	51.8	0.29 (0.06–1.32)	2009
Dag et al. [22]	3	100	3	100	22.2	1.00 (0.21–4.84)	2011
da Fonseca et al. [21]	1	24	0	60	3.6	3.24 (0.14–75.91)	2011
Subtotal (95% CI)		279		280	100.0	0.71 (0.31–1.59)	
Total events	8		12				
Heterogeneity: χ^2 = 3.53, d.f. = 5 (p = 0.62); I^2 = 0%							
Test for overall effect: Z = 0.84 (p = 0.40)							
Wound infection							
Stewart et al. [17]	0	40	4	40	24.5	0.11 (0.01–2.00)	1998
El Nakeeb et al. [19]	5	60	5	60	27.2	1.00 (0.31–3.28)	2009
Dag et al. [22]	5	99	7	100	37.9	0.72 (0.24–2.20)	2011
da Fonseca et al. [21]	2	24	2	26	10.4	1.08 (0.17–7.10)	2011
Subtotal (95% CI)		223		226	100.0	0.69 (0.34–1.37)	
Total events	12		18				
Heterogeneity: χ^2 = 2.15, d.f. = 3 (p = 0.54); I^2 = 0%							
Test for overall effect: Z = 1.07 (p = 0.29)							
Total complications							
Hartsell et al. [16]	1	29	1	29	1.5	1.00 (0.07–15.24)	1997
Stewart et al. [17]	10	40	12	40	18.3	0.83 (0.41–1.70)	1998
Lucha et al. [18]	1	26	1	25	1.6	0.96 (0.06–14.55)	2005
El Nakeeb et al. [19]	14	60	22	60	33.5	0.64 (0.36–1.12)	2009
Lobato Dias Consoli et al. [20]	4	15	5	14	7.9	0.75 (0.25–2.23)	2010
Dag et al. [22]	12	99	14	100	21.2	0.87 (0.42–1.78)	2011
da Fonseca et al. [21]	4	24	11	26	16.1	0.39 (0.14–1.07)	2011
Subtotal (95% CI)		293		294	100.0	0.70 (0.50–0.98)	
Total events	46		66				
Heterogeneity: χ^2 = 2.07, d.f. = 6 (p = 0.91); I^2 = 0%							
Test for overall effect: Z = 2.11 (p = 0.04)							

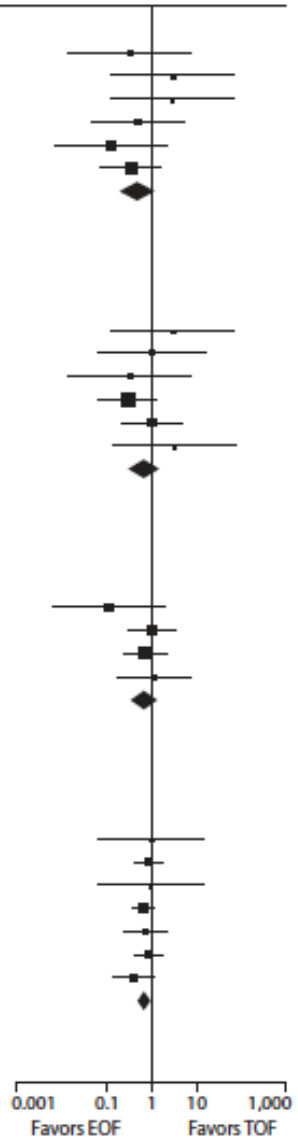
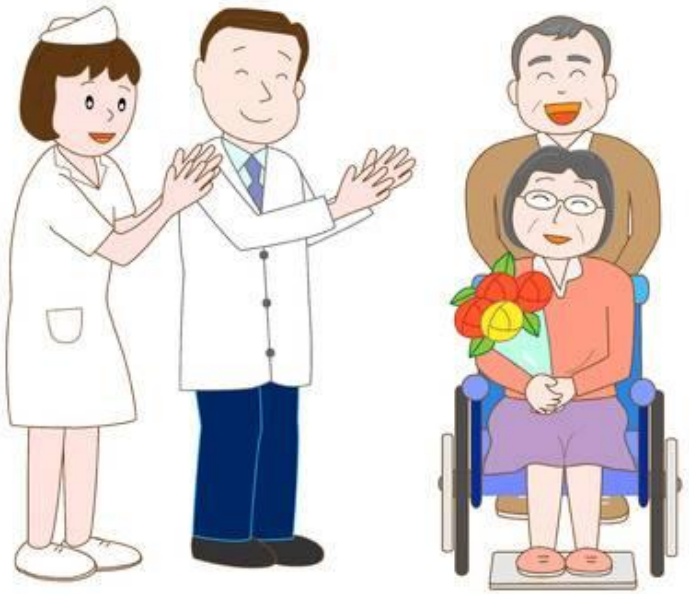


Fig. 3. EOF versus TOF for postoperative complications.

fference
m, 95% CI

-2 0 2 4
OF Favors TOF

- Criteri per la dimissione:
    - Ripristino della funzione intestinale
    - Possibilità di mangiare o bere senza difficoltà
    - Canalizzazione
    - Dolore controllato con analgesia orale
    - Adeguato supporto assistenziale a domicilio



IBD surgery enhanced recovery evidence

Cochrane Library

Cochrane Database of Systematic Reviews

Fast track surgery versus conventional recovery strategies for colorectal surgery (Review)

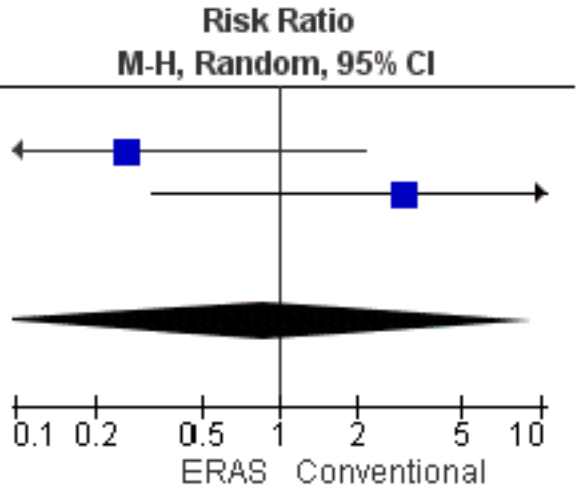
Spanjersberg WR, Reurings J, Keus F, van Laarhoven CJHM

Figure 9. Forest plot of comparison: 1 Primary analyses ERAS versus conventional, outcome: 1.6 ital Readmissions.

Study or Subgroup	ERAS Events	ERAS Total	Conventional Events	Conventional Total	Weight	Risk Ratio M-H, Random, 95% CI
Anderson 2003	0	14	0	11		Not estimable
Gatt 2005	1	19	4	20	51.1%	0.26 [0.03, 2.15]
Khoo 2007	3	35	1	35	48.9%	3.00 [0.33, 27.46]
Serclova 2009	0	51	0	52		Not estimable
Total (95% CI)		**119**		**118**	**100.0%**	**0.87 [0.08, 9.39]**
Total events	4		5			

Heterogeneity: Tau² = 1.75; Chi² = 2.44, df = 1 (P = 0.12); I² = 59%

Test for overall effect: Z = 0.12 (P = 0.91)



IBD surgery enhanced recovery evidence

Cochrane Library

Cochrane Database of Systematic Reviews

Spanjersberg WR, Reurings J, Keus F, van Laarhoven CJHM

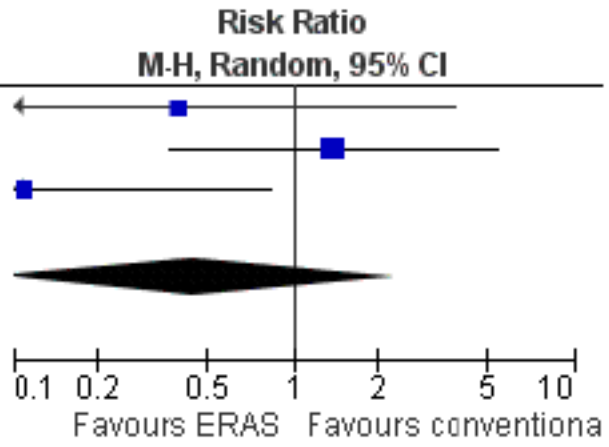
Figure 5. Forest plot of comparison: 1 Primary analyses ERAS versus conventional, outcome: 1.2 All complications.

Figure 6. Forest plot of comparison: 1 Primary analyses ERAS versus conventional, outcome: 1.3 Major Complications.

Study or Subgroup	ERAS Events	ERAS Total	Conventional Events	Conventional Total	Weight	Risk Ratio M-H, Random, 95% CI
Anderson 2003	1	14	2	11	27.5%	0.39 [0.04, 3.79]
Gatt 2005	4	19	3	20	41.5%	1.40 [0.36, 5.46]
Khoo 2007	1	35	9	35	31.0%	0.11 [0.01, 0.83]
Total (95% CI)		**68**		**66**	**100.0%**	**0.45 [0.09, 2.32]**
Total events	6		14			

Heterogeneity: Tau² = 1.20; Chi² = 4.70, df = 2 (P = 0.10); I² = 57%

Test for overall effect: Z = 0.95 (P = 0.34)



IBD surgery enhanced recovery evidence

Enhanced Recovery Protocols for Adults Undergoing Colorectal Surgery: A Systematic Review and Meta-analysis

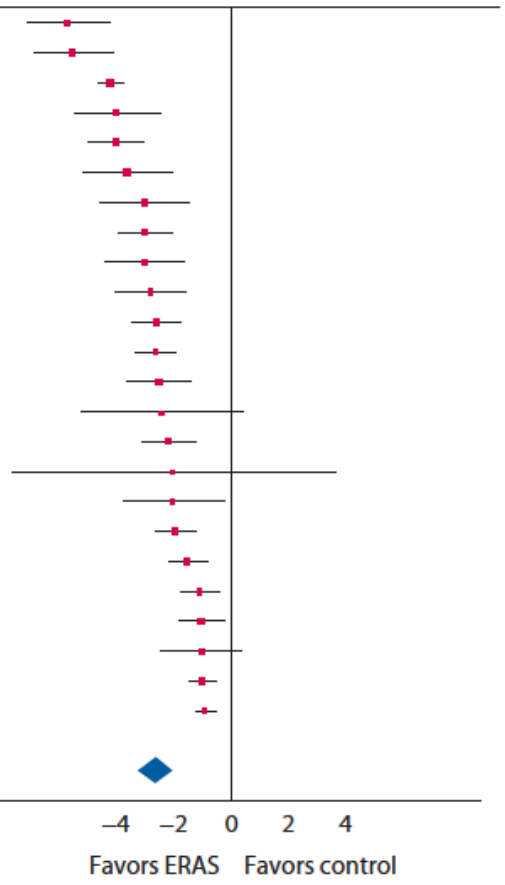
Nancy L. Greer, Ph.D.[1] • William P. Gunnar, M.D., J.D.[2] • Philipp Dahm, M.D., M.H.Sc.[3]
Alice E. Lee, M.D.[4] • Roderick MacDonald, M.S.[1] • Aasma Shaukat, M.D., M.P.H.[1,5]
Shahnaz Sultan, M.D., M.H.Sc.[1,5] • Timothy J. Wilt, M.D., M.P.H.[1,6]

Dis Colon Rectum 2018;

Length of stay

Study or subgroup	ERAS Mean	ERAS SD	ERAS Total	Control Mean	Control SD	Control Total	Weight	Mean difference IV, random, 95% CI
Yang 2012 (24)	6	1	32	11.7	3.8	30	4.0%	−5.70 (−7.10 to −4.30)
Ota 2017 (29)	8.5	6	159	14	6.5	161	4.0%	−5.50 (−6.87 to −4.13)
Jia 2014 (14)	9	1.8	117	13.2	1.3	116	5.0%	−4.20 (−4.60 to −3.80)
Gouvas 2012 lap (12)	4	2.3	42	8	3.8	33	3.9%	−4.00 (−5.47 to −2.53)
Scioscia 2017 (30)	3	2.3	62	7	4.8	165	4.5%	−4.00 (−4.93 to −3.07)
Muller 2009 (16)	6.7	4.8	76	10.3	4.9	75	3.8%	−3.60 (−5.15 to −2.05)
Anderson 2003 (9)	4	1.8	14	7	2.1	11	3.8%	−3.00 (−4.56 to −1.44)
Serclova 2009 (20)	7.4	1.3	51	10.4	3.1	52	4.5%	−3.00 (−3.92 to −2.08)
Mari 2014 (28)	4.7	2.4	25	7.7	2.4	25	4.1%	−3.00 (−4.33 to −1.67)
Ionescu 2009 (13)	6.4	3.4	48	9.2	2.7	48	4.2%	−2.80 (−4.03 to −1.57)
Wang 2015 (32)	6.1	1.7	57	8.7	2.8	60	4.6%	−2.60 (−3.43 to −1.77)
Nanavati 2014 (17)	4.7	1.3	30	7.3	1.4	30	4.8%	−2.60 (−3.28 to −1.92)
Wang 2011 (23)	5.1	3.1	106	7.6	4.8	104	4.4%	−2.50 (−3.60 to −1.40)
Gatt 2005 (11)	6.6	4.4	19	9	4.6	20	2.4%	−2.40 (−5.22 to 0.42)
Mari 2016 (27)	5	2.6	70	7.2	3	70	4.5%	−2.20 (−3.13 to −1.27)
Khoo 2007 (15)	5	8.5	35	7	14.8	35	0.9%	−2.00 (−7.65 to 3.65)
Forsmo 2016 (35)	5	8	154	7	7.6	153	3.6%	−2.00 (−3.75 to −0.25)
Feng 2014 (25)	5.1	1.4	57	7	2.3	59	4.8%	−1.90 (−2.59 to −1.21)
Wang 2012 (33)	5.5	1	40	7	1.8	38	4.8%	−1.50 (−2.15 to −0.85)
Feng 2016 (10)	7.5	2.2	116	8.6	2.8	114	4.8%	−1.10 (−1.75 to −0.45)
Vlug 2011 lap (21)	5	2.9	100	6	2.9	109	4.7%	−1.00 (−1.79 to −0.21)
Gouvas 2012 open (12)	7	2.3	36	8	4	45	4.0%	−1.00 (−2.39 to 0.39)
Vlug 2011 open (21)	6	1.6	93	7	1.3	98	5.0%	−1.00 (−1.41 to −0.59)
Ren 2011 (19)	5.7	1.6	299	6.6	2.4	298	5.0%	−0.90 (−1.23 to −0.57)
Total (95% CI)			1838			1949	100.0%	−2.62 (−3.22 to −2.02)

Heterogeneity: $Tau^2 = 1.86$; $Chi^2 = 292.54$, df = 23 ($p < 0.00001$); $I^2 = 92\%$
Test for overall effect: Z = 8.51 ($p < 0.00001$)



Enhanced Recovery Protocols for Adults Undergoing Colorectal Surgery: A Systematic Review and Meta-analysis

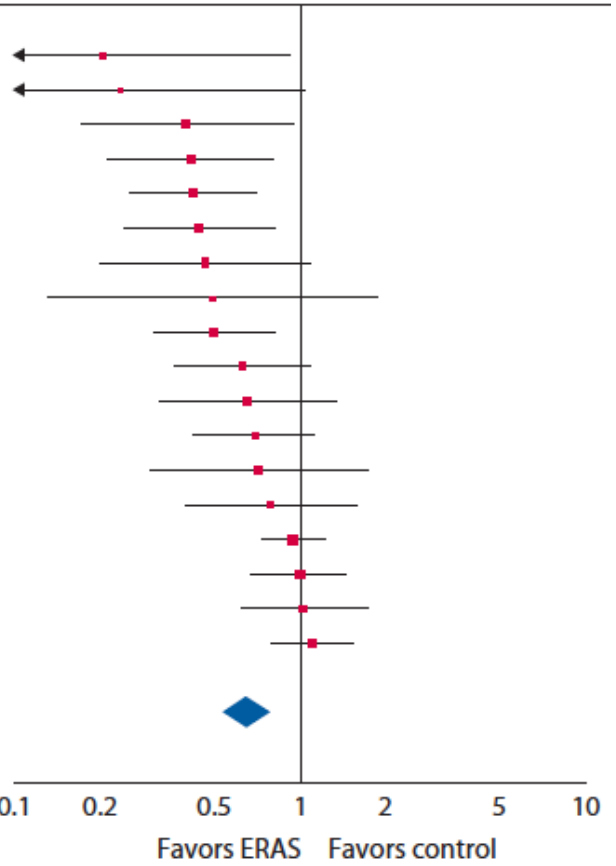
Nancy L Greur Dis Colon Rectum 2018

Morbidity

Study or subgroup	ERAS Events	ERAS Total	Control Events	Control Total	Weight	Risk ratio M-H, random, 95% CI
Mari 2014 (28)	0	25	0	25		Not estimable
Feng 2014 (25)	2	57	10	59	1.6%	0.21 (0.05–0.90)
Wang 2012 (33)	2	40	8	38	1.6%	0.24 (0.05–1.05)
Feng 2016 (10)	7	116	17	114	3.8%	0.40 (0.17–0.94)
Gouvas 2012 lap (12)	9	42	17	33	5.2%	0.42 (0.21–0.81)
Muller 2009 (16)	16	76	37	75	7.0%	0.43 (0.26–0.70)
Serclova 2009 (20)	11	51	25	52	5.8%	0.45 (0.25–0.81)
Yang 2012 (24)	6	32	12	30	3.8%	0.47 (0.20–1.09)
Wang 2012 lap (22)	3	40	6	40	1.9%	0.50 (0.13–1.86)
Wang 2011 (23)	20	106	39	104	7.3%	0.50 (0.32–0.80)
Gatt 2005 (11)	9	19	15	20	6.5%	0.63 (0.37–1.08)
Wang 2015 (32)	10	57	16	60	4.8%	0.66 (0.33–1.33)
Gouvas 2012 open (12)	14	36	25	45	7.1%	0.70 (0.43–1.14)
Wang 2012 open (22)	7	41	10	42	3.7%	0.72 (0.30–1.70)
Mari 2016 (27)	12	70	15	70	5.0%	0.80 (0.40–1.58)
Forsmo 2016 (35)	65	154	68	153	10.2%	0.95 (0.74–1.23)
Vlug 2011 lap (21)	34	100	37	109	8.5%	1.00 (0.69–1.46)
Ren 2011 (19)	29	299	28	298	7.0%	1.03 (0.63–1.69)
Vlug 2011 open (21)	43	93	41	98	9.3%	1.11 (0.80–1.52)
Total (95% CI)		1454		1465	100.0%	0.66 (0.54–0.80)
Total events	299		426			

Heterogeneity: $Tau^2 = 0.08$; $Chi^2 = 36.54$, df = 17 (F = 0.004); $I^2 = 53\%$

Test for overall effect: Z = 4.12 ($p < 0.0001$)



Enhanced Recovery Protocols for Adults Undergoing Colorectal Surgery: A Systematic Review and Meta-analysis

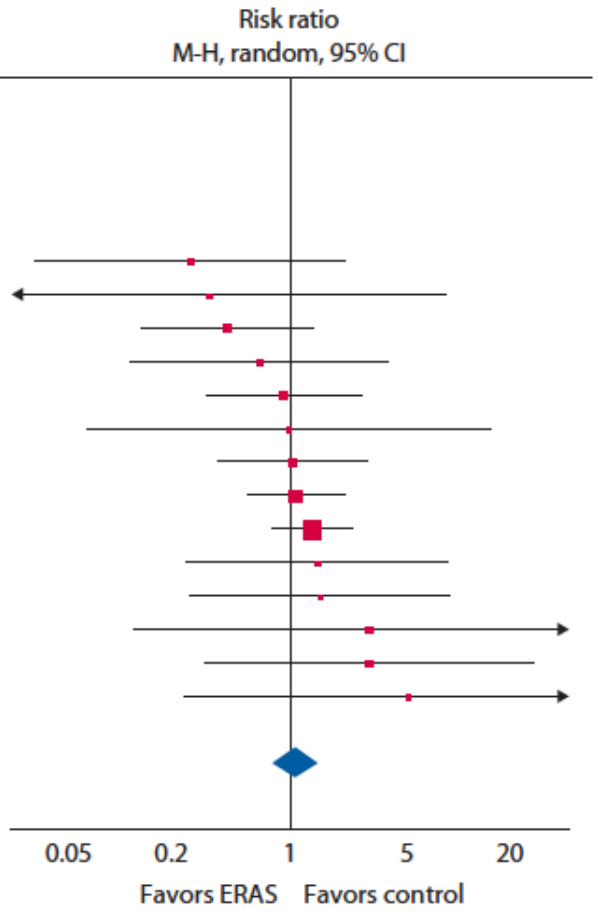
Nancy L Greur Dis Colon Rectum 2018

Readmissions

Study or subgroup	ERAS Events	ERAS Total	Control Events	Control Total	Weight	Risk ratio M-H, random, 95% CI
Mari 2014 (28)	0	25	0	25		Not estimable
Serclova 2009 (20)	0	51	0	52		Not estimable
Anderson 2003 (9)	0	19	0	20		Not estimable
Ionescu 2009 (13)	0	48	0	48		Not estimable
Yang 2012 (24)	0	32	0	30		Not estimable
Gatt 2005 (11)	1	19	4	20	2.1%	0.26 (0.03–2.15)
Feng 2014 (25)	0	57	1	59	0.9%	0.34 (0.01–8.29)
Wang 2011 (23)	4	106	9	104	7.1%	0.44 (0.14–1.37)
Wang 2012 (31)	2	49	3	50	3.1%	0.68 (0.12–3.90)
Vlug 2011 lap (21)	6	100	7	109	8.4%	0.93 (0.32–2.69)
Nanavati 2014 (17)	1	30	1	30	1.3%	1.00 (0.07–15.26)
Vlug 2011 open (21)	7	93	7	98	9.2%	1.05 (0.38–2.89)
Scioscia 2017 (30)	11	62	26	162	22.7%	1.11 (0.58–2.10)
Forsmo 2016 (35)	29	154	21	153	35.2%	1.37 (0.82–2.30)
Muller 2009 (16)	3	76	2	75	3.0%	1.48 (0.25–8.61)
Wang 2012 open (22)	3	41	2	42	3.1%	1.54 (0.27–8.73)
Wang 2012 lap (22)	1	40	0	40	0.9%	3.00 (0.13–71.51)
Khoo 2007 (15)	3	35	1	35	1.9%	3.00 (0.33–27.46)
Ota 2017 (29)	2	159	0	161	1.0%	5.06 (0.24–104.62)
Total (95% CI)		1196		1313	100.0%	1.10 (0.81–1.50)
Total events	73		84			

Heterogeneity: Taul^2 = 0.00; Chi^2 = 8.31, df = 13 (p = 0.82); I^2 = 0%

Test for overall effect: Z = 0.62 (p = 0.53)



Criticità

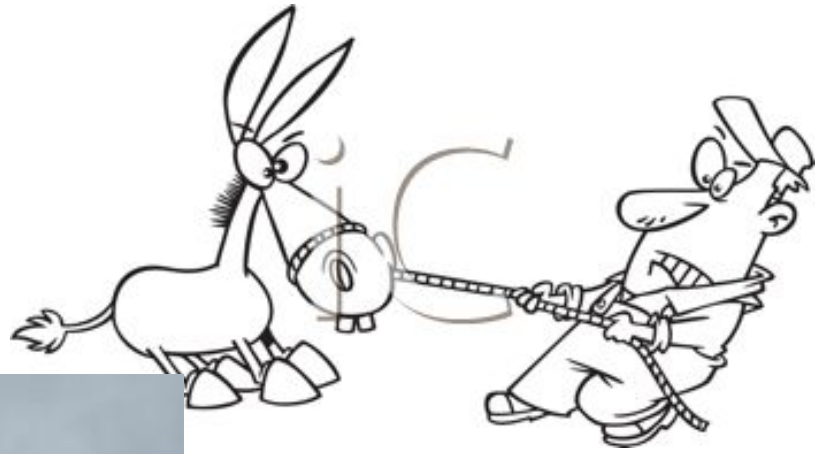
- Compliance
- Comorbidità
- Ileo prolungato
- Complicanze
- Assistenza

Factors predicting outcome fro laparoscopic colorectal surgery

Surg Endosc (2017) David E. Messenger

Outcome measure	Predictors of adverse outcome (number of studies)					
	ERAS elements	*n*	Pathophysiological	*n*	Operative	*n*
LOS	Reduced overall compliance	6	Increased ASA	6	Open approach	8
	Delayed mobilisation	5	Older age	3	Longer operative duration	3
	Delayed oral intake	5	Male	2	Conversion to open	2
	Delayed urinary catheter removal	4	Increased POSSUM score	1	Malignancy or IBD	2
	Delayed epidural removal	3	Increased WHO score	1	Rectal resection	2
	NG tube insertion	3	Malnourishment (≥SGA-B)	1	Lower surgeon volume	1
	No post-operative IV fluid restriction	3	Raised BMI		Left-sided resection	1
	Use of epidural	2			Complex resection	1
	Use of intra-abdominal drain	2			Volatile anaesthesia	1
	Use of oral opiates	2			Blood loss	1
	No pre-operative counselling	1			Side to side anastomosis	1
	No pre-operative carbohydrate drink	1				
	No intra-operative IV fluid restriction	1				
	Non-functioning epidural	1				
	Urinary re-catheterisation	1				
	Avoidance of NSAIDs	1				
Morbidity	Reduced overall compliance	4	Increased ASA	2	Open approach	2
	No post-operative IV fluid restriction	2	Older age	2	Rectal resection	2
	No peri-operative IV fluid restriction	1	Male	2	Left-sided resection	1
	No intra-operative IV fluid restriction	1	CRP>150 day 2	1	Longer operative duration	1
	No intra-operative GDFT	1	Increased WHO score	1		
	No pre-operative carbohydrate drink	1	Malnourishment (≥SGA-B)	1		
	Delayed oral intake	1				
	Delayed urinary catheter removal	1				
	Delayed epidural removal	1				
	Delayed mobilisation	1				
	Avoidance of laxatives	1				
	Use of NSAIDs	1				
Readmission	Reduced overall compliance	2	Younger age	1	Open approach	2
	Early solid oral intake	1	Raised BMI	1	Rectal resection	2
	Longer initial LOS	1			Laparoscopic approach	1

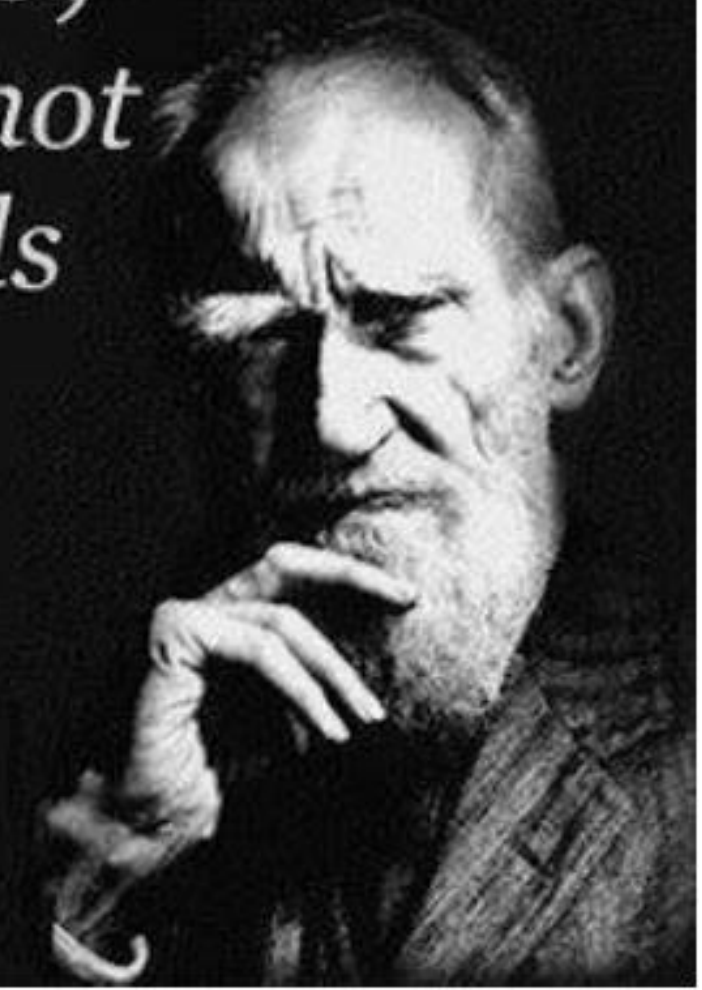
Protocol compliance is the most frequentl reported predictive factor for outcomes of ERAS programme following laparoscopic colorectal resection



- ERAS : Applicazione pratica

- Diffici
  nella p
- Molte
  sono c
- La pra
  attual
- L’ader
  post-c
  compl

Progress is impossible without change, and those who cannot change their minds cannot change anything.



- George Bernard Shaw

Approccio multimodale per ottimizzare le cure perioperatorie

- ✓Anestesisti
- ✓Chirurghi
- ✓Infermieri
- ✓Nutrizionisti
- ✓Fisioterapisti
- ✓ADI

Stress operatorio

Discomfort

Degenza

Wind et al: BJS 2006
Holte et al: J Am Coll Surg 2006
Kehlet et al: BJS 2000

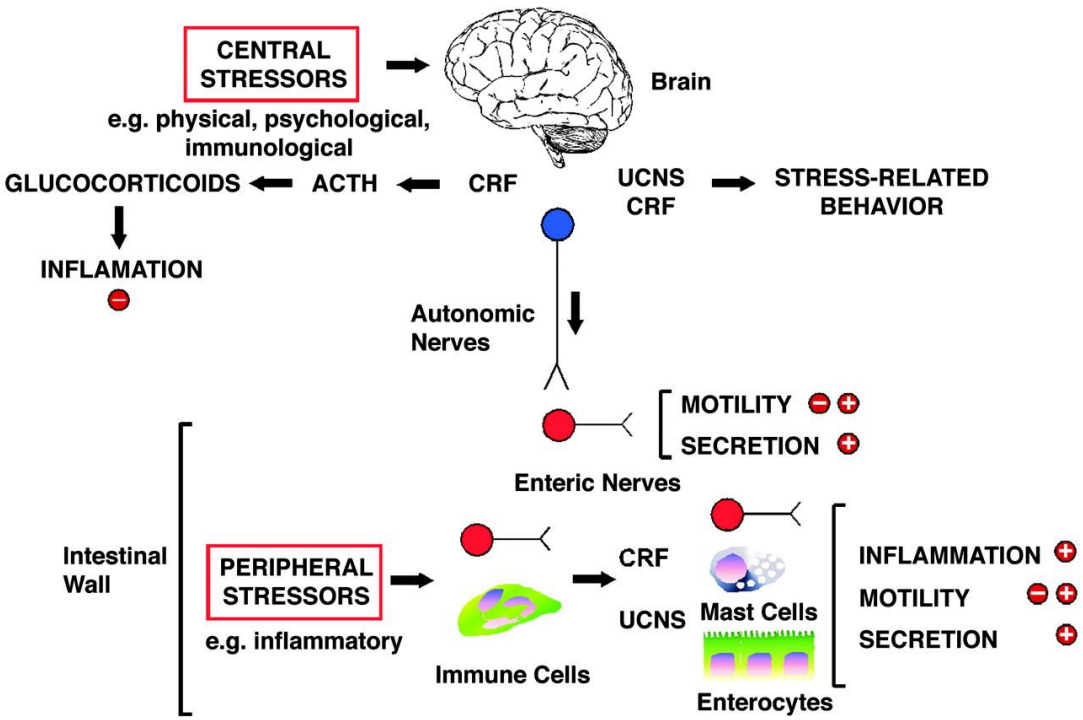
ERAS: fattori condizionanti il risultato correlati al paziente

- Comorbilità
  - Paziente complesso
- Aspettative del paziente
  - Personalità
- Collaborazione del paziente
  - Barriere linguistiche
  - Livello culturale

Ileo paralitico post-operatorio

- Fase neurologica: incisione chirurgica , farmaci anestetici
- Fase infiammatoria: manipolazione intestinale (cellule dendritiche)
- Fase di risoluzione: sistema vagale (precoce alimentazione, mobilizzazione)

Venara A et al J Visceral Surgery 2016



Intestinal Surgery for Crohn's Disease: Predictors of Recovery, Quality of Life, and Costs

Marco Scarpa · Cesare Ruffolo · Domenico Bassi · Riccardo Boetto · Renata D'Incà · Andrea Buda · Giacomo C. Sturniolo · Imerio Angriman

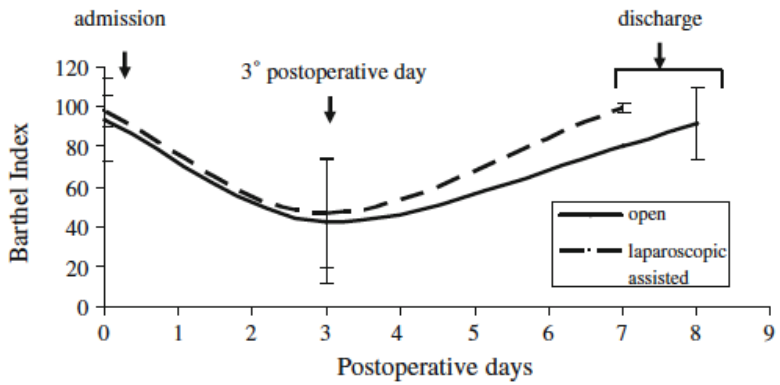
J Gastrointest Surg (2009)

Table 2 Surgical Techniques and Recovery Parameters

Surgical technique	Outcome measure	Yes: median (IQR)	No: median (IQR)	*p* level
Ileal resection	Discharge (days after operation)	7 (6–8)	9 (7–10)	0.038
	Sick leave duration (days)	30 (18–53)	45 (30–83)	0.063
Colonic resection	Discharge (days after operation)	9 (7–12)	7 (6–8)	0.025
	Barthel Index at discharge	100 (90–100)	100 (100–100)	0.016
Stricturoplasty	First bowel movement (days)	4 (3–5)	3 (2–4)	0.042
Laparoscopy	Discharge (days after operation)	7 (6–8)	8 (7–10)	0.001
	Body Image score	6 (5–8)	5 (0–7)	0.072
Ileostomy	Discharge (days after operation)	11 (8–16)	7 (6–9)	0.015
	Barthel Index at third post-operative day	3 (0–25)	45 (25–70)	0.020
	Barthel Index at discharge	93 (58–100)	100 (100–100)	0.048
	Sick leave duration (days)	71 (48–98)	30 (20–60)	0.071

	YES: median (IQR)	NO: median (IQR)	*p* level
Laparoscopic-assisted bowel resection			
Total lost working days	33 (15–53)	41 (29–71)	0.055
Lost gain for sick leave	0 (0–1,908)	1,170 (0–2,346)	0.325
Hospital stay cost	8,640 (7,680–10,560)	10,560 (8,640–13,440)	0.021
Overall cost	11,166 (10,117–14,707)	13,293 (10,203–17,056)	0.178
Stoma			
Total lost working days	61 (31–83)	37 (17–53)	0.147
Lost gain for sick leave	0 (0–3,200)	870 (0–2,100)	0.774
Hospital stay cost	15,360 (11,520–20,160)	8,640 (7,680–10,560)	0.017
Overall cost	19,003 (12,123–26,991)	11,495 (10,117–15,003)	0.050

Overall disability during hospital stay for surgery for Crohn's disease



The Impact of Enhanced Recovery Protocol Compliance on Elective Colorectal Cancer Resection Results From an International Registry

On behalf of the ERAS Compliance Group

Annals of Surgery Volume 261, Number 6, June 2015

TABLE 6. Multivariate Analysis for LOS After Colorectal Resection

Variable	OR	95% CI	*P*
ASA > 2	1.18	1.12–1.24	<0.001*
BMI > 30	1.04	0.98–1.10	0.092
Preoperative WHO > 1	1.13	1.08–1.17	<0.001*
Preoperative radiotherapy	1.06	0.97–1.15	0.267
Surgery for rectal cancer	1.30	1.25–1.35	<0.001*
Laparoscopy	0.83	0.79–0.87	<0.001*
Total intravenous anesthesia	0.86	0.81–0.91	<0.001*
Preadmission education	0.98	0.94–1.02	0.299
Antibiotic prophylaxis	0.99	0.95–1.03	0.301
Preoperative carbohydrate drinks	0.89	0.84 - 0.94	0.001
Intraoperative epidural analgesia	1.07	1.04–1.10	0.019
Avoidance of nasogastric drainage	0.99	0.95–1.02	0.417
Laxative	0.97	0.95–1.00	0.172

Model fit statistic $R^2 = 0.640$.
*Remains significant after Bonferroni correction.

TABLE 8. Multivariate Analysis of Complications Development After Colorectal Resection

	OR	95% CI	*P*
Male sex	1.27	1.13–1.40	0.033
ASA > 2	1.52	1.40–1.64	0.002
BMI > 30	1.05	0.99–1.11	0.099
DM	1.07	0.95–1.19	0.301
Preoperative WHO > 0	1.56	1.49–1.63	<0.001*
Preoperative radiotherapy	1.10	0.98–1.20	0.105
Surgery for rectal cancer	1.50	1.35–1.65	<0.001*
Laparoscopy	0.68	0.62–0.74	<0.001*
Total intravenous anesthesia	0.93	0.82–1.04	0.120
Preadmission education	0.95	0.81–1.08	0.208
TED prophylaxis	1.02	0.90–1.14	0.472
Preoperative carbohydrate drinks	0.95	0.86–1.04	0.198
Intraoperative epidural analgesia	1.06	0.97–1.15	0.202
Restrictive intravenous fluids	0.35	0.30–0.40	<0.001*

Model fit statistic $R^2 = 0.620$.
*Remains significant after Bonferroni correction.
DM indicates diabetes mellitus; TED, thromboembolic disease.

L'incremento della compliance nei confronti dei protocolli ERAS e l'uso della chirurgia laparoscopica migliorano in modo indipendente l'outcome chirurgico.

IBD surgery enhanced recovery evidence

Enhanced Recovery Protocols for Adults Undergoing Colorectal Surgery: A Systematic Review and Meta-analysis

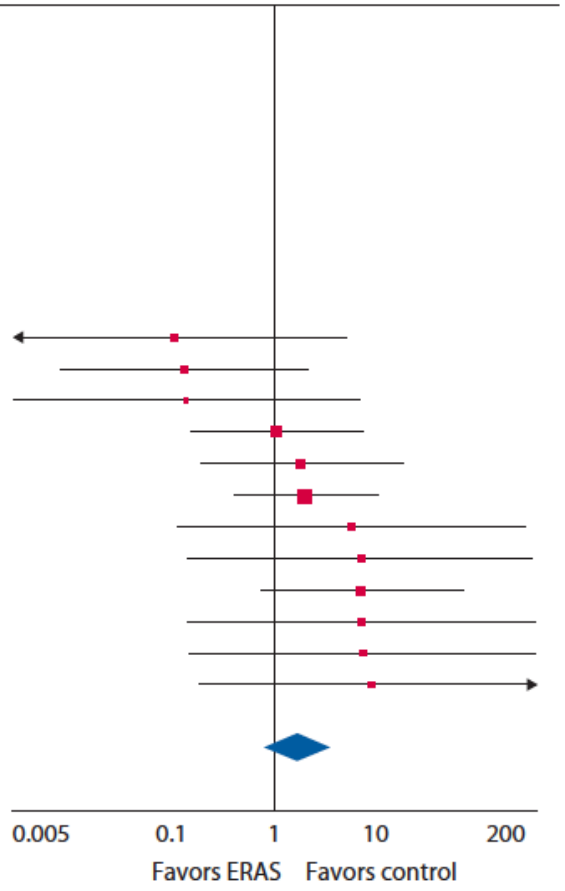
Nancy L. Greer, Ph.D.[1] • William P. Gunnar, M.D., J.D.[2] • Philipp Dahm, M.D., M.H.Sc.[3]
Alice E. Lee, M.D.[4] • Roderick MacDonald, M.S.[1] • Aasma Shaukat, M.D., M.P.H.[1,5]
Shahnaz Sultan, M.D., M.H.Sc.[1,5] • Timothy J. Wilt, M.D., M.P.H.[1,6]

Dis Colon Rectum 2018;

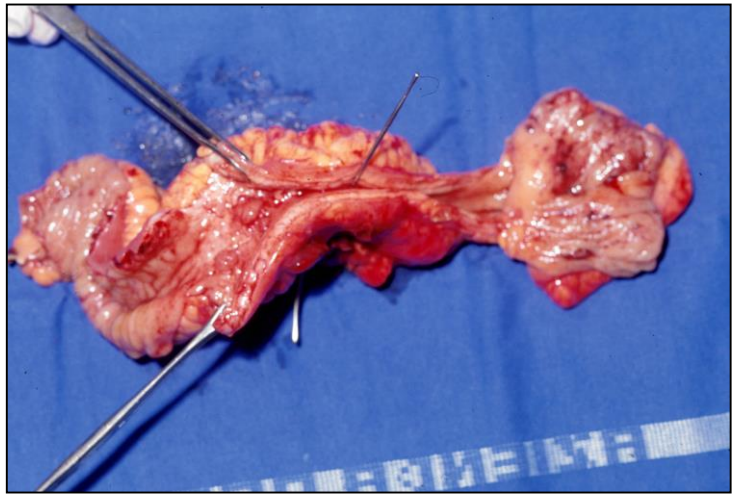
Mortality

Study or subgroup	ERAS Events	ERAS Total	Control Events	Control Total	Weight	Peto odds ratio Peto, fixed, 95% CI
Ren 2011 (19)	0	299	0	298		Not estimable
Mari 2014 (28)	0	25	0	25		Not estimable
Pappalardo 2016 (18)	0	25	0	25		Not estimable
Feng 2014 (25)	0	57	0	59		Not estimable
Ota 2017 (29)	0	159	0	161		Not estimable
Nanavati 2014 (17)	0	30	0	30		Not estimable
Serclova 2009 (20)	0	51	0	52		Not estimable
Wang 2015 (32)	0	57	0	60		Not estimable
Mari 2016 (27)	0	70	0	70		Not estimable
Jia 2014 (14)	0	117	0	116		Not estimable
Anderson 2003 (9)	0	14	1	11	4.0%	0.10 (0.00–5.34)
Khoo 2007 (15)	0	35	2	35	8.0%	0.13 (0.01–2.14)
Wang 2012 open (22)	0	41	1	42	4.1%	0.14 (0.00–6.99)
Vlug 2011 lap (21)	2	100	2	109	16.0%	1.09 (0.15–7.87)
Wang 2011 (23)	2	106	1	104	12.1%	1.92 (0.20–18.69)
Vlug 2011 open (21)	4	93	2	98	23.7%	2.09 (0.41–10.60)
Gouvas 2012 lap (12)	1	42	0	33	4.0%	5.96 (0.12–309.26)
Wang 2012 lap (22)	1	40	0	40	4.1%	7.39 (0.15–372.38)
Forsmo 2016 (35)	3	154	0	153	12.1%	7.44 (0.77–72.04)
Wang 2012 (33)	1	49	0	50	4.1%	7.54 (0.15–380.14)
Gatt 2005 (11)	1	19	0	20	4.1%	7.79 (0.15–393.02)
Gouvas 2012 open (12)	1	36	0	45	4.0%	9.49 (0.18–489.97)
Total (95% CI)		1619		1636	100.0%	1.79 (0.81–3.95)
Total events	16		9			

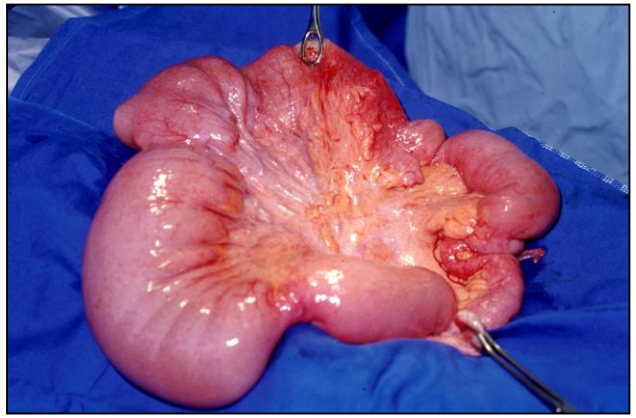
Heterogeneity: $Chi^2 = 11.40$, df = 11 ($p = 0.41$); $I^2 = 4\%$
Test for overall effect: Z = 1.45 ($p = 0.15$)



Protocollo ERAS e IBD



- Flogosi sistemica
- Ileo dilatato
- Sepsi
- Terapia steroidea
- Malnutrizione
- Anemia



Colectomy for IBD under ERAS protocol

Xujie Dai J.Surg.Research 2017

	IBD	CRC	p
Prolonged POI	28.8%	14.8	P<0.001
Time to GI recovery	4.8 ± 2.1	3.7 ± 1.4	P<0.001
Post-op LOS	10.7 ± 6.2	7.9 ± 5.3	P<0.001
NGT reinsertion	9.8%	4.0%	P<0.02

In the setting of ERAS, colectomy for IBD is associated with delayed GI function recovery and higher incidence of prolonged POI compared to CRC patients

Increased incidence of prolonged ileus after colectomy for inflammatory bowel diseases under ERAS protocol: a cohort analysis

Xujie Dai , J. Surgical Research 2017

Table 5 – Univariate and multivariate logistic regression analysis of factors associated with prolonged postoperative ileus in IBD patients.

Variables, *n* (%)	Univariate analysis			Multivariate analysis	
	Nonprolonged POI ($n = 131$)	Prolonged POI ($n = 53$)	P value	Odds ratio (95% CI)	P value
Age >40 y	31 (23.7)	19 (35.8)	0.09	1.80 (0.824-3.931)	0.14
Preoperative steroids >20 mg/d	32 (24.4)	24 (45.3)	0.01	2.19 (1.007-4.748)	0.048
Preoperative biologics	8 (6.1)	3 (5.7)	1.00		
Preoperative CRP >10 mg/L	36 (27.5)	22 (41.5)	0.06	0.53 (0.199-1.403)	0.20
Preoperative hemoglobin <120 g/L	81 (61.8)	38 (71.7)	0.21		
Preoperative hypoalbuminemia (<35 g/L)	24 (18.3)	24 (45.3)	<0.001	2.72 (1.107-6.687)	0.03
NRS-2002 ≥ 3	70 (53.4)	35 (66.0)	0.12		
Preoperative SIRS	5 (3.8)	10 (18.9)	0.001	4.91 (1.227-19.628)	0.03
Emergent surgery	5 (3.8)	5 (9.4)	0.13		
Laparoscopic surgery	64 (48.9)	32 (60.4)	0.16		
Duration of operation > 180 min	62 (47.3)	28 (52.8)	0.50		
Postoperative K^+ < 3.5 mmol/L	4 (3.1)	4 (7.5)	0.18		
Previous abdominal surgery	26 (19.8)	14 (26.4)	0.33		
Postoperative IAS	4 (3.1)	11 (20.8)	<0.001	9.31 (2.535-34.200)	0.001
Intraoperative fluid load ≥ 1.5 L	77 (58.8)	38 (71.7)	0.10		
Stoma creation	52 (39.7)	27 (50.9)	0.16		

CRP = C-Reaction Protein; SIRS = systemic inflammatory response syndrome; IAS = intra-abdominal infections.

Increased incidence of prolonged ileus after colectomy for inflammatory bowel diseases under ERAS protocol: a cohort analysis

Xujie Dai , J. Surgical Research 2017

In the setting of ERAS, colectomy for IBD is associated with increase of surgical complication

Table 3 – Postoperative complications.

Postoperative complications	IBD ($n = 184$)	CRC ($n = 250$)	P value
Overall complications, n (%)	63 (34.2)	40 (16.0)	<0.001[a]
Grade I-II, n (%)	39 (21.2)	26 (10.4)	0.002[a]
Grade III, n (%)	20 (10.9)	12 (4.8)	0.02[a]
Wound dehiscence	1 (0.5)	2 (0.8)	
Intraabdominal abscess	4 (4.3)	1 (0.4)	
Anastomotic leakage	8 (3.3)	5 (2.0)	
Pleural effusion	4 (2.2)	2 (0.8)	
Gastrointestinal bleeding	3 (1.6)	1 (0.4)	
Intraabdominal collection	7 (3.8)	1 (0.4)	
Grade IV, n (%)	4 (2.2)	2 (0.8)	0.23[b]
Renal failure	1	0	
Respiratory failure	1	1	
Septic shock	2	1	
Heart failure	2	1	
Surgical site infections (SSIs)	35 (19.0)	30 (12.0)	0.04[a]
IAS complications	15 (8.2)	8 (3.2)	0.02[a]
Reoperation, n (%)	4 (2.2)	6 (2.4)	0.89[b]

IAS = intra-abdominal infections.
[a]Data was calculated using χ^2 test and [b]Fisher's exact test.

Effect of Diagnosis on Outcomes in the Setting of Enhanced Recovery Protocols

Kristen A. Ban, M.D., M.S.[1,2] • Julia R. Berian, M.D., M.S.[2,3] • Jason B. Liu, M.D.[2,3]
Clifford Y. Ko, M.D., M.S., M.S.H.S.[2,4] • Liane S. Feldman, M.D.[5]
Julie K. M. Thacker, M.D.[6]

Table 2. Length of stay, morbidity, and readmission by diagnosis

Variables	*Neoplasm n = 4620*	*Diverticulitis n = 1730*	*IBD n = 593*	*p value*
LOS				
Median (IQR)	4 (3–6)	4 (3–6)	5 (3–7)	<0.001
Mean (SD)	5.69 (5.05)	4.99 (4.35)	5.97 (4.50)	
Prolonged LOS, n (%)	1126 (24.4)	328 (19.0)	172 (29.0)	<0.001
SSI, n (%)	326 (7.1)	116 (6.7)	59 (10.0)	0.024
DSM, n (%)	543 (11.8)	149 (8.6)	89 (15.0)	<0.001
Reoperation, n (%)	149 (3.2)	48 (2.8)	33 (5.6)	0.004
Readmission, n (%)	424 (9.2)	121 (7.0)	77 (13.0)	<0.001

Unadjusted outcomes compared with χ^2 tests or Kruskal-Wallis test (LOS).
LOS = length of stay; IQR = interquartile range; SSI = surgical site infection; DSM = death/serious morbidity.

Table 3. Recovery-specific outcomes by diagnosis

Variables	*Neoplasm*	*Diverticulitis*	*IBD*	*p value*
POD PO pain control	n = 4268	n = 1583	n = 552	
Median (IQR)	3 (2–4)	3 (2–4)	3 (2–5)	<0.001
Mean (SD)	3.40 (2.55)	3.52 (2.29)	4.20 (2.83)	
POD tolerating diet	n = 4393	n = 1651	n = 567	
Median (IQR)	3 (2–5)	3 (2–4)	3 (2–5)	<0.001
Mean (SD)	3.66 (2.96)	3.52 (2.35)	4.09 (3.09)	
POD return of bowel function	n = 4516	n = 1692	n = 584	
Median (IQR)	2 (1–3)	2 (2–3)	2 (1–4)	0.462
Mean (SD)	2.59 (1.79)	2.57 (1.52)	2.75 (2.07)	

Unadjusted outcomes compared with Kruskal-Wallis tests.
POD = postoperative day; PO = per os (by mouth); IQR = interquartile range.

Patients with IBD have higher odds of adverse outcomes, including prolonged length of stay, death/serious morbidity, and readmission, and take longer to achieve PO pain control and to tolerate a diet

Enhanced recovery after Surgery in IBD patients

Conclusioni

- Il protocollo ERAS migliora l'outcome chirurgico
- Morbilità equivalente allo standard care
- Implementazione dei protocolli
  - Educazione del paziente pre operatoria
  - Stretta collaborazione e motivazione del team
- Ottimizzare il paziente IBD
  - Correggere malnutrizione
  - Ridurre la flogosi sistemica
  - Sospendere steroidi
- Chirurgia mininvasiva