Bariatric ERAS: All hype or strong value proposition for patients and programs?

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ERAS

- A multimodal perioperative care pathway designed to achieve early recovery for patients undergoing major surgery
- Perioperative evidence-based interventions that were developed initially for elective colorectal surgery
- Objectives:
  - reduce surgical stress
  - optimize physiological function
  - enhance mobilisation
  - reduce pain
  - facilitate early oral nutrition postoperatively
- ERAS pathways have resulted in improved outcome in terms of reduced morbidity, faster recovery and reduced length of hospital stay

ERAS care protocol elements

Preoperative	Intraoperative	Postoperative
• medical optimization • nutritional supplementation • alcohol / smoking cessation • surgical counseling • limited fasting • nausea prophylaxis • antimicrobial prophylaxis	• neuraxial anesthesia / anatomical anesthetic blocks • minimally invasive incisions • avoiding hypothermia • fluid euvolemia • strict glycemic control • decreased surgical drains, including nasograstric tubes	• immediate mobilization / physical therapy • immediate PO nutrition • multimodal pain control (minimized narcotics) • nausea prophylaxis • social work with early discharge planning

T.W. Smith Jr. et al. / The American Journal of Surgery 219 (2020) 530–534

ERAS Phase Benefits

Preoperative

- **Patient Education:** Reduces anxiety, improves compliance with postoperative protocols.
- **Nutritional Optimization:** Preoperative carbohydrate loading to reduce insulin resistance.
- **Smoking and Alcohol Cessation:** Reduces complications, improves wound healing.

Intraoperative

- **Minimally Invasive Techniques:** Laparoscopic approaches reduce pain and recovery time.
- **Anesthetic Management:** Use of short-acting anesthetics, reduced opioid use to minimize postoperative nausea and sedation.
- **Fluid Management:** Goal-directed therapy to maintain optimal hydration and reduce postoperative complications.

Postoperative

- **Pain Management:** Multimodal analgesia reduces opioid use, leading to quicker mobilization and fewer side effects.
- **Early Mobilization:** Reduces the risk of thromboembolism, enhances lung function, and shortens hospital stay.
- **Early Oral Intake:** Encourages quicker return to normal gastrointestinal function, reduces hospital stay.

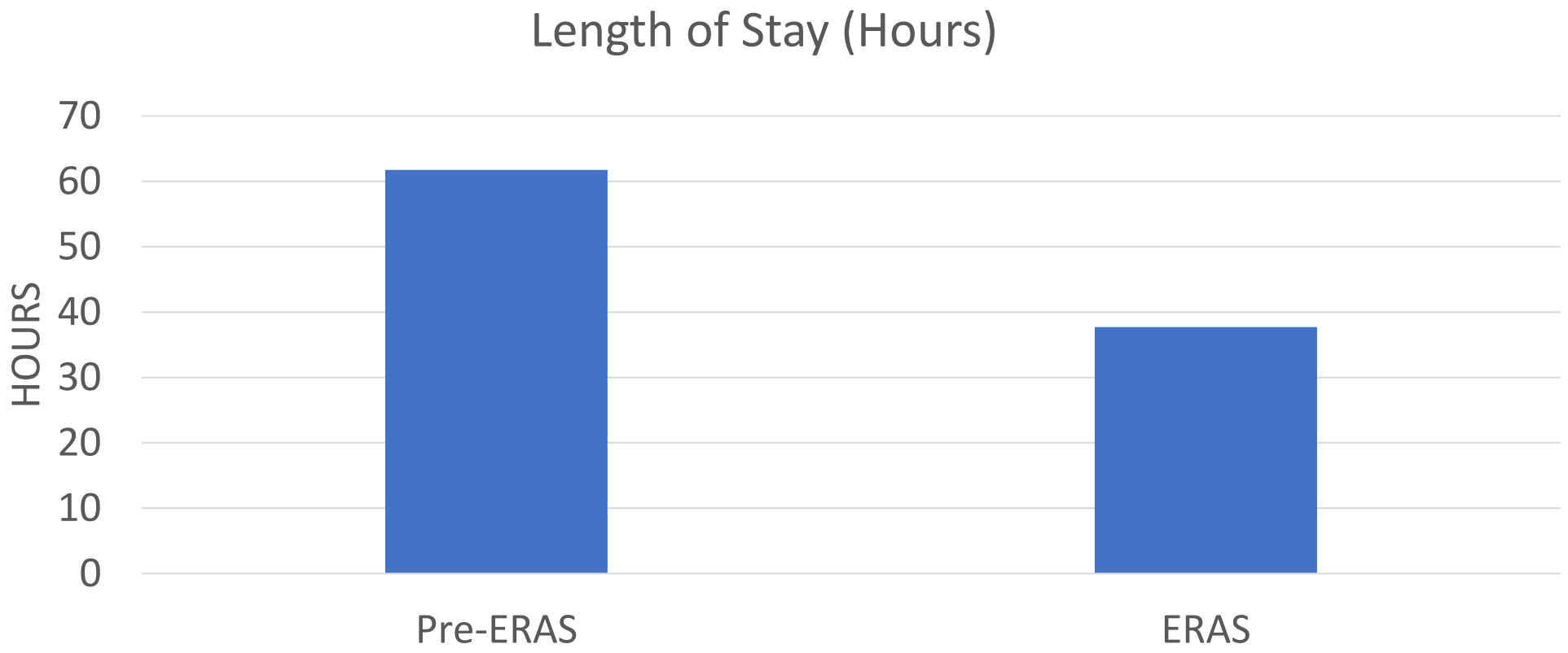
Summary of Clinical Outcomes
ERAS vs. Standard Care

N	Country	Study type	Year	LOS	Complications	Readmissions	PONV	Cost	Pain / Drug use	Early Ambulation	Mortality	OR time	Pt satisfaction
13 931	Korea	systematic review & meta-analysis	2021										
435	China	retrospective cohort study	2021	*	*	*							
740	Ireland	systematic review & meta-analysis of RCTs	2024										
10 764	China	meta-analysis.	2023	*				*					
5230	Poland	systematic review & meta-analysis	2017	*									
84	Spain	non randomized CT	2022										
574	Poland	observational study	2017										
610	Italy	systematic review & meta-analysis	2020		*		*						
865	Various	meta-analysis	2017										
2400	Italy	retrospective study	2019										
625	USA	observational study	2020										
222	Italy	Prospective observational study	2019										
464	France	retro cohort study with prospective data	2019	*									
6172	Ireland	meta-analysis	2018										
2889	Netherland	retro cohort study with prospective data	2020		*	*							
657	USA	retrospective review	2023										
366	USA	retrospective cohort study	2021										
8182	China	systematic review & meta-analysis	2021	*			*						

- * Significant improvement
- Improvement
- No increase/decrease
- Outcome not studied

COVID restrictions re inpatient admissions encouraged many to adopt outpatient approaches

Retrospective Study Examining Impact of Implementation of a Bariatric Enhanced Recovery After Surgery Protocol on Post-Operative Opioid Consumption at a High-Volume Bariatric Centre in Ontario: Ramji et al



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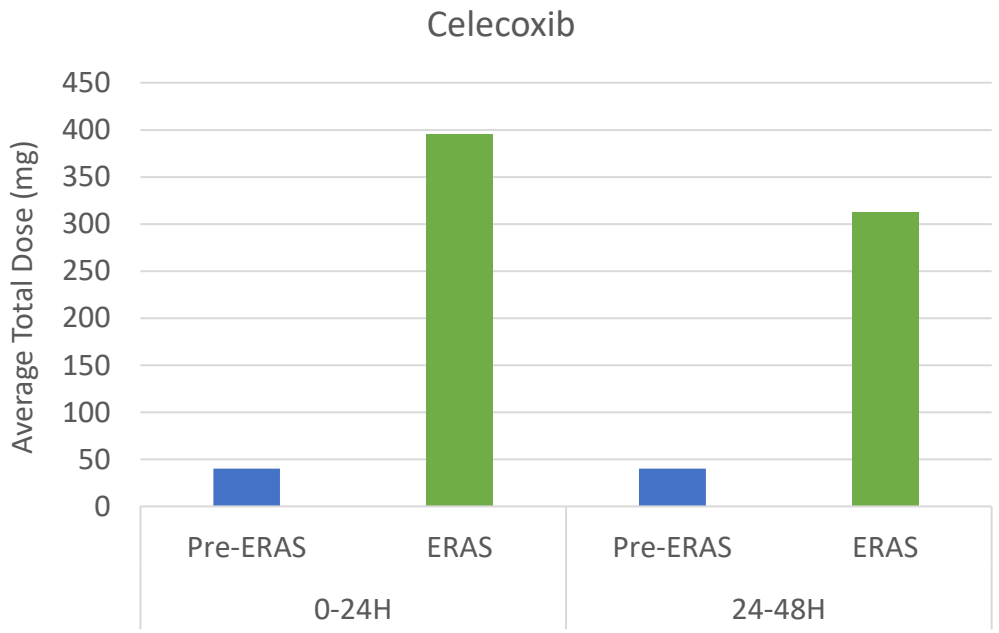

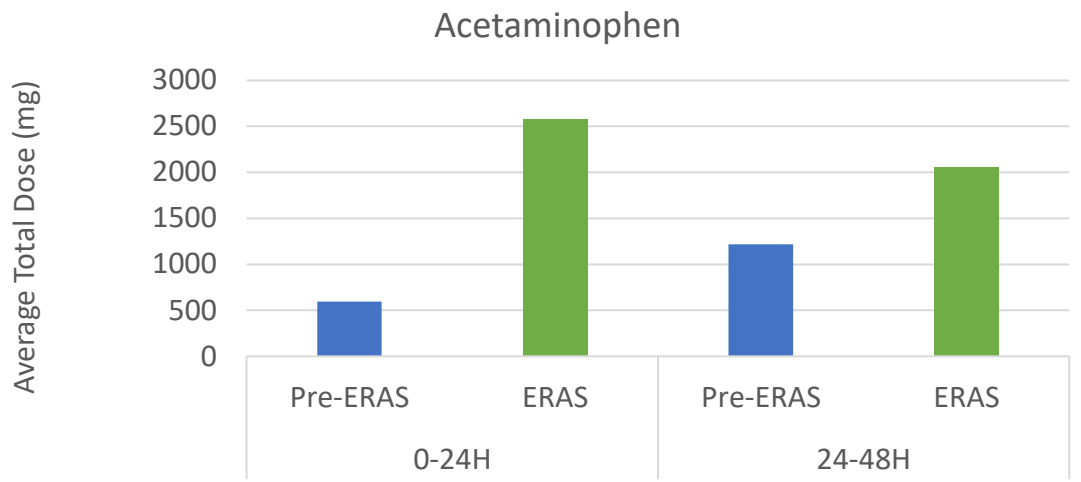

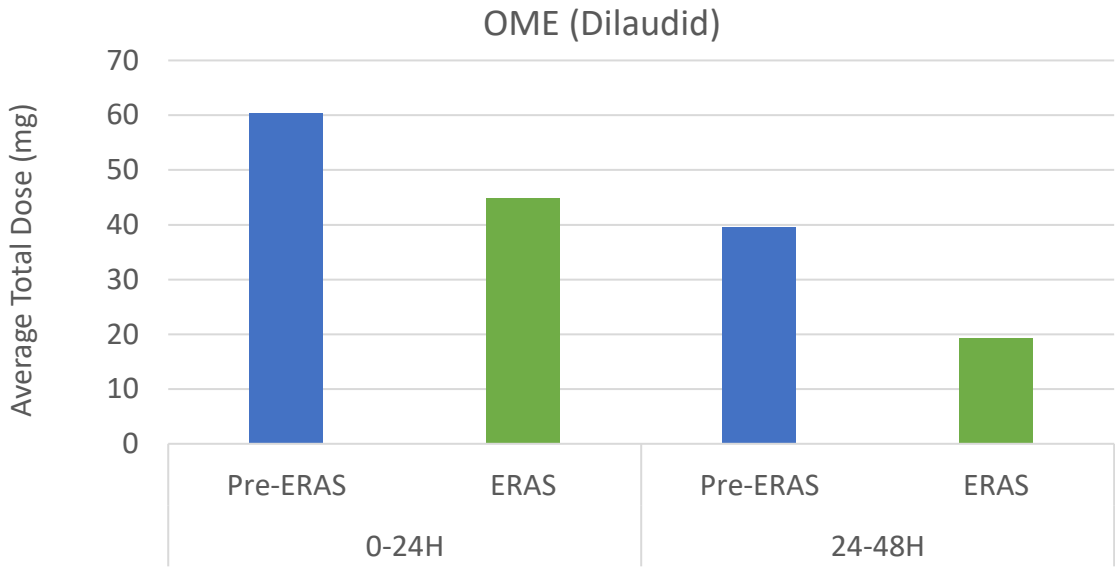

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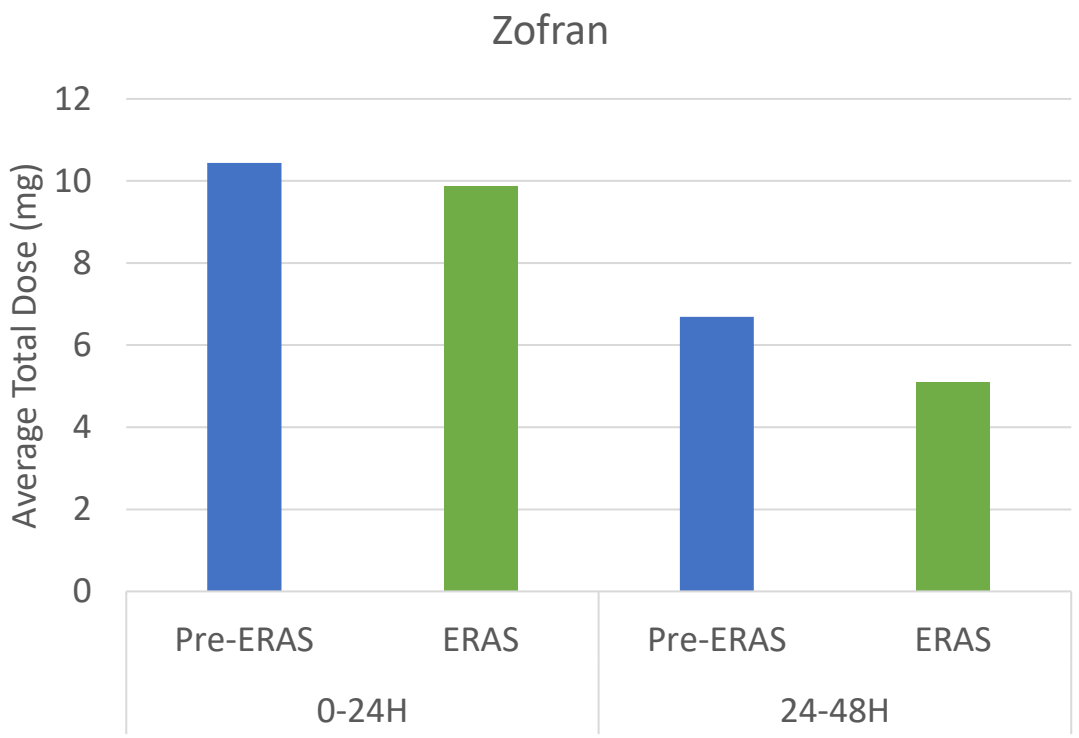
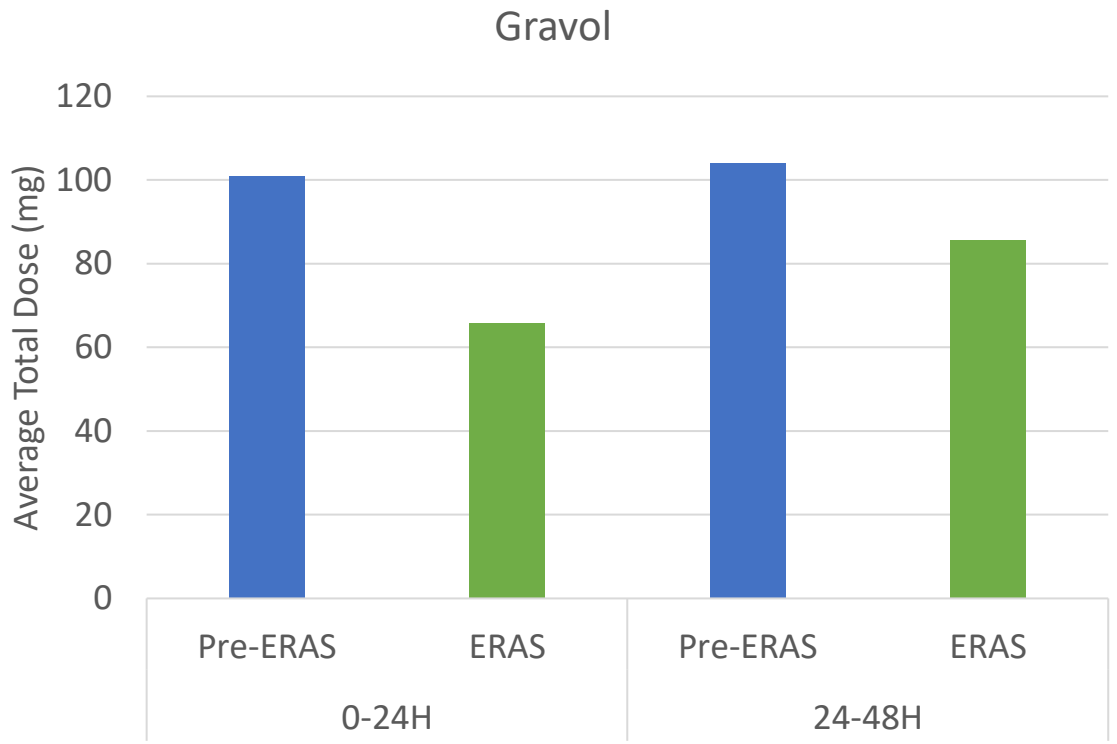




Clinical Benefit: Decreased LOS

Average decrease in hospital length of stay: 1-2 days

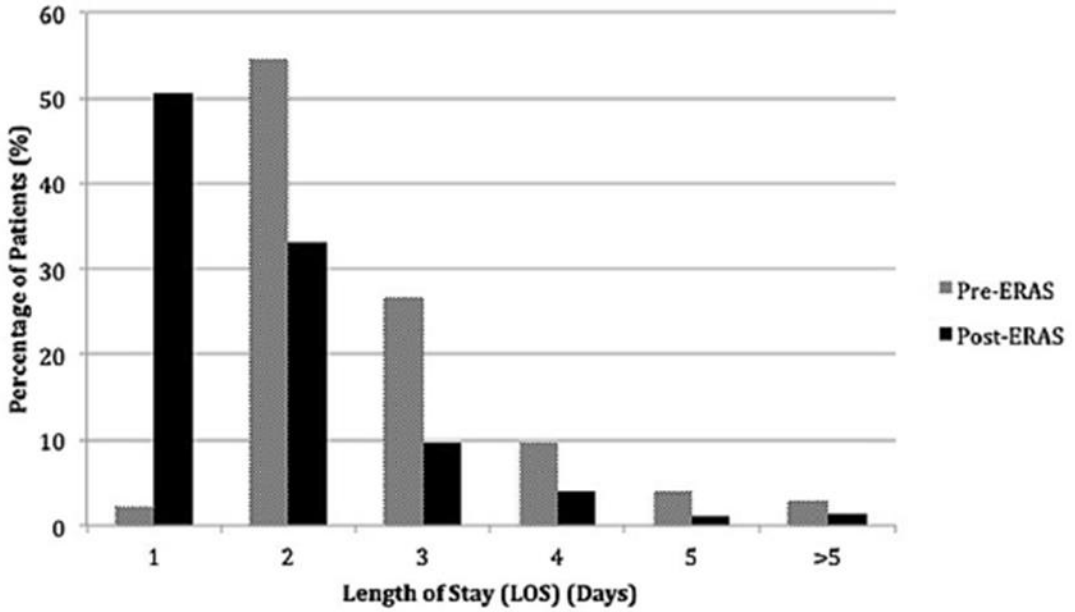
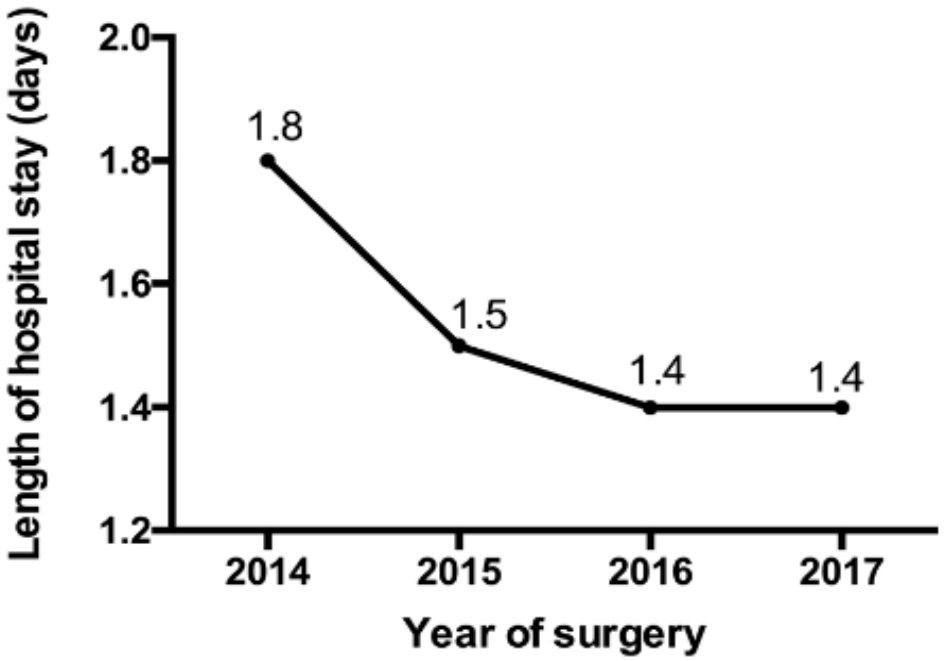
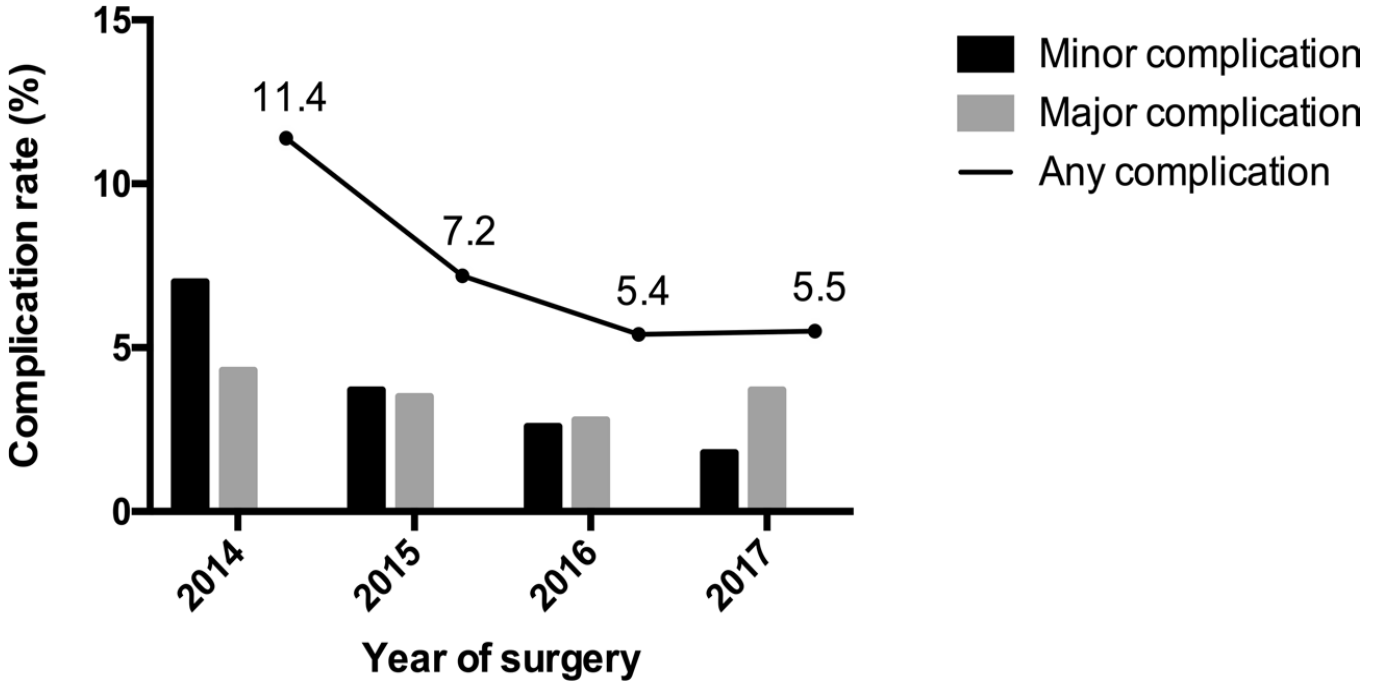


Fig. 1 Length of stay for patients following bariatric surgery, pre- and post-ERAS pathway implementation

Taylor, J., Canner, J., Cronauer, C. et al. Implementation of an enhanced recovery program for bariatric surgery. Surg Endosc 34, 2675–2681 (2020).

Clinical Benefits
Introduction of ERAS: 2014





Leeman, M., van Mil, S.R., Biter, L.U. *et al.* Reducing complication rates and hospital readmissions while revising the enhanced recovery after bariatric surgery (ERABS) protocol. *Surg Endosc* **35**, 612–619 (2021).

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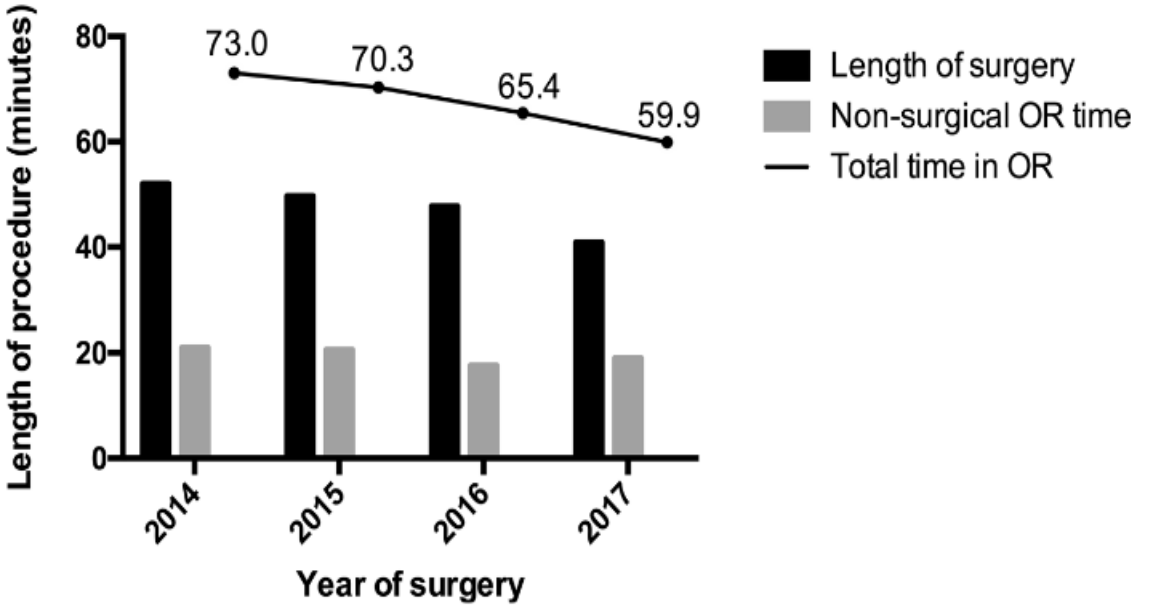

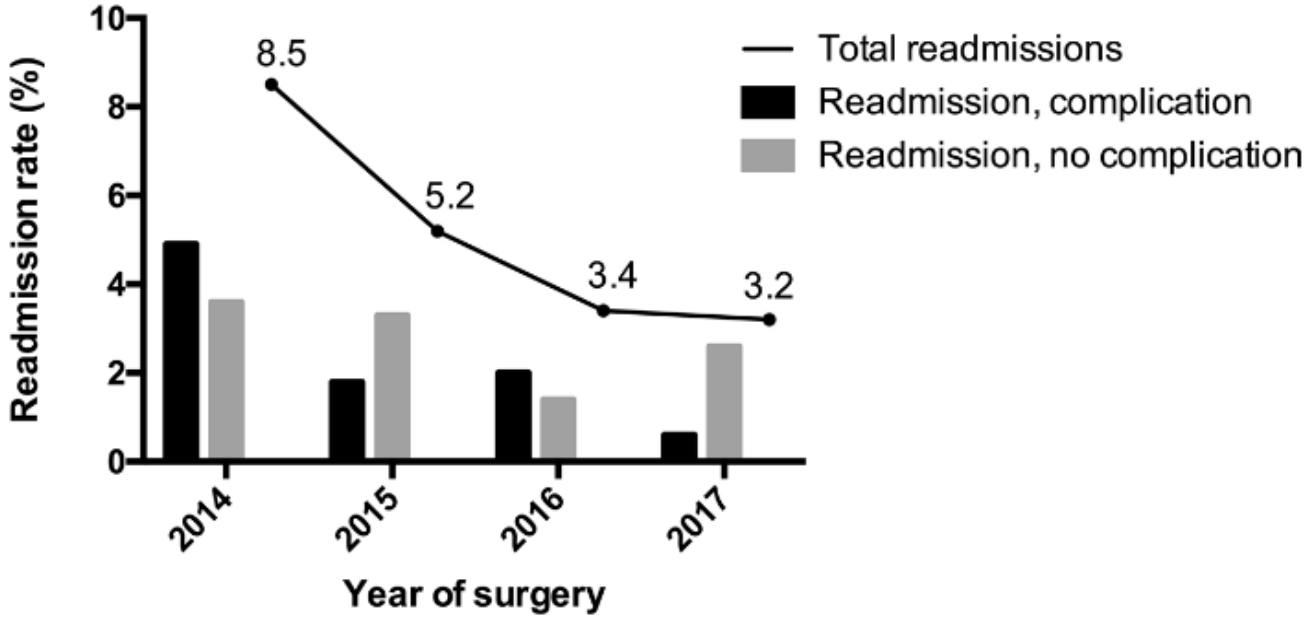

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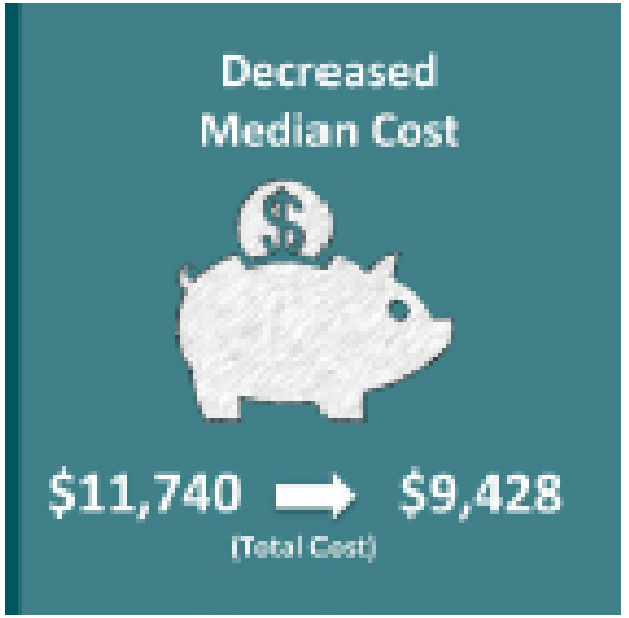
Economic Benefits

Cost Savings: Reduced length of stay and fewer complications lower overall healthcare costs.

Resource Utilization: Efficient use of hospital resources, leading to better patient throughput.



USA study:

- Decrease in LOS from 2.77 days to 1.77 days
- A reduction in median cost from $11,739.03 to $9482.18,
- Decrease in the 30-day readmission rate from 7.94% to 2.86%.
- The total costs saved were greater than $800,000 in one calendar year

Taylor, J., Canner, J., Cronauer, C. et al. Implementation of an enhanced recovery program for bariatric surgery. Surg Endosc **34**, *2675–2681 (2020).*

Economic Impact of the Implementation of an ERAS Protocol in a Bariatric Patient Undergoing a Roux-En-Y Gastric Bypass

Distribution of Costs Between Groups

	ERAS	Standard Care	*p*	Mean Cost Difference between Protocols
Pharmacologic cost$	337.6 ± 14.9	356.1 ± 16.7	<0.001	18.5
Cost of surgical material and time$	3270.69 ± 322.9	3257.67 ± 277.63	0.843	−13.02
Cost of complementary tests$	311.5 ± 39.6	423.4 ± 58.6	<0.001	111.9
Cost of bed occupancy$	1466.7 ± 1201.6	2828.3 ± 1429.2	<0.001	1361.6
Total cost of the procedure$	5406.86 ± 1334.54	6865.49 ± 1443.24	<0.001	1458.63

Higueras A, Gonzalez G, de Lourdes Bolaños M, Redondo MV, Olazabal IM, Ruiz-Tovar J. Economic Impact of the Implementation of an Enhanced Recovery after Surgery (ERAS) Protocol in a Bariatric Patient Undergoing a Roux-En-Y Gastric Bypass. Int J Environ Res Public Health. 2022 Nov 13;19(22):14946. doi: 10.3390/ijerph192214946. PMID: 36429661; PMCID: PMC9690327.

Ambulatory Bariatric Surgery: A prospective single-centre experience

Patient characteristic	SDD Cohort ($n=265$)	SDD-SG ($n=244$)	SDD-RYGB ($n=21$)
Age, y, median (IQR)	43 (15)	43 (16)	40 (9)
Sex, female, n (%)	215 (81.1)	198 (81.1)	17 (81.0)
BMI (kg/m^2), median (IQR)	44.5 (9.5)	44.5 (9.8)	42.6 (7.0)
T2D, n (%)	38 (14.3)	34 (13.9)	4 (19.0)
Insulin dependent, n (%)	2 (5.3)	2 (5.9)	0
HTN, n (%)	71 (26.8)	68 (27.9)	3 (14.3)
DLP, n (%)	56 (21.1)	51 (20.9)	5 (23.8)
OSA, n (%)	63 (23.8)	57 (23.4)	6 (28.6)
Using CPAP, n (%)	53 (84.1)	49 (86.0)	4 (66.7)
GERD, n (%)	58 (21.9)	50 (20.5)	8 (38.1)
Using PPI, n (%)	21 (36.2)	16 (32.0)	5 (62.5)
ASA			
Class II, n (%)	193 (72.8)	182 (74.6)	11 (52.4)
Class III, n (%)	48 (18.1)	42 (17.2)	6 (28.6)

SDD Same-day discharge, *SG* Sleeve gastrectomy, *RYGB* Roux-en-Y gastric bypass, *IQR* Interquartile range, *BMI* Body mass index, *T2D* Type 2 diabetes mellitus, *HTN* Hypertension, *DLP* Dyslipidemia, *OSA* Obstructive sleep apnea, *CPAP* Continuous positive airway pressure, *GERD* Gastroesophageal reflux disease, *PPI* Proton pump inhibitor, *ASA* American Society of Anesthesiologists

Ali AK, Safar A, Vourtzoumis P, Demyttenaere S, Court O, Andalib A. Ambulatory bariatric surgery: a prospective single-center experience. Surg Endosc. 2024 Jul 15. doi: 10.1007/s00464-024-11052-x. Epub ahead of print. PMID: 39009727.

Ambulatory Bariatric Surgery: a prospective single-centre experience

Post-operative outcomes - SG

	SDD-SG (n = 244)	SDA-SG (n = 567)	*P* value
LOS* (h), median (range)	6 (4–10)	24 (24–168)	< 0.001
Mortality, n (%)	0	0	N/A
VTE, n (%)	0	1 (0.2)	0.512
SSI, n (%)	0	0	N/A
Bleeding†, n (%)	1 (0.4)	7 (1.2)	0.276
Staple-line leak, n (%)	0	0	N/A
Unplanned Readmission, n (%)	4 (1.6)	14 (2.5)	0.462
Unplanned Reintervention‡, n (%)	0	4 (0.7)	0.188

LOS Length of stay, *SDD* Same-day discharge, *SG* Sleeve gastrectomy, *SDA* Same-day admission, *VTE* Venous thromboembolic event, *SSI* Surgical site infection

Ali AK, Safar A, Vourtzoumis P, Demyttenaere S, Court O, Andalib A. Ambulatory bariatric surgery: a prospective single-center experience. Surg Endosc. 2024 Jul 15. doi: 10.1007/s00464-024-11052-x. Epub ahead of print. PMID: 39009727.

Does the future of laparoscopic sleeve gastrectomy lie in the outpatient surgery center? A retrospective study of the safety of 3162 outpatient sleeve gastrectomies.

Variable	Value
Patient, n	3162
Male/female, %	48.1/51.8
Age, yr*	43.1 ± 10.8
Weight, lbs*	263.5 ± 53
BMI, kg/m^2*	42.1 ± 7.1
IBW, lbs*	140.2 ± 20.9
EBW, lbs*	110.6 ± 59.3
Co-morbidity†	
Available data, n	2057
Sleep apnea, n (%)	297 (14.4)
T2D, n (%)	279 (13.5)
GERD, n (%)	509 (24.7)
HTN, n (%)	626 (30.4)
Hyperlipidemia, n (%)	364 (17.6)

BMI = body mass index; IBW = ideal weight; EBW = excess weight; T2D = type 2 diabetes; GERD = gastroesophageal reflux disease; HTN = hypertension.

* Values expressed as mean ± standard deviation.

Early surgical outcomes

Variable	Value
Total operative time, min*†	56.4 ± 16.9
Intraoperative complication, n (%)†	1 (.03)
Conversion to open, n†	0
Transfer to hospital, n (%)†	7 (.2
30-d follow-up (%)†	85
30-d readmission, n (%)‡	17 (.6)
30-d reoperation, n (%)‡	18 (.6)
30-d ER visit, n (%)‡	4 (.1)
30-d reintervention, n (%)‡	9 (.2)
Death, n‡	0

ER = emergency room.

* Value expressed as mean ± standard deviation

† Values are calculated based on available data (3162 patients).

‡ Values are calculated based on available data (2688 patients).

Surve A, Cottam D, Zaveri H, Cottam A, Belnap L, Richards C, Medlin W, Duncan T, Tuggle K, Zorak A, Umbach T, Apel M, Billing P, Billing J, Landerholm R, Stewart K, Kaufman J, Harris E, Williams M, Hart C, Johnson W, Lee C, Lee C, DeBarros J, Orris M, Schniederjan B, Neichoy B, Dhorepatil A, Cottam S, Horsley B. Does the future of laparoscopic sleeve gastrectomy lie in the outpatient surgery center? A retrospective study of the safety of 3162 outpatient sleeve gastrectomies. Surg Obes Relat Dis. 2018 Oct;14(10):1442-1447.

Same-Day Discharge After Laparoscopic Roux-en-Y Gastric Bypass:
a Cohort of 500 Consecutive Patients:
Kleipool et al; Obes Surg (2023)

Baseline characteristics	
Age, years (mean, SD)	37 ± 11
Female (n, %)	448 (89.6)
Weight, kg (mean, SD)	118 ± 16
BMI, kg/m2 (mean, SD)	42 ± 4
ASA classification (n, %)	
2	156 (31.2)
3	344 (68.8)
AHI (median, IQR)	4 (2–8)
Associated medical problems (n, %)	
Hypertension	76 (15.2)
NIDDM	29 (5.8)
Dyslipidemia	23 (4.6
Smoking (n, %)	
No	264 (52.8)
Former	128 (25.6)
Current	58 (11.6)
OR time, minutes (mean, SD)	46 ± 11
LOS hh:mm (median, IQR)	10:33 (9:50–11:02)

Study: Same-Day Discharge After Laparoscopic Roux-en-Y Gastric Bypass: a Cohort of 500 Consecutive Patients: *Kleipool et al; Obes Surg (2023)*

Conclusion: Same-day discharge after RYGB is safe, provided that patients are carefully selected and strict discharge criteria are used. It is an effective care pathway to reduce the burden on hospital capacity.

Postoperative outcomes	
Primary outcome (n = 500)	
Same-day discharge (n, %)	465 (93.0)
Same-day discharge without readmission within 48 h (n, %)	444 (88.8)
Secondary outcomes after SDD (n = 465)	
Readmissions POD 0–30 (n, %)	41 (8.8)
POD 0–2	21 (4.5)
POD 3–30	20 (4.3)
Severe complications POD 0–30 (n, %)	6 (1.3)
POD 0–2	3 (0.6)
POD 3–30	3 (0.6)
ED visits POD 0–30 (n, %)	66 (14.2)
POD 0–2	31 (6.7)
POD 3–30	35 (7.5)
Mortality	0

Benefits of ERAS

1. Shorter LOS: many can be discharged same day
2. Reduced nausea and postoperative pain
3. Reduced Cost
4. No major increase in readmission and complications