Implementing and Sustaining Enhanced Recovery After Cesarean (ERAC) in Care

ACOG FOUNDATION

Advancing ob-gyn care for all.

Before We Get Started

This webinar will be recorded

If you need help during the call, please chat an ACOG staff member

Submit your questions throughout this session using the Q&A box

Any questions following this webinar can be sent to alliance@acog.org

ACOG FOUNDATION

Introducing…

THE ALLIANCE FOR

Clinical Excellence in Obstetrics and Gynecology

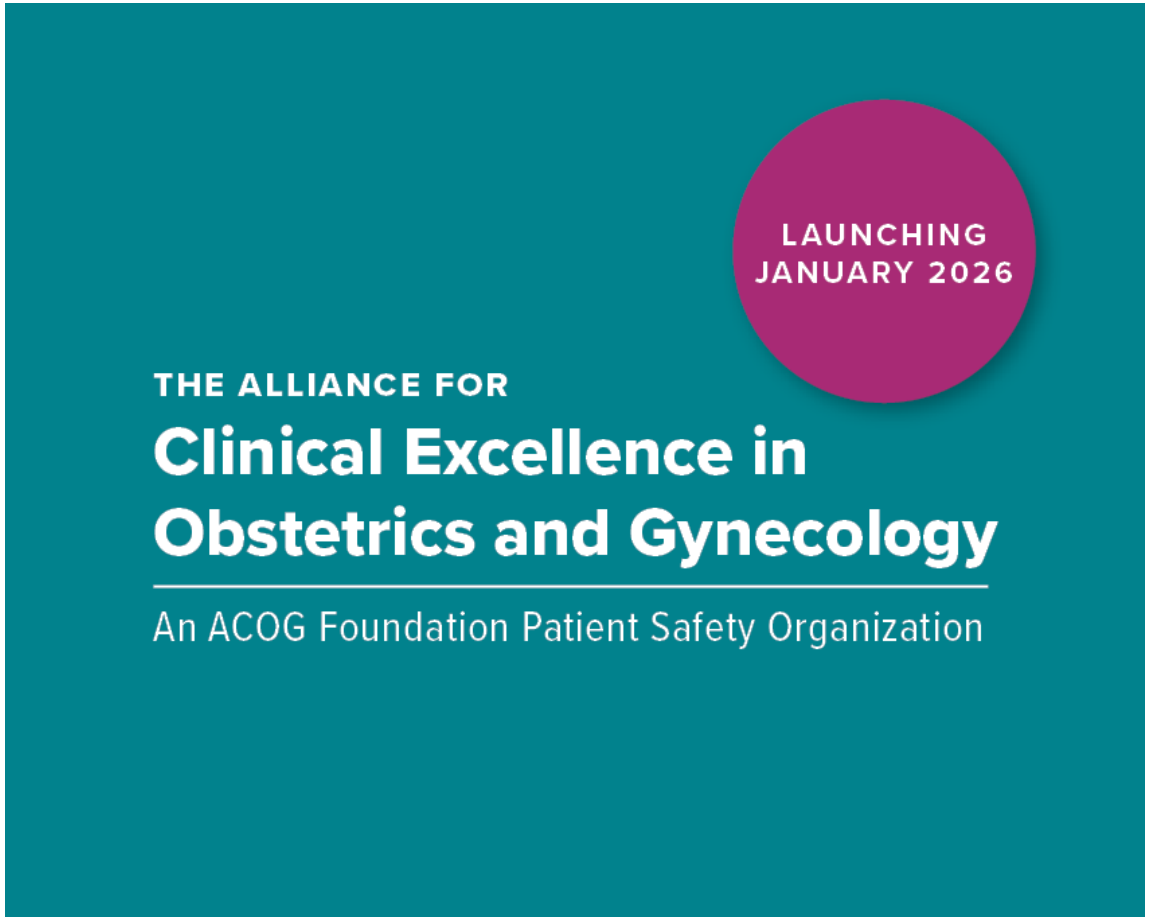
ACOG FOUNDATION

A New Partner in Quality and Patient Safety

Combining ACOG's trusted expertise with real-world support to help hospitals and health systems deliver safer, more equitable care.

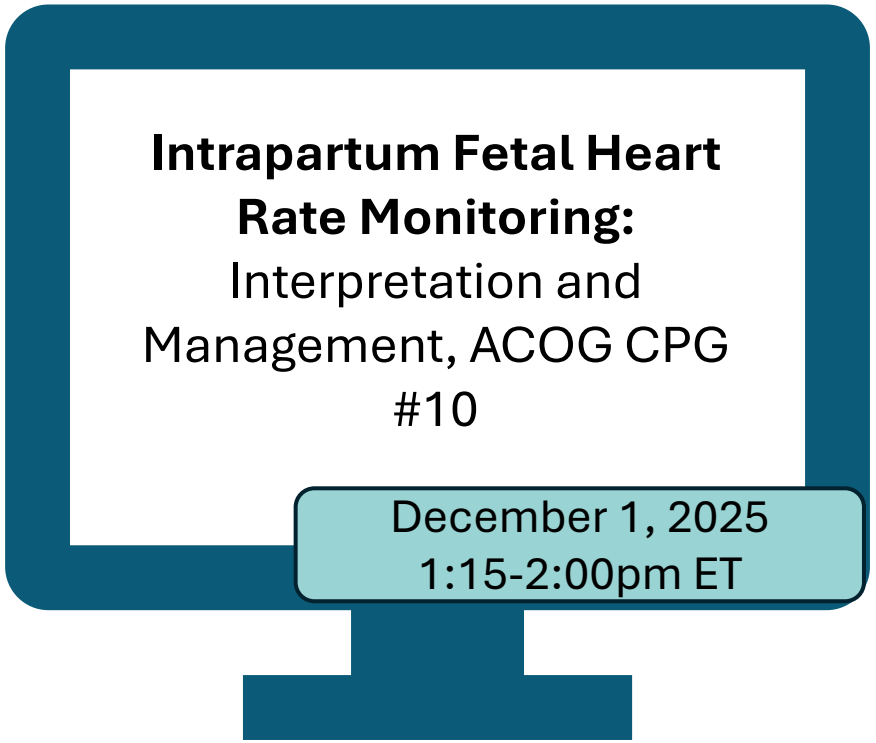
- Evidence-based quality improvement strategies
- Plan to support review of patient safety work
- Tailored support for frontline teams
- Designed for measurable impact

Let's improve ob-gyn care–together.

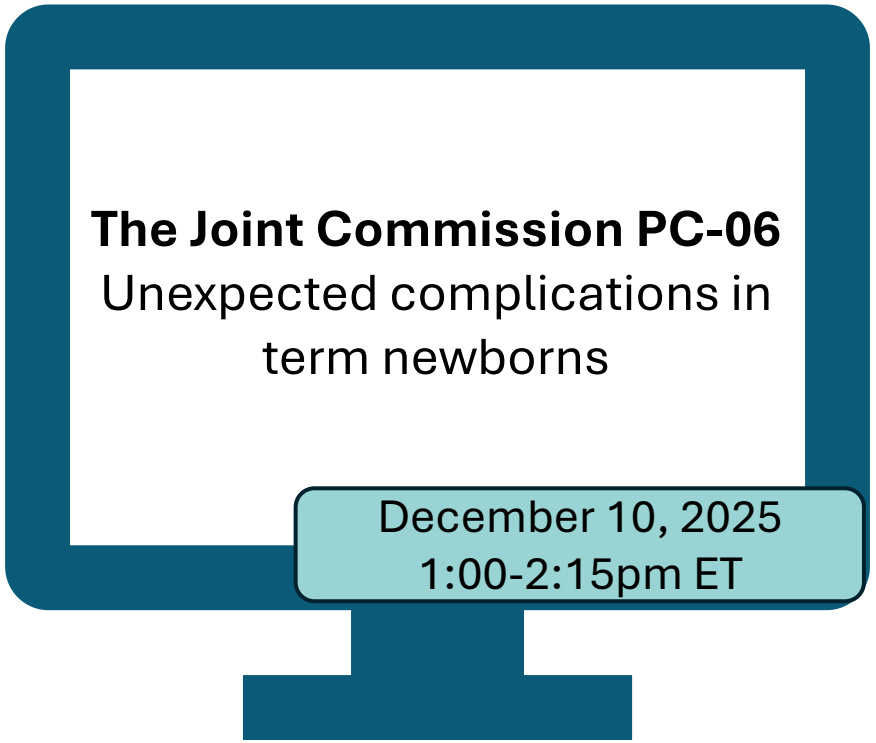


ACOG FOUNDATION

December Sessions



Conversation



Lecture

ACOG FOUNDATION

Today's Speakers

Dr. Pervez Sultan, MBChB, FRCA, MD (Res)

Dr. Gregg Nelson, MD, PhD, FRCSC

ACOG FOUNDATION

Enhanced Recovery after Cesarean Delivery

Pervez Sultan MBChB, FRCA, MD (Res)
Professor
Department of Anesthesiology, Perioperative and Pain Medicine
Stanford University School of Medicine

Disclaimer

- No relevant financial disclosures

Content

ERAS Society cesarean delivery guidelines:

2025 update

Patient-reported outcome measures

Core outcome set for ERAS for CD

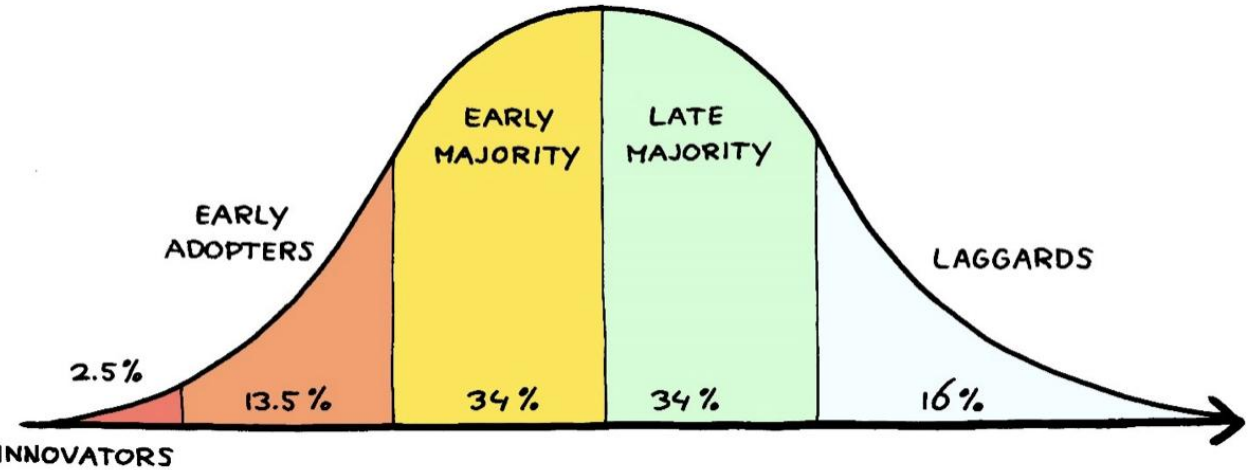
Enhanced Recovery

Individual Clinician Anesthesia and Surgical Management

↓

Standardize evidence-based Multimodal Recovery Protocol

ERAS® Society



Colorectal ERAS 1995

Lancet 1995; 345:763764

OB ERAC 2013

Int J Obstet Anesth. 2013; 22:92-5

ERAS Guidelines for Cesarean Delivery

		Obstetricians	Anesthesiologists	Nurses	Patients
ERAS® Society	ERAS Society 1, 2, 3	✓ 🇺🇸 🇨🇦	✓ 🇬🇧		
SOAP Society for Obstetric Anesthesia and Perinatology	SOAP consensus statement		✓ 🇺🇸		
Healthcare Excellence Canada	Canadian pathway	✓ (SOGC) 🇨🇦	✓ (CAS) 🇨🇦	✓ 🇨🇦	✓ 🇨🇦

SUMMARY

- Lack of US specific guidelines
- Lack of representation from diverse groups
- Lack of stakeholders from key professional societies

Am J Obstet Gynecol. 2018 Dec;219(6):523.e1-523.e15
Am J Obstet Gynecol. 2018 Dec;219(6):533-544
Am J Obstet Gynecol. 2019 Sep;221(3):247.e1-247.e9
Anesth Analg. 2021 May 1;132(5):1362-1377
Healthcare excellence Canada. 2022

Multidisciplinary ERAS Guidelines

Modified Delphi approach (n=19):

- American Society of Anesthesiologists
- ACOG – The American College of Obstetricians and Gynecologists
- AWHONN
- SOAP – Society for Obstetric Anesthesia and Perinatology
- Society for Maternal-Fetal Medicine
- AANA – American Association of Nurse Anesthesiology
- ERAS® Society
- SOGH – Society of OB/GYN Hospitalists
- Lactation consultant
- Physical therapist

Diverse group of patient representatives

ELSEVIER

AJOG

Cesarean

32 interventions:

- 6 Preoperative
- 13 Intraoperative
- 13 Postoperative

Wilson RD et al. 2025. Am J Obstet Gynecol
Caughey AB et al. 2025. Am J Obstet Gynecol
Sultan P et al. 2025. Am J Obstet Gynecol

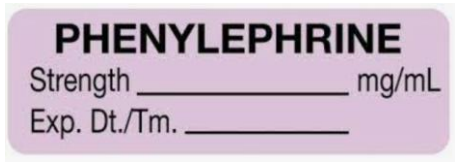
Preoperative Interventions

	Intervention	Details	Why?
Nutrition	Limit fasting interval	Solids – 6-8 h Clear fluids - 2 h	↓Hypovolemia ↓Metabolic stress ↓Ketosis
	Carbohydrate loading	Gatorade 32 oz - 2 h (apple juice 16 oz)	↓ Hypoglycemia ↓Metabolic stress
Education	Patient / staff education	Handout / videos e.g., 'what to expect'	Set expectations ✓ ↑ Compliance ↓ Anxiety and pain
	Lactation preparation	Handout / prenatal classes Resources / groups	↑ Breastfeeding success: ↑ maternal-neonatal bonding ↓ infection and ↓ SIDS
Optimization	Hb optimization Smoking cessation Exercise / BP / glucose	Screening for anemia Fe tx or Investigations	↓ Postpartum anemia ↓ Fatigue and depression ↓ Perinatal mortality

Wilson RD et al. 2025. Am J Obstet Gynecol

Intraoperative Interventions

Prevention and treatment of spinal hypotension



Warming

Anti-emetics

Ondansetron

- <u>Support person</u>
- Vaginal preparation
- Prevention of spinal induced hypotension
  - Crystalloid co-load and phenylephrine
- Maintain maternal / neonatal normothermia
- Optimized uterotonic administration
- Antibiotic prophylaxis
- Intra and postoperative N&V prophylaxis
- Multimodal analgesia initiation
- Promotion of breastfeeding and maternal-newborn bonding
- Intravenous fluid optimization – euvolemia

Uterotonics

OXYTOCIN

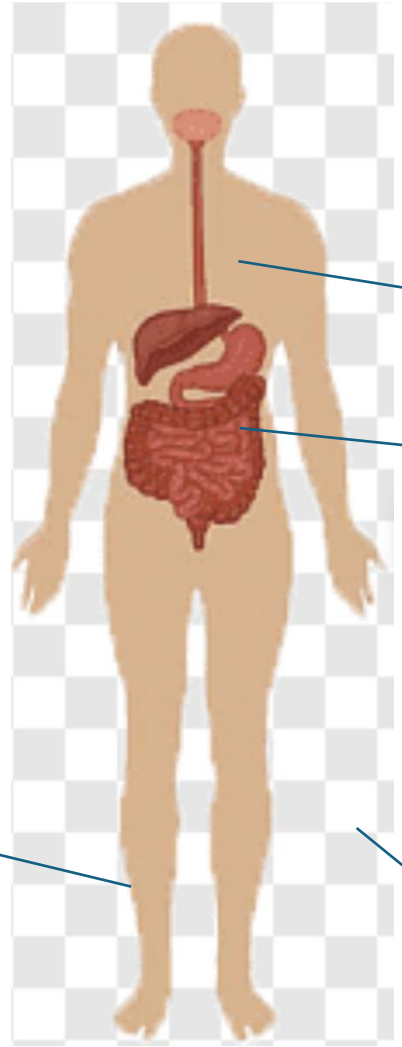
Antibiotics

Multimodal analgesia

Caughey AB et al. 2025. Am J Obstet Gynecol

Postoperative Interventions

'DREAMS'
(Drinking, Eating, Analgesia, Mobilizing and Sleeping)



Maternal satisfaction:
- Facilitate patient centric transition to discharge

Comfort:
- Discontinue IV fluids
- Early oral intake
- Multimodal analgesia
- Early catheter removal
- Promote rest

Breastfeeding support

Return of bowel function

Scheduled: acetaminophen & ibuprofen
As required: opioid e.g., oxycodone

VTE prevention:
- Early mobilization
  - 0-8 h sit on edge of bed, t/f to chair
  - 8-24 h walk 1-2 times in hall
  - 24-48 h walk ≥3 times in hall (and aim out of bed for 8 h)
- Venous thromboembolism prophylaxis

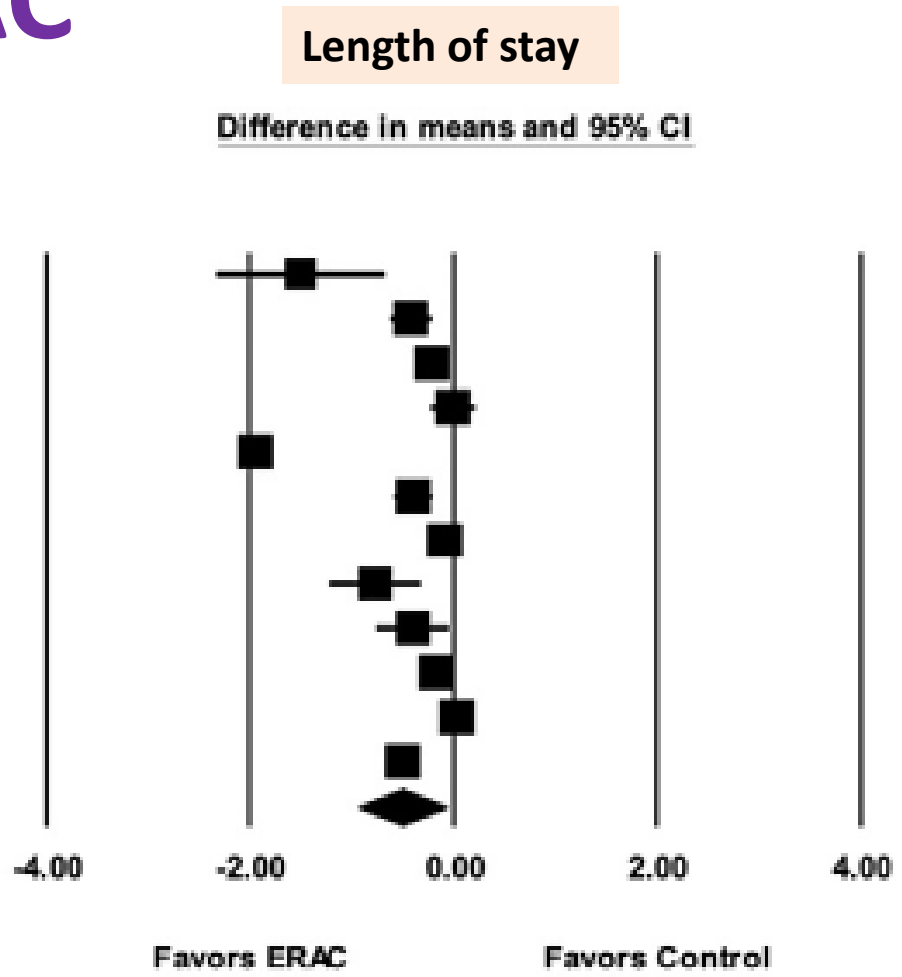
Hematology:
- Anemia remediation
- Glycemic control

Sultan P et al. 2025. Am J Obstet Gynecol

Evidence Surrounding ERAC

- **12 studies (n=17,607)**
  - **Length of hospital stay (MD -0.51 days)**
  - Time first mobilization (MD -11.05 h)
  - Time urinary catheter removal (MD -13.19 h)
  - Opioid consumption (MD -21.85 mg MMEq)
  - Cost savings: 3 studies
  - No difference in maternal readmission rates

- **Low / Very-low levels of evidence**
  - Inconsistent interventions (42) & outcomes (90)
  - Many interventions are strongly recommended given low risk of harm and high chance of benefit



ERAS implementation study is urgently needed to improve levels of evidence
Aspiration: Cluster randomization across CMQCC

Sultan et al. ACCPM 2021;40:100935
Sultan et al. Int J Obstet Anesth 2020;43:72-86

Patient-Reported Outcome Measures (PROMs)

Definition: a survey instrument which evaluates multiple domains of health

PROMs are the **gold standard** for measuring postoperative and postpartum recovery

Invaluable **Quality Improvement** tools:

Benchmarking and incentives

JAMA Netw Open. 2020 May 1;3(5):e205540
JAMA Netw Open. 2021 May 3;4(5):e2111600
Anaesthesia. 2020;75 (Suppl. 1):e143-e150
Health Services and Delivery Research. 2014;2(1):1-89

ObsQoR-10

Obstetric Quality of Recovery Score

- Adapted from QoR-40
  - Removed GA items
  - Added NA items
  - Added in obstetric / baby items
- Scored 0 – 100
  - 0=worst; 100=best recovery
- Implementation at LPCH
  - Anesthesia called if score <65
  - May need OB / lactation / nursing / psych input

		 Worst Imaginable					 Moderate				 None	
		10	9	8	7	6	5	4	3	2	1	0	
1	Pain								X				7
2	Nausea or vomiting										X		9
3	Dizziness											X	10
4	Shivering										X		9

		 No / Never					 Sometimes / with help					 Yes / Always	
5	I have been comfortable	0	1	2	3	4	5	6	X	8	9	10	7
6	I am able to mobilise independently	0	1	X	3	4	5	6	7	8	9	10	2
7	I can hold a baby without assistance	0	1	2	X	4	5	6	7	8	9	10	3
8	I can feed / nurse my baby without assistance	0	X	2	3	4	5	6	7	8	9	10	1
9	I can look after my personal hygiene / toilet	0	1	2	X	4	5	6	7	8	9	10	3
10	I feel in control	0	1	X	3	4	5	6	7	8	9	10	2
													53

Sharawi. Anaesthesia 2019;74(11):1439-1455
Ciechanowicz. Br J Anaesth 2018;122:69–78
Ciechanowicz. IJOA 2019;39:51–9
Sultan. J Clin Anesth. 2020;63:109781
Sultan. AJOG:MFM 2020;2(4):100202
Sultan. Curr Opin Obstet Gynecol. 2021;33(2):86-93

ObsQoR – UK and US validation studies

Journal Reference	Delivery type Country	N	Good vs. poor	LOS	EBL	Anti-emetic	Other measures of validity
Brit J Anaes 2019;122(1):69-78	Elective CD GB	100	✓	✓	NA	NA	Elective > Emergency cesarean
Int J Obstet Anesth 2019;39:51-59	Emergency CD GB	100	✓	✓	✗	NA	
J Clin Anes 2020;63:109781	Instrumental & SVD GB	123	NA	✓	✓	✓	SVD > Instrumental
AJOG:MFM 2020;2(4):100202	All delivery modes US	215	NA	✓	✓ (Tx)	✓	SVD > cesarean

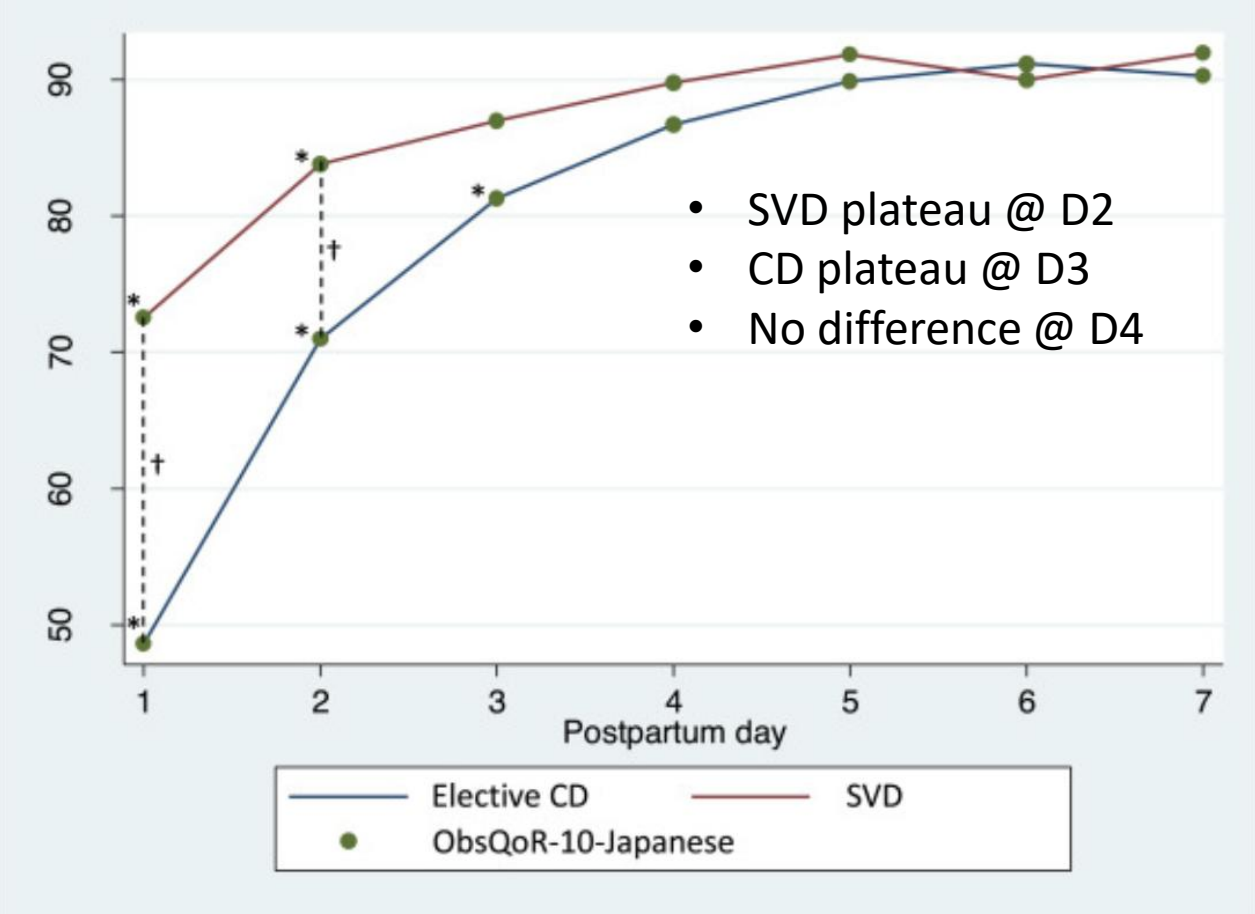
Validation of Translated Versions of ObsQoR-10

ObsQoR-10 Language	Country	Developed version?	Published / completed / Study underway?
Portuguese	BR	✓	2022. ACCPM
Turkish	TR	✓	2022. Turk J Anesth
Japanese	JP	✓	2023. AJOG Global reports
French	FR	✓	2023. BJA Open
Spanish	CO	✓	2024. BJA Open
Mandarin	SG	✓	2024. Bali J Anaesthesiology
Hebrew	IL	✓	2023. J Clin Anes
Arabic	SA	✓	2022. Saudi J Anesth
German	DE & AT	✓	2025, Int J Obstet Anesth
Filipino	PH	✓	2024. Philippine J Anesthesiol

Inpatient recovery – CD vs SVD

JP

- Observational cohort study
- N=98 (50 elective CD; 48 SVD)
- Nulliparous



	CD	SVD
First analgesia (min)*	333	596
Antiemetics (48 h)*	↑	
Opioids (48h)*	↑	
Max pain 24 h	5.3	5.2
First fluid (min)*	409	109
First food (h)*	25	3..62
Frist walk (min)*	7.9	5.1
Foley removal (h)	23.8	16.5
Discharge (day)*	6	5

Summary

- Post CD recovery largely achieved @ D3 (D2 SVD)
- Pain scores similar up to 24 h postpartum

Mazda et al. AJOG Global Reports. 2023 May 20;3(3):100226

@ObsQoR

A Multicenter Evaluation of Quality of Recovery Following Cesarean Delivery

Obstetric Anaesthetists' Association

Aims

Evaluate the quality of postpartum recovery across the UK

Predict women with prolonged length of stay

Predict women with a complicated recovery

Methods

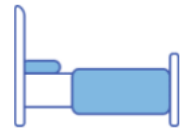
ObsQoR at day 1

EQ-5D, complications and readmission at day 30

107 centers

n=1631 postpartum women

Results



Median Length of Stay 39.3 hrs

Median ObsQoR Score
- with vs. without prolonged LOS
- 63.3 vs. 71.7; p<0.001

5.4% readmission rate

Median ObsQoR Score
- with vs. without readmission
- 66.6 vs. 71.5; p=0.047

19.7% Complicated recovery rate

Median ObsQoR Score
- with vs. without readmission/investigations
- 68.9 vs. 71.8; p=0.033

Stanford MEDICINE

ObsQoR

O'Carroll et al. Anaesthesia. 2023 Sep;78(9):1071-1080

ERAS Society guidelines for Cesarean & Core Outcome Measures to Evaluate ERAC

ERAS - recommended by professional societies (SOAP and ERAS Society)

General measures
Length of hospital stay
Pathway or bundle compliance
Maternal Outcomes
Maternal satisfaction with analgesia
Postpartum opioid use (Mg Morphine Equivalents)
Postpartum opioid use (%)
Postpartum nausea or vomiting (%)
Maternal hospital re-admission rate (%)
Maternal re-attendance rate (unplanned outpatient visit)
**Obstetric Quality of Recovery-10 score (composite score)*

Process metrics
Duration of preoperative fasting (liquids)
Time to first fluid intake postoperatively
Time to first solid food intake postoperatively
Time to first mobilization
Time to urinary catheter removal
Neonatal related outcomes
Breastfeeding by time of discharge (%)

Future steps:

- ERAS toolkit – implementation study

Wilson RD et al. AJOG 2025. Online in print
Caughey AB et al. AJOG 2025 Online in print
Sultan P et al. AJOG 2025 Online in print
Sultan et al. Anesthesiology 2022;137(2):201-211

Implementing and Sustaining Enhanced Recovery After Cesarean (ERAC) in Care

Gregg Nelson MD PhD FRCSC

Professor and Deputy Head

Department of Obstetrics & Gynecology

University of Calgary

Calgary, Alberta

ACOG FOUNDATION

Advancing ob-gyn care for all.

Disclosures

- Speaker Fee: Intuitive (2024)
- Advisory Board: Integra Life Sciences (2024)
- Chair Scientific Committee, ERAS Society (unpaid)

Objectives

- Describe the history and current state of ERAS Guidelines in Cesarean Delivery
- Discuss key steps required to start a successful ERAS Caesarean Delivery program at your institution

ERAS Society

2000's

Group of European surgeons start to question evidence behind historical practices such as "NPO after midnight"

- *Non-profit Multi-professional Multi-disciplinary Medical Society*

- **Mission statement: Enhancing Recovery After/Around Surgery**

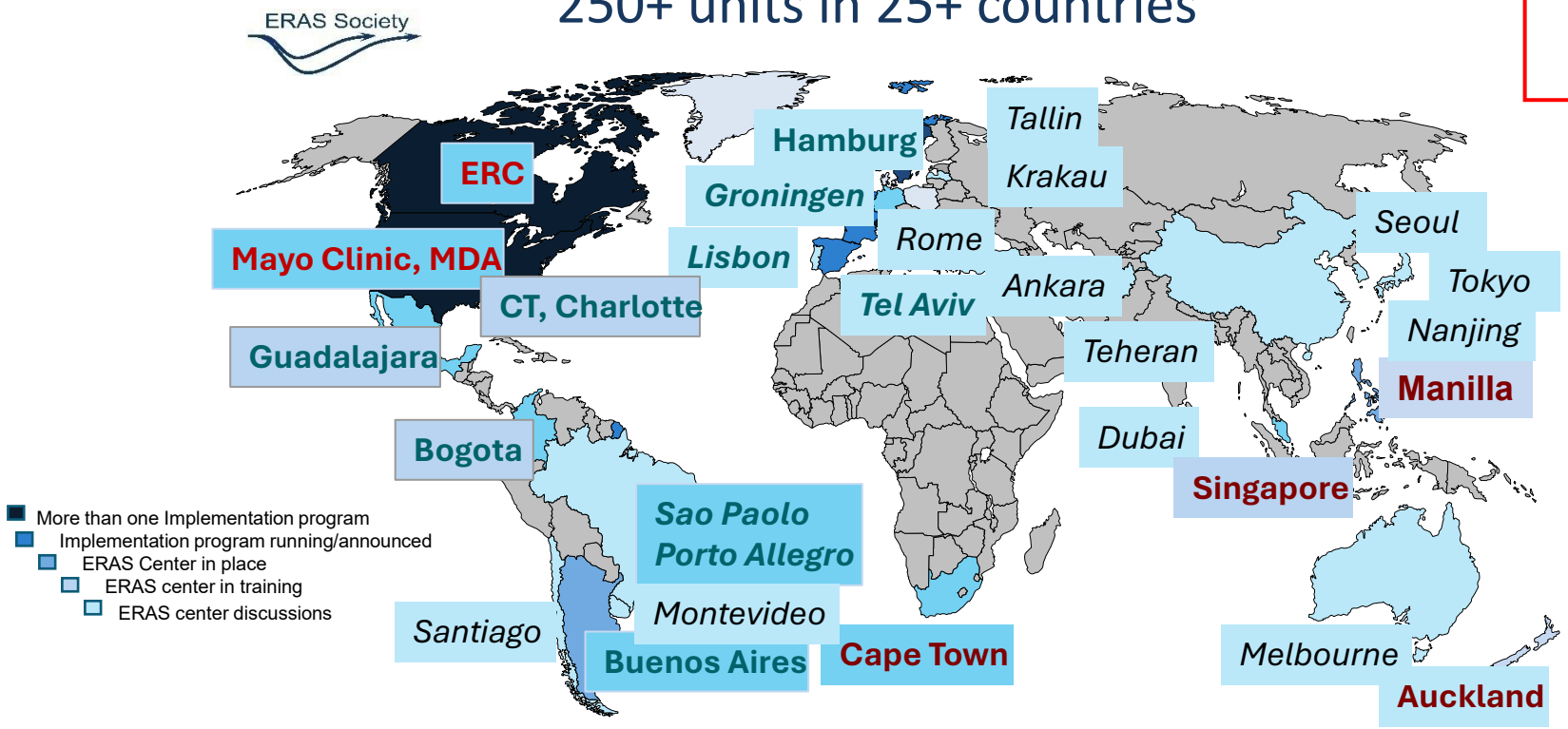
- The mission of the Society is to **develop** perioperative care and to **improve** recovery through:
  - **education,**
  - **research,**
  - **audit and**
  - **implementation of evidence-based practice**

ACOG FOUNDATION

ERAS Society growth in Nov 2025

250+ units in 25+ countries

Global Surgical Quality Improvement Initiative



World J Surg
DOI 10.1007/s00268-012-1772-0

World Journal of Surgery

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

U. O. Gustafsson · M. J. Scott · W. Schwenk · N. Demartines · D. Roulin · N. Francis · C. E. McNaught · J. MacFie · A. S. Liberman · M. Soop · A. Hill · R. H. Kennedy · D. N. Lobo · K. Fearon · O. Ljungqvist

Colorectal

erassociety.org

- Pancreas/liver
- Cardiac
- Urology
- Breast
- ENT
- Bariatric
- Gyn
- Cesarean
- Many more…

ERAS is CRAZY!!

World J Surg
DOI 10.1007/s00268-012-1772-0

World Journal of Surgery

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

U. O. Gustafsson · M. J. Scott · W. Schwenk · N. Demartines · D. Roulin · N. Francis · C. E. McNaught · J. MacFie · A. S. Liberman · M. Soop · A. Hill · R. H. Kennedy · D. N. Lobo · K. Fearon · O. Ljungqvist

Colorectal

ERAS

Postoperative

- Mid-thoracic epidural anesthesia/analgesia
- No nasogastric tubes
- Prevention of nausea and vomiting
- Avoidance of salt and water overload
- Early removal of catheter
- Early oral nutrition
- Non-opioid oral analgesia/NSAIDs
- Early mobilization
- Stimulation of gut motility
- Audit of compliance and outcomes

Preoperative

- Preadmission counseling
- Fluid and carbohydrate loading
- No prolonged fasting
- No/selective bowel preparation
- Antibiotic prophylaxis
- Thromboprophylaxis
- No premedication

Intraoperative

- Short-acting anesthetic agents
- Mid-thoracic epidural anesthesia/analgesia
- No drains
- Avoidance of salt and water overload
- Maintenance of normothermia (body warmer/warm intravenous fluids)

What am I currently doing?

ACOG FOUNDATION

JAMA Network Open

Original Investigation | Surgery

Enhanced Recovery After Surgery Guidelines and Hospital Length of Stay, Readmission, Complications, and Mortality

A Meta-Analysis of Randomized Clinical Trials

Khara M. Sauro, PhD; Christine Smith, MSc; Seremi Ibadin, MD; Abigail Thomas, MSc; Heather Ganshorn, MLIS; Linda Bakunda, BBA; Bishnu Bajgain, MSc; Steven P. Bisch, MD, MPH; Gregg Nelson, MD, PhD

JAMA Network Open. 2024;7(6):e2417310.

- Hospital length of stay decreased by 1.88 days (95% CI, 0.95-2.81days; P<.001)
- Risk of complications decreased 29% (RR, 0.71; 95% CI, 0.59-0.87; P<.001)

Figure 2. Meta-Analysis of Hospital Length of Stay

Factor	Mean difference (95% CI)
Overall	1.88 (0.95 to 2.81)
Surgery	
GI	2.88 (0.74 to 5.02)
Gynecological	0.55 (-0.25 to 1.34)
Orthopedic	3.37 (-1.21 to 7.95)
Bariatric	-0.48 (-1.48 to 0.52)
Urology	-8.33 (-14.24 to -2.40)
Pancreatic	5.48 (0.12 to 10.83)
Liver	2.54 (0.22 to 5.05)
Other	3.34 (2.73 to 3.95)
Protocol type	
ERAS	1.59 (0.54 to 2.64)
ERP	2.92 (0.02 to 5.83)
Fast-track	4.37 (0.87 to 7.88)
Other	4.67 (-2.13 to -11.46)
ERAS elements	
Low	0.44 (-3.72 to 4.60)
Moderate	2.54 (1.26 to 3.81)
High	2.04 (0.82 to 3.25)
RECOvER	
Low	2.92 (-3.72 to 9.56)
High	1.87 (0.91 to 2.83)

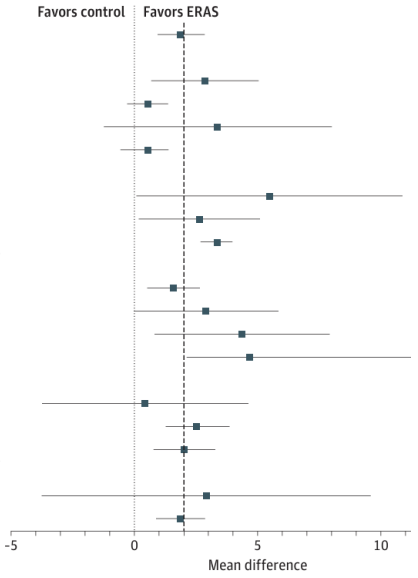
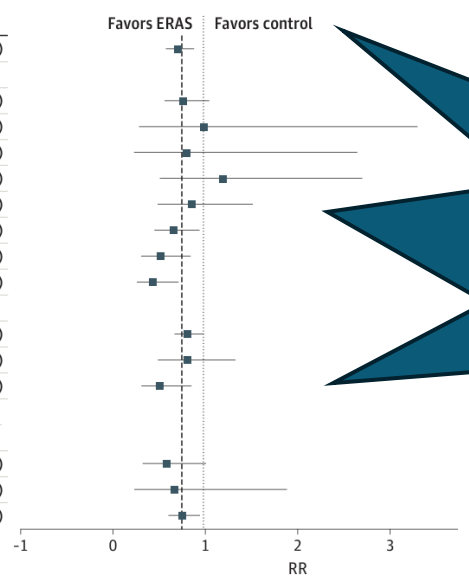


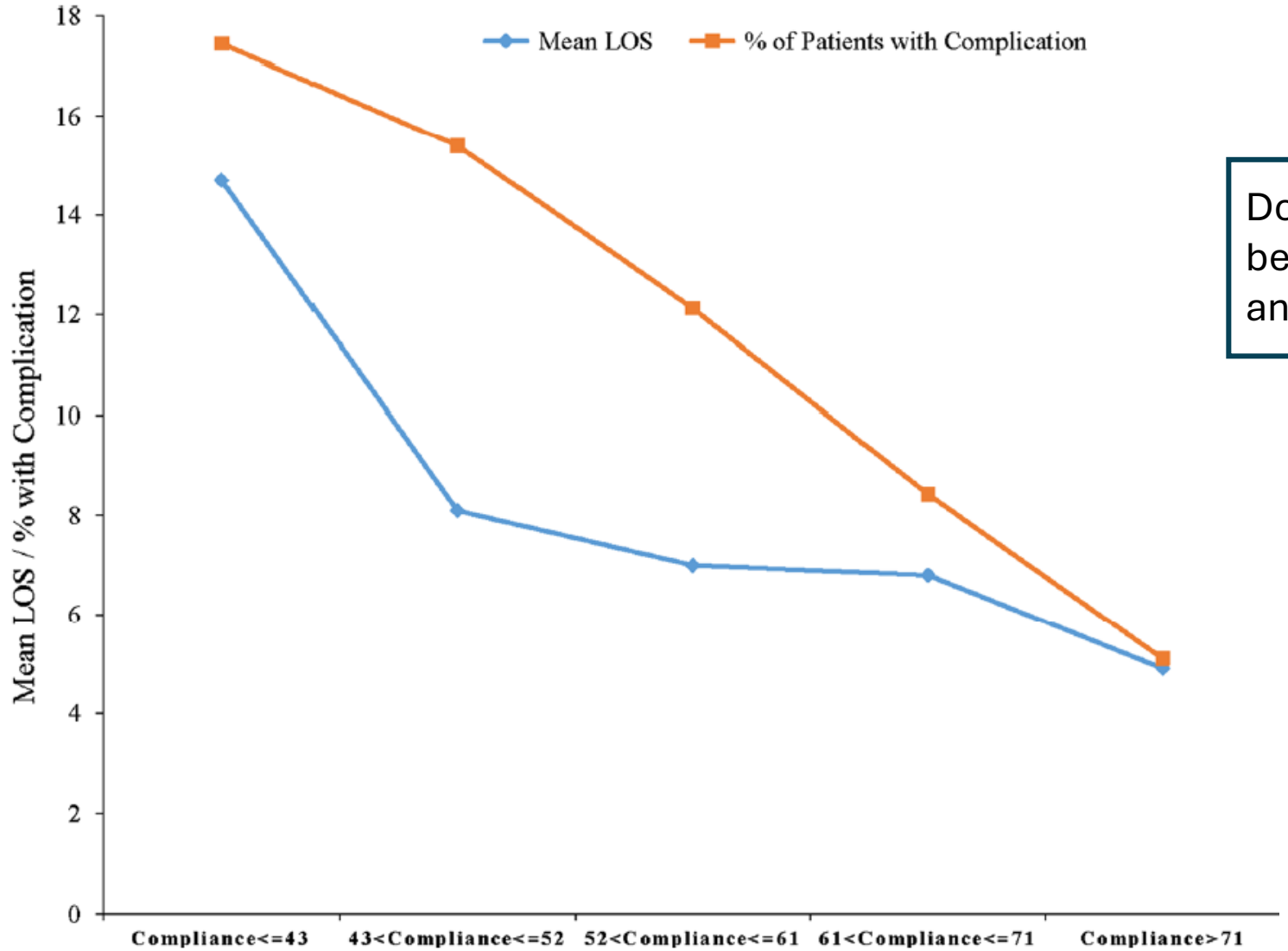
Figure 4. Meta-Analysis of Complications

Complication	RR (95% CI)
Overall	0.71 (0.58-0.87)
Surgery	
GI	0.77 (0.57-1.04)
Gynecological	1.00 (0.30-3.29)
Orthopedic	0.80 (0.24-2.64)
Bariatric	1.19 (0.52-2.69)
Urology	0.86 (0.49-1.50)
Liver	0.66 (0.46-0.93)
Cardiac	0.52 (0.32-0.84)
Other	0.44 (0.27-0.71)
Protocol type	
ERAS	0.81 (0.68-0.96)
ERP	0.81 (0.50-1.32)
Fast-track	0.52 (0.32-0.84)
Other	NA
ERAS elements	
Low	0.58 (0.33-1.00)
Moderate	0.67 (0.24-1.88)
High	0.76 (0.62-0.94)



12000 refs identified
1493 full texts screened
495 studies included
74 RCTs, 21 countries

ACOG FOUNDATION



Dose response relationship between ERAS compliance and outcomes

key concept

Nelson WJS 2016

ACOG FOUNDATION

ERAS® Cesarean Delivery Guidelines

Guidelines for antenatal and preoperative care in cesarean delivery: Enhanced Recovery After Surgery Society recommendations (part 1)–2025 update

Guidelines for intraoperative care in cesarean delivery: Enhanced Recovery After Surgery Society recommendations (part 2)–2025 update

Guidelines for postoperative care in cesarean delivery: Enhanced Recovery After Surgery Society recommendations (part 3)–2025 update

Pervez Sultan [1], David T Monks [2], Nadir Sharawi [3], James Bamber [4], Danielle M Panelli [5], Khara M Sauro [6], Prakeshkumar S Shah [7], Giulia M Muraca [8], Amy Metcalfe [9], Stephen L Wood [10], Caitlin A Jago [10], Sean Daly [11], Lindsay E A Blake [12], George A Macones [13], Aaron B Caughey [14], R Douglas Wilson [10], Gregg Nelson [15]

Preoperative

Antenatal pathway: OPTIMIZED			
Preadmission information, education and counselling (optimized element)	clinical practice efore, during, and be adapted to whether or is a scheduled surgery.	Ver	
	2. Cesarean delivery without medical indication should not be recommended without a solid preadmission evaluation of harms and benefits, both for th	Very Low-Low	
Preoperative pathway: FOCUSED			
Preanesthetic medications (focused elements)	1. Antacids administere pneumonitis.	w	Strong
	2. Preoperative sedation shou cesarean delivery because of the potential for detrimental effects on the mother and neonate.	Low	Stro
Preoperative bowel preparation (focused element)	1. Oral or mechanical bowel preparation should not be used before cesarean delivery.	High	Strong
Preoperative fasting (focused element)	1. Women should be enco juice, coffee, or tea wit 2. A light meal may be		trong g
Preoperative carbohydrate supplementation (focused element)	1. Oral carbohydrate fluid delivery, may be offered to nond		Weak
Appendix: Preoperative maternal comorbidity optimization (optimized elements)	1. Maternal obesity (body mass index, >40 kg/m^2) significantly increases risks of maternal and fetal complications. Optimal gestational weight gain management should be used to control their weight during pregnancy. Surgical complexity requires multidisciplinary plannin	High	Strong
	2. Maternal hypertension should be ma maternal chronic hypertension has the incidence of maternal and fetal		
	3. Maternal gestational diabetes mellitus increase the risk for maternal and fetal morbidity. should receive timely and effective management during preconception and pregnancy.		
	4. Maternal anemia during pregnancy is associated with low birthweight, preterm birth, and increases perioperative morbidity and mortality The cause of the anemia should be identified and corrected	Moderate	Strong
	5. Maternal cigarette smoking is associated with advers reproductive morbidity and should be stopped before or i pregnancy.		

Intraoperative

athway focused: obial prophylaxis and d elements)	1. Intravenous antibiotics should be administered routinely within 60 min before the cesarean delivery skin incision. In all women, a first-generation cephalosporin is recommended; in women in labor or with ruptured membranes, the addition of azithromycin confers additional reduction in postoperative infections.	High	Strong
	2. Chlorhexidine-alcohol is preferred to aqueous povidone-iodine solution for abdominal skin cleansing before cesarean delivery.	Low	Strong
	3. Vaginal preparation with povidine-iodine solution should be considered for the reduction of postcesarean infections.	Moderate	Weak
	. Regional anesthesia is the preferred method of anesthesia for cesarean delivery as part of an enhanced recovery protocol.	Low	Strong
Prevention of intraoperative hypothermia (focused element)	1. Appropriate patient monitoring is needed to apply warming devices and avoid hypothermia.	Low	Strong
	2. Forced air warming, intravenous fluid warming, easing operating room temperature are all revent hypothermia during	High	Strong
	nsverse uterine hysterotomy ery is recommended to reduce	Moderate	Weak
	closure of the hysterotomy in 2 layers may be associated with a lower rate of uterine rupture.	Low	Weak
	3. The peritoneum does not need to be closed because closure is not associated with improved outcomes and	Low	Weak
	eous tissue, ld be performed.	Moderate	Weak
	h subcuticular dence of reduced men whose staples were days postoperatively.	Moderate	Weak
fluid management (focused	1. Perioperative and intraoperative euvolemia are important factors in patient perioperative care and appear to lead to improved maternal and neonatal outcomes after cesarean delivery.	Low-moderate	Strong

No bowel prep

Carb load

6 and 2 rule

No sedatives

DVT and Anbx prophylaxis

Multimodal PONV prevention

No NG tubes

Keep patient warm

Judicious intraop fluids

Postoperative

Postoperative pathway			
Chewing gum after cesarean section (focused element)	Gum chewing appears to be effective and is low risk. It may be a redundant treatment if a policy for early oral intake is being used. However, it should be considered if delayed oral intake is planned.	Low	Weak
Nausea and vomiting	(1) Fluid preloading, the intravenous administration of	Moderate (multiple	Strong
	thromboembolism prophylaxis in patients after cesarean delivery.		
Early post—cesarean delivery mobilization (focused element)	Early mobilization after cesarean delivery is recommended.	Very low	Weak
Post—cesarean delivery urinary drainage (focused element)	Urinary catheter should be removed immediately after cesarean delivery, if placed during surgery.	Low	Strong
Postoperative/ postpartum mother pathway			
Discharge counselling (focused element)	Standardized written discharge instructions should be used to facilitate discharge counselling.	Low	Weak

Bottom Line:

How does your current practice compare?

Can you make changes that will improve outcomes?

ACOG FOUNDATION

Key steps to successful ERAS implementation

ACOG FOUNDATION

#1

How to create an ERAS Protocol

“We read the Guidelines, what do we do now??”

ACOG FOUNDATION

NEJM Evidence

Published February 25, 2025
NEJM Evid 2025;4(3)
DOI: 10.1056/EVIDra2400012

REVIEW ARTICLE

Enhanced Recovery after Surgery — Evidence and Practice

Kevin M. Elias, M.D.,[1] Mary E. Brindle, M.D., M.P.H.,[2,3] and Gregg Nelson, M.D., Ph.D.[2,4]

ACOG FOUNDATION

Table 2. Example Order Set for an Enhanced Recovery after Surgery Protocol.*

Surgical Phase	Example
Preoperative	
Bowel preparation	• No mechanical bowel preparation • If using an oral antibiotic preparation: neomycin 1 g orally + metronidazole 500 mg orally at 1:00 p.m., 2:00 p.m., and 10:00 p.m. day prior to surgery
Modern fasting guidelines	• Light snack (dry toast and fruit) allowed up to 6 hours prior to the procedure • May ingest clear fluids up to 2 hours before procedure
Carbohydrate loading	• Complex carbohydrate (e.g., maltodextrin) drink 2 hours prior to surgery
Preoperative medications	• Acetaminophen 1000 mg orally, once • Celecoxib or ibuprofen 400 mg orally, once • Aprepitant 40 mg orally
VTE prophylaxis	• Heparin 5000 IU subcutaneously, given preoperatively or after induction • Sequential compression devices placed prior to induction of anesthesia
Antimicrobial prophylaxis	• Bathe or shower with soap the night before surgery • Chlorhexidine alcohol for skin cleansing • Cefazolin 2 g intravenously before incision (3 g for weight >120 kg) • If bowel resection anticipated: cefazolin 2 g intravenously before incision + metronidazole 500 mg intravenously
Intraoperative	
Nausea and vomiting prophylaxis (antiemetics to choose from)	• Dexamethasone 4 mg intravenously after induction • Amisulpride 5 mg intravenously after induction • Droperidol 0.625 to 1.25 mg intravenously, end of surgery • Ondansetron 4 mg intravenously, end of surgery • Promethazine 6.25 to 12.5 mg intravenously, end of surgery
Anesthesia	• Short-acting anesthetic agents (e.g., sevoflurane or propofol) should be used Opioid-sparing multimodal analgesia techniques (options): • Bupivacaine with epinephrine at incision site • Liposomal bupivacaine 266 mg (20 ml) diluted to at least 180 ml of sterile saline injected at incision site • Transversus abdominis plane block or rectus sheath block using bupivacaine with epinephrine
Best surgical practices	• Avoidance of peritoneal drains and nasogastric tubes
Maintenance of normothermia	• Use of active warming device and warmed fluids
Fluid therapy	• Use of lactated ringers as opposed to normal saline • Aim for euvolemia (very restrictive or liberal fluid regimes to be avoided) • Use of goal-directed fluid therapy where available and in high-risk cases
Postoperative	
Diet	• Solid diet started postoperative day (POD) 0 • Chewing gum after meals three times per day starting on POD 0 • Oral nutritional supplement on POD 0 and continue until discharge
Analgesia	• Acetaminophen 1000 mg orally every 6 hours (should not exceed 4000 mg/24 h from all sources) (start POD 0) • Ketorolac 15 mg or ibuprofen 400–600 mg orally every 6 hours (start POD 0) If scheduled acetaminophen/ibuprofen ineffective (or if contraindications): • Oxycodone 5–10 mg orally every 4 hours as needed • Tramadol 100 mg orally every 4 to 6 hours as needed • Opioid, intravenously (e.g., hydromorphone 0.5 mg intravenously every 30 minutes as needed) only if orally opioid medications ineffective within 30 minutes • Patient controlled analgesia started only if patient requires two doses or more of intravenous opioids in a 24-hour period
Nausea and vomiting prophylaxis	• Ondansetron 4 mg orally every 6 hours as needed for nausea • Prochlorperazine 10 mg intravenously every 6 hours for breakthrough nausea after 30 minutes Ondansetron
Fluid therapy	• Fluids at 1 ml/kg/hour postoperatively (typical duration 6 to 8 hours) • Fluid bolus of 250 to 500 ml for urine output <0.25 ml/kg/hour • Peripheral lock IV when patient has 600 ml oral intake
Urinary catheter removal	• Remove urinary catheters on the day of surgery for MIS, and no later than POD 1 for laparotomy, unless contraindications exist
VTE prophylaxis	• Low-molecular-weight heparin (e.g., dalteparin 5000 IU subcutaneously daily or equivalent) starting POD 1 • Extended prophylaxis for 28 days for all patients undergoing laparotomy for cancer using either direct oral anticoagulant or low-molecular-weight heparin • Sequential compression devices while in bed in hospital

#2

Formation of the ERAS Clinical Team

People who will be doing the work:

OBGYN
Anesthesiologist
Nurse
Dietitian
Pharmacist
Physiotherapist
Manager

<u>Choose people who are passionate about quality improvement</u>

ACOG FOUNDATION

#3

ERAS Protocol

ERAS Team

We do ERAS!!

Checklist for ERAS program:

ERAS protocol ✓

ERAS team ✓

Audit system ?

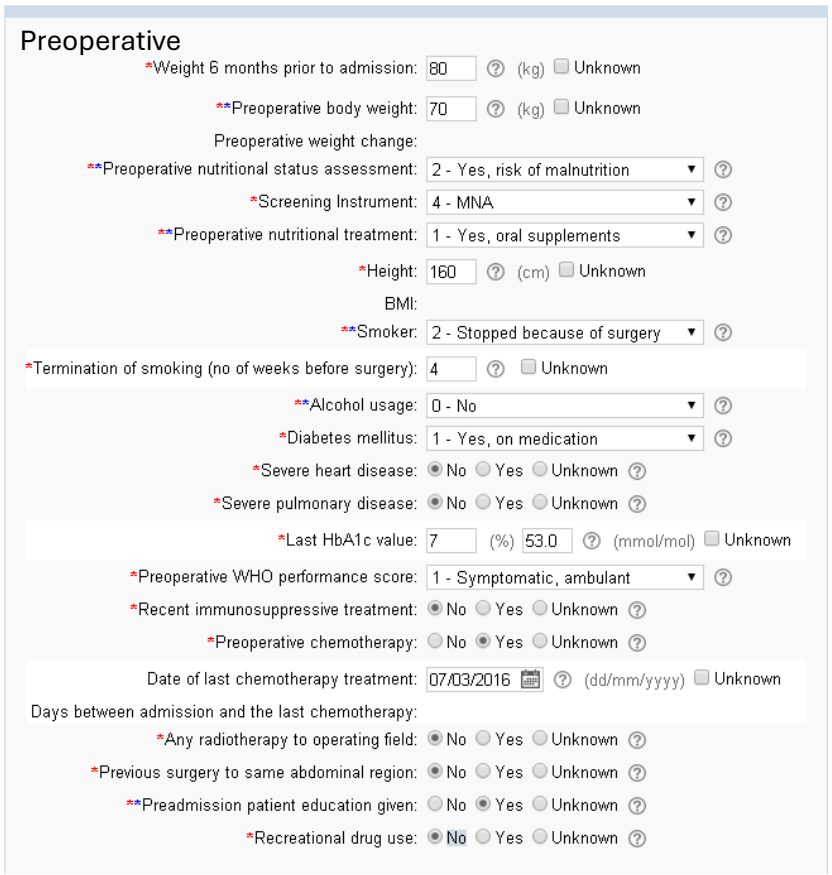
Do you audit your program?

ACOG FOUNDATION

We think we know…
But Audit is the only way to get control
(*"we don't know what we don't measure"*)

ACOG FOUNDATION

How to audit?



Preoperative

*Weight 6 months prior to admission: 80 (kg) Unknown

**Preoperative body weight: 70 (kg) Unknown

Preoperative weight change:

**Preoperative nutritional status assessment: 2 - Yes, risk of malnutrition

*Screening Instrument: 4 - MNA

**Preoperative nutritional treatment: 1 - Yes, oral supplements

*Height: 160 (cm) Unknown

BMI:

**Smoker: 2 - Stopped because of surgery

*Termination of smoking (no of weeks before surgery): 4 Unknown

**Alcohol usage: 0 - No

*Diabetes mellitus: 1 - Yes, on medication

*Severe heart disease: No Yes Unknown

*Severe pulmonary disease: No Yes Unknown

*Last HbA1c value: 7 (%) 53.0 (mmol/mol) Unknown

*Preoperative WHO performance score: 1 - Symptomatic, ambulant

*Recent immunosuppressive treatment: No Yes Unknown

*Preoperative chemotherapy: No Yes Unknown

Date of last chemotherapy treatment: 07/03/2016 (dd/mm/yyyy) Unknown

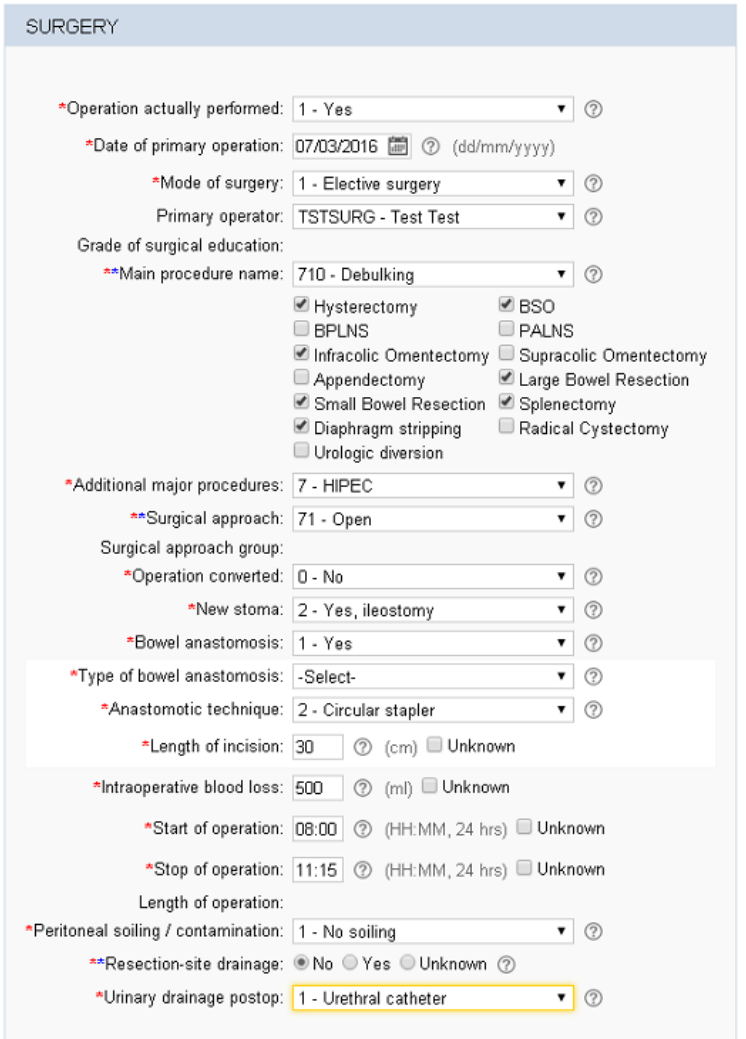
Days between admission and the last chemotherapy:

*Any radiotherapy to operating field: No Yes Unknown

*Previous surgery to same abdominal region: No Yes Unknown

**Preadmission patient education given: No Yes Unknown

*Recreational drug use: No Yes Unknown



SURGERY

*Operation actually performed: 1 - Yes

*Date of primary operation: 07/03/2016 (dd/mm/yyyy)

*Mode of surgery: 1 - Elective surgery

Primary operator: TSTSURG - Test Test

Grade of surgical education:

**Main procedure name: 710 - Debulking

Hysterectomy BSO
BPLNS PALNS
Infracolic Omentectomy Supracolic Omentectomy
Appendectomy Large Bowel Resection
Small Bowel Resection Splenectomy
Diaphragm stripping Radical Cystectomy
Urologic diversion

*Additional major procedures: 7 - HIPEC

**Surgical approach: 71 - Open

Surgical approach group:

*Operation converted: 0 - No

*New stoma: 2 - Yes, ileostomy

*Bowel anastomosis: 1 - Yes

*Type of bowel anastomosis: -Select-

*Anastomotic technique: 2 - Circular stapler

*Length of incision: 30 (cm) Unknown

*Intraoperative blood loss: 500 (ml) Unknown

*Start of operation: 08:00 (HH:MM, 24 hrs) Unknown

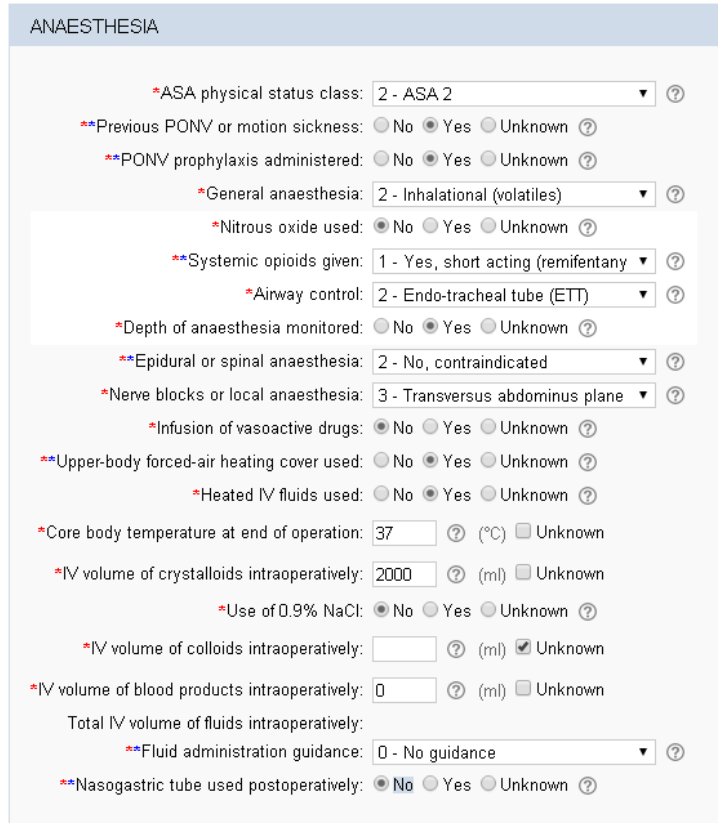
*Stop of operation: 11:15 (HH:MM, 24 hrs) Unknown

Length of operation:

*Peritoneal soiling / contamination: 1 - No soiling

**Resection-site drainage: No Yes Unknown

*Urinary drainage postop: 1 - Urethral catheter



ANAESTHESIA

*ASA physical status class: 2 - ASA 2

**Previous PONV or motion sickness: No Yes Unknown

**PONV prophylaxis administered: No Yes Unknown

*General anaesthesia: 2 - Inhalational (volatiles)

*Nitrous oxide used: No Yes Unknown

**Systemic opioids given: 1 - Yes, short acting (remifentany

*Airway control: 2 - Endo-tracheal tube (ETT)

*Depth of anaesthesia monitored: No Yes Unknown

**Epidural or spinal anaesthesia: 2 - No, contraindicated

*Nerve blocks or local anaesthesia: 3 - Transversus abdominus plane

*Infusion of vasoactive drugs: No Yes Unknown

**Upper-body forced-air heating cover used: No Yes Unknown

*Heated IV fluids used: No Yes Unknown

*Core body temperature at end of operation: 37 (°C) Unknown

*IV volume of crystalloids intraoperatively: 2000 (ml) Unknown

*Use of 0.9% NaCl: No Yes Unknown

*IV volume of colloids intraoperatively: (ml) Unknown

*IV volume of blood products intraoperatively: 0 (ml) Unknown

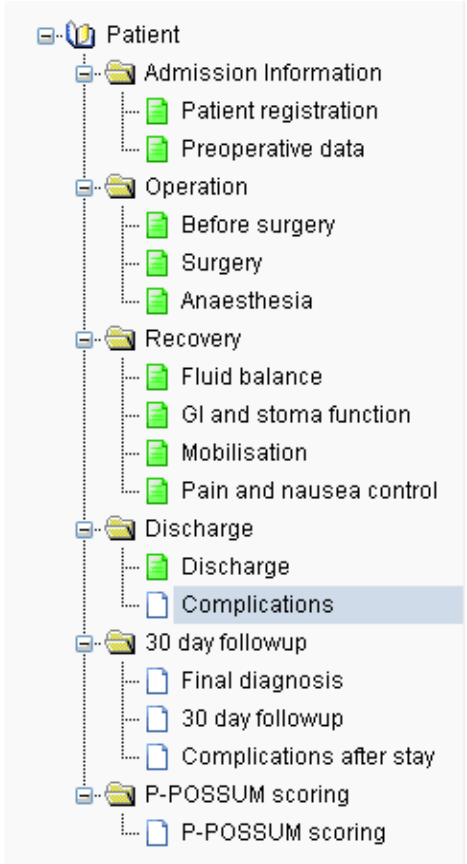
Total IV volume of fluids intraoperatively:

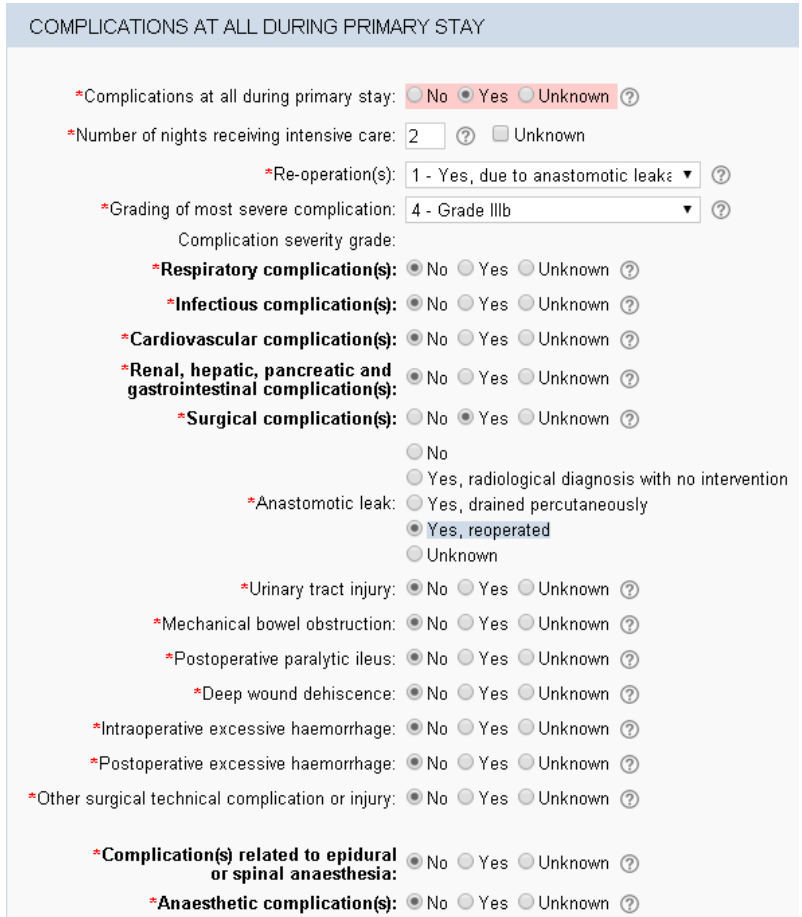
**Fluid administration guidance: 0 - No guidance

**Nasogastric tube used postoperatively: No Yes Unknown

ACOG FOUNDATION

Postoperative Data





ERAS® Interactive Audit System

REDCap
Research Electronic Data Capture

Excel

ACOG FOUNDATION

#4

Putting it all together

"The ERAS Way"

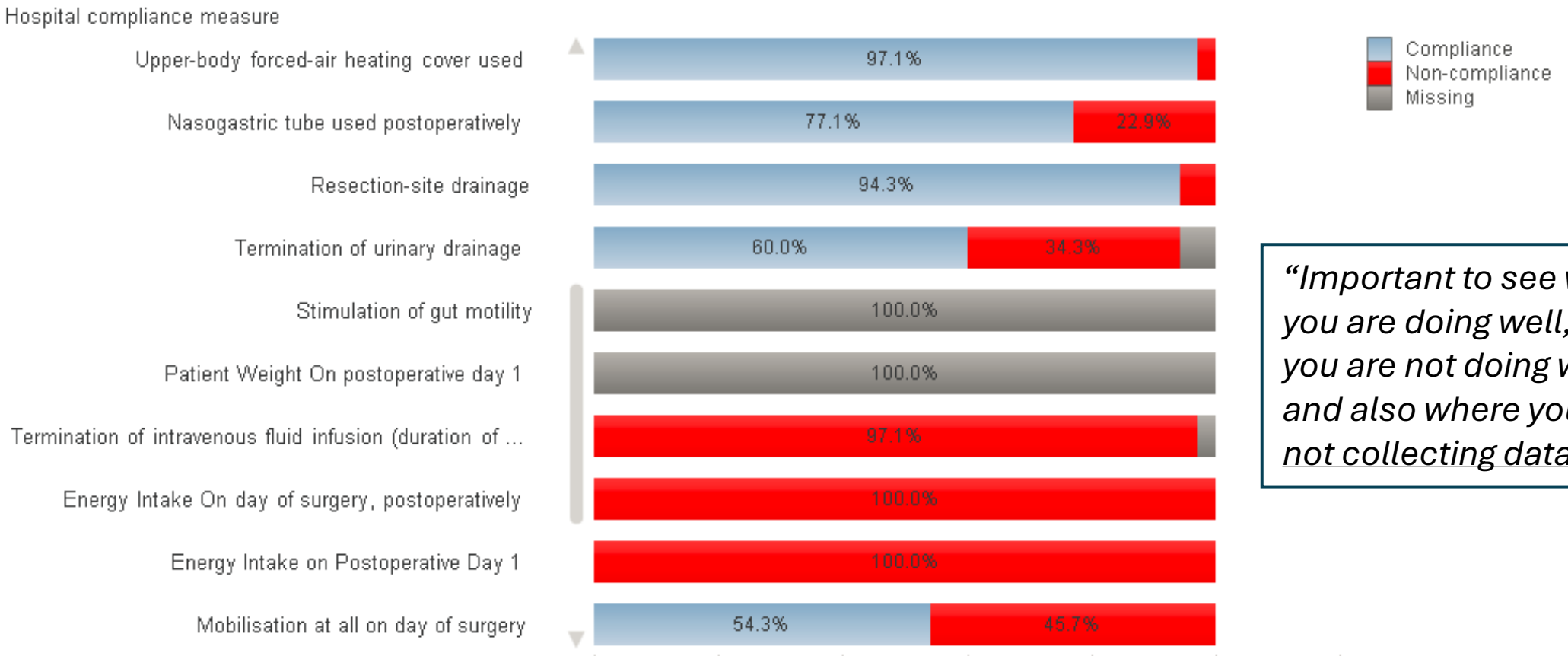
ERAS team meets regularly to review protocol compliance and clinical outcomes (LOS, complications)

Low compliance → High compliance

What do you do with audit data?
(how to achieve change?)

ACOG FOUNDATION

ERAS Compliance Data pre-ERAS 2015



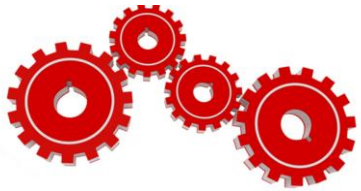
"Important to see where you are doing well, where you are not doing well, and also where you are not collecting data..."

ACOG FOUNDATION

Putting it all together

"The ERAS Way"

ERAS team meets regularly to review protocol compliance and clinical outcomes (LOS, complications)



Low compliance → High compliance

PDSA cycles

Improved outcomes

Plan-Do-Study-Act cycles = concrete action plans targeted towards areas of low compliance

ACOG FOUNDATION

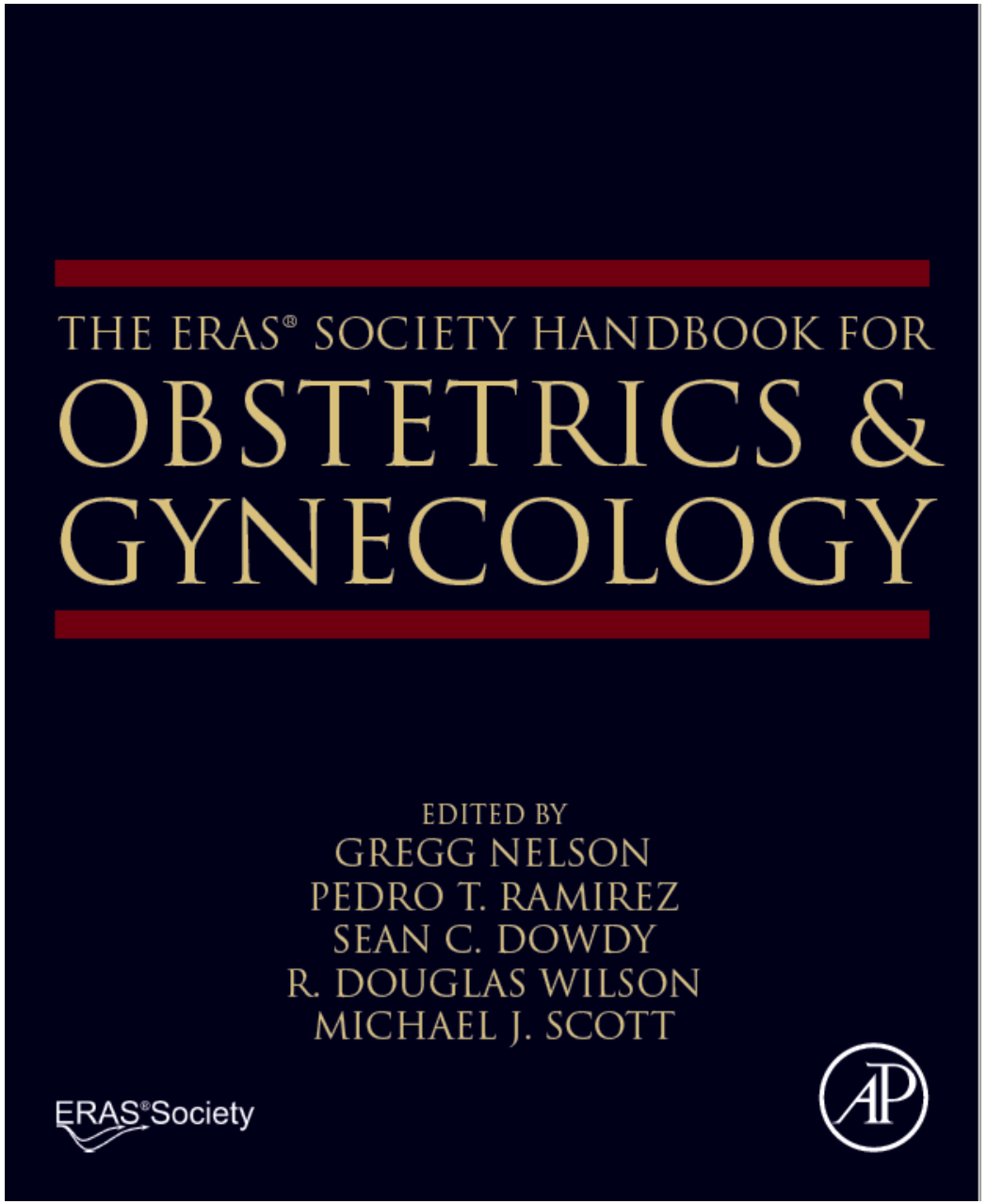
Successful ERAS Implementation

- ✓ Create an ERAS protocol
- ✓ Create ERAS clinical team
- ✓ Audit baseline compliance and outcomes
- ✓ Team meets regularly, PDSA cycles to increase compliance
- ✓ Clinical outcomes improved

ACOG FOUNDATION

All proceeds to the

ERAS Society



ACOG FOUNDATION

Conclusions

- ERAS
  - Global surgical quality improvement program changing the course of surgery as we know it
- ERAS Caesarean Guidelines/team/audit system
  - help integrate knowledge into practice
  - align perioperative care
  - improves outcomes for patients

Questions?

Please enter your questions in the Q&A box at the bottom of your screen.

ACOG FOUNDATION

Advancing ob-gyn care for all.

Thank you!

Please send any questions to alliance@acog.org

ACOG FOUNDATION

Advancing ob-gyn care for all.