Enhanced Recovery after Cesarean
SOAP 2019

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ACCME Disclosures

- No conflicts of interest

Disclaimer:

- Member, CMQCC Task Force Preeclampsia, Mother/Baby Substance Exposure Initiative
-
- Passionate about Maternal and Baby well being
- Owner, Quantum Birthing LLC

ERAS = Enhanced Recovery Program

Enhanced Recovery After Surgery

- Interdisciplinary
- Perioperative care
- Clinical outcomes
- LOS

-Ljungqvist O. JAMA Surg 2017:152:292-8

Enhanced Recovery Cesarean – SOAP 2019

GOAL ERAS Cesarean:

- ***Evidence based and patient centered care using a systematic, multidisciplinary approach to optimize maternal and newborn outcome.***
- ***Culture of applying current knowledge, continual process improvements and education.***

Enhanced Recovery Program- ERP

- Not spinal mixture
- Not pain control
- Not super-tech

- Not ALL inclusive 'best practices'

- Functional GOAL

Genomics

Enhanced Recovery Interdisciplinary

Continuum of care
- Pre-op
- Intra-op
- Post-op

NOT just pain medications – so much more!

ERP Cesarean Interdisciplinary

Multidisciplinary
- Education
- Patient
- Surgeon
- Anesthesiology
- Scrub tech
- Nursing
- Lactation
- Follow-ups

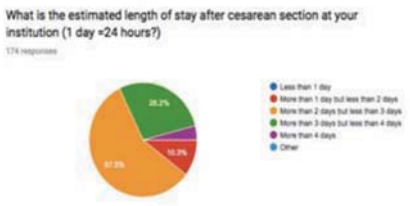
Enhanced Recovery Goals

Improved care and efficiency
- **Better quality of post-Cesarean care**
- **Reduced patient morbidities**
- **Reduced costs**

Figure Legend:

Enhanced Recovery After Surgery (ERAS) FlowchartA typical ERAS flowchart overview indicating different ERAS protocol items to be performed by different professions and disciplines in different parts of the hospital during the patient journey. The wedge-shaped arrows depicting each time period move into the period to follow to indicate that all treatments given affect later treatments. No NPO indicates fasting guidelines recommending intake of clear fluids and specific carbohydrate drinks until 2 hours before anesthesia; PONV, postoperative nausea and vomiting. Reprinted with permission from Olle Ljungqvist, MD, PhD.

Enhanced Recovery: Cesarean LOS



Cesarean LOS

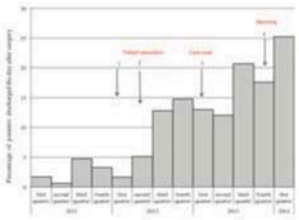
Univ Penn 1988-1991

- LOS decreased 26%
  - 116 to 86 hours, p<.01
- Early discharge
  - RN home visit x2
  - Phone calls x10
- Greater satisfaction 14% higher, p<.01
- Readmit: p=NS
- Hospital charges 29% less

-Brooten D. Obstet Gynecol 1994:84:832-8.

ERP Cesarean – Day 1 Discharge

	2012	2014
Day 1 Discharge	1.6%	25.2%
30-day readmit		
Day 1 D/C		4.4%
Day 2 D/C		5.6%
Day 3+ D/C		12.9%
Delays:		PACU LOS
		Pain
		Breastfeeding
		PPH



-Wrench IJ. IJOA 2015:24:124-30

ERP Cesarean

	Pre ERAS	Post ERAS	
LOS - days	4.34±.71	3.92±.61	P<.01
Autonomy toilet- h	45	26.5	P<.01
Mobility - h	19.3	10.5	P<.01
Urinary Catheter -h	17	4.3	P<.01
Complications			
Urinary retention –Rx straight cath	2.4%	13.1%	P<.01

-Rousseau A. Gynecol Obstet Fertile Senologie 2017:45:387-392

ERP Pre-Admission

- Anxiety
  - Sympathetic tone
- Education
  - Patient Expectation
- Immune function
- Pain severity
  - depression
- Patient satisfaction

-Hobson JA IJOA 2006, Orbach-Zinger BJA 2012, Eisenach JC Pain 2008

ERP Cesarean Pre-admission

Goal	Where	"Owner"
Hb optimization	Prenatal visit	OB
Medical optimization BMI>40, HTN, DM, Anemia, Smoking	Prenatal visits High Risk Obstetric Anesthesia Consult	OB Anesthesiologist
Patient Preparation Education Expectation	Hospital/office/Flyer enroll patient accept desired behaviors Pain functional vs. relief	Hospital-ERAS Team
Lactation education	Hospital/office/flyer	Hospital/Lactation Team
Patient Preparation	Call 1-2 days before, reinforce	Hospital-ERAS Team

ERP Cesarean Pre-OP Period

Goal	Where	"Owner"
Reduce Infections	Shower home CHG cleanse no Shaving	Hospital-ERAS Team Pre-Admission instructions
	Hospital – CHG wipes	Nursing
Temperature	Pre-op room consider 'pre-warming' OR 72ºF minimum	Hospital-ERAS Team
Antibiotics	Within 1 hour of incision Cefazolin 2gm, 3 gm>120kg Clinda/Gent for true "PCN allergy" Consider azithromycin 500 mg IV If labor to cesarean.	Nursing/Anesthesiology/Pharmacy/OB

SOAP ERAC Cesarean Pre-OP

Recommendation	Action	Level/'Owner"
Limit fasting**	Solids to 6*-8 hrs prior Clear liquids to 2 hrs prior *ASA definition light meal	Classs IIb, Level C-EO Pre-Admission instructions Hospital-ERAC Team
Non-particulate liquid carbohydrate loading**	Carbohydrate load drink 2hr non-DM, non-GDM simple vs complex (maltodextrin) 45 gm (e.g. Gatorade 32 oz/apple juice 16 ounce)	Classs IIb, Level C-EO Pre-Admission instructions Hospital-ERAC Team
Patient Education**	Education, recovery, expectations	Class IIb, Level C-NR
Lactation/Breastfeeding Preparation and Support	Education	Class IIa, Level B-R
Hemoglobin Optimization	Screen Anemia, Iron per ACOG	Class IIa, Level B-R

SOAP ERAC Cesarean Intra-op

Recommendation	Action	Level/"Owner"
Initiate Multimodal Analgesia**		Class 1, Level A
Neuraxial long acting Opioid low dose	IT morphine 0.15 mg max (0.05-0.15 mg) Epidural morphine 3 mg max (1-3mg) Doses: SOAP COE	Anesthesiology
Non-opioid analgesia started in OR	Ketorolac 15-30 mg IV after peritoneum closed Acetaminophen IV or PO before or after Delivery Consider Local Anesthetic wound infiltration or regional blocks in select cases (e.g. no neuraxial opioid, risk for severe pain) TAP, QL	

SOAP ERAC Cesarean Intra-op

Recommendation	Action	Level/"Owner"
Intra and Post Operative Nausea and Vomiting (IONV/PONV) prophylaxis**	Prophylactic vasopressor infusion decrease IONV from hypotension Combination of at least 2 prophylactic IV antiemetics with different mechanisms of action. Examples: 5HT3 antagonist (e.g. ondansetron 4mg) Glucocorticoid (e.g. dexamethasone 4mg) D2 receptors antagonist (e.g. metoclopramide 10mg)	Class 1, Level B-R IONV/PONV Anesthesiology
	Limiting uterine exteriorization	Class IIb, Level C-LD: OB
Delayed cord clamping	Vigorous term and preterm infants, per ACOG	Class I, Level A
Promote Breastfeeding and Maternal-Infant Bonding**	Skin-to-skin in OR (if mom and baby stable)	Class IIa, Level C Nursing, Anesthesiology OB
Optimal uterotonic**	Potential to standardize bolus/drip, low dose	Class IIa, Level B-R

SOAP ERAC Cesarean Intra-op

Recommendation	Action	Class/'Owner'
Prevent Spinal Hypotension**	Decrease IONV, Prophylactic e.g. Phenylephrine infusion 0.5 mcg/kg/min	Class 1, Level A Anesthesiology
Maintain Normothermia**	Active warming Examples: In-Line IV Fluid Warmer • Forced air warmer • Consider active warming pre-op • OR temperature >72ºF (TJC guidance)	Class 1Ia, Level C-LD ERAC Protocol
Antibiotic prophylaxis**	Prior to skin incision Do not wait for after cord clamping Follow ACOG guideline	Class 1, Level A ERAC Protocol
IV Fluid optimization	Moderate fluids <3L for routine cases; Transition to institutional hemorrhage resuscitation protocol for hemorrhage	Class IIA, Level C-EO Anesthesiology

ERP PACU

Goal	Where	"Owner"
Pain control	IV narcotic as rescue only NSAID, Acetaminophen already given lower doses, longer acting	ERAS Protocol/Anesthesiology
PONV	Additional meds, different classes: 5-HT3 antagonist (e.g. ondansetron) Dopamine antagonist (e.g. Metoclopramide) Dexamethasone Mu receptor antagonist if narcotics	Anesthesiology PACU orders
BabyFriendly/Breastfeeding	Skin-to-skin in PACU (if mom and baby stable)	Nursing
Temperature	PACU arrival 36ºC goal Fluid warming Underbody/forced air warming	Nursing

ERP PostPartum

Goal	Where	"Owner"
Pain control	PO narcotic as rescue only NSAID, Acetaminophen scheduled PO Narcotic lower doses, longer acting 2.5-5 mg oxycodone Q3h max 2 days	ERAS Protocol/Anesthesiology
Early Feeding	Ice chips/sips fluid @ 60 min PACU Food @ 4 hrs	ERAS Protocol/Nursing
Early Mobilization	Dangle legs 4 hrs Ambulate 8 hrs Ambulate QID	Nursing
Urinary Catheter	Removal 8 hr. shorter higher incidence re-cath	Nursing/ERAS Protocol
IV	Heplock when tolerating 500 ml PO Urine output >0.5ml/kg/hr. Goal: 12-24 hr to remove	Nursing/ERAS Protocol

SOAP ERAC Cesarean PostPartum

Recommendation	Action	Level/"Owner"
Early oral intake**	Ice chips/sips fluid @ 60 min PACU Food @ 4 h	Class IIb, Level C-EO ERAC Protocol/Nursing
Glycemic control	Normoglycemia (<180-200 mg/dL)	Class I, Level B-R
Promotion resting periods**	Optimize sleep and rest Limit unnecessary interruptions	Class IIb, level C-LD Nursing/ERASC Protocol
VTE prophylaxis**	Follow institutional policies, see ACOG, ACCP guidelines	Class IIa, Level B-NR Nursing/ERAC Protocol
Facilitate Early Discharge**	Standardize discharge/coordinate Establish patient oriented goals early	Class IIb, Level C-EO
Promotion return bowel function	Minimization of opioids Consider chewing gum Availability of multiple PRN bowel medications	Class IIb, Level C-EO

SOAP ERAC Cesarean PostPartum

Recommendation	Action	Level/"Owner"
Early Mobilization** After return of motor function	*0-8hrs Post-op:* • Sit on edge of bed • Out of bed to chair • Ambulation as tolerated *8-24hrs Post-op*: • Ambulation as tolerated • Walk: 1-2 times (or more) in hall *24-48hrs Post-op*: • Walk: 3-4 times (or more) in hall • Out of bed for 8 hours	Class I, Level B-NR Nursing
Early Urinary Catheter removal**	Removal 6-12 h Earlier removal may be associated with higher rates of need for re-catheterization	Class IIB, level C-EO Nursing/ERAS Protocol
IV	Heplock when oxytocin infusion complete, tolerating fluids, and urine output adequate	Nursing/ERAS Protocol

SOAP ERAC Cesarean PostPartum

Recommendation	Action	Level/"Owner"
Multimodal Analgesia**	Scheduled NSAID, Acetaminophen e.g. acetaminophen 650-1000 mg q6hrs scheduled ibuprofen 600mg q6hrs (or naproxen 500 BID or) scheduled *after* IV ketorolac 15-30mg was given after Oral narcotics PRN e.g. Oxycodone 2.5 -5mg PO q4hrs PRN TAP block does not provide significant improvement when given in addition to neuraxial morphine and scheduled NSAID/Acetaminophen. Peripheral nerve blocks (TAP/QL, wound) may be helpful for breakthrough or high risk pain or neuraxial morphine cannot be given Gabapentinoids have not been shown to have significant benefit in routine cesarean; may be appropriate in select patients	Class I, Level A Anesthesiology, Nursing, ERAC Protocol

Welcome to *Name of your Hospital*

Things To Be Done Before You Go Home

MOM

First 24 hours after your surgery:

- ❑ Eat and drink within 4 hours after your surgery
- ❑ Sit up in bed within 4 hours after your surgery
- ❑ Walk within 8 hours after your surgery
- ❑ Breastfeeding teaching with nurse
- ❑ Needed blood tests
- ❑ Talk about birth control with your obstetrician
- ❑ Walk 4 times a day ☐☐☐☐

Next days after your surgery:

- ❑ Obstetric team visit on the day of discharge
- ❑ Review home care instructions with nurse
- ❑ Make sure your prescriptions are ready
- ❑ Walk 4 times a day ☐☐☐☐
- ❑ Talk to your team if you have questions (for example contraception questions)

BABY

First 24 hours after your surgery:

- ❑ Pick a doctor for your baby
- ❑ Hepatitis B vaccine
- ❑ Hearing check
- ❑ Routine blood checks
- ❑ Oxygen level check

Next days after your surgery:

- ❑ Complete birth certificate form/social security
- ❑ Bring car seat before day of discharge
- ❑ Pediatric team visit on day of discharge

Patient Name:

Room:

Nurse Today:

Admission Date:

Target Discharge Date:

Target Discharge Time:

Available Classes and Resources

Breastfeeding Classes:
Time:
Place:

Car Seat Classes:
Time:
Place:

Courtesy Lucile Packard Children's Hospital-Stanford University, Palo Alto, CA

What is Enhanced Recovery after Cesarean Section (ERAC)?

ERAC is a step by step plan to help you feel better faster after your Cesarean Section. Research has shown this plan helps you to manage your pain better, and help you start eating and moving soon after your surgery.

Spinal Anesthesia

Most scheduled Cesarean Sections are done with a spinal or combined spinal-epidural anesthetic.

The spinal medicine will make your body go numb from your chest down through your legs. The surgery will not start until you are numb. It is normal to feel some pressure and tugging during your Cesarean Section, but you will feel minimal to no pain. Let you anesthesia provider know if you fell any pain or discomfort.

How is a Spinal Anesthesia given?

A numbing medicine will be placed on your back where the anesthetic will be placed. If you feel discomfort, more numbing will be given. You may feel pressure when the medicine is given, but it should not be painful. After a few minutes your legs will start to feel numb.

Courtesy Lucile Packard Children's Hospital-Stanford University, Palo Alto, CA

Frequently asked questions

How long will I be in the Hospital?
If you have Cesarean Section, you will be in the hospital for around 3 days. Women with complications might need to stay longer.

I am very nervous about my Cesarean Section, can I be asleep for it?
Spinal anesthesia is safer. General anesthesia, or being asleep for your Cesarean Section, has risks for mom and baby and is usually reserved for emergencies.

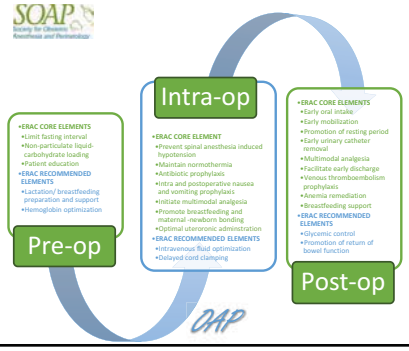
Can my partner stay with me during my Cesarean Section?
Yes, your partner can stay with you during your Cesarean Section. If there is an emergency your partner will be escorted out of the operation room, so the anesthesia team can focus on taking care of you.

Can I still hold my baby to my chest if I am having a Cesarean Section?
Yes. Doctors will check your baby right after birth and if s/he is doing well, and it is a safe time during surgery, the baby will be brought to you for skin-to-skin.

Recovery After your Cesarean Section
Patient Handout
Enhanced Recovery after Cesarean Section (ERAC)

Resources

Labor and Delivery	Add Phone Number
Breastfeeding Class	Add Details
Car Seat Class	Add Details



Patient Instructions

	Before Delivery	Just before and during your Cesarean Delivery	First 24 hours after your surgery	24 hours before your hospital discharge
Pain control	Take medicines as instructed by your anesthesia and obstetric providers	You will receive spinal or epidural anesthesia for your Cesarean delivery	Take pain medicines as directed If needed, ask for medicines for itching, nausea and shivering	Take pain medicines as directed Continue skin-to-skin contact with your baby
Skin care	Don't shave pubic hair the day before or day of your Cesarean Shower or bathe and wait until you are completely dry before using the disinfectant wipes night before surgery		Do not touch your incision site	Bandage over incision is removed You may shower or bathe Follow wound care instructions
Eating and drinking	You may eat until 6-8 hours before your Cesarean delivery You may drink clear liquid (water) or a carbohydrate-containing drink up to 2 hours before surgery		You may start chewing gum while in recovery You may eat and drink as soon as you feel you are ready	Eat healthy foods, that are easy to digest Drink 8-10 large glasses of water each day

Patient Instructions

Activity	Normal		With the assistance of your nurse: Sit up in bed within 4 hours after surgery Walk within 8 hours after surgery Walk at least 4 times every day	Walk at least 4 times every day Don't lift anything heavier than your baby
Breastfeeding	Discuss breastfeeding with your care team If you plan to pump at home plan for it	Communicate your breastfeeding preference with your care team Ask for lactation support and inform yourself how to hand express to help stimulate your milk supply	Start breastfeeding as soon as possible after birth Breastfeed at least every 3 hours or more often if baby is hungry Your nurse and lactation services can address any question you have Try attend a breastfeeding class	Breastfeed at least every 3 hours or more often if baby is hungry
Other Steps	Don't smoke as smoking may delay your recovery from surgery Talk to your doctor about programs to stop smoking			Review discharge instructions Schedule follow-up appointments with your obstetric provider and pediatrician

ERAS Cesarean Elements ACOG

Preop
- 2 h fasting clear liquid
- Carbohydrate supplement
- Skin prep

Intraop
- Normothermia
- Surgical technique
- Euvolemia

Postop
- Chewing gum
- PONV control
- Analgesia
- **2 h eat**
- Glucose control
- VTE prophylaxis
- Ambulation
- Urinary catheter removal

-Wilson RD, Caughey AB et al. AJOG 2018:219:523-38

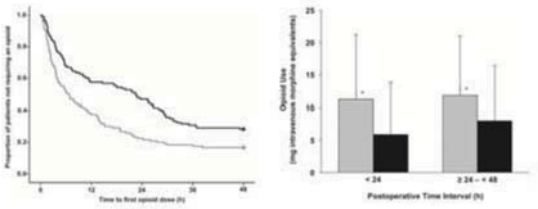
ERP: OPIOID Reduction

Goal	Where	"Owner"
Acetaminophen	Acetaminophen 3000 mg/day recommended 625 mgQ6h or 1000 mg Q8h Healthy, short term (2-3 days) 4000 mg/day also used (FDA warning)	
NSAID	Ibuprofen 600 Q Q6h or naproxen 500 BID PO Ketorolac 30 mg Q6h IV	
Med Optimization	Staggered vs. simultaneous	
Opioid reduction	Intra-op Neuraxial low dose	Anesthesiology
	Multimodal analgesia – NSAID & Acetaminophen scheduled Local Anesthetic wound/TAP consider	ERAS Protocol
	Oral Narcotic rescue only Discharge Rx – minimal/no opioid (max 2 days)	OB

ERP Opioid Reduction

- Opioid tolerant/low pain threshold
- Epidural infusion postop
  - Local anesthetic dilute/lipophilic narcotic dilute
  - Stronger as needed for Opioid tolerant e.g. suboxone
- Pain service consultation
  - Ketamine infusion possible
  - Long acting narcotic

Acetaminophen scheduled +NSAID



-Valentine AR. IJOA 2015:24:210-6

Non-Opioid Analgesics: Multimodal Options

Class	Medication
Acetaminophen	Acetaminophen
Alpha-2 agonists	Clonidine Dexmedetomidine
Gabapentinoids	Gabapentin Pregabalin
Local Anesthetics	Bupivacaine Liposomal Bupivacaine Lidocaine
NMDA receptor antagonists	Ketamine
NSAID	Celecoxib Ibuprofen Ketorolac, etc.

-Wu CL. Lancet 2011:377:2215-25

Future

- Local Anesthetics
  - Single injection
  - Wound infusion/long acting
  - TAP block
  - QL block
- Adjuncts
  - Gabapentin
  - Ketamine
  - Clonidine
- VR

NOT ENOUGH EVIDENCE TO SUPPORT INCLUSION ERAS/MANDATED ROUTINE USE

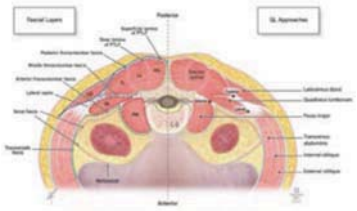
Components may be helpful for those with history of severe pain/opioid tolerance

-Carvalho B. Best Practice & Research Clinical Anaesthesia 2017;31:69-79. SOAP ERAS task force

Quadratus Lumborum Block

- QL1 Cesarean RCT n=60
- IT Bupiv, fent
- IV Paracetamol Q6h

- QL1 for 48 h
- Less morphine
  - 16 v 42 mg, p<.001
- Lower pain score, p<.001



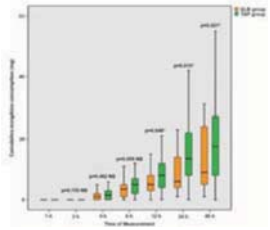
-Mieszkowski MM. Ginekologia Polska 2018:89:89-96

Elsharkaway H. Anesthesiology 2019:130:322-35

Quadratus Lumborum Block type 2: Cesarean

QL2 v TAP, RCT cesarean, n=78
- IT Bupiv, fent
- NSAID, paracetamol

QL2: for 48 h
- Less Morphine IV PCA
  - 9 vs 17mg /48h, p<.05
- Fewer demands p<.05
- VAS similar



-Blanco R. RAPM 2016:41:757-762

Breastfeeding - Neonatal Transfer

Opioid	RID (%)
Morphine	5.8-10.7
Fentanyl	0.9-3
Oxycodone	1.5-8
Hydrocodone	1.6-3.7
Tramadol	2.4-2.9

Non-Opioid Analgesics	RID (%)
Ibuprofen	0.1-0.7
Ketorolac	0.2-0.4
Celecoxib	0.3
Acetaminophen	1.3-6.4
Gabapentin	1.3-6.5

Relative Infant Dose – RID, 10% transfer undesirable

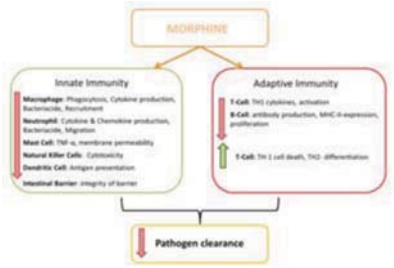
-Carvalho B. Best Practice & Research Clinical Anaesthesia 2017;31:69-79

Uterine Handling

	Exteriorize (n=355)	In-Situ (n=732)	P
Surgery (min)	58.8±15	50.7±9	<.05
LOS (day)	2.83±1.4	2.04±0.37	<.05
First Bowel Movement (h)	17.1±6.6	14.15±4.5	<.05
SSI (%)	13.2	0.6	<.05
Intraop Hypotension	39.4	34	.08
Intraop N/V	29.3	27	.48

-Gode F. Arch Gynecol Obstet 2012:285:1541–1545

Opioid – Immune Function



-Plein LM, Rittner HL. Br J Pharmacology 2018:175:2717-25

ERP Cesarean LOS Decrease

Goal	Where	"Owner"
Mom	Ambulates Urinates Afebrile Stable Baby disposition NOT a prerequisite. Can sit with baby in nursery area.	ERAS Protocol/Team/OB
Baby	Baby Discharge criteria independent of maternal disposition Pediatricians need to be engaged – for time of day/timely orders D/C	Pediatrics
BreastFeeding	Lactation consult if needed	RN/Lactation
Rx	If no Opioid Rx, NSAID, Acetaminophen OTC Education pre-admission, have meds at home before coming to hospital	ERAS Protocol/Team/OB

ERP: Cesarean LOS

Saint Peter's Univ. Hospital, NJ

- N=110
- LOS pre ERAS 3.7 days
- LOS post ERAS 2.45 days = 34% reduction
- ROI: 300%

- Cherot E, Kett A, Mauro R. Enhanced Recovery Program reduces Length of Stay
- and improves value for patients undergoing elective cesarean section, Poster ACOG Annual Meeting 2018

ERP Implementation

Motivation

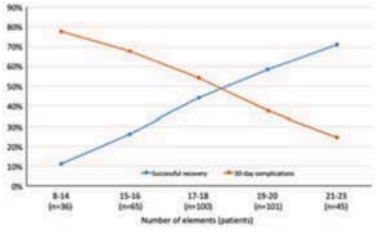
- Reduce complications 91%
- Higher patient satisfaction 73%
- Shorter Length of Stay 62%

Barriers

- Time 69%
- Colleagues 68%
- Logistics 66%

-Martin D. A multicenter qualitative study assessing implementation of an ERAS after surgery program. Clin Nutri 2018;37:2172-2177

ERAS Additive Benefits (Colorectal)



-Pecorelli N. Surg Endosc 2017:31:1760-71

Chronic Opioid Risk from Cesarean

- Risk 0.36% (1/300) opioid naïve
  - Commercial insurer

Predictor	adjusted Odds Ratio
Cocaine abuse	6.1
Antidepressant use	3.2
Tobacco use	3
Illicit substance abuse	2.8
Migraines	2.1
Back pain	1.7

-Bateman B. Am J Obstet Gynecol 2016;215:353.e1-18.

Opioid Rx after Vaginal Delivery

- Medicaid – PA
  - 164,720, 2008-2013
- 12% filled Rx within 5 days, opioid naïve
  - 14% **filled second opioid Rx 6-60 days (1.6% of all deliveries)**

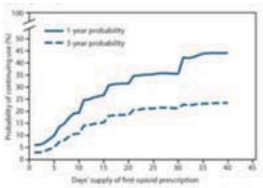
Predictor	adjusted Odds Ratio
Tobacco	1.3
Mental Health condition	1.3
Abuse disorder (non-opioid), 2nd Rx	1.4

-Jarlenski M. Obstet Gynecol 2017;129:431–7

Chronic Opioid: Rx Discharge

Chronic Opioid – Rx at Discharge
- 5 days, 30 days – increase
- Includes Tramadol
- Second opioid Rx

MINIMIZE Opioid Rx Discharge



-Shah A. Characteristics of initial prescription episodes and likelihood of long-term opioid use – United States 2006-2015, MMWR 2017 Vol 66 #10

Opioid Vaginal Delivery

TABLE 2
Postpartum analgesia utilization in the last 24 hours of inpatient hospitalization

Analgesia medication	All Vaginal deliveries (n = 9038) (n, %)	Tablet count	Tablet range	MME, median	MME, range
Opioid	2242 (24.8)	3 (2–4)	1–13	20 (10–40)	5–160
NSAID	8774 (97.1)	4 (4–4)	1–6	—	—
Acetaminophen	2328 (25.8)	2 (2–4)	1–6	—	—
	Uncomplicated vaginal deliveries (n = 5038)				
Opioid	1032 (20.5)	3 (2–4)	1–10	20 (10–35)	5–120
NSAID	4908 (97.4)	4 (4–4)	1–6	—	—
Acetaminophen	1255 (24.9)	2 (2–4)	1–6	—	—

Data are presented as n (percentage), median (interquartile range), or range.
IQR, interquartile range; MME, morphine milligram equivalents; NSAID, nonsteroidal anti-inflammatory drug.
Badreldin et al. Inpatient postpartum opioid use. Am J Obstet Gynecol 2018.

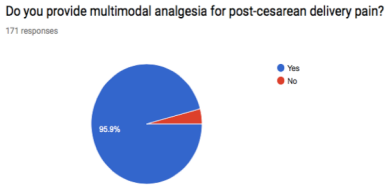
-Badreldin N, Grobman WA, Yee LM. AJOG 2018:219:608.e1-7.

Enhanced Recovery Program: Cesarean

- SOAP - ERAS Cesarean Protocol – Winter 2019
  - Pre-cesarean education/expectation
  - Medications/protocols
  - Decrease opioid usage
  - Early Fluids/mobilization
  - Discharge follow up

- Join SOAP: www.SOAP.org

Enhanced Recovery: Opioid use



ERP Cesarean: Pain and Opioid Use

- Post Cesarean section pain management: PRE ERAS
  - Naproxen 500 mg BID
  - Oxycodone 5mg PO for Pain < 5
  - Oxycodone 10 mg PO for Pain > 5
  - Hydromorphone 0.2-0.4 mg was ordered for intractable pain.
- Post Cesarean section Pain Management ERAS:
  - May 2016 – October 2017
    - Acetaminophen 975mg PO Q 6 hours
    - Alternate with Ketorolac Q 6 hours (30- 15-15-15)
    - Naproxen 500mg BID +Acetaminophen 650 mg TID
  - November 2017-to date
    - Acetaminophen PO 975 mg Q6 + with Ketorolac Q6 hours
    - Acetaminophen 650 mg Q8 hours + Naproxen 500 mg Q 8hours
    - Acetaminophen 650 mg TID and Naproxen BID

-U. Virginia, Tiouririne M

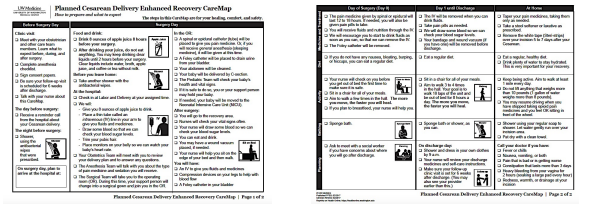
ERP: Opioid Use

Pre ERAS	ERAS Phase 1	ERAS Phase 2
44.7 MME	34 MME	21.7 MME

ERAS: Pain Scores

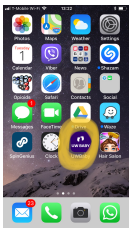
Pre ERAS	ERAS Phase 1	ERAS Phase 2
7.63	7	7.1
3.6	3.2	3.4
4.15	4.2	4.4

- U. Virginia, Tiouririne M



UW ERAS PATHWAY/Care Map
FOR SCHEDULED TERM C-Sections

ERAS Multimedia Education Tool



-Univ Washington app UW Baby

Stergiopoulou A. Methods of Information in Medicine 2007:
The Effect of Interactive Multimedia on Preoperative Knowledge and Postoperative Recovery of Patients Undergoing Laparoscopic Cholecystectomy.

Warning Signs

Call us if you have any of these problems:

- Fever higher than 100.4°F (38°C)
- Chills
- Nausea or vomiting, or both
- Redness, warmth, or drainage at your incision
- Severe pain
- Heavy bleeding from your vagina
- Constipation that lasts more than 3 days

-Univ. Washington cesarean ERAS

-Discoveries 2018, Cedars-Sinai Medical Center

Digital Healthcare Flow

Smart Hospital
- Pre Care
- During Care
- Post Care

Improved Outcomes

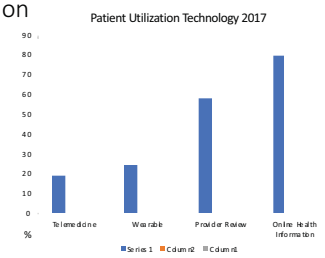
-Frost & Sullivan, Succeeding in Delivery of Value Based Care 2018 Enterprise Ireland

Healthcare Disparities Reduced

Technology/AI support
- Uniform processes
  - Education prenatal - in mom's preferred language, in style of learning that works best for them
  - Metabolic reporting
  - Discharge instructions/Meds
  - Follow ups
- Genomics – therapy tailored
- Pain Medications

Technology Utilization

- Patient Centric
- Empowers Patients
- Information accessible
- Access to care
- Lower healthcare costs



https://rockhealth.com/reports/healthcare-consumers-in-a-digital-transition/

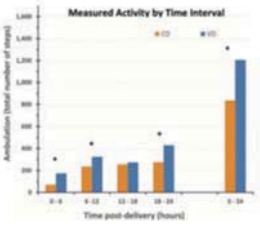
Compliance

- ERAS
- Patient activity
- Medication
- Fluids
- Tracking

-seamless.md

Compliance Activity

Wrist activity device
- Vaginal and cesarean
- Similar pain scores
- Similar opioid consumption



-Ma J. Anesthesiology 2018;128:598-608

Compliance

- Medication
- Ingestible sensor
- Tracking compliance

-abilifymycite.com

Business of Medicine

- Megamergers – vertical integration
  - Walmart, CVS – routine POC
  - CVS – Aetna purchase $69B
  - **Employers are insurer** – 63% risk share 2015
- Brand loyalty for patients
- Amazon, Google – IT
  - Integrated EMR
- Value based model
  - Fee for Service model marginalized
  - Corporate practice of medicine?
  - **Outcomes based contracting**

Insurers

- Sending out health apps
- Expected to be biggest source

Enhanced Recovery Cesarean Implementation

Potential for improved quality in care with cost-savings and decreased LOS

Multidisciplinary Team Consensus

- Pathway Champions
- Patient education/expectation
- Provider education

- Outpatient:
  - Pre-op education/expectation
  - Pre-op carbohydrate loading

- Intra-op: Minimal changes: Easiest

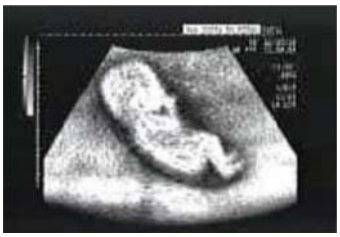
- Post-op:
  - Early feeding
  - Ambulation early, QID; remove barriers (Peds, Lactation, OB)
  - Multimodal pain management; Scheduled Acetaminophen, minimize opioids
  - Discharge planning early

SOAP Member Benefits

Society for Obstetric Anesthesia and Perinatology - SOAP

- Membership benefits
  - All providers – Anesthesiologists, OB, MFM, CRNA, CAA, RN
  - Free for Residents/Fellows
- Best practices Obstetric Anesthesia
- Stay up to date - Advisories
- Lectures
- Friendly community experts willing to help
- Great Value - $250 dues
- Join NOW – www.SOAP.org

Future Tech: Better then FHR



SOAP 50

CELEBRATING 1968-2018

Advancing Care of the Pregnant Patient and Newborn