



University of California
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Enhanced Recovery After Surgery (ERAS) Pathway for Cesarean Delivery

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to:

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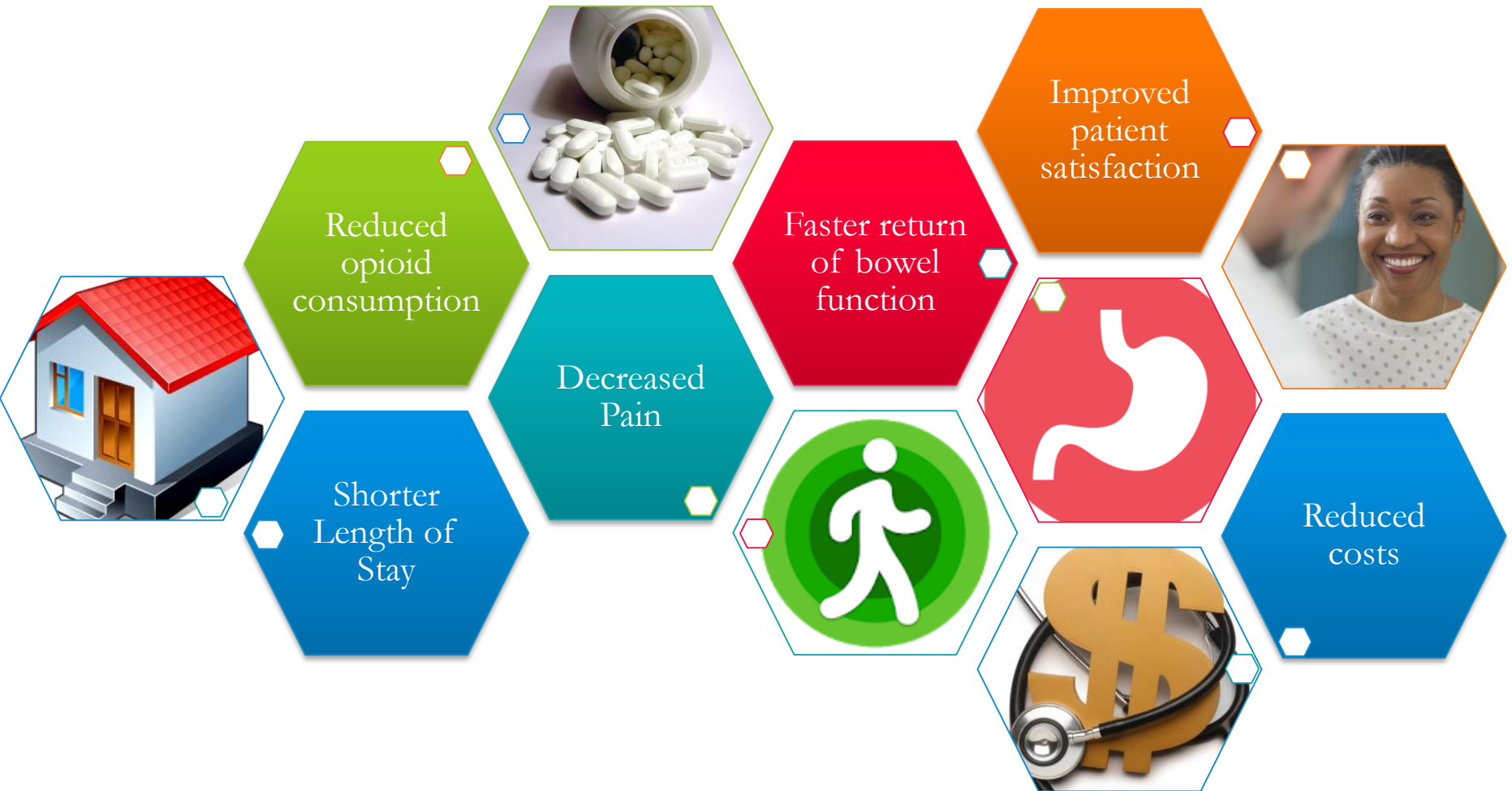
Presenter Disclosure:

- **Nothing to Disclose, no conflicts of interest**

Outline

- Concept of an ERAS pathway
- Current evidence
- 2018 Cesarean delivery guidelines
- A look at our pathway
- Some outcomes
- Parting thoughts

Potential Benefits of ERAS for Cesarean Delivery



An example ERAS pathway

Preoperative

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

Intraoperative

- Nerve block, local or epidural analgesia
- Short-acting anesthetic agents
- Multimodal analgesia
- Prevent nausea & vomiting
- Limit use of drains
- Avoid salt & water overload
- Maintain normothermia (body warmer/warm intravenous fluids)

Postoperative

- Nerve block, local or epidural analgesia
- No nasogastric tubes
- Prevent nausea & vomiting
- Avoid salt & water overload
- Early removal of catheters/drains
- Early oral nutrition
- Nonopioid oral analgesia/NSAIDs
- Early mobilization
- Stimulation of gut motility
- Audit of compliance & outcomes

ENHANCED RECOVERY IS FOUNDED ON FOUR WORKING PRINCIPLES



1. All patients should be on a pathway to enhance their recovery. This enables patients to recover from surgery, treatment, illness and leave hospital sooner by minimising the physical and psychological stress responses.



2. Patient preparation ensures the patient is in the best possible condition, identifies the risk and commences rehabilitation prior to admission or as soon as possible.



3. Pro-active patient management components of enhanced recovery are embedded across the entire pathway; pre, during and after operation/treatment.



4. Patients have an active role and take responsibility for enhancing their recovery.

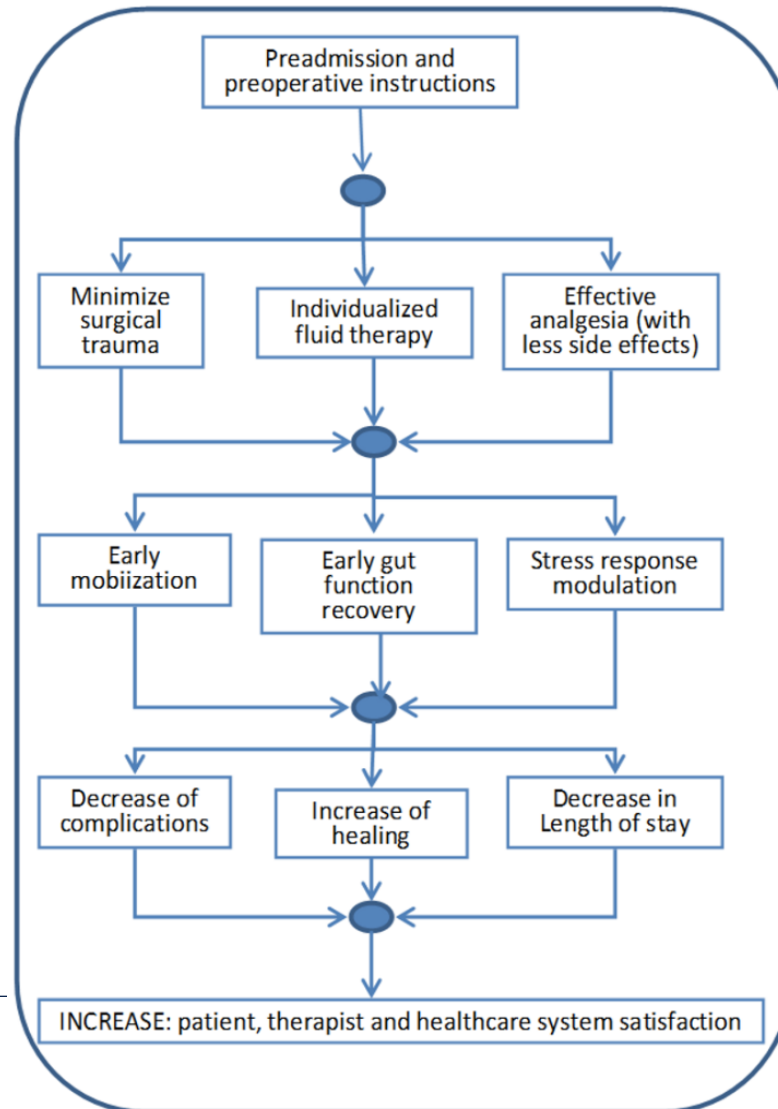
“Enhanced Recovery After Surgery (ERAS) refers to patient-centered, evidence-based, multidisciplinary team developed pathways for a surgical specialty and facility culture to reduce the patient’s surgical stress response, optimize their physiologic function, and facilitate recovery.”

- American Academy of Nurse Anesthetists

Traditional care on POD#1












Principles of ERAS – multiple small interventions effect big changes



One way to reduce length of stay...



Manage Expectations from beginning

ROOM:	PHONE NUMBER: (415) 514-	WIRELESS LOGIN: longquest
GOING HOME DATE & TIME:		BY 12:00PM (NOON)
MY CARE TEAM		
	MOM	BABY
NURSE:		
ATTENDING MD:		
NURSE MIDWIFE /		
NURSE PRACTITIONER:		
RESIDENT MD:		
NURSING ASSISTANT:		
OTHER:		
GOING HOME ACTIVITIES		
<input type="checkbox"/>  TRANSPORTATION HOME	<input type="checkbox"/>  INFANT CAR SEAT	<input type="checkbox"/>  PEDIATRICIAN APPOINTMENT
<input type="checkbox"/>  ONGOING EDUCATION	<input type="checkbox"/>  IMMUNIZATIONS (MOM)	<input type="checkbox"/>  IMMUNIZATIONS (BABY)
<input type="checkbox"/>  PRESCRIPTIONS (MOM)	<input type="checkbox"/>  BIRTH CERTIFICATE	<input type="checkbox"/>  SEEN BY OB ATTENDING/ MIDWIFE ON MY GOING HOME DAY
NOTES/QUESTIONS		

ERAS improves post-op outcomes

Outcomes	Marx et al. (2006)	Chase et al. (2008)	Gerardi et al. (2008)	Carter et al. (2012)	Kalogera et al. (2013)	Wijk et al. (2014)
Type of surgery	Cytoreductive surgery	Abdominal or vaginal hysterectomy; open staging	Cytoreductive surgery	Cytoreductive surgery & open staging	Cytoreductive surgery, open staging & pelvic organ prolapse	Abdominal hysterectomy
Length of stay difference	-1 day	NS	-3 days	NS	-3 days	-0.5 days
Postoperative complications	NS	NS	NS	NS	NS	NS
Mortality	NS	NS	NS	NS	NS	NS
Readmissions	NS	NS	NS	NS	NS	NS
Reoperations	NS	--	NS	NS	--	NS
Total hospital cost difference	--	--	6293	--	6634	--

Table adapted from Nelson, Kalogera & Dowdy in Enhanced recovery pathways in gynecologic oncology. Gynecol Oncol. 2014 Dec;135(3):586-94.

ERAS / GUIDELINES / LIST OF GUIDELINES

All ERAS® Society Guidelines are available free at the ERAS® Society website. All you need to get access is to register and then download the Guidelines. The Guidelines are published by the ERAS® Society and in some cases also as a joint effort with other medical societies such as The European Society for Clinical Nutrition and Metabolism (ESPEN) and the International Association for Surgical Metabolism and Nutrition (IASMEN), part of the International Surgical Society (ISS). Copyrights are in such cases shared between the three Societies.



Guidelines for postoperative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations — Part II



Guidelines for pre- and intra-operative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations — Part I



Enhanced Recovery After Surgery (ERAS®) for gastrointestinal surgery, part 1: pathophysiological considerations



ERAS[®] Society

The logo for the ERAS Society features the text "ERAS[®] Society" in a blue, sans-serif font. Below the text is a graphic consisting of two blue, wavy lines that curve upwards and then downwards, ending in arrowheads pointing to the right.

~~No guidelines on Cesarean~~



American Journal of Obstetrics and Gynecology

Volume 219, Issue 6, December 2018, Pages 523.e1-523.e15



Guidelines for Antenatal and Preoperative care in Cesarean Delivery: Enhanced Recovery After Surgery Society Recommendations (Part 1)

ERAS OBSTETRICAL GUIDLLINES

■ Goals of the study

- Support the most common surgical procedure in the industrialized healthcare world
- To enhance the quality and safety of the cesarean delivery for improved maternal and fetal/neonatal outcomes through evaluation and audit
- Break down the surgical delivery process into “focused” pathway that starts 40-60 minutes before skin incision for both scheduled and unscheduled cesarean deliveries until hospital discharge

Our goals..

- Optimize and standardize patient care of patients undergoing Cesarean delivery
- Employ multimodal analgesia to reduce opioid consumption
- Encourage early mobilization and prevent complications, such as DVT
- Improve patient satisfaction
- Ultimately, we hope that through this improved patient care, we can reduce the length of stay



Prenatal Education CRUCIAL

- "What to expect" for Cesarean handout and EMMI video
- Activity/Safety
- Choosing pediatrician
- Obtain car seat
- Other patient education materials
 - Breastfeeding
 - Newborn care
 - Circumcision



Day(s) Prior to surgery

- Anesthesia pre-op evaluation
 - Explanation of post-op pain regimen
 - “What to expect” handout
- OB consents
- Labs
- Provide Boost Breeze to patient, to drink on way to hospital
- Provide antibacterial scrub to patient, to use the night before procedure

ERAS pathway for Cesarean delivery

UCSF Cesarean Delivery ENHANCED RECOVERY PATHWAY						
Inclusion Criteria: Scheduled C/S		Exclusions: Preeclampsia, urgent C/S, coagulopathy, failure to progress, arrest of descent, accreta				
ANESTHESIA	OB	NURSING	PATIENT	PEDIATRICS		
DAYS Before (72hr prior) Pre-Op evaluation by Anesthesia Provider Discuss Post-op pain regimen plan (i.e. Acetaminophen ATC, Ibuprofen ATC to minimize opioids) Provide patient with "What to expect" handout.	Patient education during antepartum visit Surgery scheduling, discharge planning initiation including confirming ride home date and time for discharge HUSC will ask providers if eligible for ERAS Informed Consent Enter pre-op orders (see below) Order CBC, RPR, T&S if primary C/S, T&C if repeat C/S or other risks	Provide patient with Boost Breeze Provide hibiclens Lactation RN consultation Verify Pediatrician (if none, baby will go to MZ Gen Peds Clinic) Verify to home health eligibility for pp check	Enroll in MyChart Receive Boost Breeze or other carbohydrate clear drink Review educational material (EMM and "What to Expect" handout) Use hibiclens night before surgery Obtain car seat, choose pediatrician	Patient education material re: breastfeeding, newborn care, circumcision, establishing PCP for baby		
	DOCS PRE-OP Review H&P Confirm NPO status & allergies Follow-up on preop labs Confirm appropriate T&S/T&C sent Blood in room if high risk of hemorrhage.	Complete consent, 24-hour update, risks/benefits note ORDERS Acetaminophen 1000mg PO once Bicitra 30mL PO once Skin-to-skin plan Partner in OR determination	Complete pre-op RN checklists Place PIV. Give crystalloid 200mL/hour up to 1 L. Acetaminophen & bicitra given with water (<50mL) Incentive Spirometry education Clipping in Triage SAGE Prep	No solids for 8 hours pre-op, can have clears up to 2 hours preop (surgery may be delayed if consumed later) Drink Boost Breeze prior to coming to hospital		
INTRA-OP HAZITIC SAB: 12-13.5mg bupivacaine, 100 mcg morphine, +/- 50 mcg epi, +/-10-15mcg fentanyl (to level of number to process, 1-5)	Fluids Fluids wide open during spinal, 25-40 mL/kg (IBW) crystalloid during case (excludes pt with ESRD, CHF)	Attending Time-out prior to placement of spinal	Set room temperature to 70°F	After arrival in OR, communicate with OB and Anesthesia re: comorbidities and meds given		
	TEMP Check & Maintain patient temperature above 36.0°C, Check that room temp set to 70°F	Test prior to skin incision. Confirm with adequate block prior to incision.	Place SCDs, turn on SCD machine.			
	MEDICATIONS ABX Antibiotic: Cefazolin 2g (3g if >120kg) PCN allergic: clindamycin 900mg IV + gentamicin 1.5mg/kg IV		After spinal, place Foley.			
	INCENTIVESPIROMETRY phenylephrine gtt (start at 35mcg/min during spinal placement)		Record FHR strip if time from spinal to prep >10min			
	PCNV Ondansetron 4mg IV x 1 at start of case Reglan 10mg IV x1 PRN N/V		Prep abdomen with chlorhexidine. Attach suction and bovie Get partner after drapes up			
		Call for Peds prior to delivery & communicate type of anesthesia				

<https://anesthesia.ucsf.edu/sites/anesthesia.ucsf.edu/files/wysiwyg/ERAS%20C-section%5B1%5D7-17.pdf>

UCSF Cesarean Delivery ENHANCED RECOVERY PATHWAY

Inclusions: Scheduled C/S

Exclusions: Preeclampsia, urgent C/S, coagulopathy, failure to progress, arrest of descent, accreta

ANESTHESIA		OB		NURSING	PATIENT	PEDS					
Antepartum Clinic visit		Patient education on "What to expect" for C-section, method of feeding, choosing pediatrician. Add Breastfeeding AVS. Schedule surgery. HUSC will ask providers if eligible for ERAS. Identify Pediatrician (refer to MZ, Laurel Heights, or China Basin)			Enroll in MyChart Review educational material (EMMI and "What to Expect" handout) Obtain car seat, choose pediatrician	Patient education material re: breastfeeding, newborn care, circumcision, establishing PCP for baby					
DAYS Before (72hr prior)	Pre-Op evaluation by Anesthesia Provider Discuss Post-op pain regimen plan (i.e. Acetaminophen ATC, Ibuprofen ATC to minimize opioids) Provide patient with "What to expect" handout.	Confirm surgery date/time. D/c planning initiation including confirming ride home date and time for d/c Informed Consent Enter pre-op orders (see below): Order CBC, RPR, T&S if primary C/S, T&C if repeat C/S or other risks		Provide Boost Breeze Provide hibiclens	Receive Boost Breeze or other carbohydrate clear drink Use hibiclens night before surgery						
DOS PRE-OP	Review H&P Confirm NPO status & allergies Follow-up on preop labs Confirm appropriate T&S/T&C sent Blood in room if high risk of hemorrhage.	Complete consent, 24-hour update, risks/benefits note	<table border="1"> <tr> <td rowspan="2" style="writing-mode: vertical-rl; transform: rotate(180deg);">ORDERS</td> <td>Acetaminophen</td> <td>1000mg PO once</td> </tr> <tr> <td>Bicitra</td> <td>30mL PO once</td> </tr> </table>	ORDERS	Acetaminophen	1000mg PO once	Bicitra	30mL PO once	Complete pre-op RN checklists Place PIV. Give crystalloid 200mL/hour up to 1 L Acetaminophen & bicitra given with water (<50mL)	No solids for 8 hours pre-op, can have clears up to 2 hours preop (surgery may be delayed if consumed later) Drink Boost Breeze prior to coming to hospital	
ORDERS	Acetaminophen	1000mg PO once									
	Bicitra	30mL PO once									
		Skin-to-skin plan Partner in OR determination	Incentive Spirometry education Clipping in Triage SAGE Prep								

Preoperative carbohydrate treatment for enhancing recovery after elective surgery (Review)

Smith MD, McCall J, Plank L, Herbison GP, Soop M, Nygren J

2014

- Preoperative carbohydrate treatment was associated with a small reduction in length of hospital stay when compared with placebo or fasting in adult patients undergoing elective surgery
- Aspiration pneumonitis was not reported in any patients, regardless of treatment group allocation.

Pre-op

- Antacid
- Acetaminophen
- IVF at 200mL/hour up to 1 liter
- Clipping in Triage
- SAGE prep
- Incentive spirometer instruction



INTRA-OP	FLUIDS	Fluids wide open during spinal; 25-40 mL/kg (IBW) crystalloid during case (excludes pt with ESRD, CHF)	Attending Time-out prior to placement of spinal	Set room temperature to 70°F	After arrival in OR, communicate with OB and Anesthesia re: co-morbidities and meds given			
		TEMP				Check & Maintain patient temp above 36.0°C, Check that room temp set to 70°F	Place SCDs, turn on SCD machine.	
	MEDICATIONS ABX	Antibiotic: Cefazolin 2g (3g if >120kg)				Test prior to skin incision. Confirm with adequate block prior to incision.	After spinal, place foley.	
		PCN allergic: clindamycin 900mg IV + gentamicin 1.5mg/kg IV						Record FHR strip if time from spinal to prep >10min
	INFUSIONS	phenylephrine gtt (start at 35mcg/min during spinal placement)						Prep abdomen with chlorhexidine.
	PONV	Ondansetron 4mg IV x 1 at start of case						Attach suction and bovie
		Reglan 10mg IV x1 PRN NV						Get partner after drapes up
	ANESTHETIC	SAB: 12-13.5mg bupivacaine, 100 mcg morphine, +/- 50 mcg epi, +/-10-15mcg fentanyl						Call for Peds prior to delivery & communicate type of anesthesia
		If labor epidural used, lidocaine 2% to T6 or higher level, 2mg morphine epidurally						Communicate skin & uterine incision & delivery times
		T6 level or higher to proceed. GA with RSI for inadequate level, patient refusal or contraindication of neuraxial						
	Tilt table 15° for LUD							

Intra-op

- Anesthesia team manages medications, airway
- OB team does timeout prior to anesthetic plan and prep for surgery
- Nursing team: EFM until abdominal prep, SCDs, foley, safety belt
- Peds: called to bedside before skin incision or at timing determined by acuity of the neonate ie anticipated resuscitation vs routine care

Intra-op



- Hypotension Prevention:
 - IV fluids during neuraxial placement
 - Vasopressors
- Spinal cocktail:
 - 12-13.5mg bupivacaine
 - 100mcg morphine
 - \pm 50mcg epinephrine
 - \pm 10-15mcg fentanyl
 - 25-40mL/kg (IBW) crystalloid
 - Ondansetron 4mg at start of case
 - Antibiotics
- Set room temperature to 70 degrees F
- Leg compression devices on
- Foley after spinal placed
- FHR if time from spinal to prep >10min
- Mother / Neonate skin-to-skin after birth

Anesthesia

OB

Nursing

Pt


Peds

Post-delivery	Pitocin 20units in 500mL infusion	Uterine massage after skin closure.	Skin-to-skin	Skin-to-skin bonding	Vitamin K injection, erythromycin within 1 hour of delivery
	If poor tone, Methergine 0.2mg IM (avoid in HTN) OR Hemabate 0.25mg IM (avoid in asthma) OR Misoprostol 800 PR/buccal	Communicate uterine tone to anesthesia	ID bands to mother and baby		
	If asked, give azithromycin 500mg IV over 1 hr				
		Ask Anesthesia for Azithromycin if indicated.	RN obtains additional uterotonics from PYXIS as needed		
	If no duramorph given, b/l TAP blocks: Ropivacaine 0.2% 20cc per side	Attending/Fellow Debrief at end of case, including EBL			
PACU	MEDICATIONS	Pain management per anesthesia for 24hrs post-delivery if neuraxial opioid given. Oxycodone 5-10mg PO q3h PRN moderate pain Hydromorphone 0.2-0.6mg IV q2h PRN severe pain Ondansetron 4mg IV PRN NV	Labs: only if indicated	Oxycodone PO PRN moderate pain Hydromorphone IV PRN severe pain Complete Anesth-RN signout card	Incentive Spirometry x10 q 1H



Chew Gum!

It's the Doctor's
orders



Believe it or not, chewing gum 4 times each day will help your body recover from surgery. Chewing gum tricks your body into thinking that you're eating so that your bowels wake up more quickly after surgery.

FLOOR POD 0	<p>Hydromorphone PCA +/- TAP block if inadequate analgesia. Anesthesia will order hydromorphone PCA.</p>	<p>Use order set 2293</p>	<p>MEDICATIONS</p> <table border="1"> <tr> <td>Acetaminophen*</td> <td>1000mg PO q8H ATC</td> </tr> <tr> <td>Ketorolac**</td> <td>30mg IV q8H ATC x 3 doses</td> </tr> <tr> <td colspan="2">Oxycodone 5-10mg q4h PRN moderate pain, hydromorphone 0.2-0.6mg IV q2h PRN severe pain.</td> </tr> <tr> <td colspan="2">d/c Hydromorphone PCA if used by POD#1 Noon</td> </tr> <tr> <td colspan="2">Bowel regimen: Colace 250mg PO BID + Senna 17.2mg PO qbedtime + Milk of Magnesia 30mL daily, Miralax 17g daily PRN constipation, Bisacodyl 10mg suppository PRN#2</td> </tr> <tr> <td colspan="2">DVT PPx: SCDs when in bed; Lovenox 40mg SQ QD starting 12-24 hr postop if high risk (hx VTE, thrombophilia, C-hyst, transfused >4 RBC, >2 uterotonics given, GA, IR embolization, ICU, BMI>40, surgical time>2hr) to continue until fully ambulating</td> </tr> <tr> <td colspan="2">Labs: only if indicated</td> </tr> <tr> <td colspan="2">Evaluate wound. Assess pain control.</td> </tr> </table>	Acetaminophen*	1000mg PO q8H ATC	Ketorolac**	30mg IV q8H ATC x 3 doses	Oxycodone 5-10mg q4h PRN moderate pain, hydromorphone 0.2-0.6mg IV q2h PRN severe pain.		d/c Hydromorphone PCA if used by POD#1 Noon		Bowel regimen: Colace 250mg PO BID + Senna 17.2mg PO qbedtime + Milk of Magnesia 30mL daily, Miralax 17g daily PRN constipation, Bisacodyl 10mg suppository PRN#2		DVT PPx: SCDs when in bed; Lovenox 40mg SQ QD starting 12-24 hr postop if high risk (hx VTE, thrombophilia, C-hyst, transfused >4 RBC, >2 uterotonics given, GA, IR embolization, ICU, BMI>40, surgical time>2hr) to continue until fully ambulating		Labs: only if indicated		Evaluate wound. Assess pain control.		<p>Vital signs q4, I&O qshift, incision care.</p> <p>Advance to regular diet</p> <p>Encourage incentive spirometry</p> <p>Dangle feet at bedside by 6 hr postop.</p> <p>Foley catheter to gravity. Try to walk to bathroom by 8hr postop. D/c foley 8-12 hours after c/s if able to walk to bathroom. Notify HO if not out by 12 hr</p> <p>Out of bed (OOB) with RN, SCDs when in bed</p> <p>If pain not well controlled for 1st 24hrs postop, call Anesthesia</p> <p>Notify Peds if circumcision desired</p>	<p>Ankle pumps and circles in bed, 10x every hour</p> <p>Advance to regular diet</p> <p>Incentive Spirometry x10 q1H</p> <p>Out of bed (OOB) with RN, SCDs when in bed</p> <p>Baby Vitamin K injection, erythromycin eye ointment</p> <p>Decide if circumcision desired/notify RN</p>	<p>Check with patient if circumcision desired</p> <p>Assessment by nursery provider</p>
Acetaminophen*	1000mg PO q8H ATC																					
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Labs: only if indicated																						
Evaluate wound. Assess pain control.																						
FLOOR POD 1	<p>Post-op assessment for PDPH, nerve injury, urinary retention, pain control</p>	<p>MEDICATIONS</p> <table border="1"> <tr> <td>Acetaminophen*</td> <td>1000mg PO q8H ATC</td> </tr> <tr> <td>Ibuprofen**</td> <td>600mg PO q6h ATC</td> </tr> <tr> <td colspan="2">Oxycodone 5-10mg q4h PRN moderate pain, hydromorphone 0.2-0.6mg IV q2h PRN severe pain.</td> </tr> <tr> <td colspan="2">d/c Hydromorphone PCA if used by POD#1 Noon</td> </tr> <tr> <td colspan="2">Continue POD#0 bowel regimen</td> </tr> <tr> <td colspan="2">DVT PPX: SCDs when in bed; Continue POD#0 DVT PPx plan</td> </tr> </table>	Acetaminophen*	1000mg PO q8H ATC	Ibuprofen**	600mg PO q6h ATC	Oxycodone 5-10mg q4h PRN moderate pain, hydromorphone 0.2-0.6mg IV q2h PRN severe pain.		d/c Hydromorphone PCA if used by POD#1 Noon		Continue POD#0 bowel regimen		DVT PPX: SCDs when in bed; Continue POD#0 DVT PPx plan		<p>Vital Signs q 4H, I&O shift, weight daily, surgical incision care, bowel assessment</p> <p>Lactation consultation</p> <p>DVT ppX: SCDs</p> <p>Regular Diet</p> <p>Encourage ambulation</p>	<p>Sit up in chair for all meals.</p> <p>Lactation Consultation</p> <p>Incentive Spirometry x10 q1hr</p> <p>Regular Diet</p> <p>Ambulate with assistance</p>	<p>Confirm baby PCP (if none, discuss with Peds team)</p> <p>Assessment by nursery provider</p> <p>Newborn screen at 24hr of life</p>					
Acetaminophen*	1000mg PO q8H ATC																					
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d/c Hydromorphone PCA if used by POD#1 Noon																						
Continue POD#0 bowel regimen																						
DVT PPX: SCDs when in bed; Continue POD#0 DVT PPx plan																						

Post-op

■ Goal: early mobilization and prevent DVTs

- Ketorolac in PACU
 - Incentive spirometer
 - Dangle legs by 6 hours
 - Foley out by 12 hours
 - Lactation consultation
 - POD#0: OOB with assistance, SCDs when in bed, advance to regular diet, bowel regimen
 - POD#1: OOB with assistance, chair for meals
 - POD#2: Ambulate 3x/day
- SCDs while in bed
 - Lovenox 40 mg subQ daily at 12 hours post-op if high risk until fully ambulating:
 - Hx VTE, thrombophilia
 - C-hyst
 - Transfused >4 units RBC
 - >2 uterotonics given
 - GA
 - IR embolization
 - ICU
 - BMI >40
 - Surgical time >2 hours

- Pharmacologic prophylaxis (LMWH) recommended → **one major** or **two or more minor** risk factors
- Mechanical prophylaxis recommended → contraindications to pharmacologic prophylaxis

MAJOR RISK FACTORS	MINOR RISK FACTORS
<ul style="list-style-type: none"> • Immobility (strict bed rest ≥ 1 week in the antepartum period) • Postpartum haemorrhage ≥ 1000 mL with surgery • Previous VTE • Preeclampsia with fetal growth restriction • Thrombophilia <ul style="list-style-type: none"> Antithrombin deficiency Factor V Leiden (homozygous or heterozygous) Prothrombin G20210A (homozygous or heterozygous) • Medical conditions <ul style="list-style-type: none"> Systemic Lupus erythematosus Heart disease Sickle cell disease • Blood transfusion • Postpartum infection 	<ul style="list-style-type: none"> • BMI > 30 kg/m² • Multiple pregnancy • Emergency caesarean • Smoking > 10 cigarettes/day • Fetal growth restriction • Thrombophilia <ul style="list-style-type: none"> Protein C deficiency Protein S deficiency • Preeclampsia <p><i>Chest, Feb 2012; 141</i></p>

Post-op pain control: multimodal

- Maximizing non-opioid analgesics
 - Acetaminophen ATC
 - Ketorolac for 1st 24 hours, then ibuprofen ATC
 - Oxycodone PRN
 - Dilaudid IV PRN breakthrough pain not controlled by above
- Regimen typically in PACU only.
-

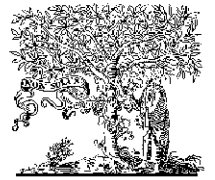


NSAIDs

On-Demand vs. Fixed-Interval

	<i>Fixed time interval group</i>	<i>On-demand group</i>	<i>P values</i>
No. of analgesic doses in first 24 h	4.65 ± 1.32 (5) 1-6†	3.61 ± 0.4 (3) 3-6†	<.001*
Time from delivery to first analgesic dose (h)	3.1 ± 0.4 (3)	5.15 ± 2.2 (5)	<.001‡
Time from first to second analgesic dose (h)	3.07 ± 0.5 (3)	5.78 ± 3.4 (4.5)	<.001‡
Pain score at first analgesic dose	33.3 ± 33.1 (18) n = 54	72.3 ± 25 (77) n = 60	<.001‡
Pain score at second analgesic dose	45.2 ± 29.5 (44) n = 54	78.3 ± 18.7 (85) n = 59	<.001‡
Pain score at third analgesic dose	48.0 ± 28.8 (43) n = 54	77.4 ± 22.4 (87) n = 50	<.001‡
Overall satisfaction score	87.5 ± 18.8 (94.5)	78.6 ± 21 (85)	<.001*

Fixed-interval NSAID dosing provides more effective post-operative cesarean analgesia and results in better patient satisfaction compared to on-demand dosing.



ELSEVIER

www.obstetanesesthesia.com

ORIGINAL ARTICLE

Scheduled acetaminophen with as-needed opioids compared to as-needed acetaminophen plus opioids for post-cesarean pain management

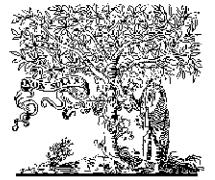
A.R. Valentine,^a B. Carvalho,^b T.A. Lazo,^b E.T. Riley^b

^aStanford University School of Medicine, Stanford, CA, USA

^bDepartment of Anesthesia, Stanford University Medical Center, Stanford, CA, USA

- Review of 240 records (120 each group)
- IT morphine 200 mcg
- 15mg ketorolac or 600mg ibuprofen q 6hrs

- 1) Scheduled acetaminophen (650 q 6hrs with oxycodone prn)
- 2) PRN combination opioid-acetaminophen



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ORIGINAL ARTICLE

Scheduled acetaminophen with as-needed opioids compared to as-needed acetaminophen plus opioids for post-cesarean pain management

A.R. Valentine,^a B. Carvalho,^b T.A. Lazo,^b E.T. Riley^b

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Scheduled acetaminophen (650 q 6hrs with oxycodone prn)

- Less opioid use first 48 hours 14mg vs 23mg ($p < .0001$)
- Less acetaminophen use (17% of prn group > 3g)



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Table 2 Analgesic use and pain scores

	As-needed Group (n=120)	Scheduled Group (n=120)	<i>P</i> value
Patients requiring opioids	100 (83%)	86 (72%)	0.03
Patients requiring intravenous morphine	24 (20%)	21 (18%)	0.62
Mean VPS <24 h post cesarean	2 ± 1	1 ± 1	0.02
Mean VPS ≥24–48 h post cesarean	2 ± 1	2 ± 1	0.98
Maximum VPS <24 h post cesarean	5 ± 2	4 ± 3	0.04
Maximum VPS ≥24–48 h post cesarean	5 ± 2	5 ± 2	0.92

Data are number (percentage) or mean ± SD; VPS: verbal pain score.

Postoperative Days- postpartum care

FLOOR POD 2		MEDICATIONS				
FLOOR POD 3		Acetaminophen*	1000mg PO q8H ATC	daily, surgical incision care abdomen, bowel assessment	Walk 3 times a day	Circumcision by POD2 (if desired and timing clinically appropriate)
		Ibuprofen**	600mg PO q6h ATC	Ambulation 3x a day	Incentive Spirometry x10 q1hr	Assessment by nursery provider
		Oxycodone 5-10mg q4h PRN moderate pain, hydromorphone 0.2-0.6mg IV q2h PRN severe pain.		Regular Diet	Regular Diet	Assessment by nursery provider
		Continue POD#0 bowel regimen and DVT PPx plan		SCDs while in bed	SCDs while in bed	
		TdaP, flu shot prior to discharge		Confirm ride home and discharge time for POD#3	Confirm ride home and discharge time for POD#3	Confirm peds follow-up visit and discharge time for POD#3
		Evaluate wound. Assess pain control. If pain not well controlled, consult Anesthesia.		Confirm TdaP and flu shot Discharge NP: Meds to Bed request (if eligible) for discharge meds below. Confirm follow-up clinic visit.	TdaP and flu shot	
		Use orderset 2294 for discharge meds, but change Oxycodone to #25		Vital Signs q8h, I&O shift, weight daily, surgical incision care abdomen, bowel assessment	Walk 3 times a day	Assessment by nursery provider
		Acetaminophen*	1000mg PO q8H ATC			
		Ibuprofen**	600mg PO q6h ATC	Ambulation 3x a day	Incentive Spirometry x10 q1hr	Check with nursery team that baby is ready for discharge.
		Oxycodone 5-10mg q4h PRN moderate pain, hydromorphone 0.2-0.6mg IV q2h PRN severe pain.		Regular Diet	Regular Diet	* If baby is not ready for discharge, mother can remain admitted with baby through 96 hours
		Continue POD#0 bowel regimen and DVT PPx plan		SCDs while in bed		
		Goal discharge ready by noon		Regular Diet		
		Rx: Ibuprofen 600mg PO q6h ATC x 3 days, then PRN. #60, 1 Refill.		SCDs while in bed		
		Rx: Acetaminophen 1000mg PO q8H ATC x 3 days, then PRN. #50, no refills		Prior to discharge, notify Anesthesia if any headache, back pain, neurologic symptoms		
		Rx: Oxycodone 5-10mg PO q4h PRN #25, no refills				
		Bowel Regimen Rx: Colace 250mg BID PRN constipation #60, Refill 1, Senna 8.6-17.2mg BID PRN constipation #120, Refill 1,				
		Rx: Ferrous sulfate 325mg PO daily #30, 2 Refills				

Post-Op Bowel Regimen

- SO important alongside effective pain med regimen!

- Colace 250mg PO, BID
- Senna 17.2mg PO q bedtime
- Milk of Magnesia 30mL daily,
- Miralax 17g daily PRN constipation,
- Bisacodyl 10mg suppository PRN#2

Before D/C: Plan for Follow-Up

		<p>Evaluate wound. Assess pain control. If pain not well controlled, consult Anes.</p> <p>Tdap, flu shot prior to discharge</p> <p>Check with nursery team that baby is ready for discharge.*</p>			
POST-D/C	6 WEEK	Evaluate wound. Assess pain control.	Screen for post-partum depression	Decrease opioids slowly. No driving while on opioids.	

*Order regular acetaminophen dosing (1g po q8h) if the patient has normal liver function, lower dose acetaminophen (650mg po q8h) if ALT between 300-500. Avoid acetaminophen if ALT > 500.

**Avoid NSAIDs if the patient has preeclampsia with severe features (BP \geq 150/100, Cr \geq 1.1, or Plt \leq 100K), kidney disease, cardiac disease

Readiness for Discharge

- Goal “ready” for discharge by POD#2/3
 - Lactation Consult – POD# 1
 - Circumcision – POD#2
 - Car seat & Tdap/Flu shot – POD#2
 - Appointments for OB and Peds confirmed prior to D/C



Early lactation support benefits

Compliance (cont)

Count (%)	Sept 2017 n=61	Oct 2017 n=62	Nov 2017 N=64	Dec 2017	Jan 2018 N=55	Feb 2018 N=50	Mar 2018 n=63	Apr 2018 n=57	May 2018 n=73	June 2018 N=37	July 2018 N=68	Aug 2018
Skin to Skin within 30 min	34 (56%)	36 (58%)	44 (69%)	39 (53%)	34 (62%)	30 (60%)	35 (56%)	29 (51%)	49 (67%)	19 (51%)	42 (62%)	28 (49%)
Any skin to skin in OR	34 (56%)	37 (60%)	50 (78%)	42 (57%)	35 (64%)	30 (60%)	35 (56%)	30 (53%)	49 (67%)	21 (51%)	42 (62%)	32 (56%)
POD#1 Lactation c/s	13 (21%)	13 (21%)	35 (55%)	26 (35%)	16 (29%)	15 (30%)	24 (38%)	21 (37%)	21 (29%)	19 (51%)	18 (26%)	31 (54%)

Count (%)	Sept 2018 n=56	Oct 2018 n=70	Nov 2018 N=64	Dec 2018	Jan 2019 N=	Feb 2019 N=	Mar 2019 n=	Apr 2019 n=	May 2019 n=	June 2019 N=	July 2019 N=	Aug 2019
Skin to Skin within 30 min	33 (59%)	41 (59%)										
Any skin to skin in OR	34 (61%)	46 (66%)										
POD#1 Lactation c/s	35 (63%)	34 (49%)										

Skin to Skin in OR when stable



Breastfeeding & bonding support

- What support is present during C/S recovery?
- Lack of confidence with breastfeeding skills/latch is often very impactful on patients as far as feeling ready for D/C
- Goal of a LATCH score documented at least q shift and referral to lactation consultant or specialist early for challenges in addition to bedside nurse assistance with breastfeeding.

ERAS from before admission

- Consistency on scripting and patient education is key for the success of ERAS implementation on your unit.
- From pre-op education and admission to reiterating key milestones during the patient stay, will all increase the success of meeting ERAS goals and patient readiness for discharge.

Additional Interventions that improve ERAS outcomes:

1) Foley: goal of removed by 12 hrs

Foley

Metric (count, %)	Sept 2017 N =61	Oct 2017 N=62	Nov 2017 N=64	Dec 2017 N=74	Jan 2018 N=55	Feb 2018 N=50	Mar 2018 n=63	Apr 2018 n=57	May 2018 n=73	June 2018 N=37	July 2018 N=68	Aug 2018 n=57
Foley removed <12 hours	24 (39%)	35 (57%)	23 (26%)	34 (46%)	18 (33%)	15 (30%)	17 (27%)	18 (32%)	30 (41%)	20 (54%)	25 (37%)	21 (37%)
Foley removed <24 hours	52 (85%)	49 (79%)	58 (91%)	63 (85%)	44 (80%)	37 (74%)	51 (81%)	46 (81%)	62 (85%)	36 (97%)	62 (91%)	48 (84%)

Metric (count, %)	Sept 2018 N =56	Oct 2018 N=70	Nov 2018 N=	Dec 2018 N=	Jan 2019 N=
Foley removed <12 hours	26 (46%)	21 (29%)			
Foley removed <24 hours	50 (89%)	62 (89%)			

Goal to decrease opioid use in ERAS: Oral Morphine Equivalent (OME) data

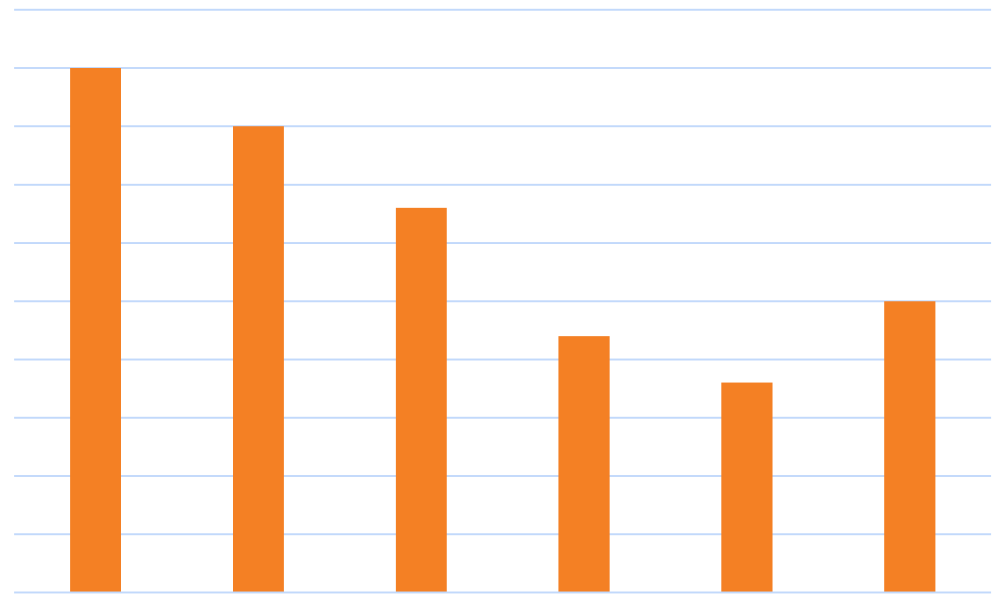
Oral Morphine Equivalents (mg)	non-ERAS	ERAS	p-value	% decrease in OME
0-12hr postop	0 [0, 10]	0 [0, 15]	0.247	
12-24 hr postop	8 [0, 16.57]	0 [0, 15]	0.009*	100%
24-36 hr postop	10 [5, 20]	7.5 [0, 22.5]	0.016*	25%
36-48 hr postop	10 [0, 20]	0 [0, 22.5]	< 0.001*	100%
48-72 hr postop	20 [5, 35]	7.5 [0, 22.5]	< 0.001*	63%
72-96hr Post-op OME	10 [0, 25]	0 [0, 11.5]	< 0.001*	100%

Goal of tolerable pain level for pt achieved Pain Scores (Scale of 0 to 10)

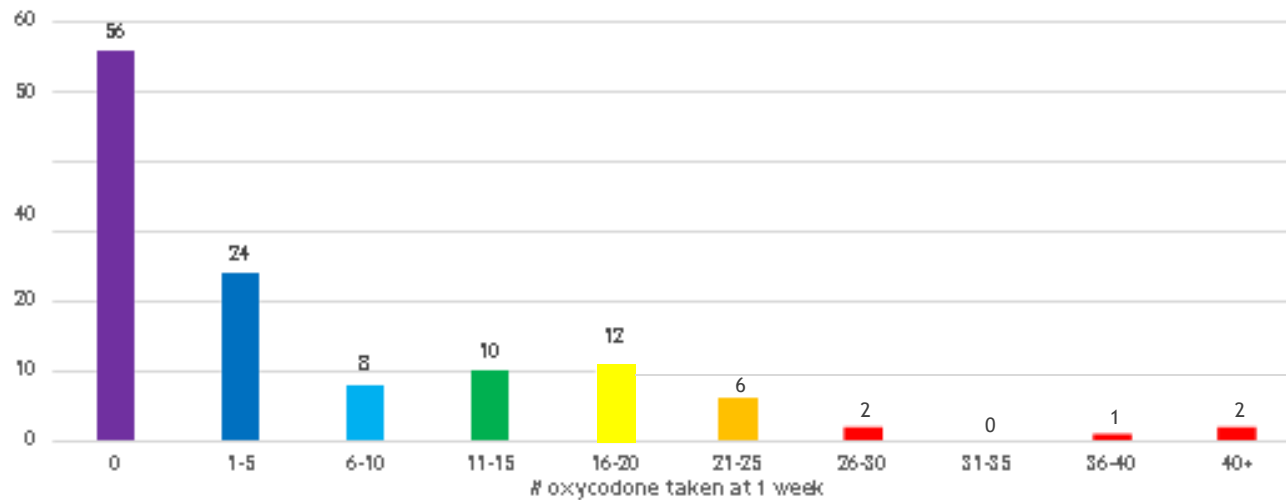
Highest NRS Pain Score	non-ERAS	ERAS	p-value
0-12hr Postop	0 [0, 4.5]	0 [0, 5]	0.7008
12-24hr Postop	3 [0, 5)	0 [0, 6]	0.0132*
24-36 hr Postop	4 [0,6]	0 [0, 6]	< 0.001*
36-48hr Postop	3 [0, 5)	0 [0, 5]	< 0.001*
48-72hr Postop	4 [0,6]	0 [0, 6]	< 0.001*
72-96hr Postop	3 [0, 5)	0 [0, 3]	< 0.001*

Goal of less use of opioid use post D/C! Discharge Oxycodone reduction began (March – July 2017)

- 186 responses out of 448 possible (41.5% response rate)
- 135/186 filled prescription (72.5%)
- Practice change: 20 pills prescribed instead of 40



of Oxycodone Taken in first week postop



From 2017 until now: continued

Discharge meds

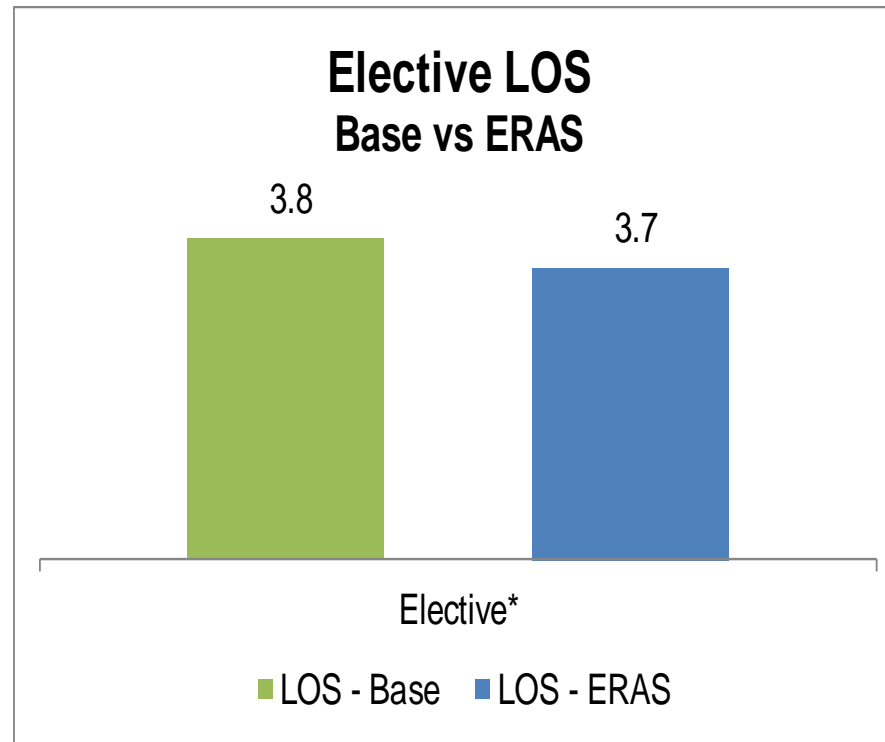
Metric (count, %)	Sept 2017 n=61	Oct 2017 n=62	Nov 2017 N=64	Dec 2017	Jan 2018	Feb 2018 N=50	Apr 2018 n=57	May 2018 n=73	June 2018 n=37	July 2018 N=68	Aug 2018 n=57	Sep 2018 n=56	Oct 2018 n=70
Orderset 2294 (discharge meds) used?	45 (74%)	56 (90%)	59 (92%)	65 (88%)	50 (91%)	45 (90%)	55 (96%)	58 (80%)	33 (89%)	61 (90%)	46 (81%)	47 (84%)	51 (73%)
Oxycodone ordered for discharge	55 (90%)	56 (90%)	54 (84%)	68 (92%)	50 (91%)	44 (88%)	43 (75%)	61 (84%)	27 (73%)	51 (75%)	45 (79%)	35 (63%)	49 (70%)

- In June: one person received Percocet 5-325
- In August: 15 prescribed #20; 40 prescribed #20 or less; 5 greater than #20
- In Sept: **2 people prescribed 5-325!** 30 prescribed #20 or less; 5 greater than #20



ERAS for Elective C/D

- 170 “elective” C-sections from Sept 2016-March 2017
- LOS decreased 0.1 day post-implementation



Reduction in LOS with ERAS implemented

Average Length of Stay (LOS)

	Baseline (Feb 2015-Aug 2016)	Sept 2016-May 2017	June 2017 n=64	July 2017 n=67	Aug 2017 n=43	Sept 2017 n=61	Oct 2017 n=62	Nov 2017 N=64	Dec 2017 n=74	Jan 2018 N=55	Feb 2018 N=50	Mar 2018 n=63	Apr 2018 n=57
Overall LOS (days)			6.33	5.85	6.12	6.13	5.31	5.16	5.53	5.6	4.76	5.44	5.44
Post-op LOS (days)	3.9	3.8	3.81	4.01	3.77	3.83	3.94	3.80	3.89	4.05	3.82	4.02	3.60
	May 2018 n=73	June 2018 N=37	July 2018 N=68	Aug 2018 N=57	Sept 2018 N=56	Oct 2018 n=70							
Overall LOS (days)	5.44	4.27	5.06	5.11	5.91	4.47							
Post-op LOS (days)	3.70	3.43	3.56	3.35	3.5	3.45							

Goal <5.2 days overall LOS



Summary

- Enhanced recovery pathways have been shown in a variety of post-operative settings to provide benefit both to patients & to health care institutions
- Patient centered and multidisciplinary team approach makes all the difference in the success.
- There is always room for Improvement!

Bottom Line

- While there are many system challenges to overcome, collaboration with patients, obstetricians, nursing, OB anesthesia, pediatricians and medical support staff can result in successful implementation of an ERAS pathway
- Don't reinvent the wheel!



Any Questions?!

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Thank you!