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# Implementing Enhanced Recovery After Surgery

*Ankit Sarin MD, MHA*

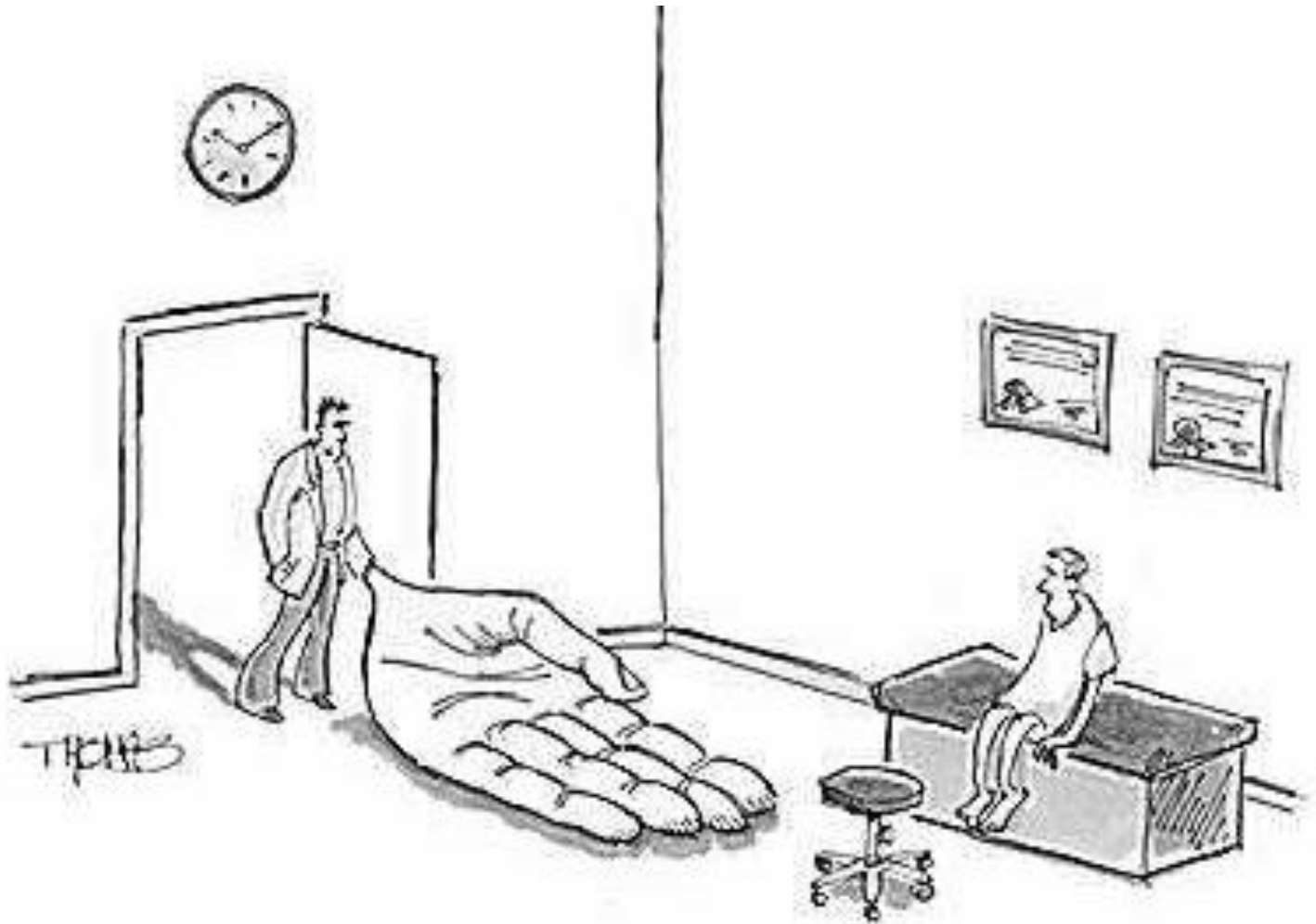
*Assistant Professor*

*Colon and Rectal Surgery*

*University of California, San Francisco*

Southern California Patient  
Safety First Collaborative,  
City of Industry, California

Thursday, June 9th, 2016

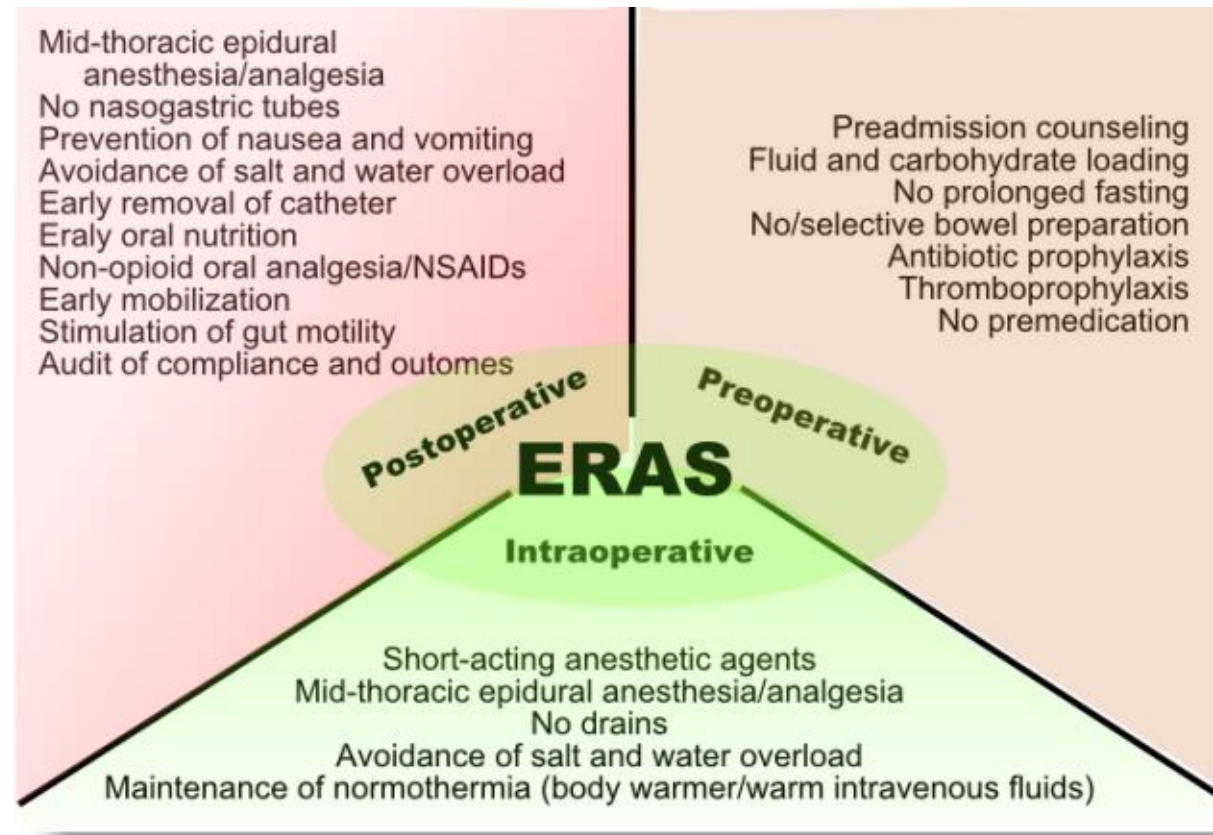


***“Hi, I’m Ankit Sarin, your proctologist”***

I have no disclosures

# Background

- **Over the last 20 years there have been significant changes to the way surgical care is conducted.**
- **Data showing improved outcomes with early feeding, fluid restriction, standardized anesthesia approaches and pain medication regimes, ambulation and non use of tubes have been met with resistance**
- **In order to address this challenge evidence based programs have been initiated that have proven to improve outcomes and patient satisfaction.**

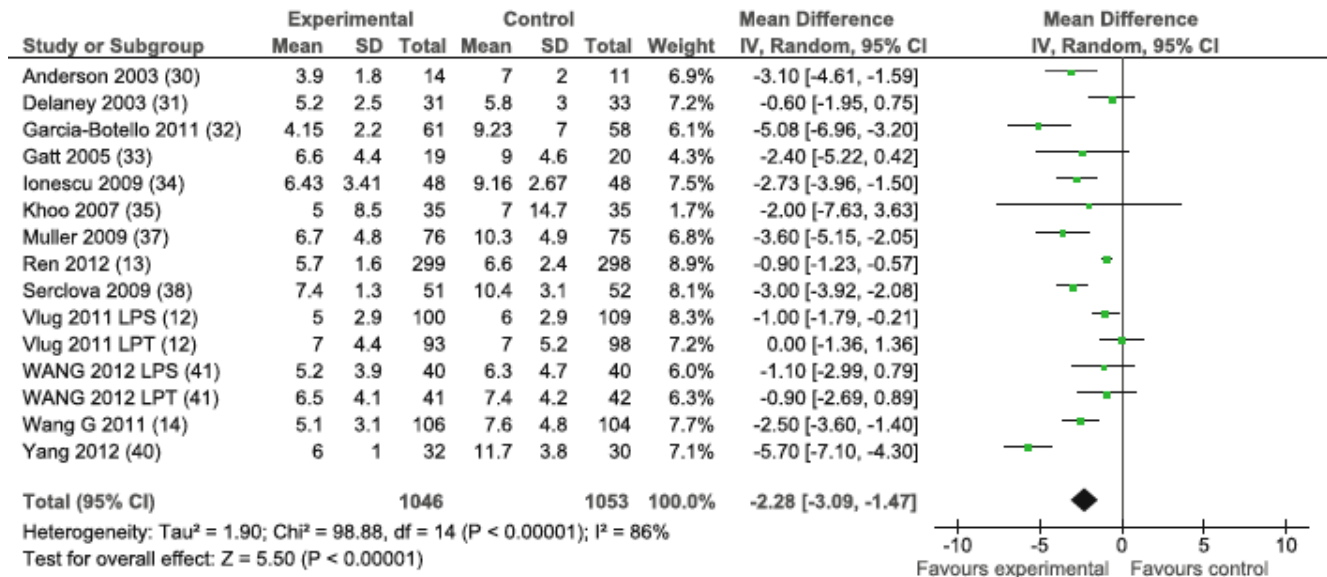


A combination of evidence based perioperative strategies which work synergistically to expedite recovery after surgery

# We know ERAS Programs Work

Author	Design	Year	Number of patients		PHS (days)		THS (days)		Morbidity (%)		Readmission (%)		Mortality (%)	
			TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS
Teewen <sup>20</sup>	CCT	2010	122	61	9	6					2	3	1.6	0
Muller <sup>18</sup>	RCT	2009	75	76	10.3	6.7			49	21	3	4		
Serclova <sup>14</sup>	RCT	2009	52	51	10.4	7.4			48	22	0	0		
Khoo <sup>5</sup>	RCT	2007	35	35	7	5	7	5	46	26	3	9	6	0
Polle <sup>13</sup>	CCT	2007	52	55	6	4	6.5	4	31	27	6	11	0	0
Kariv <sup>21</sup>	CCT	2007	97	97							20	24	0	0
Wichmann <sup>24</sup>	CCT	2007	20	20	9.7	6.7								
Gatt <sup>4</sup>	RCT	2005	20	19	9	6.6			75	47	20	5	0	5
Basse <sup>7</sup>	CCT	2004	130	130	10	3.3	13	5.5	55	26	12	21	3	5
Raue <sup>22</sup>	CCT	2004	29	23					21	4	3	9	0	0
Anderson <sup>30</sup>	RCT	2003	11	14	7	4			45	29	0	0	9	0
Delaney <sup>12</sup>	RCT	2003	33	31	5.8	5.2	7.1	5.4	30	23	18	10		
Stephen <sup>23</sup>	CCT	2003	52	86	6.6	3.7	6.9	4.2	25	11	2	9		

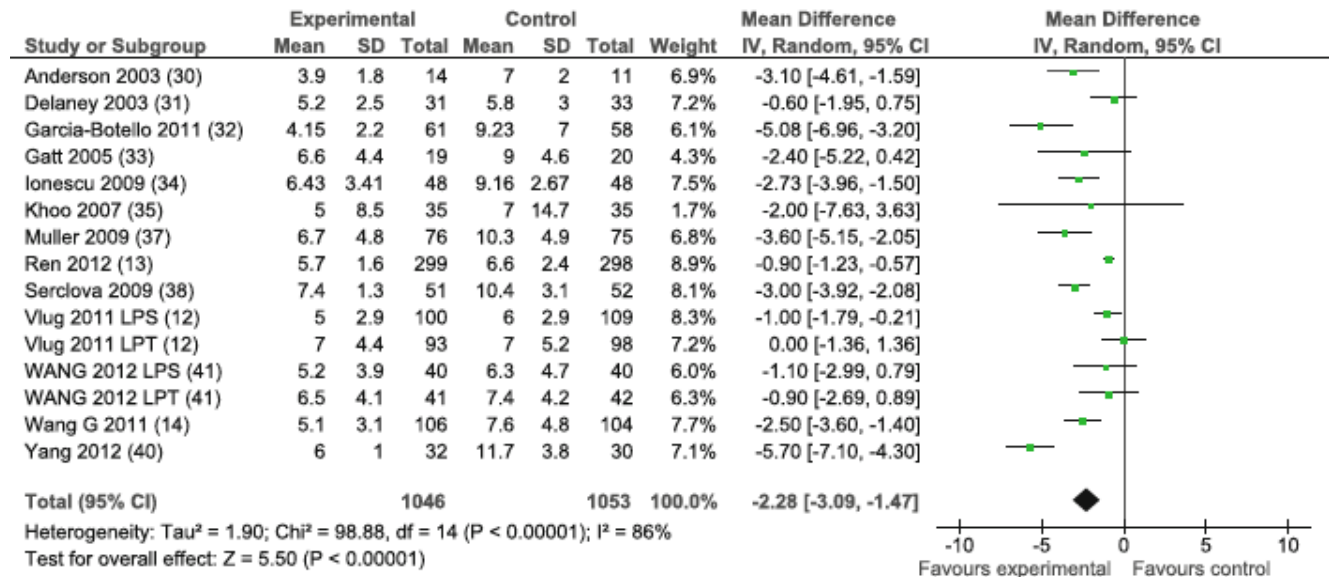
PHS – primary hospital stay; THS – total hospital stay; TC – traditional care; ERAS – enhanced recovery after surgery; CCT – clinical controlled trial; RCT – randomised controlled trial



# We know ERAS Programs Work

Author	Design	Year	Number of patients		PHS (days)		THS (days)		Morbidity (%)		Readmission (%)		Mortality (%)	
			TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS
Teewen <sup>20</sup>	CCT	2010	122	61	9	6					2	3	1.6	0
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Serclova <sup>14</sup>	RCT	2009	52	51	10.4	7.4			48	22	0	0		
Khoo <sup>5</sup>	RCT	2007	35	35	7	5	7	5	46	26	3	9	6	0
Polle <sup>13</sup>	CCT	2007	52	55	6	4	6.5	4	31	27	6	11	0	0
Kariv <sup>21</sup>	CCT	2007	97	97							20	24	0	0
Wichmann <sup>24</sup>	CCT	2007	20	20	9.7	6.7								
Gatt <sup>4</sup>	RCT	2005	20	19	9	6.6			75	47	20	5	0	5
Basse <sup>7</sup>	CCT	2004	130	130	10	3.3	13	5.5	55	26	12	21	3	5
Raue <sup>22</sup>	CCT	2004	29	23					21	4	3	9	0	0
Anderson <sup>30</sup>	RCT	2003	11	14	7	4			45	29	0	0	9	0
Delaney <sup>12</sup>	RCT	2003	33	31	5.8	5.2	7.1	5.4	30	23	18	10		
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# We know ERAS Programs Work

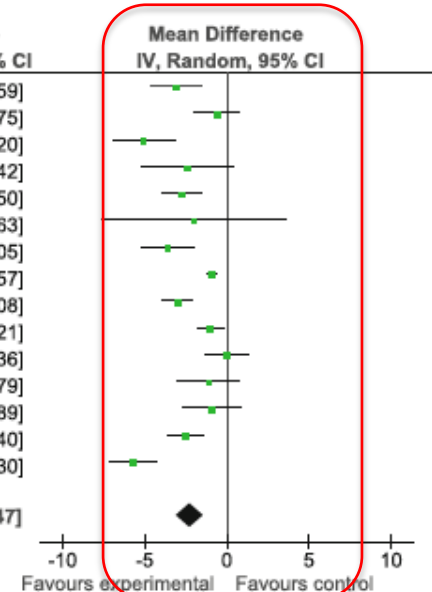
Author	Design	Year	Number of patients		PHS (days)		THS (days)		Morbidity (%)		Readmission (%)		Mortality (%)	
			TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS	TC	ERAS
Teewen <sup>20</sup>	CCT	2010	122	61	9	6					2	3	1.6	0
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Serclova <sup>14</sup>	RCT	2009	52	51	10.4	7.4			48	22	0	0		
Khoo <sup>5</sup>	RCT	2007	35	35	7	5	7	5	46	26	3	9	6	0
Polle <sup>13</sup>	CCT	2007	52	55	6	4	6.5	4	31	27	6	11	0	0
Kariv <sup>21</sup>	CCT	2007	97	97							20	24	0	0
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Raue <sup>22</sup>	CCT	2004	29	23					21	4	3	9	0	0
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Study or Subgroup	Experimental			Control			Weight	Mean Difference IV, Random, 95% CI
	Mean	SD	Total	Mean	SD	Total		
Anderson 2003 (30)	3.9	1.8	14	7	2	11	6.9%	-3.10 [-4.61, -1.59]
Delaney 2003 (31)	5.2	2.5	31	5.8	3	33	7.2%	-0.60 [-1.95, 0.75]
Garcia-Botello 2011 (32)	4.15	2.2	61	9.23	7	58	6.1%	-5.08 [-6.96, -3.20]
Gatt 2005 (33)	6.6	4.4	19	9	4.6	20	4.3%	-2.40 [-5.22, 0.42]
Ionescu 2009 (34)	6.43	3.41	48	9.16	2.67	48	7.5%	-2.73 [-3.96, -1.50]
Khoo 2007 (35)	5	8.5	35	7	14.7	35	1.7%	-2.00 [-7.63, 3.63]
Muller 2009 (37)	6.7	4.8	76	10.3	4.9	75	6.8%	-3.60 [-5.15, -2.05]
Ren 2012 (13)	5.7	1.6	299	6.6	2.4	298	8.9%	-0.90 [-1.23, -0.57]
Serclova 2009 (38)	7.4	1.3	51	10.4	3.1	52	8.1%	-3.00 [-3.92, -2.08]
Vlug 2011 LPS (12)	5	2.9	100	6	2.9	109	8.3%	-1.00 [-1.79, -0.21]
Vlug 2011 LPT (12)	7	4.4	93	7	5.2	98	7.2%	0.00 [-1.36, 1.36]
WANG 2012 LPS (41)	5.2	3.9	40	6.3	4.7	40	6.0%	-1.10 [-2.99, 0.79]
WANG 2012 LPT (41)	6.5	4.1	41	7.4	4.2	42	6.3%	-0.90 [-2.69, 0.89]
Wang G 2011 (14)	5.1	3.1	106	7.6	4.8	104	7.7%	-2.50 [-3.60, -1.40]
Yang 2012 (40)	6	1	32	11.7	3.8	30	7.1%	-5.70 [-7.10, -4.30]
<b>Total (95% CI)</b>			<b>1046</b>			<b>1053</b>	<b>100.0%</b>	<b>-2.28 [-3.09, -1.47]</b>

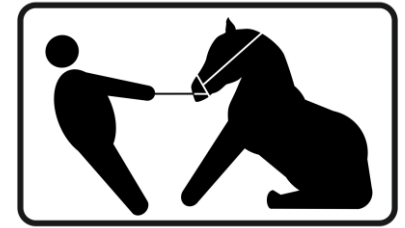
Heterogeneity: Tau<sup>2</sup> = 1.90; Chi<sup>2</sup> = 98.88, df = 14 (P < 0.00001); I<sup>2</sup> = 86%

Test for overall effect: Z = 5.50 (P < 0.00001)





# However Change is Hard



- Major difficulties arise when introducing evidence based clinical guidelines into routine practice
- Many features of ERAS protocols are not instantly intuitive and, therefore, pose natural barriers
- Current colorectal practice differs greatly from the current available evidence
- Adherence rate to ERAS protocols has been shown to be low in the postoperative phase with less than half of patients completing some aspect of postoperative recovery.

- **EXAMPLE OF AN ERAS PROGRAM**
- **BARRIERS TO IMPLEMENTATION**
- **FACILITATORS THAT CAN AID IMPLEMENTATION**

## Department of Surgery Enhanced Recovery After Surgery

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PATIENT CENTER ▾


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### Surgical Director



Ankit Sarin, M.D., MHA  
Assistant Professor of Surgery,  
Department of Surgery

## State-of-the-art Perioperative Care from a Multidisciplinary Team Dedicated to Improving Surgical Outcomes

The Enhanced Recovery After Surgery (ERAS) Program is focused on improving surgical outcomes and enhancing the patient experience before, during and after surgery. The program is comprised of a multidisciplinary team of surgeons, anesthesiologists, nurses and other healthcare professionals working collaboratively to implement highly effective, evidenced-based interventions and protocols that accelerate recovery following surgery.

[Read more >>](#)

### Featured Video

Part 1: Intestines Before and After Ileostomy Surgery

# Previous Practice for Colorectal Surgery Patients at UCSF (Circa 2012)

- **Most patients - Bowel Prep**
- **NPO after midnight, sips of water with meds**
- **Laparoscopic/minimally invasive surgery**
- **Avoidance of NGT and drains**
- **Patient controlled analgesia (epidural for some open cases, none for laparoscopic)**
- **Other analgesics ad hoc**
- **Ambulation on POD# 1**
- **Diet started/advanced with flatus/BM**
- **Discharge around POD# 6-7.**

# Designing the Pathway

- **Creation of a Multidisciplinary Working Committee**
  - Surgery, Anesthesia, Nursing, Nutrition
- **Create a pathway that was evidence based and utilized discreet steps - Pre-operative , Intra-operative and Post-operative**
- **Obtain adequate resources and aim for ease of implementation**
- **Define responsibilities of the different disciplines in each phase of care and get buy-in from key players**
- **Put in place a constant review and feedback mechanism**
- **Ease of Implementation**







# Critical Components

- **Core team with constant re-engagement**
- **Pre-operative teaching and defining expectations**
- **Reducing/eliminating systemic opioids**
- **Avoiding over/under hydration**
- **Early Mobilization**
- **Early Diet advancement**
- **Ensuring compliance and tracking outcomes**
- **Evolving as needed**

# ERAS Components

PERIOD	MEDICATIONS		ANESTHESIA		SURGERY	NURSING	PATIENT
PREADMISSION	PREPARE		Phone Consult or Appointment		Enter pre-op orders		Enroll in MyChart
			Deliver instructions via MyChart or mail.		Patient Education in Clinic		Rehabilitation: Follow Exercise program in patient instructions
					Stoma marking if applicable		Visit ERAS website for information
DOS. PRE-OP	MEDS	ANALGESICS	Pre-Op Warming. PIV. Crystalloid @ 30 ml/hr		No bowel prep for ileocolic, right, transverse, colectomy  Nothing by mouth for eight hours before surgery except for a Boost Breeze completed 2 hours before coming to hospital.	Please complete Pre-Op RN checklist 45 minutes prior to OR start time, then Green Light.  Apply Warming Blanket to patient. Teach IS.  IV Placed. Crystalloid started at 30ml/hr.  Gabapentin 600, APAP 1000, Diclofenac given once with water (<100ml). Antiemetics may also be ordered	Nothing by mouth for eight hours before surgery except for a Boost Breeze completed 2 hours before coming to hospital.  Risks of surgery and anesthesia will be discussed. You will sign a consent for the procedure, and discuss the possibility of receiving blood products.  If there is any chance you might be pregnant, please discuss with surgery and anesthesia
			Gabapentin	600mg once			
			Acetaminophen	1000mg once			
			Diclofenac (if eGFR>60)	100mg once			
			Scopolamine	1.5mg TD once			
	PONV	Age < 60 years					
REGIONAL	30 minutes before start time, complete anesthesia assessment, go to Block		Consent checked, Site Marking, and 24-hr H&P completed 40 minutes before OR start time				
	SCIP-VTE		Heparin 5000units SQ X 1 after epidural placement		If on steroids, ask for Hydrocortisone 100mg IV x 1		
			Orogastric tube to low intermittent suction.				
			Fluids: NTE 2L unless EBL>300ml,				
	SCIP-10		Patient temperature must not drop below 36.0 C.				
	SCIP-Inf-1,2		Antibiotic: Ertapenem	1 gram IV x 1			
INTRA-OP	MEDS		Opioid of Choice: Hydromorphone or Morphine. Titrate to RR 12bpm at time of extubation.				
			If Opioid-Tolerant, continue their opioid regimen intra-op. Start ketamine load and infusion. 0.2 mg/kg x 1. Then 2 mcg/kg/min.				
			Dexamethasone	4mg IV x 1 after induction			

## Patient Pathway for Colectomy

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



# Website

<http://eras.surgery.ucsf.edu/>

# Pre-op Epidurals

- **6:00 AM (t-90 mins):** Patient arrives in Admitting. Goes to Pre-Op.
- **6:30 AM (t-60 mins):** Pre-Op RN reviews NPO status, meds, allergies, general health, IV placed.
- **6:45 AM (t-45 mins):** Surgical team completes consent, 24-hr update, site marking.
- **6:50-7:00 AM (t-30-40 mins):** Anesthesia team sees patient, explains R&B's of regional anesthesia, pt. agrees. Anesthesia team prepares Block room.
- **7:00-7:10 AM (t-20-30 mins):** OR nurses arrive for their shift, check OR for all necessary elements for the case, sees patient and completes checklist (Green light activated/Green dot placed).
- **7:10 AM (t-20 mins):** ASA monitors placed, perform regional.
- **7:30 (t-0 mins):** Epidural complete and take the patient to OR.

# Partial Integration with EMR

- Caseview “ERAS Colorectal Patient”
- APEX

The screenshot displays the Epic EMR interface for a Citrix Viewer session. The main window shows a 'Status Board - Anesthesia My Cases Status Board [15422] for 7/19/2015'. The interface includes a search bar, various filters, and a table of patient cases. The table has columns for 'Sched. Start', 'Room', 'Patient Name', 'Surgeons', 'Anesthesia Team', 'UCSF ANE AD HOC OR CASE/APPT', 'Intra RN', 'Cons Veri...', 'Anes Sign Off', 'Nursi Preo Site Co...', 'Docu and Ma...', 'OR rea...', 'ASA Stat...', 'Last Weight BMI', 'Infe... Enc Clo', 'Lat... PostC', and 'Pre-c Note'. A legend at the bottom identifies status colors: In Facility (yellow), Waiting Area (orange), Pre-op (light green), Intra-op (green), Out of Proc (dark green), Discharged (grey), In PACU (light blue), Ready for DC (blue), Canceled (dark grey), In PACU (medium blue), In PACU (medium blue), and Convert Anes (grey).

# Extensive data collection

	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
3	ABGN8029	LAPAROSCOPIC LEI	2:02:00 PM	3:40:00 PM	6:25:00 PM	165		2 Mild Systemic Dise	General	Surg	Physician Referral	9/4/12	12:01:00 PM	9/9/12
4	ENDO0151	ENDO ADULT COLC	7:30:00 AM	7:27:00 AM	7:34:00 AM	7	NULL	NULL	NULL	IP	Transfer - Acute Ho	9/7/12	3:59:00 PM	10/12/12
5	ABGN8021	LAPAROSCOPIC TO	12:11:00 PM	1:07:00 PM	7:49:00 PM	402		3 Severe Systemic Di	General	IP	Transfer - Acute Ho	9/7/12	3:59:00 PM	10/12/12
6	ABGN8429	LAPAROSCOPIC AB	8:42:00 AM	9:31:00 AM	11:19:00 AM	108		2 Mild Systemic Dise	General	Surg	Physician Referral	9/11/12	6:34:00 AM	9/14/12
7	ABGN8429	LAPAROSCOPIC AB	12:50:00 PM	12:57:00 PM	5:30:00 PM	273		2 Mild Systemic Dise	General	Surg	Physician Referral	9/12/12	10:59:00 AM	9/28/12
8	ABGN8038	LAPAROSCOPIC SIC	7:30:00 AM	8:37:00 AM	2:48:00 PM	371		3 Severe Systemic Di	General	Surg	Physician Referral	9/17/12	7:10:00 AM	9/21/12
9	ABGN8229	LAPAROSCOPIC ILE	2:28:00 PM	4:35:00 PM	8:25:00 PM	230		3 Severe Systemic Di	General	Surg	Physician Referral	9/17/12	11:56:00 AM	9/27/12
10	ABGN5130	ABDOMINAL COLE	3:00:00 PM	4:01:00 PM	8:01:00 PM	240		2 Mild Systemic Dise	General	Surg	Physician Referral	9/18/12	7:43:00 AM	9/24/12
11	ABGN8029	LAPAROSCOPIC LEI	9:00:00 AM	9:58:00 AM	12:19:00 PM	141		2 Mild Systemic Dise	General	Surg	Physician Referral	9/19/12	6:36:00 AM	9/24/12
12	ABGN8029	LAPAROSCOPIC LEI	9:23:00 AM	10:21:00 AM	5:13:00 PM	412		2 Mild Systemic Dise	NULL	Surg	Physician Referral	9/21/12	8:55:00 AM	9/28/12
13	ABGN8029	LAPAROSCOPIC LEI	9:23:00 AM	10:21:00 AM	5:13:00 PM	412		2 Mild Systemic Dise	General	Surg	Physician Referral	9/21/12	8:55:00 AM	9/28/12
14	ABGN5042	TOTAL PROCTOCO	12:00:00 PM	3:11:00 PM	7:13:00 PM	242		2 Mild Systemic Dise	General	Surg	Physician Referral	9/27/12	10:43:00 AM	10/3/12
15	ABGN8121	LAPAROSCOPIC TO	7:30:00 AM	8:32:00 AM	12:00:00 PM	208		2 Mild Systemic Dise	General	IP	Physician Referral	10/8/12	3:06:00 PM	10/15/12
16	RECT1001	EUA, ANAL FISTUL	10:18:00 AM	12:34:00 PM	4:16:00 PM	222		2 Mild Systemic Dise	General	Surg	Physician Referral	10/8/12	9:01:00 AM	10/17/12
17	ABGN8429	LAPAROSCOPIC AB	11:39:00 AM	11:54:00 AM	2:25:00 PM	151		2 Mild Systemic Dise	General	Surg	Physician Referral	10/16/12	9:46:00 AM	10/21/12
18	ABGN8038	LAPAROSCOPIC SIC	12:15:00 PM	12:44:00 PM	7:01:00 PM	377		2 Mild Systemic Dise	General	Surg	Physician Referral	10/19/12	10:08:00 AM	10/25/12
19	ABGN8038	LAPAROSCOPIC SIC	7:30:00 AM	8:46:00 AM	11:45:00 AM	179		2 Mild Systemic Dise	General	Surg	Physician Referral	10/22/12	6:17:00 AM	10/26/12
20	ABGN8429	LAPAROSCOPIC AB	12:54:00 PM	1:47:00 PM	4:30:00 PM	163		2 Mild Systemic Dise	General	Surg	Physician Referral	10/24/12	10:19:00 AM	10/27/12
21	ABGN8429	LAPAROSCOPIC AB	9:00:00 AM	9:57:00 AM	11:56:00 AM	119		2 Mild Systemic Dise	General	Surg	Physician Referral	10/29/12	6:31:00 AM	11/2/12
22	ABGN8038	LAPAROSCOPIC SIC	7:30:00 AM	8:26:00 AM	1:04:00 PM	278		2 Mild Systemic Dise	General	Surg	Physician Referral	10/30/12	6:07:00 AM	11/4/12
23	ABGN8229	LAPAROSCOPIC ILE	10:58:00 AM	12:10:00 PM	3:42:00 PM	212		1 Healthy	General	Surg	Physician Referral	11/1/12	9:17:00 AM	11/6/12
24	ABGN8021	LAPAROSCOPIC TO	7:30:00 AM	8:39:00 AM	3:57:00 PM	438		2 Mild Systemic Dise	NULL	Surg	Physician Referral	11/1/12	5:57:00 AM	11/7/12
25	ABGN8021	LAPAROSCOPIC TO	7:30:00 AM	8:39:00 AM	3:57:00 PM	438		2 Mild Systemic Dise	General	Surg	Physician Referral	11/1/12	5:57:00 AM	11/7/12
26	ABGN8038	LAPAROSCOPIC SIC	9:58:00 AM	11:10:00 AM	1:50:00 PM	160		2 Mild Systemic Dise	General	Surg	Physician Referral	11/5/12	8:01:00 AM	11/11/12
27	ABGN8038	LAPAROSCOPIC SIC	10:22:00 AM	10:59:00 AM	5:58:00 PM	419		2 Mild Systemic Dise	General	Surg	Physician Referral	11/16/12	9:13:00 AM	11/21/12
28	ABGN8429	LAPAROSCOPIC AB	9:30:00 AM	10:53:00 AM	1:36:00 PM	163		2 Mild Systemic Dise	General	Surg	Physician Referral	11/16/12	7:27:00 AM	11/22/12
29	ABGN8029	LAPAROSCOPIC LEI	4:46:00 PM	4:51:00 PM	9:05:00 PM	254		2 Mild Systemic Dise	General	IP	Emergency Room	11/25/12	6:38:00 PM	12/14/12
30	ABGN8429	LAPAROSCOPIC AB	7:30:00 AM	8:25:00 AM	11:17:00 AM	172		2 Mild Systemic Dise	General	Surg	Physician Referral	11/26/12	6:11:00 AM	12/2/12
31	ABGN8137	LAPAROSCOPIC LO	10:00:00 AM	12:44:00 PM	6:10:00 PM	326		3 Severe Systemic Di	General	Surg	Physician Referral	12/4/12	8:23:00 AM	12/12/12
32	ABGN8137	LAPAROSCOPIC LO	10:12:00 AM	11:11:00 AM	3:01:00 PM	230		2 Mild Systemic Dise	General	Surg	Physician Referral	12/6/12	7:13:00 AM	12/11/12
33	ABGN8038	LAPAROSCOPIC SIC	2:00:00 PM	3:45:00 PM	7:25:00 PM	220		2 Mild Systemic Dise	General	Surg	Physician Referral	12/11/12	11:04:00 AM	12/15/12
34	ABGN8038	LAPAROSCOPIC SIC	12:00:00 PM	1:42:00 PM	4:58:00 PM	196		2 Mild Systemic Dise	NULL	Surg	Physician Referral	12/12/12	10:06:00 AM	12/17/12
35	ABGN8038	LAPAROSCOPIC SIC	12:00:00 PM	1:42:00 PM	4:58:00 PM	196		2 Mild Systemic Dise	General	Surg	Physician Referral	12/12/12	10:06:00 AM	12/17/12
36	ABGN8038	LAPAROSCOPIC SIC	9:00:00 AM	10:41:00 AM	12:52:00 PM	131		2 Mild Systemic Dise	General	Surg	Physician Referral	12/13/12	5:41:00 AM	12/17/12

**TABLE 1 : Patient Characteristics**

	Parameter	Pre- ERAS group (Jun-12 to Aug-13)	ERAS Group (Dec-13 to Nov-14)	p
<b>Procedures</b>	Procedures excluding re-operations, n	298	310	
<b>Individuals</b>	Patients, n	245	279	
<b>Age</b>	Median age, years (Range)	54 (20 – 95)	53 (17 – 90)	0.44
<b>Sex</b>	Male patients, n (%)	169 (57 %)	137 (44 %)	0.0015
<b>BMI</b>	Median BMI, kg/m2 (Range)	25.5 (14.9 - 52.7)	24.1 (14.8 - 49.3)	
<b>American Society of Anesthesiologists' (ASA) classification</b>	ASA Grade 1, n (%)	4 (1.3 %)	6 (1.9 %)	0.65
	ASA Grade 2, n (%)	199 (66.8 %)	208 (67.1 %)	
	ASA Grade 3, n (%)	90 (30.2 %)	95 (30.6 %)	
	ASA Grade 4, n (%)	5 (1.7 %)	1 (0.3 %)	
<b>Smoker</b>	Smokers, n (%)	24 (8.1 %)	9 (2.9 %)	0.0065
<b>Diabetes</b>	Diabetes, n (%)	23 (7.7 %)	21 (6.8 %)	0.75
<b>Hypertension</b>	Hypertension, n (%)	41 (14 %)	22 (7.1 %)	0.0077
<b>CHD</b>	Chronic heart disease, n (%)	25 (8.4 %)	14 (4.5 %)	0.068

**TABLE 2 : Details of Surgery**

	Parameter	Pre- ERAS group (Jun-12 to Aug-13)	ERAS Group (Dec-13 to Nov-14)	p
<b>Indication for surgery</b>	Colon or rectal cancer, n (%)	124 (42 %)	124 (40 %)	0.74
	Inflammatory bowel disease, n (%)	87 (29 %)	112 (36 %)	0.07
	Other indication for surgery, n (%)	94 (32 %)	87 (28 %)	0.38
<b>Operative approach</b>	Minimally invasive surgery, n (%)	155 (52 %)	184 (59 %)	0.073
	Planned Open surgery, n (%)	144 (48 %)	125 (40 %)	0.061
<b>Length of Procedure</b>	Median Length of Procedure, Min (Range)	228 (30-1417)	196 (39-692)	0.01
<b>Blood Loss</b>	Blood loss during surgery Median, ml (range)	100 ml (0-7800)	75 ml (0-6000)	0.58

**TABLE 3 : Case Mix – Top 10 Most Common cases**

Pre- ERAS group (Jun-12 to Aug-13)			ERAS Group (Dec-13 to Nov-14)		
Procedure	n	Percent	Procedure	n	Percent
TAKEDOWN OF LOOP ILEOSTOMY OR COLOSTOMY, SIMPLE	35	11.7	TAKEDOWN OF LOOP ILEOSTOMY OR COLOSTOMY, SIMPLE	48	15.3
LAPAROSCOPIC LOW ANTERIOR RESECTION WITH COLOSTOMY OR LOOP ILEOSTOMY	23	7.7	LAPAROSCOPIC ABDOMINAL RIGHT COLECTOMY	23	7.3
LAPAROSCOPIC SIGMOID COLECTOMY	20	6.7	LAPAROSCOPIC ILEO-COLECTOMY WITH ILEOCOLIC ANASTOMOSIS	23	7.3
LAPAROSCOPIC ABDOMINAL RIGHT COLECTOMY	18	6	LAPAROSCOPIC SIGMOID COLECTOMY	18	5.8
ABDOMINAL PERINEAL RESECTION OF RECTUM	15	5	LAPAROSCOPIC LOW ANTERIOR RESECTION WITH COLOSTOMY OR LOOP ILEOSTOMY	15	4.8
COMPLETION PROCTECTOMY WITH CREATION OF ILEAL RESERVOIR AND ILEOANAL ANASTOMOSIS	13	4.3	LAPAROSCOPIC TOTAL ABDOMINAL COLECTOMY WITH ILEOSTOMY	15	4.8
LAPAROSCOPIC TOTAL ABDOMINAL COLECTOMY WITH ILEOSTOMY	13	4.3	ROBOTIC ASSISTED LAPAROSCOPIC LOW ANTERIOR RESECTION WITH ANASTOMOSIS, COLOSTOMY OR LOOP ILEOSTOMY	11	3.5
LAPAROSCOPIC ILEO-COLECTOMY WITH ILEOCOLIC ANASTOMOSIS	12	4	LAPAROSCOPIC TOTAL PROCTOCOLECTOMY WITH ILEOANAL RESERVOIR	10	3.2
LAPAROSCOPIC LOOP ILEOSTOMY	9	3	TAKEDOWN OF COLOSTOMY FROM HARTMANN PROCEDURE	10	3.2
ABDOMINAL EXPLORATORY LAPAROTOMY	8	2.7	LAPAROSCOPIC TOTAL PROCTOCOLECTOMY WITH ILEOSTOMY	9	2.9



**TABLE 4 A : Program Adherence Measures**

		Pre- ERAS group (Jun-12 to Aug-13)	ERAS Group (Dec-13 to Nov-14)	P
<b>Pre-Operative Non Opioid Medications Usage</b>	Acetaminophen n (%)	28 (9.4 %)	277 (89.4 %)	<0.001
	Diclofenac n (%)	2 (0.7 %)	104 (33.5 %)	<0.001
	Gabapentin n (%)	20 (6.7 %)	281 (90.6 %)	<0.001
	Scopolamine n (%)	2 (0.7 %)	68 (21.9 %)	<0.001
<b>Regional Analgesia Usage</b>	Epidural used for intraoperative analgesia, n (%)	78 (26.2 %)	185 (59.7 %)	<0.001
	Epidural used for postoperative analgesia, n (%)	86 (29 %)	210 (68 %)	<0.001
	TAP block given for intraoperative analgesia, n(%)	9 (3 %)	26 (8.4 %)	0.005
<b>Adjunctive Intraoperative Medications</b>	Intraoperative Ketamine Infusion, n (%)	20 (6.7 %)	29 (9.4 %)	0.24
	Intraoperative Dexamethasone, n (%)	90 (30.2 %)	133 (42.9 %)	0.0014
	Intraoperative Ondansetron, n (%)	260 (87.2 %)	272 (87.7 %)	0.9



**TABLE 4 B : Program Adherence Measures**

		Pre- ERAS group (Jun-12 to Aug-13)	ERAS Group (Dec-13 to Nov-14)	P
<b>Chemical DVT Prophylaxis</b>	Preoperative DVT prophylaxis with subcutaneous Heparin, n (%)	100 (34 %)	273 (88 %)	<0.001
<b>Preoperative antibiotic</b>	Intravenous antibiotics given before incision, n (%)	268 (90 %)	300 (97 %)	0.0008
<b>Intraoperative Fluids</b>	Median intraoperative crystalloid, ml (min, 1st Q, 3rd Q, max)	1350 (0, 800, 2000, 30000)	1500 (0, 862.5, 2500, 18000)	0.027
	Median intraoperative colloid, ml (min, 1st Q, 3rd Q, max)	0 (0, 0, 500, 6000)	0 (0, 0, 0, 4500)	<0.001
<b>Post-Operative Non Opioid Medications Scheduled Usage</b>	Acetaminophen n (%)	192 (64.4 %)	289 (93.2 %)	<0.001
	Diclofenac n (%)	5 (1.7 %)	70 (22.6 %)	<0.001
	Gabapentin n (%)	23 (7.7 %)	254 (81.9 %)	<0.001
	Scopolamine n (%)	80 (26.8 %)	188 (60.6 %)	<0.001
<b>Adherence to Ambulation</b>	Patients Ambulating on POD 0, n (%)	15 (5.0 %)	309 (99.7 %)	<0.001
	Patients Ambulating on POD 1, n (%)	91 (30.5 %)	307 (99.0 %)	<0.001
	Patients Ambulating on POD 2, n (%)	97 (32.6 %)	299 (96.5 %)	<0.001

Parameter	Pre- ERAS group (Jun-12 to Aug-13)	ERAS Group (Dec-13 to Nov-14)	P
<b>Median Total Hospital Length of Stay from Admission to Discharge, days (range)</b>	6.4 (0.2 - 197.7)	4.4 (1.0 - 80.4)	<0.001
<b>Median Post Procedure Length of Stay from end of procedure to discharge, Days (range)</b>	6.0 (0.1 - 161.5)	4.1 (0.8 - 47.0)	<0.001
<b>Readmission rate</b> 30 Day All cause readmission rate, n (%)	64 (21%)	29 (9.4%)	<0.001
<b>Reoperation rate</b> Reoperation for any indication within 30 days, n (%)	5 (2%)	6 (2.1%)	1

**TABLE 7 : Secondary Outcome Measures - Bowel and Bladder function**

		Pre- ERAS group (Jun-12 to Aug-13)	ERAS Group (Dec-13 to Nov-14)	P
<b>Need for Postoperative Antiemetics</b>	Received antiemetic in Post anesthesia care unit, n (%)	181 (60.7 %)	207 (66.8 %)	0.13
<b>Patient Self Reported Postoperative Nausea and Vomiting</b>	Postoperative Nausea and Vomiting In post anesthesia care unit, n (%)	125 (41.9 %)	74 (23.9 %)	<0.001
<b>Percentage of patient ordered nothing by mouth (NPO) post-operatively</b>	Patients NPO on POD 0, n (%)	184 (61.7 %)	90 (29.0 %)	<0.001
	Patients NPO on POD 1, n (%)	92 (30.9 %)	45 (14.5 %)	<0.001
	Patients NPO on POD 2, n (%)	36 (12.1 %)	29 (9.4 %)	0.13
<b>Days from Admission to 1st solid meal</b>	Median Time to First solid diet, days (range)	4.7 (0.6 - 23.7)	2.7 (0.8 - 37.7)	<0.001
<b>Duration of Urinary catheterization with a Foley Catheter (in hours)</b>	Foley Duration – Median, h (range)	74 (2 – 649)	46 (1 - 2262)	<0.001

**TABLE 6 : Secondary Outcome Measures - Pain management**

		Pre- ERAS group (Jun-12 to Aug-13)	ERAS Group (Dec-13 to Nov-14)	p
<b>Median opioid consumption Intraoperative (mg po morphine equivalents)</b>	Intraoperative opioid consumption, mg (range)	99.0 (0.0 - 605.0)	68.0 (0.0 - 293.0)	<0.001
<b>Median opioid consumption from POD 0 to POD 2 (mg po morphine equivalents)</b>	IV and PO opioid consumption, mg (range)	142.2 (0.0 - 1964.0)	75.0 (0.0 - 3162.0)	<0.001
	Epidural opioid consumption, mg (range)	299.3 (7.6 - 1017.1)	209.8 (7.8 - 788.5)	<0.001
<b>Median Duration of Epidural catheterization (in hours)</b>	Epidural Duration – Median, H (range)	95 (25 – 264)	52 (3 – 261)	<0.001
<b>Median Patient self-reported pain scores from 10 (worst) to 0 (no pain).</b>	POD 0 Score, n (range)	3.2 (0.0 - 8.8)	2.1 (0.0 - 9.3)	<0.001
	POD 1 Score, n (range)	3.2 (0.0 - 8.3)	2.6 (0.0 - 9.6)	0.0019
	POD 2 Score, n (range)	2.5 (0.0 - 10.0)	2.7 (0.0 - 9.1)	0.77



# ERAS Program Evolution

- **October 2013 – ERAS Program Initiation**
- **December 2013 – Data Collection**
- **February 2014 – ERAS Program Expansion**
- **June 2014 – Addition of Infection prevention**
- **July 2014 – Esophageal Doppler**
- **August 2014 – Data Dashboards**
- **September 2014 – Exercise protocol**

# ERAS Program Evolution

- **December 2014 – ERAS Website**
- **December 2014 – APEX Pathway Initiation**
- **January 2015 – Cipher Phone Call**
- **February 2015 – Move to Mission Bay**
- **March 2015 – Prehabilitation – Surgery Wellness**
- **May 2015 – Epidural in Preop**
- **June 2015 – Inpatient Nursing Practitioner**
- **July 2015 – Incorporation of Meds to Beds**
- **July 2015 – Caring Wisely Grant**

# ERAS Program Evolution

- **May - August 2015 APEX PATHWAYS**
  - Bundles orders and care plans into one pathways
  - Staircase Designation ( ) identifies patients
- **September 2015 Caring Wisely Coordinator**
- **October 2015 - Expansion to Gyn Oncology**
- **December 2015 – PSH Coordination Emails**
- **Feb 2016 - Provider Dashboards**



# Future Direction



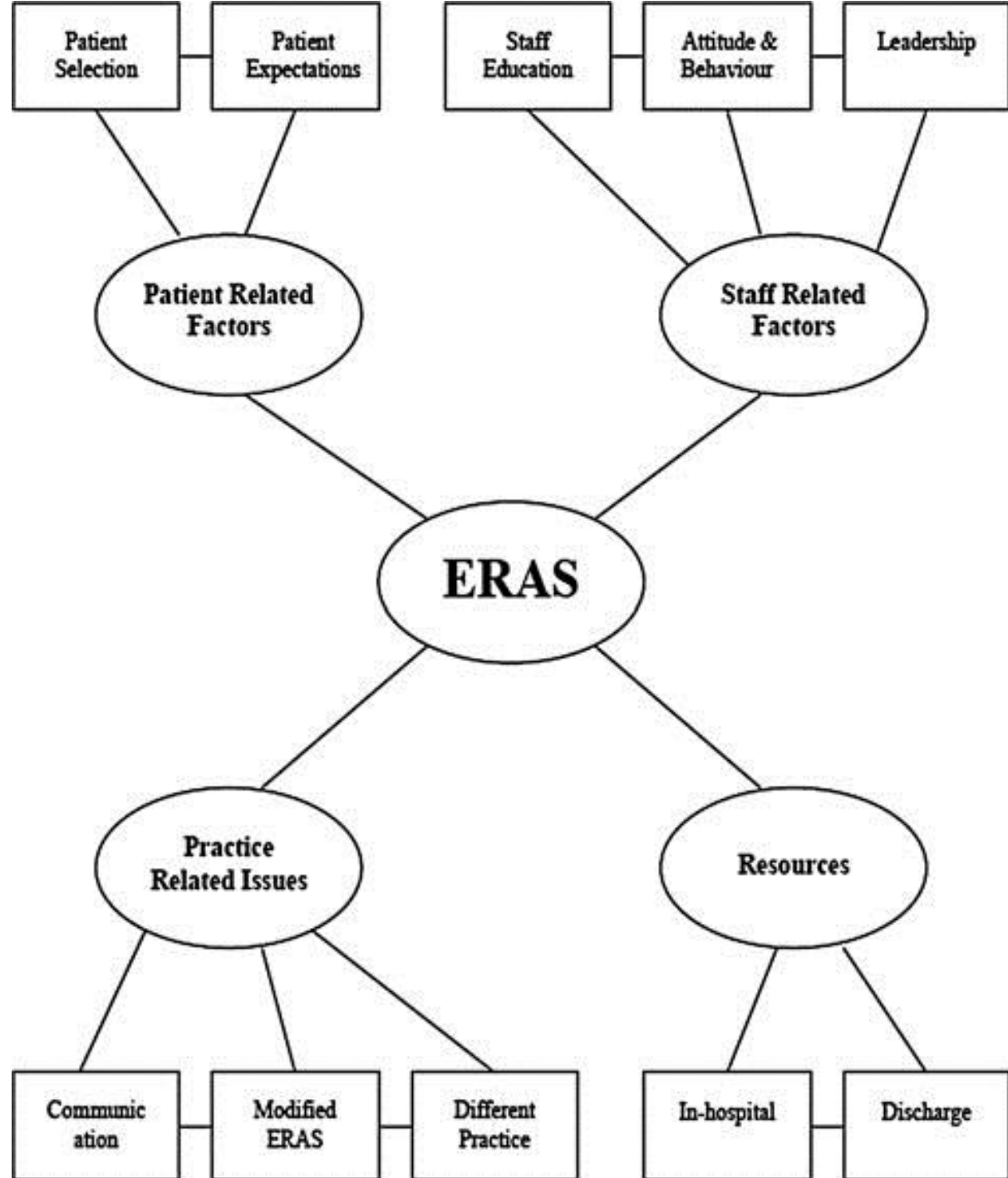
- **April 2016 Geriatric ERAS**
- **Summer 2016 ERAS Comprehensive database**
- **Expansion to Mission bay Surgical Services**
- **Fall 2016 Perioperative Surgical Home Symposium**

# BARRIERS TO IMPLEMENTATION



# ERAS Program Struggles

- **ERAS Mobility tracker Project**
- **ERAS App project**
- **One View Integration**
  
- **Bowel prep elimination**
- **Rapid Diet advancement**
- **Resident education on ERAS**
- **Consistency in Anesthesia care**
- **Esophageal Doppler**



# Patient Related Factors

- **Patient Selection**
  - Patient demographics
  - Complex patients
    - high comorbidity, obesity, and presentation with advanced disease
- **Patient Expectations**
  - Background and Personality
  - Attitude and Preconceived notions
- **Patients' lack of understanding**
  - Lower educational levels
  - Language barriers.

# Staff Related Factors

- **Tradition**
  - Opposition to a “cookbook style of management
- **Opposition to Change**
  - especially for experienced providers
  - Not receptive to change
- **Rotating Care providers**
  - hinders progress with patients receiving care that deviates from the protocol
- **ERAS seen as purely financially driven**

# Health System Resources

- **Clinic Resources**
  - Patient education
  - Care Coordination
- **In-Hospital Resources**
  - Role of an ERAS coordinator
  - Lack of weekend staffing of stoma therapy
  - Hospital systems are designed for Acute care
- **Discharge**
  - Adequacy of home health services

# Practice Related Factors

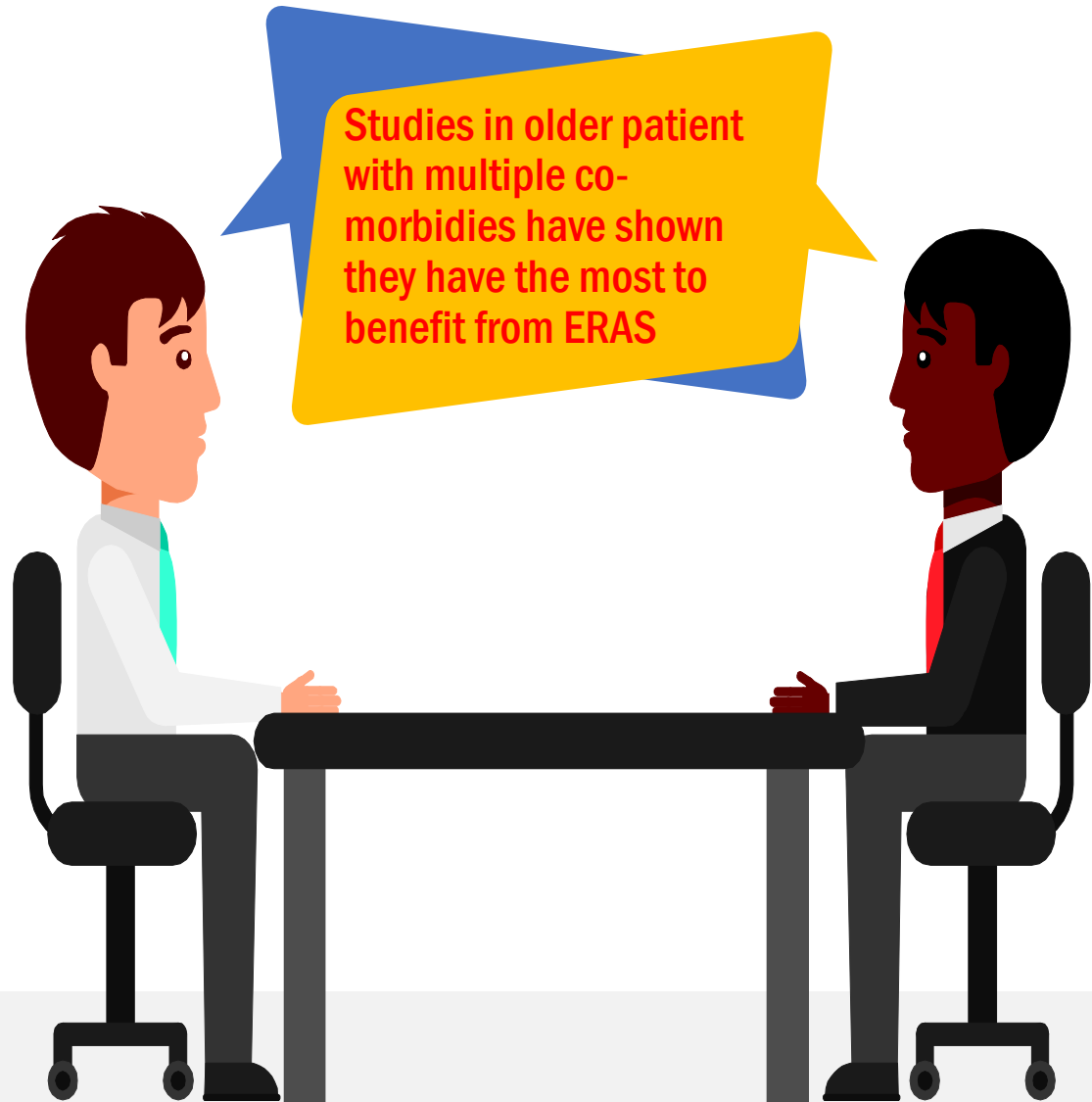
- **Inflexibility in the ERAS protocol**
  - Individualization of care in select cases is necessary
- **Ineffective Communication**
  - especially when deviation from protocol is required



Typical Interaction involving a stakeholder (surgeon) and a ERAS champion (surgeon).



Typical Interaction involving a stakeholder (surgeon) and a ERAS champion (surgeon).



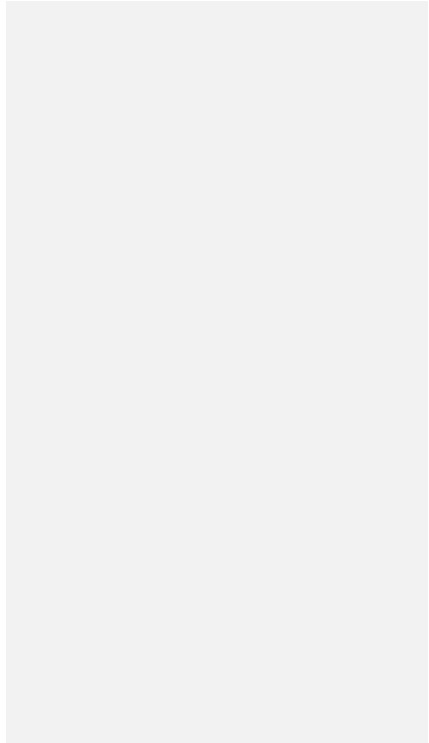
Readmissions should certainly be tracked

Are we just creating more re-admissions by discharging patients earlier



Discharge  
planning and  
communication  
key to preventing  
re-admissions






Saves anywhere  
from 2000 to  
5000 per day  
reduced length  
of stay

We will by showing the  
economic advantages  
based on reduced hospital  
stay and decreased  
morbidity





I don't want my patients to feel they are being pushed out



Patient satisfaction has also been shown to remain unchanged in protocol driven recovery





# FACILITATORS TO IMPLEMENTATION

“THE SECRET OF  
CHANGE IS TO FOCUS  
ALL OF YOUR ENERGY,  
NOT ON FIGHTING THE  
OLD, BUT ON BUILDING  
THE NEW.”

— *SOCRATES*

# Facilitators – Team Based Approach

- **Establish an effective core team early**
  - Honesty, Discipline, Creativity, Humility, Curiosity
- **Create a true partnership**
- **Team Cohesion by frequent meetings**
- Identify and get support of local champions in surgery, nursing, and anesthesia
- **Get buy in** from key demographics



# Facilitators – Clear Vision

- **Shared Goals**
- **Mutual Trust**
- **Clear Roles and Responsibilities**
- **Effective Communication within the team**
- **Measurable progress and outcome**



# Facilitators – Effective Protocol

- **Feasibility and alignment with current practice**
  - Bowel Prep
- **Standardization vs flexibility**
  - Who to include
  - Robotic Procedure
- **Prioritize areas with high impact**
  - Minimizing Opioids
- **Concentrate on process first then outcome**
- **Audit and Feedback Mechanism built in**

# Facilitators – Extensive Education and dissemination

- Development of pre-printed orders,
- Staff reminders, and
- Patient education materials
- Central Website or coordinator for queries
- Easily accessible material
- Integrate with established educational curriculum



# Facilitators – Systems Integration

- **Electronic Health System Integration**
  - Key to efficacy in use of resources
- **Creation of Effective Workflows**
- **Integrating resources already in place**
  - Meds to beds
  - Cipher phone call
- **Utilizing additional resources in high impact areas**
  - Inpatient ERAS nurse practitioner
  - Preop nurse visit

# Facilitators – Effective Communication

- **Engage the various stakeholders actively**
  - Meet and identify individual concerns
  - Find out of the box solutions
- **ERAS Coordinator**
  - Assist with protocol compliance and goal attainment
  - Can communicate between core and front line
- **Email**
- **Feedback to front line providers**
  - Nursing
  - Surgeons
  - Anesthesiologists

		Baseline Data	Running Data	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015	2016
Colorectal Surgery, MB ERAS Dashboard	Baseline Jun 12- Aug 13	Feb,15 to July, 15	Feb,15- Jan, 16	Feb	March	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan
	15 months	6 months	12 months												
Volume	325	177	391												
Cases (Discharges)/month	22	30	33	27	29	34	23	30	34	35	35	44	29	38	33
<b>Cases by Surgeon/month</b>															
Varma	12	15	179	12	21	19	10	16	10	15	15	22	15	12	12
Chern	6	6	77	8	5	4	6	7	6	6	9	7	4	9	6
Sarin	1	7	94	4	1	7	7	6	15	10	9	11	5	10	9
Finlayson	4	2	38	3	2	4	0	1	3	3	2	4	5	5	6
<b>Length of Stay</b>															
<b>Total Hospital Length of Stay - Days</b>															
Mean	10.1	8.1	7.8	7.1	7.9	9.4	9.5	8.5	6.6	7.7	8.1	6.6	9.3	7.8	6.5
Median	6.3	5.2	5.3	4.3	5.2	5.8	7.2	5.2	4.4	4.4	7.2	5.1	5.3	5.2	5.3
Mean excluding 3SD	8.8	7.3	7.0				9.5	6.4	6.6	6.0	8.1	6.6	7.7	6.6	4.8
<b>Post Procedure Length of Stay-Days</b>															
Mean	8.1	7.2	7.0	6.7	7.3	8.5	8.2	6.9	6.0	6.9	7.6	6.1	8.3	6.6	5.6
Median	5.9	4.8	4.9	4.0	4.7	5.0	6.9	5.0	4.0	4.1	6.9	4.7	5.0	4.9	4.9
<b>Arrival in Pacu to Ready for Discharge-Hrs</b>															
Mean	2.3	1.8	1.74	2.0	1.9	1.8	1.7	1.8	1.6	1.9	1.6	2.1	1.8	1.3	1.3
Median	2.1	1.6	1.50	2.1	1.7	1.4	1.6	1.7	1.4	1.8	1.4	1.9	1.8	1.3	1.3
<b>Length of Procedure-Hrs</b>															
Mean	4.1	3.8	3.8	4.4	4.2	3.4	4.3	2.9	3.7	3.9	4.9	3.7	3.4	3.5	3.6
Median	3.7	3.0	3.2	3.9	3.8	3.1	3.6	2.3	2.9	3.1	4.6	3.1	2.9	3.1	3.6
7D readmit %	9%		0%												
14D readmit %	25%		0%												
30D readmit %	46%		0%												
<b>Anesthesia</b>															
<b>Anesthesia Type</b>															
TAP Block	3%	6%	4%	7%	10%	6%	9%	3%	3%	3%	0%	2%	0%	0%	3%
% Patients w/ Epidurals	45%	60%	65%	70%	62%	68%	61%	53%	47%	66%	77%	80%	83%	58%	58%
% Patients w/ Intra-op Epidurals	46%	56%	62%	63%	62%	62%	61%	50%	41%	69%	77%	68%	66%	61%	58%
Epidural Mean Hrs.	94.9	68.2	76	72.2	69.6	61.9	80.6	66.9	61.6	89.5	86.2	86.6	70.0	66.1	94.0
Epidural Median Hrs.	93.0	61.5	68	59.0	66.0	56.0	73.0	51.0	54.5	72.0	75.0	70.0	67.0	52.0	94.0
<b>ASA Ratings</b>															
1	2%	5%	3%	0%	3%	6%	4%	13%	0%	6%	3%	0%	0%	0%	0%
2	66%	67%	65%	78%	69%	68%	61%	47%	76%	71%	60%	73%	48%	61%	67%
3	31%	28%	31%	22%	28%	24%	30%	40%	24%	23%	34%	27%	52%	39%	30%
4	2%	1%	1%	0%	0%	3%	4%	0%	0%	0%	3%	0%	0%	0%	3%



UCSF Perioperative Surgical Home Status Report | FEB-2016 (Sarin, Ankit) - Temporary Items

Message

Delete Reply Reply All Forward Move Junk Unread Categorize Follow Up

**UCSF Perioperative Surgical Home Status Report | FEB-2016 (Sarin, Ankit)**

SurgicalHome@ucsf.edu

Sent: Wednesday, March 2, 2016 at 8:01 AM  
To: Ankit.Sarin@ucsf.edu  
Cc: SurgicalHome@ucsf.edu; ait@ucsf.edu

**UCSF Perioperative Surgical Home**  
FEB-2016 Status Report for Dr. Ankit Sarin

**SURGEON**

Below are your metrics for ERAS Colorectal patients in comparison to the monthly totals and 6-month rolling data (SEP-2015 to FEB-2016) for all surgeons.

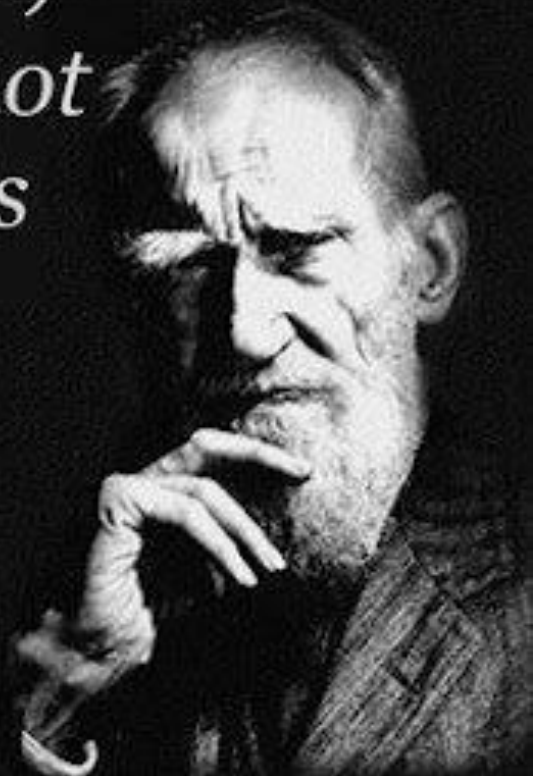
**Colorectal Data**

Metrics	Your Monthly Data	Your 6-Month Data	All Monthly Data	All 6-Month Data
Num of Cases	9	53	35	217
Median LOS (Hours)	113.0	122.2	149.6	145.4
Avg Procedure Length (Mins)	217.8	222.2	225.1	225.6
Avg CMI	2.3	2.5	2.5	2.6
Num of 30-Day Readmissions	1	6	1	25
Avg Days to Solid Food	1.9	3.1	3.2	3.4

# Thank You

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

- George Bernard Shaw





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