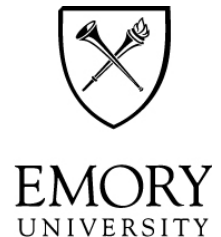


“ERAS Resurrection” Improving Pediatric Surgical Outcomes - post COVID



Kurt Heiss MD

Emeritus Professor of Surgery
Emory Healthcare



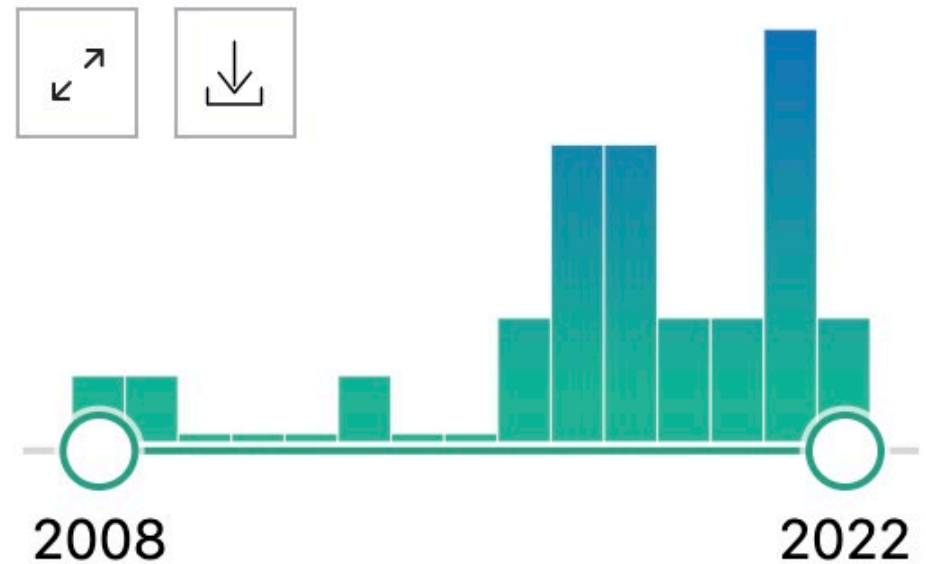
Faculty Disclosure

In compliance with ACCME Guidelines, I hereby declare:

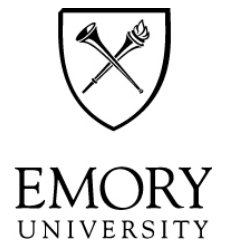
- I do not have financial or other relationships with the manufacturer(s) of any commercial services(s) discussed in this educational activity.

Bar chart showing the number of tweets per year from 2008 to 2017. The chart is titled "Reset". The x-axis represents the year, and the y-axis represents the number of tweets. The chart shows a significant increase in tweets starting around 2014, peaking in 2017.

| Year | Number of Tweets (approximate) |
|------|--------------------------------|
| 2008 | 10 |
| 2009 | 10 |
| 2010 | 5 |
| 2011 | 5 |
| 2012 | 15 |
| 2013 | 5 |
| 2014 | 10 |
| 2015 | 25 |
| 2016 | 50 |
| 2017 | 100 |
| 2018 | 25 |
| 2019 | 25 |
| 2020 | 100 |
| 2021 | 25 |



9 to 29



Objectives

Pediatric Oncology

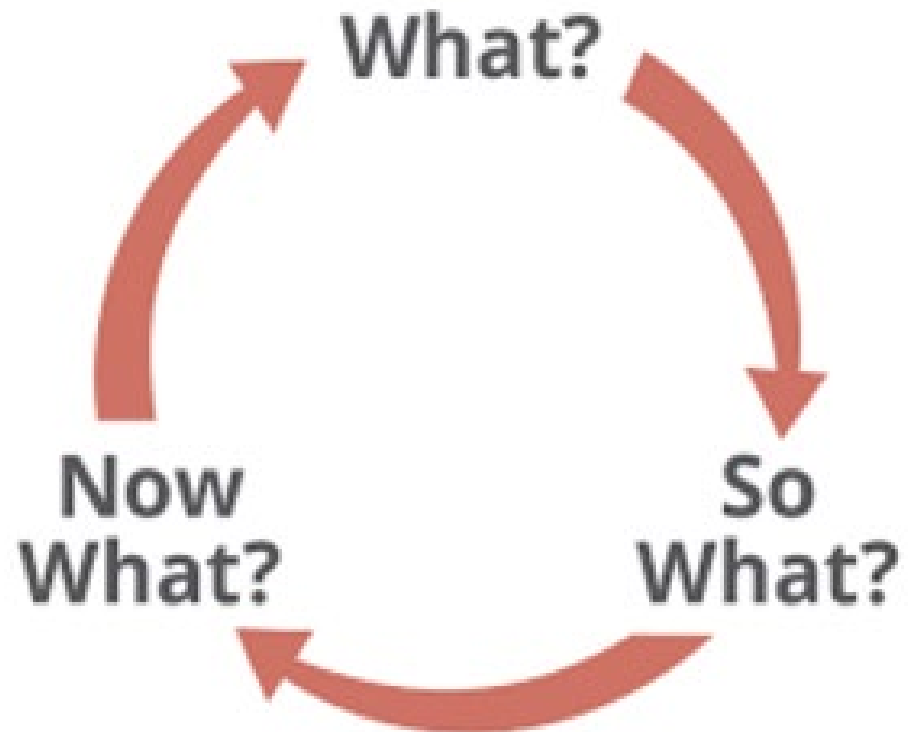
Pediatric Plastics

Pediatric IBD

Pediatric Short Stay

Pediatric Pectus

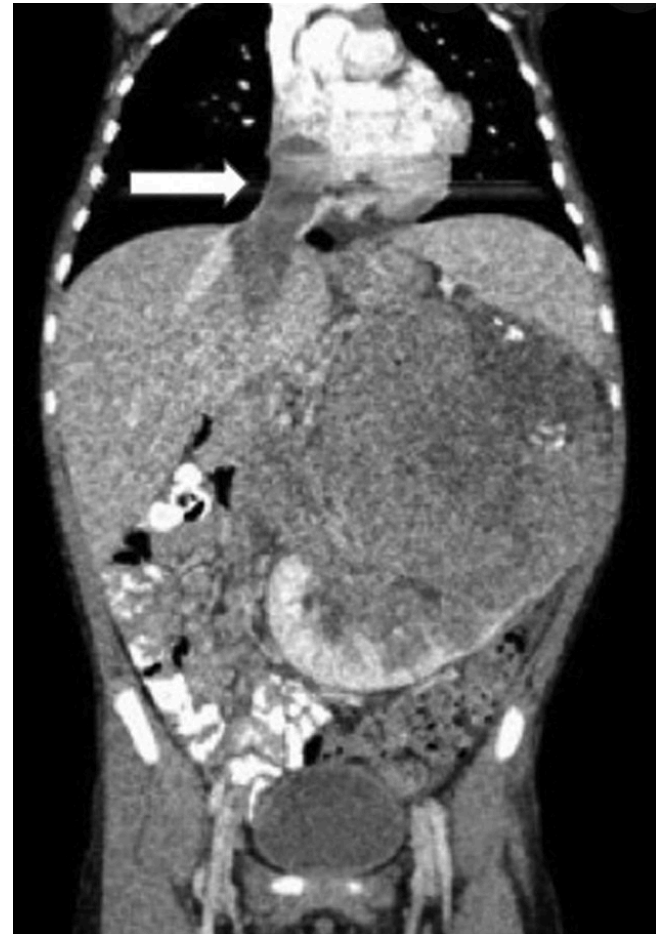
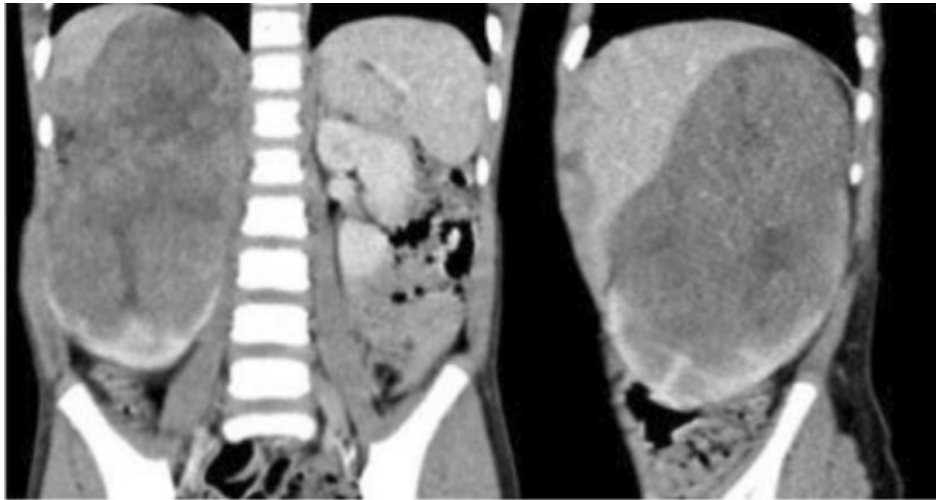
Pediatric EEN

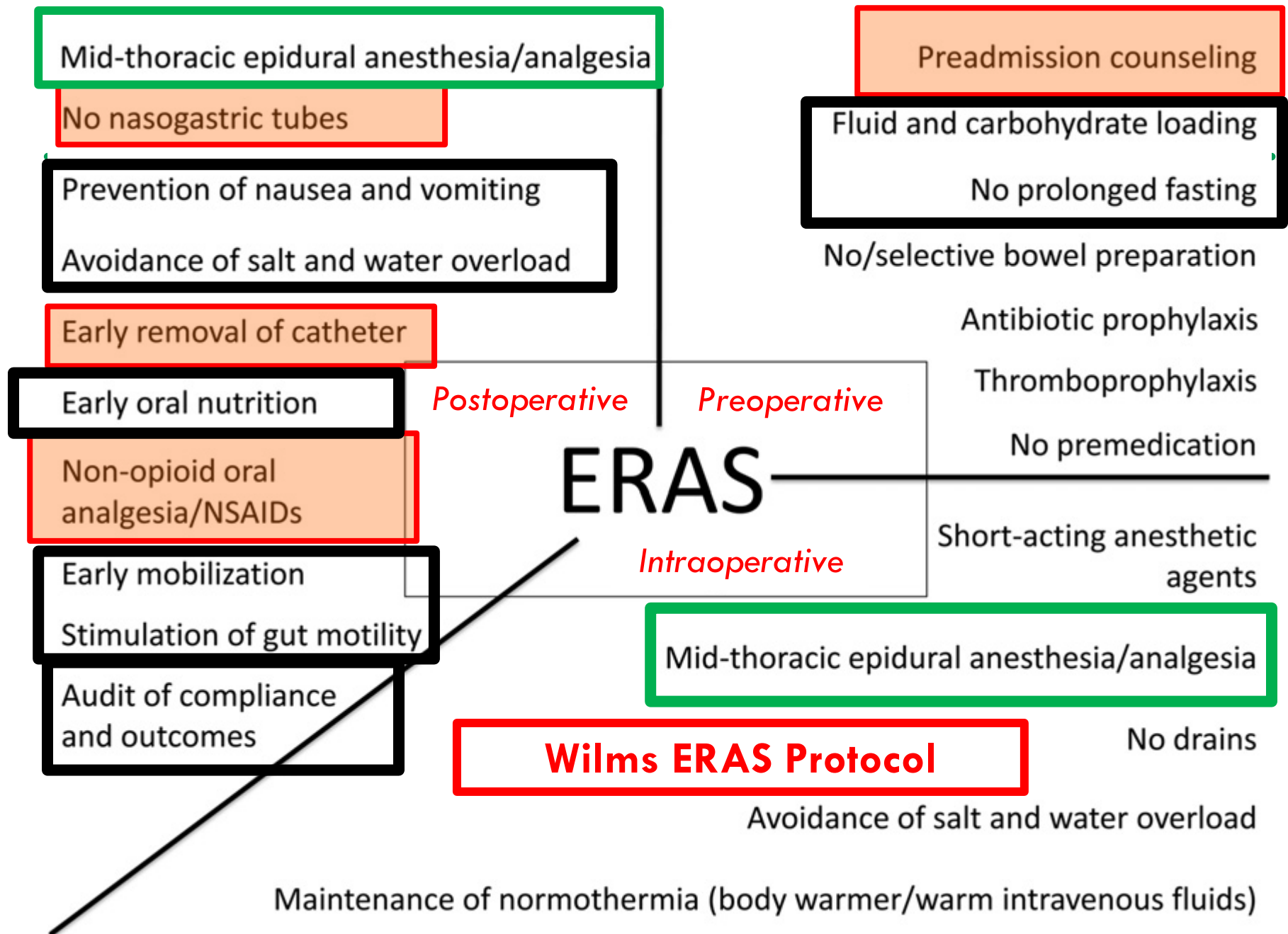


Journal of Pediatric Surgery

An Enhanced Recovery After Surgery Protocol in Children Who Undergo Nephrectomy for Wilms Tumor Safely Shortens Hospital Stay

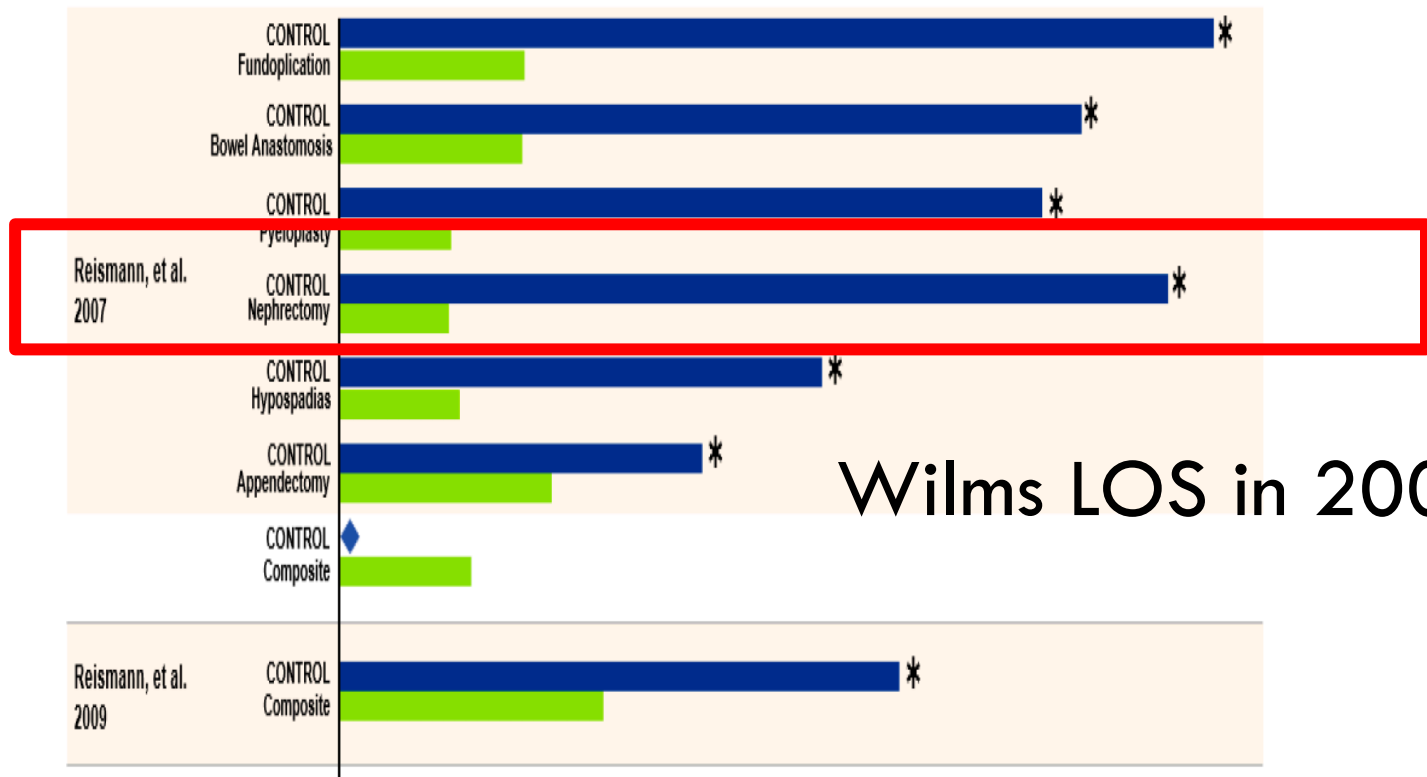
70 Unilateral Nephrectomy.
50% LOS < 3 days.
No change comps or RTS





What have we been doing for 15 yrs?!

Mean Length of Hospital Stay



Wilms LOS in 2007....

Objectives

Pediatric Oncology

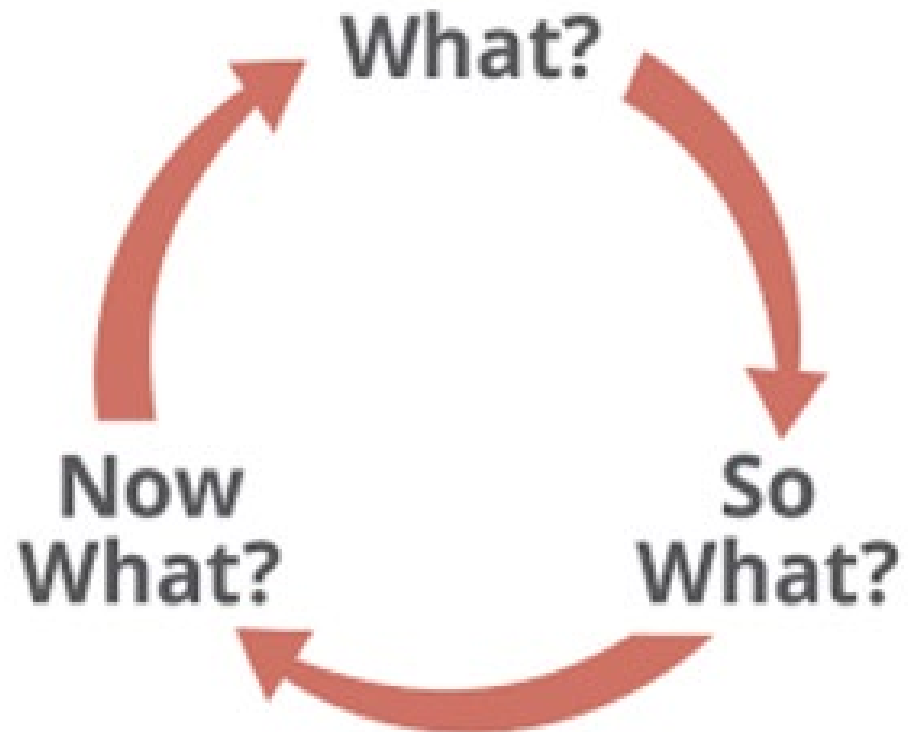
Pediatric Plastics

Pediatric IBD

Pediatric Short Stay

Pediatric Pectus

Pediatric EEN



Implementation of a Modified Enhanced Recovery Protocol in Cleft Palate Repairs

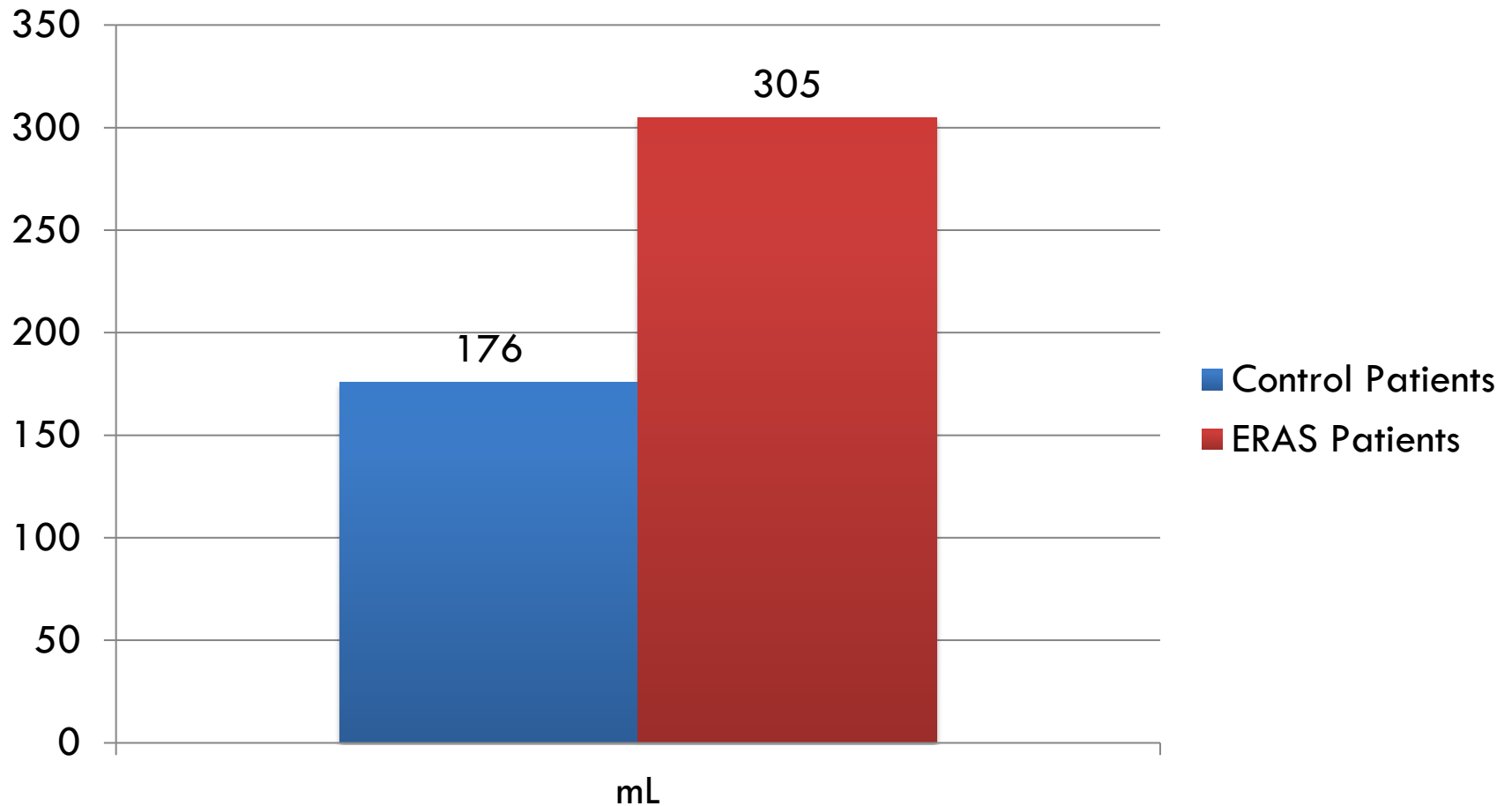
Stefanie E. Hush, MMSc, PA-C, Jenny T. Chen, MD,* Colin M. Brady, MD,*
Magdalena Soldanska, MD,* David J. Nusz, MD,† Darren L. Rhinehart, MD,†
Kurt Heiss, MD,† Connor Crowley, BS,‡ and Joseph K. Williams, MD**

(J Craniofac Surg 2019;00: 00–00)

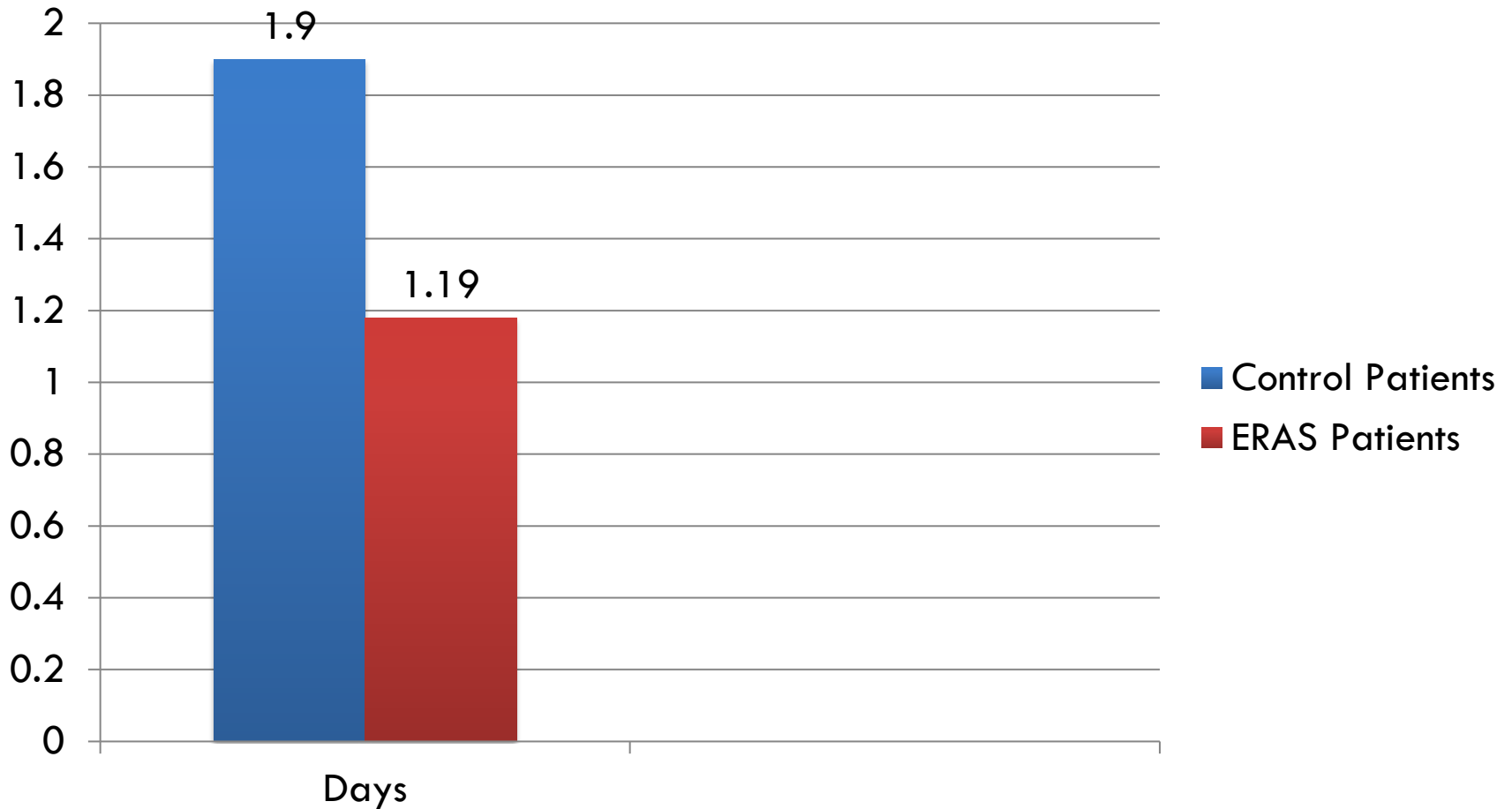


**Pediatric
Cleft
Palate
ERAS**

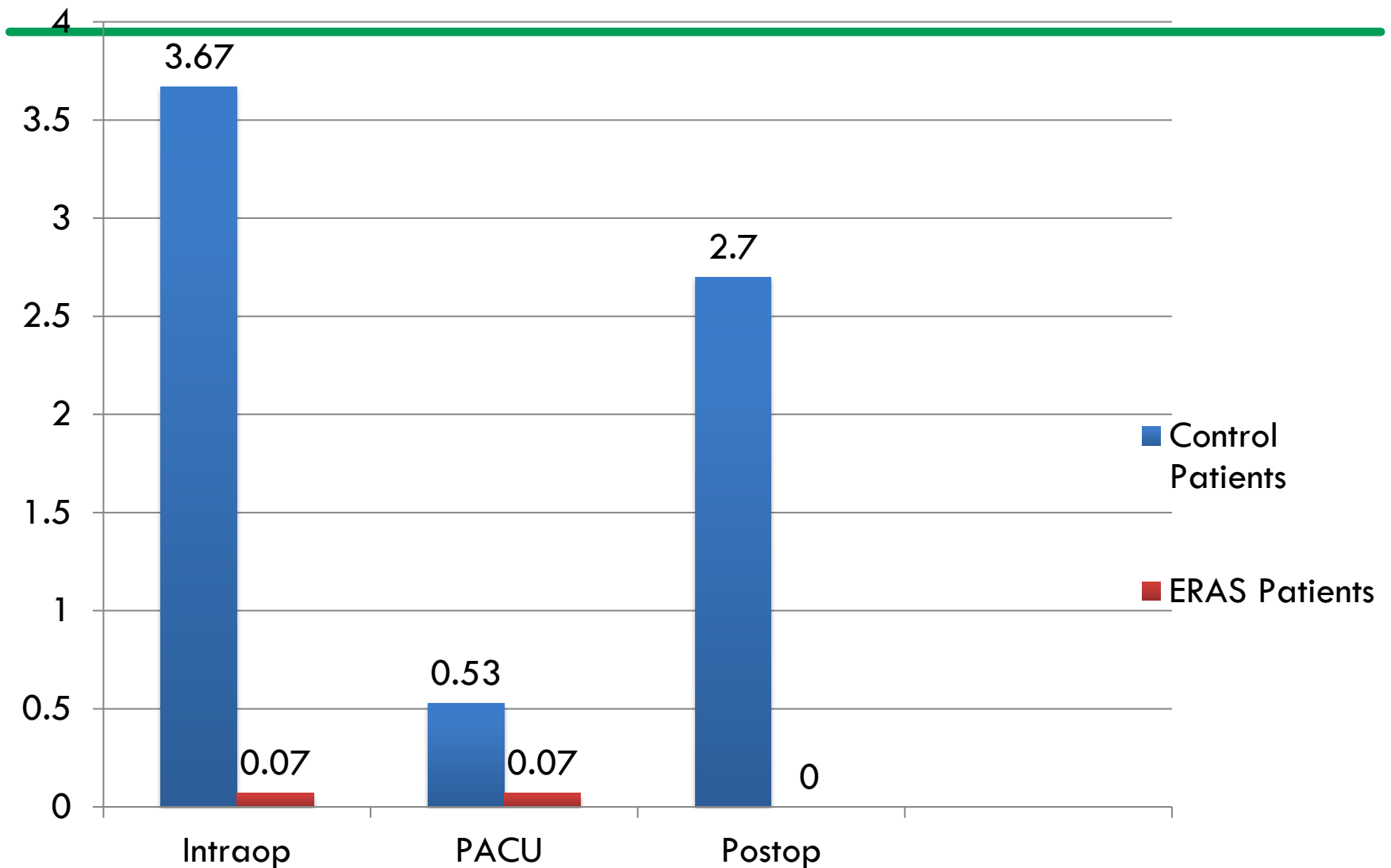
Total PO on POD 0



Average LOS decreased by 37.4% in the ERAS protocol



Average Perioperative Narcotic Use (mg)



Implementation of a Modified Enhanced Recovery Protocol in Cleft Palate Repairs



**Change Management
and
Implementation
Science**

**2 National Presentations
1 National CF Symposium**

**Huge Change in Opioid use
at CHOA**

Objectives

Pediatric Oncology

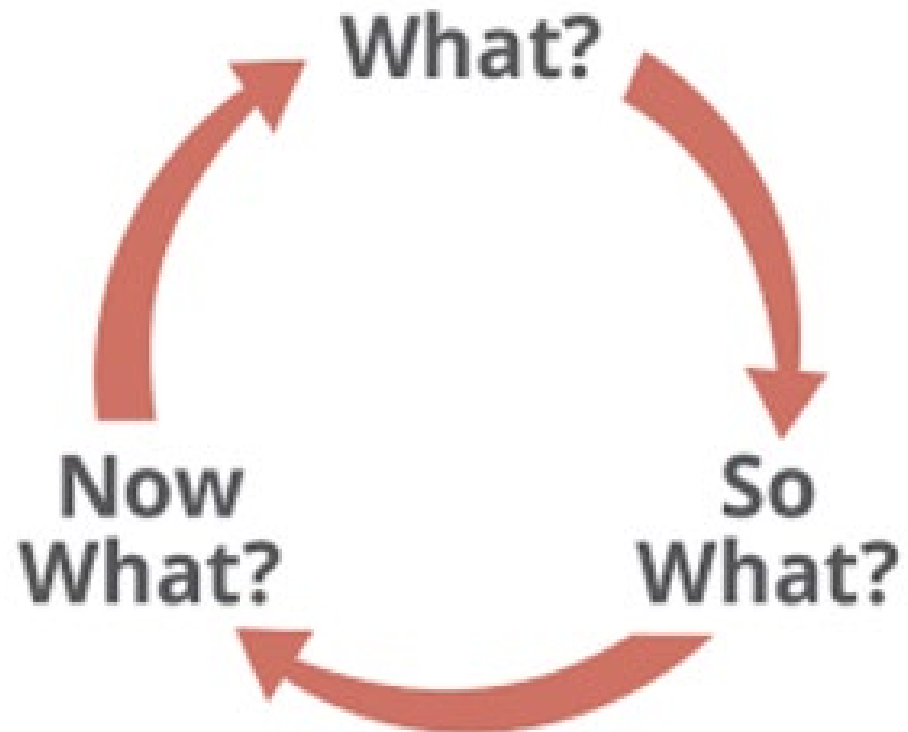
Pediatric Plastics

Pediatric IBD

Pediatric Short Stay

Pediatric Pectus

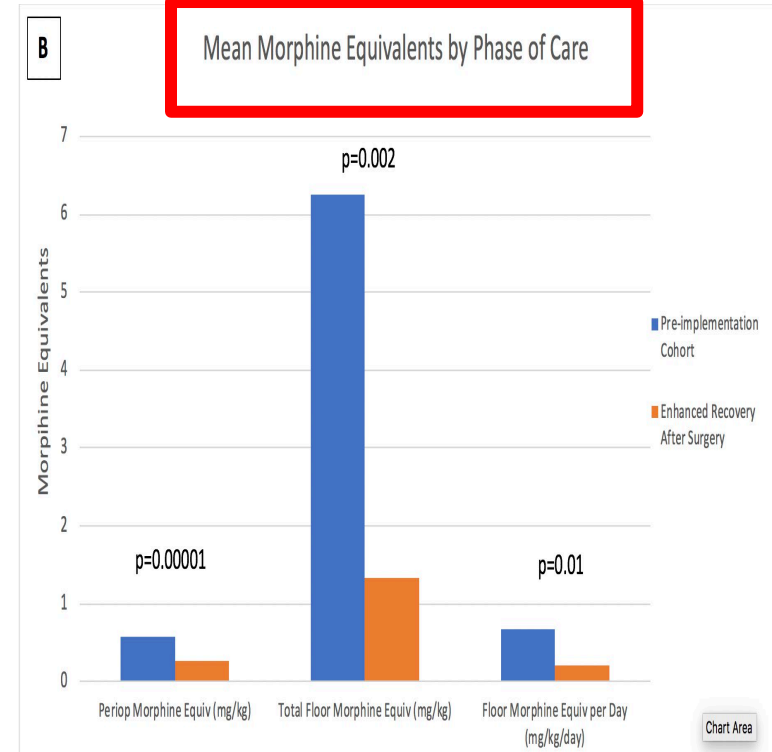
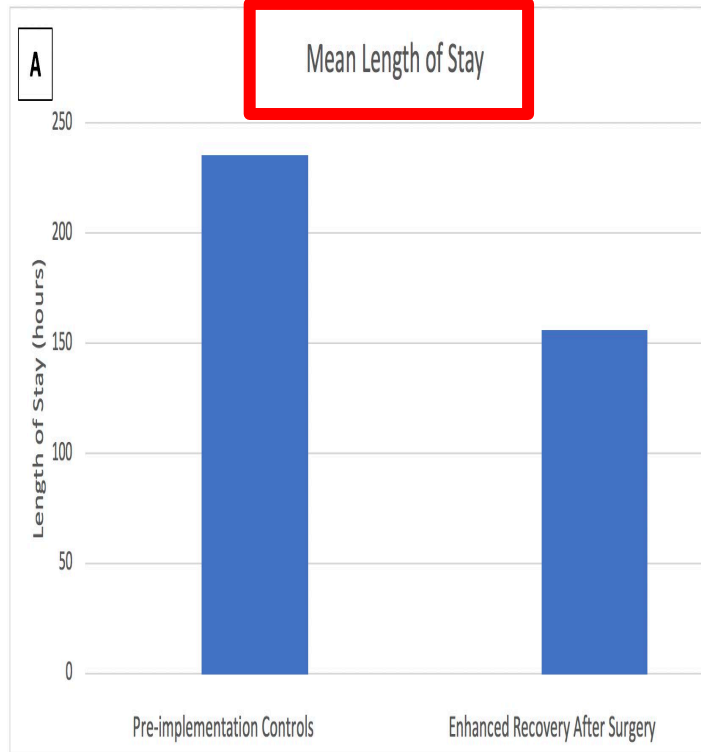
Pediatric EEN





Implementation of a pediatric enhanced recovery pathway decreases opioid utilization and shortens time to full feeding☆

Michael R. Phillips^{a,*}, William T. Adamson^b, Sean E. McLean^a, Lyla Hance^a, M. Concetta Lupa^a, Sara L. Pittenger^a, Pooja Dave^a, Peggy P. McNaul^a





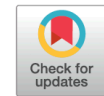
Contents lists available at ScienceDirect

Journal of Pediatric Surgery

journal homepage: www.elsevier.com/locate/jped surg



An enhanced recovery after surgery pathway in pediatric colorectal surgery improves patient outcomes[☆]



Laura N. Purcell^a, Kathleen Marulanda^a, Matthew Egberg^b, Sabrina Mangat^c, Christopher McCauley^c, Nicole Chaumont^a, Timothy S. Sadiq^a, Concetta Lupa^d, Peggy McNaul^d, Sean E. McLean^a, Andrea Hayes-Jordan^a, **Michael R. Phillips^{a,*}**

Decreased MME/kg

Decreased LOS by 40 hr

Decreased Foley

Increase in Gaba, Celebrex and Entereg premeds

40 % Open
operations

Journal of Pediatric Surgery 56 (2021) 115–120

Effect of implementing an enhanced recovery protocol for pediatric colorectal surgery on complication rate, length of stay, and opioid use in children

Jessica A. George^a, Andres J. Gonzalez Salazar^b, Ahmer Irfan^c, Laura Prichett^d,
Isam W. Nasr^e, Alejandro V. Garcia^e, Emily F. Boss^f, Eric B. Jelin^e

Decreased LOS

Decreased ERAS pain scores

Gabapentin started 1 week pre-op

Reduced NSQIP-identified post-operative complications.

Effect of implementing an enhanced recovery protocol for pediatric colorectal surgery on complication rate, length of stay, and opioid use in children

Jessica A. George^{a,*}, Andres J. Gonzalez Salazar^b, Ahmer Irfan^c, Laura Prichett^d, Isam W. Nasr^e, Alejandro V. Garcia^e, Emily F. Boss^f, Eric B. Jelin^e

Pre- and post-ERP group NSQIP data.

NSQIP Pre-enhanced recovery protocol implementation 2015
Abdominal-Pediatric

| | Total cases | Observed Events | Observed rate | Expected rate | Odds ratio | Comment |
|------------------------|-------------|-----------------|---------------|---------------|------------|-------------|
| PEDAB Morbidity | 216 | 16 | 7.41% | 6.75% | 1.08 | As expected |
| PEDAB SSI | 216 | 7 | 3.24% | 3.13% | 1.05 | As expected |

NSQIP Post-enhanced recovery protocol implementation 2018
Abdominal-Pediatric

| | Total cases | Observed Events | Observed rate | Expected rate | Odds ratio | Comment |
|------------------------|-------------|-----------------|---------------|---------------|------------|-----------|
| PEDAB Morbidity | 268 | 8 | 2.99% | 6.69% | 0.59 | Exemplary |
| PEDAB SSI | 268 | 2 | 1.82% | 3.51% | 0.50 | Exemplary |
| PEDAB Sepsis | 268 | 0 | 0.36% | 0.74% | 0.47 | Exemplary |

Objectives

Pediatric Oncology

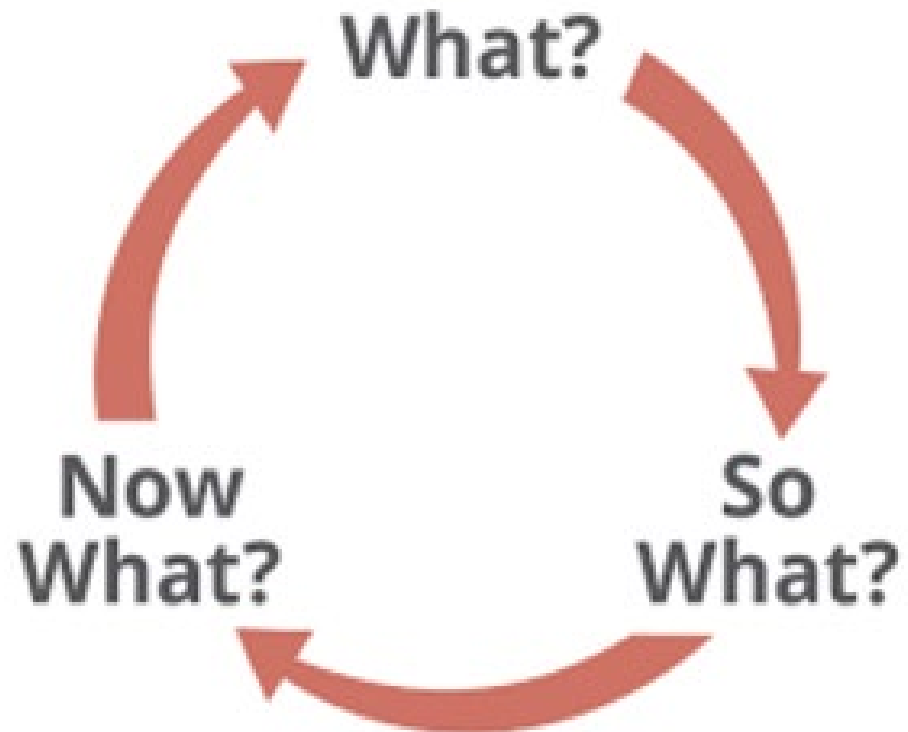
Pediatric Plastics

Pediatric IBD

Pediatric Short Stay

Pediatric Pectus

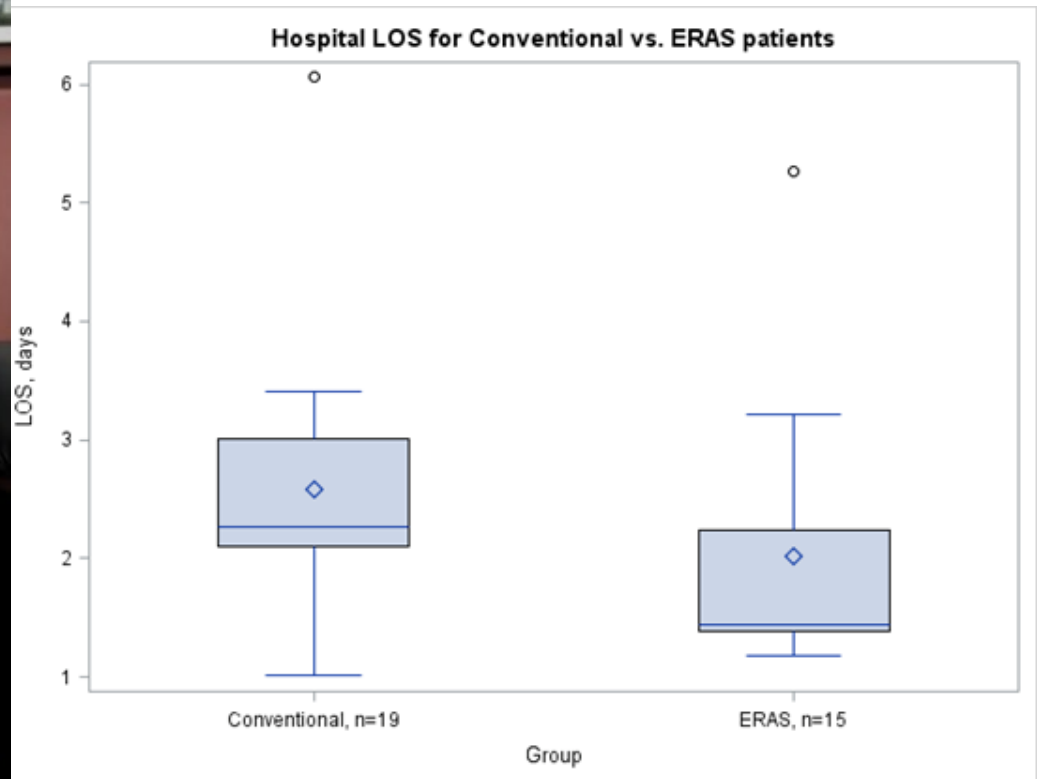
Pediatric EEN



Original article

Does ERAS impact outcomes of laparoscopic sleeve gastrectomy in adolescents?

Sule Yalcin, M.D.^a, Stephanie M. Walsh, M.S., M.D., F.A.A.P.^b, Janet Figueroa, M.P.H.^c, Kurt F. Heiss, M.D., F.A.A.P., F.A.C.S.^a, Mark L. Wulkan, M.D., F.A.A.P., F.A.C.S.^{d,*}



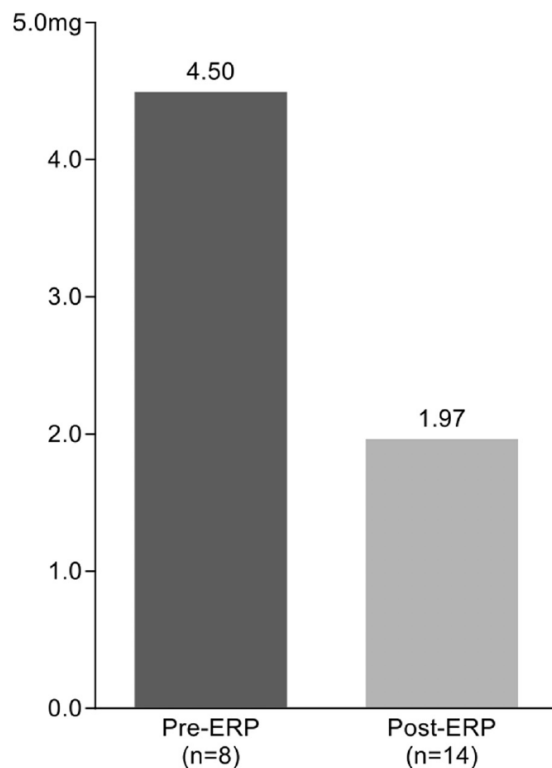


Implementation of enhanced recovery protocols reduces opioid use in pediatric laparoscopic Heller myotomy surgery

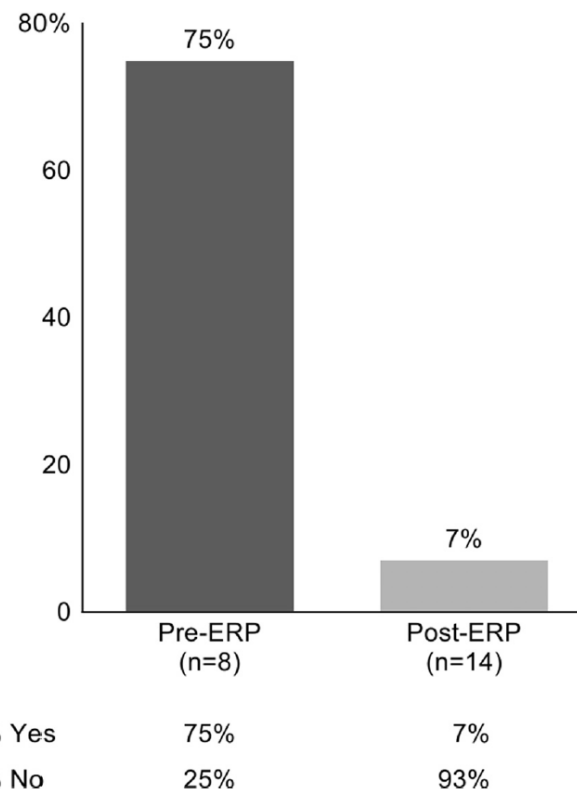


Olivia A Keane^{a,*}, Goeto Dantes^a, Srinivas Emani^b, Jose M Garza^c, Kurt F Heiss^d, Matthew S Clifton^d

Mean Morphine Equivalent
(MME, mg)



% of patients with opioid
Rx at discharge



_hildren's

% Yes
% No

75%
25%

7%
93%



Postoperative Management/ERAS

ERAS protocol for pediatric laparoscopic cholecystectomy promotes safe and early discharge☆☆☆☆☆

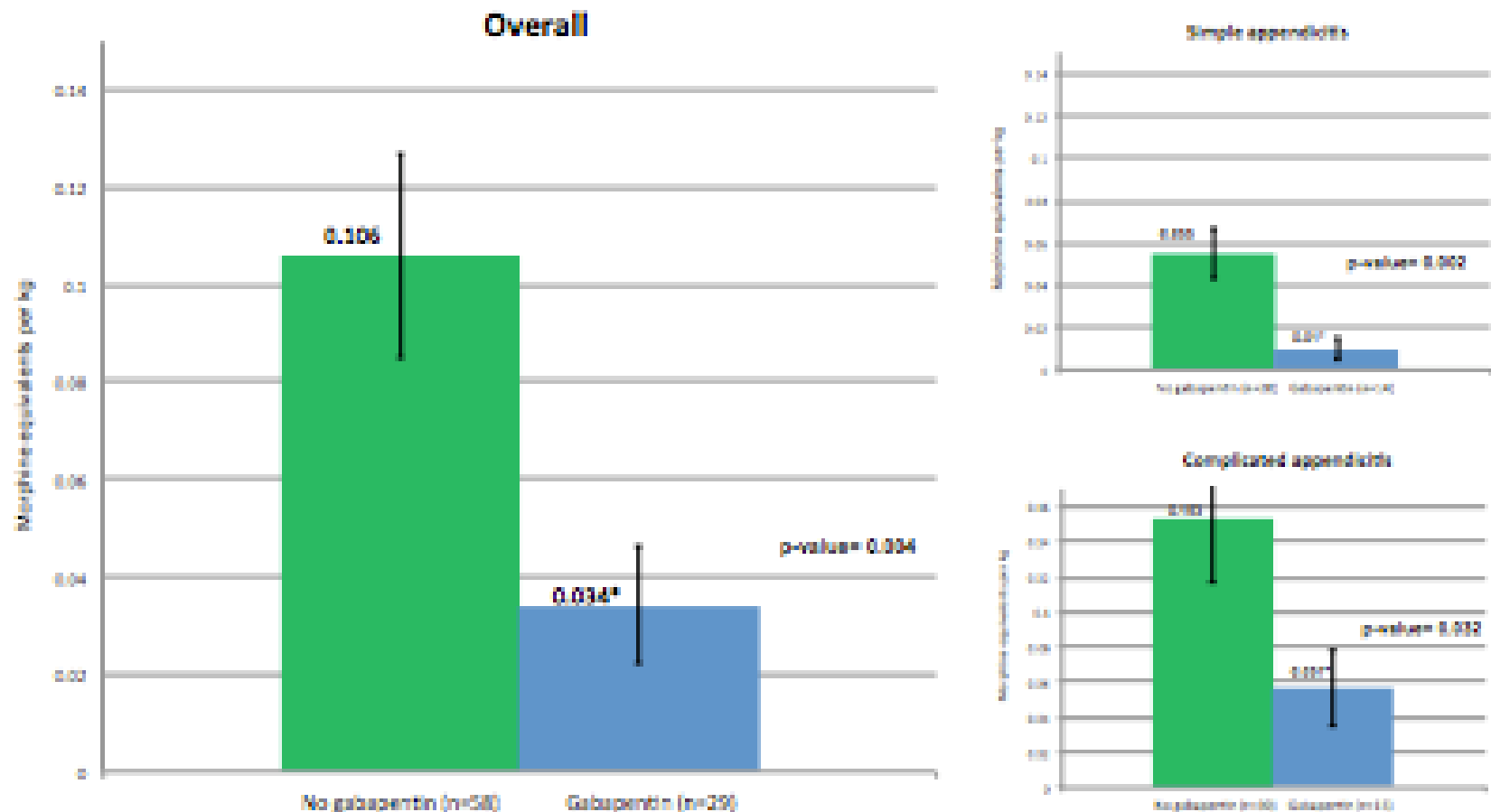


Andrew Yeh ^a, Gabriella Butler ^b, Stephen Strotmeyer ^b, Kelly Austin ^b, Mihaela Visoiu ^c,
Franklyn Cladi ^c, Marcus Malek ^{b,*}

| | | <u>Before Implementation</u> | <u>Full Implementation</u> | p-value |
|--------------------------------|------------------------|----------------------------------|---------------------------------|---------|
| Mean surgery start time | | 12:22 PM (7:40 AM – 7:03 PM) | 10:37 AM (7:45 AM – 6:19 PM) | <<0.01 |
| Mean operative time (hours) | | 1.17 (0.43 - 2.97) | 1.22 (0.33 - 2.90) | 0.78 |
| Mean length of stay (hours) | | 27.5 (10.5 - 48.6) | 13.6 (0.4 - 52.9) | <<0.01 |
| Same day discharge rate | | 2 (1.9%) | 112 (77.2%) | <<0.01 |
| ED 30-day return visit rate | Total visits | 12 (11.4%) | 14 (9.7%) | 0.52 |
| | Surgery-related visits | 8 (7.6%) | 12 (8.3%) | 1 |
| 30 day re-admission rate | | 6 (5.7%) | 3 (2.1%) | 0.17 |

Gabapentin as postoperative analgesic in pediatric appendectomy

Figure. Post-appendectomy inpatient opioid consumption

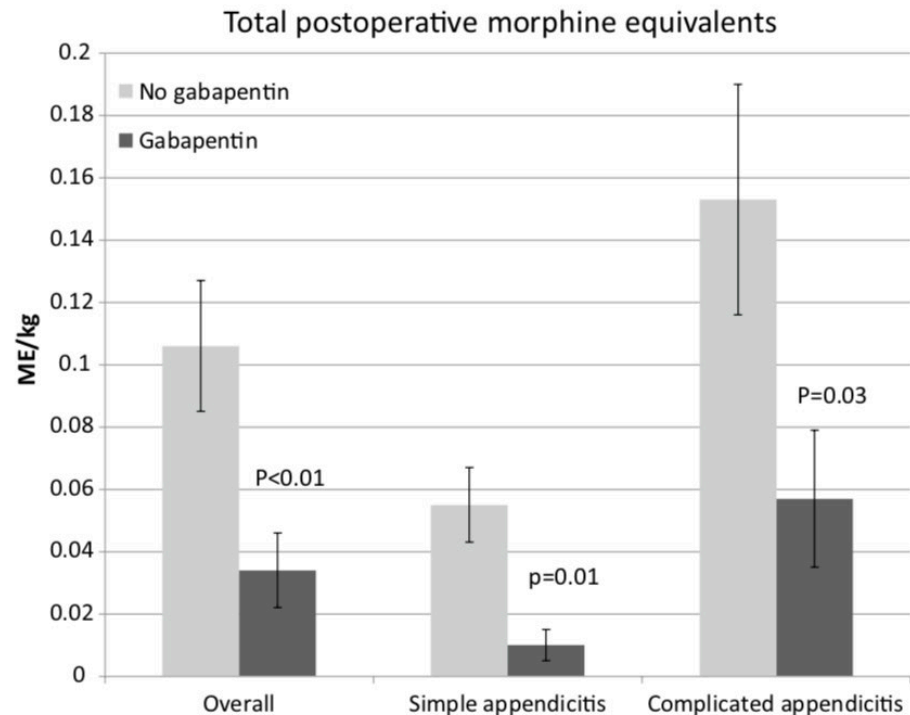




Effectiveness of gabapentin as a postoperative analgesic in children undergoing appendectomy

Katherine J. Baxter¹ · Jennifer Hafling² · Jennifer Sterner² · Adarsh U. Patel¹ · Helen Giannopoulos² · Kurt F. Heiss¹ · Mehul V. Raval¹

**Faster time to
pain score
<< 3**



ERAS Lite....

Prevention of Nausea/Vomiting
Regional blocks or Local Anesthesia
Scheduled Multi-Modal Analgesia (MMA)
Early Oral Hydration
Early Mobilization
Post op Counseling and Short Stay Goals

Pre admission Counseling
Fluid and Carbohydrate Load
1 hour Clear Liquids Fasting
Pre Anesthetic Pain Meds
Antibiotic Prophylaxis (?)

Postoperative

Preoperative

ERAS

Intraoperative

**Same Day Gallbladder
ERAS "Lite"**

Regional blocks or Local Anesthesia
Normothermia
Avoid Salt Water Overload
MIS procedure when possible

Engaged Anesthesia/OR staff (ERAS)

ERAS Lite....

Prevention of Nausea/Vomiting
Regional blocks or Local Anesthesia
Scheduled Multi-Modal Analgesia (MMA)
Early Oral Hydration (?)
Early Mobilization (?)
Post op Counseling and Short Stay Goals

Pre admission Counseling
Fluid and Carbohydrate Load
1 hour Clear Liquids Fasting
Pre Anesthetic Pain Meds
Antibiotic Prophylaxis (?)



ERAS Umbilical Hernia

Regional blocks or Local Anesthesia
Normothermia
Avoid Salt Water Overload
MIS procedure when possible
Engaged Anesthesia/OR staff (ERAS)

Objectives

Pediatric Oncology

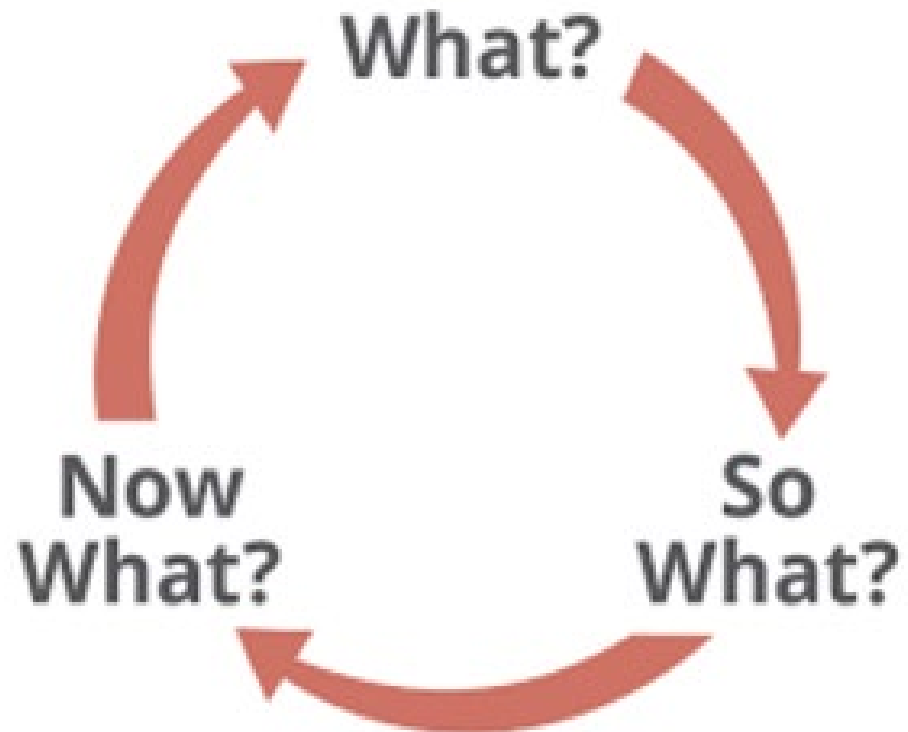
Pediatric Plastics

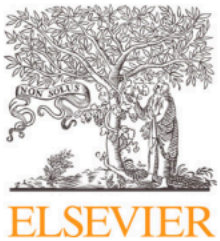
Pediatric IBD

Pediatric Short Stay

Pediatric Pectus

Pediatric EEN





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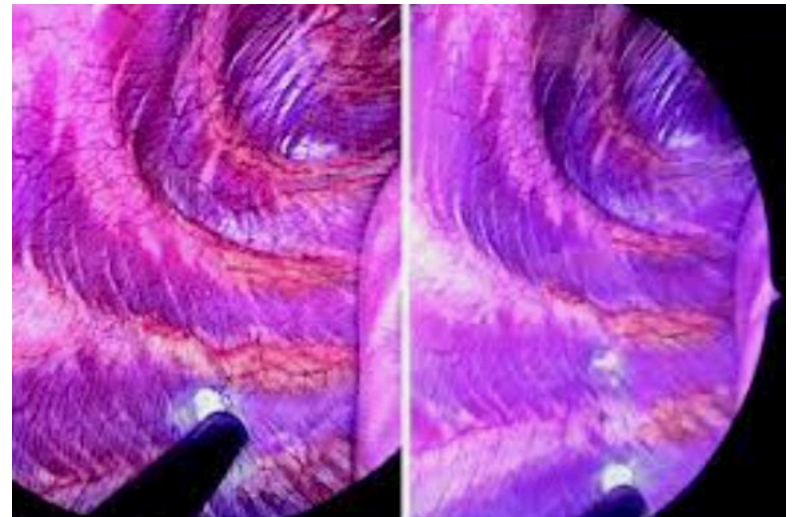
journal homepage: www.elsevier.com/locate/jped surg.org



Cryoablation is associated with shorter length-of-stay and reduced opioid use after the Ravitch procedure

R. Luke Rettig, Claire J. Yang, Adeel Ashfaq, Roman M. Sydorak*

Department of Pediatric Surgery, Kaiser Permanente Los Angeles Medical Center, 4867 Sunset Blvd. Los Angeles, CA, 90027, USA





Contents lists available at ScienceDirect

Journal of Pediatric Surgery

journal homepage: www.elsevier.com/locate/jpedisurg.org



Next day discharge after the Nuss procedure using intercostal nerve cryoablation, intercostal nerve blocks, and a perioperative ERAS pain protocol



John W. DiFiore^{a,*}, Jason O. Robertson^a, Surendrasingh Chhabada^b, Anthony L. DeRoss^a,
Mih S. Hossain^a, Lorena Rincon-Cruz^a, Wai Sung^b



Objectives

Pediatric Oncology

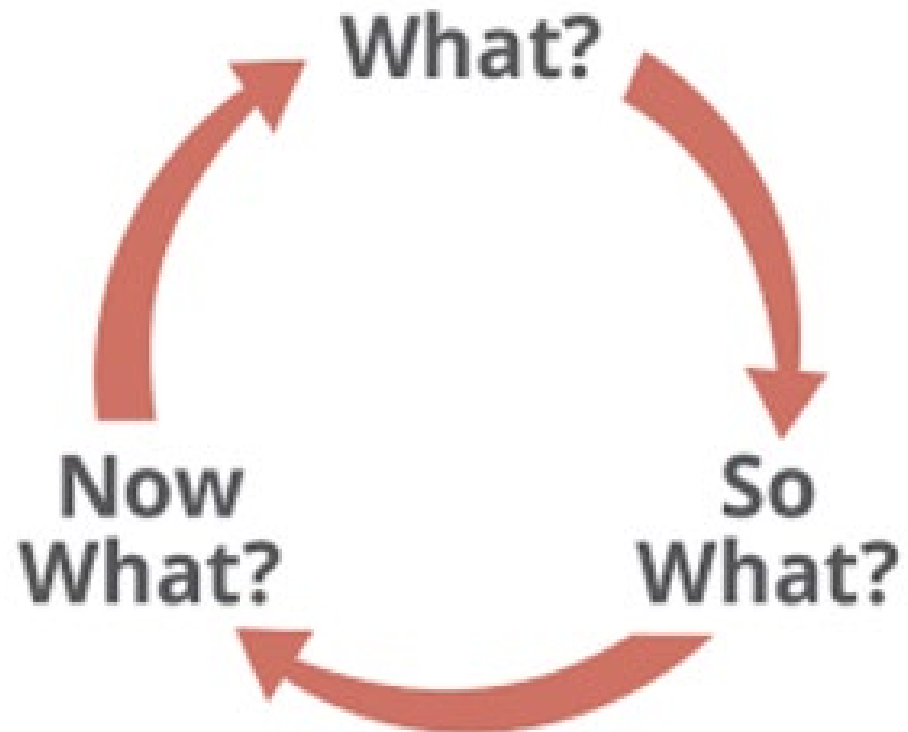
Pediatric Plastics

Pediatric IBD

Pediatric Short Stay

Pediatric Pectus

Pediatric EEN



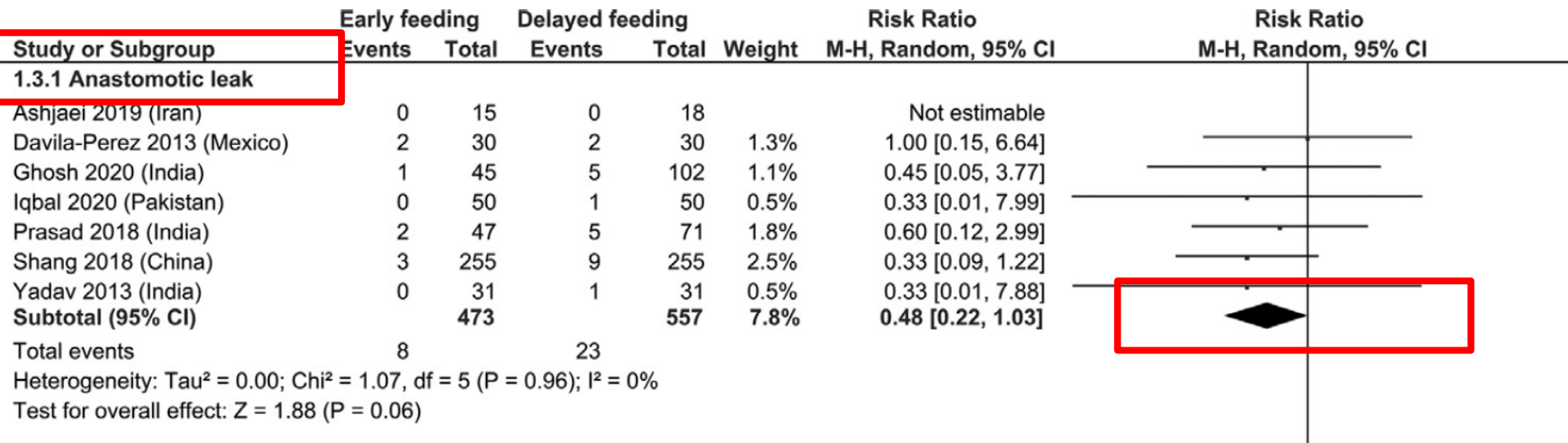


Review Article

Systematic review and meta-analysis of safety and efficacy of early enteral nutrition as an isolated component of Enhanced Recovery after Surgery [ERAS] in children after bowel anastomosis surgery

Pediatric ERAS and early enteral nutrition

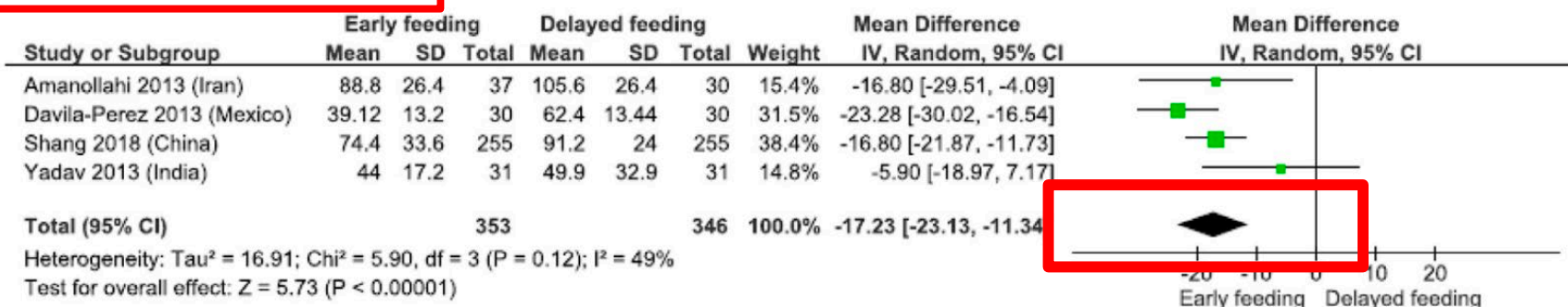
Bikram Kishore Behera^a, Satyajeet Misra^{a,*}, Bikasha Bihary Tripathy^b



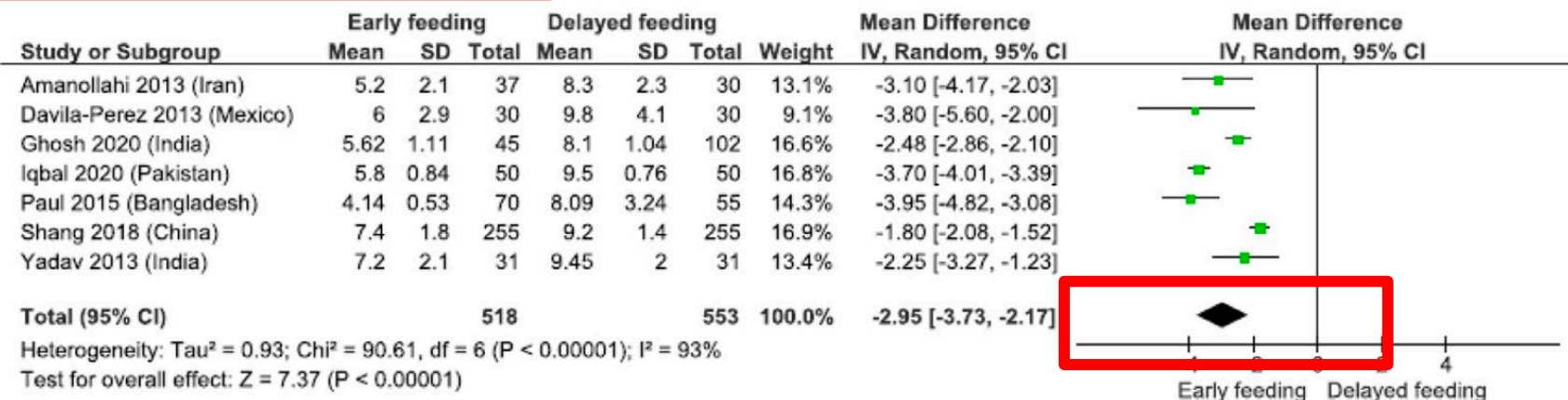
Systematic review and meta-analysis of safety and efficacy of early enteral nutrition as an isolated component of Enhanced Recovery after Surgery [ERAS] in children after bowel anastomosis surgery

Pediatric ERAS and early enteral nutrition

A. Time to first feces (hours)



B. Time to hospital discharge (days)





Review Article

Systematic review and meta-analysis of safety and efficacy of early enteral nutrition as an isolated component of Enhanced Recovery after Surgery [ERAS] in children after bowel anastomosis surgery

Pediatric ERAS and early enteral nutrition

Bikram Kishore Behera^a, Satyajeet Misra^{a,*}, Bikasha Bihary Tripathy^b

1.3.3 Surgical site infection

| | | | | | | |
|----------------------------|----|------------|----|------------|--------------|--------------------------|
| Asnjari 2019 (Iran) | 0 | 15 | 1 | 18 | 0.5% | 0.40 [0.02, 9.06] |
| Davila-Perez 2013 (Mexico) | 3 | 30 | 8 | 30 | 2.8% | 0.38 [0.11, 1.28] |
| Ghosh 2020 (India) | 2 | 45 | 9 | 102 | 2.0% | 0.50 [0.11, 2.24] |
| Iqbal 2020 (Pakistan) | 3 | 50 | 11 | 50 | 2.8% | 0.27 [0.08, 0.92] |
| Shang 2018 (China) | 22 | 255 | 19 | 255 | 7.1% | 1.16 [0.64, 2.09] |
| Yadav 2013 (India) | 2 | 31 | 9 | 31 | 2.1% | 0.22 [0.05, 0.95] |
| Subtotal (95% CI) | | 426 | | 486 | 17.4% | 0.49 [0.25, 0.97] |

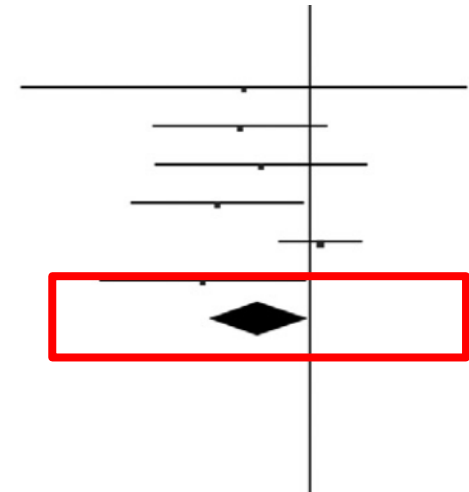
Total events

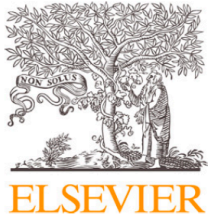
32

57

Heterogeneity: $\tau^2 = 0.29$; $\chi^2 = 8.81$, $df = 5$ ($P = 0.12$); $I^2 = 43\%$

Test for overall effect: $Z = 2.05$ ($P = 0.04$)





Review Article

Systematic review and meta-analysis of safety and efficacy of early enteral nutrition as an isolated component of Enhanced Recovery after Surgery [ERAS] in children after bowel anastomosis surgery

Pediatric ERAS and early enteral nutrition

Bikram Kishore Behera^a, Satyajeeet Misra^{a,*}, Bikasha Bihary Tripathy^b

1.3.6 Septic complications

| | | | | | | |
|----------------------------|----|------------|----|------------|--------------|--------------------------|
| Asnjael 2019 (Iran) | 13 | 15 | 17 | 18 | 11.8% | 0.92 [0.73, 1.15] |
| Davila-Perez 2013 (Mexico) | 3 | 30 | 7 | 30 | 2.7% | 0.43 [0.12, 1.50] |
| Iqbal 2020 (Pakistan) | 7 | 50 | 17 | 50 | 5.2% | 0.41 [0.19, 0.91] |
| Paul 2015 (Bangladesh) | 5 | 70 | 15 | 55 | 4.1% | 0.26 [0.10, 0.68] |
| Sangkhatat 2003 (Thailand) | 8 | 34 | 6 | 30 | 4.1% | 1.18 [0.46, 3.01] |
| Shang 2018 (China) | 28 | 255 | 48 | 255 | 9.1% | 0.58 [0.38, 0.90] |
| Yadav 2013 (India) | 4 | 31 | 13 | 31 | 3.8% | 0.31 [0.11, 0.84] |
| Subtotal (95% CI) | | 485 | | 469 | 40.7% | 0.54 [0.33, 0.91] |

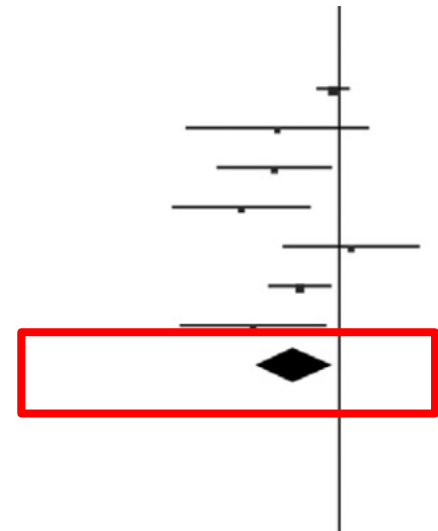
Total events

68

123

Heterogeneity: $\tau^2 = 0.32$; $\chi^2 = 26.19$, $df = 6$ ($P = 0.0002$); $I^2 = 77\%$

Test for overall effect: $Z = 2.34$ ($P = 0.02$)

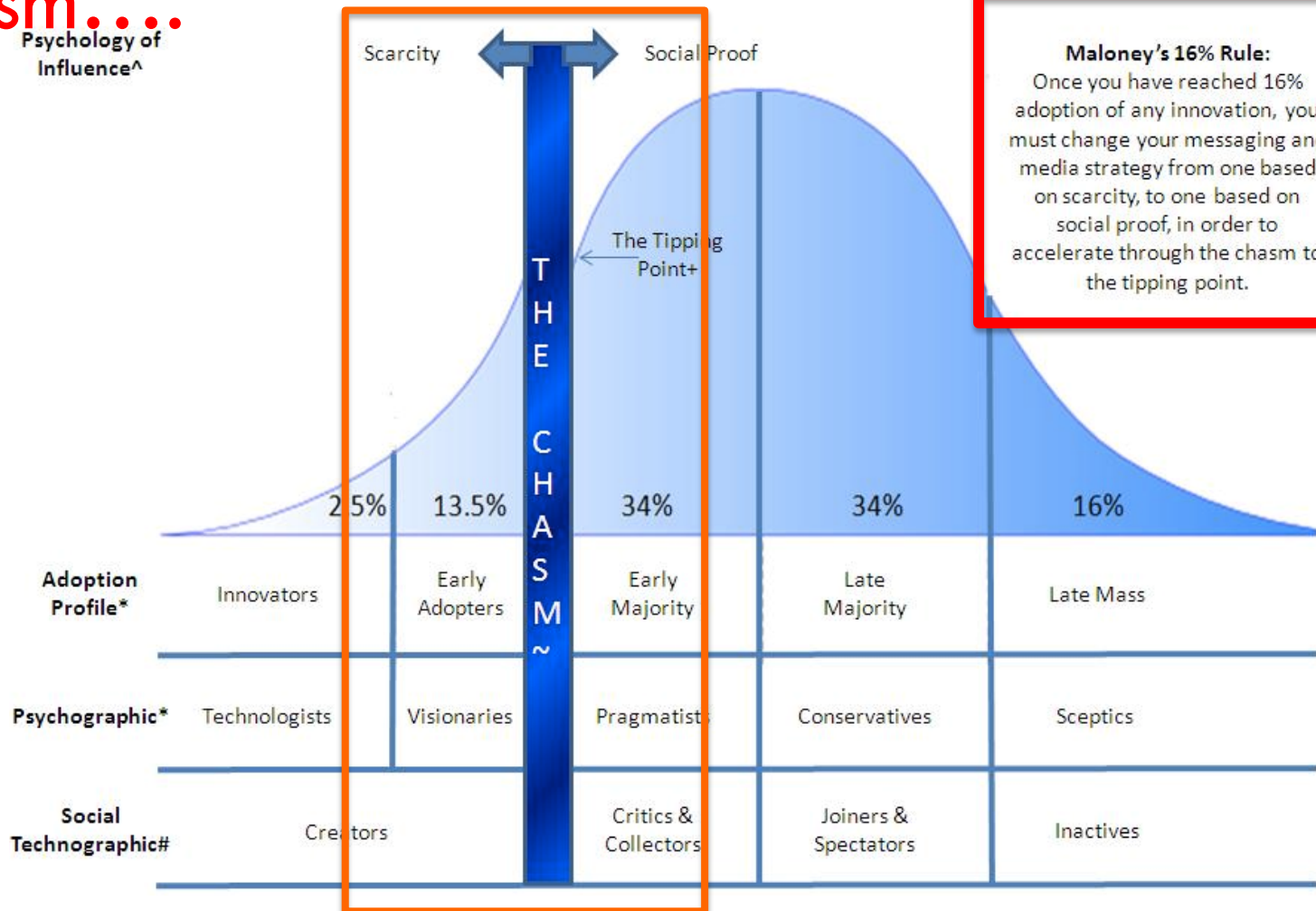


Twelve hundred and eighty-six children from 10 studies

ERAS is Awesome!!!...

But we need “Collaboration” to Jump the Quality Chasm.....

Psychology of Influence^



Maloney's 16% Rule:

Once you have reached 16% adoption of any innovation, you must change your messaging and media strategy from one based on scarcity, to one based on social proof, in order to accelerate through the chasm to the tipping point.

The ERAS and The Matrix at 20....

Original article

Hospital stay of 2 days after open sigmoidectomy with a multimodal rehabilitation programme

H. Kehlet and T. Mogensen

Department of Surgical Gastroenterology and Anaesthesiology, Hvidovre University Hospital, DK-2650 Hvidovre, Denmark

Correspondence to: Professor H. Kehlet



