Enhanced Recovery after Surgery
or
“ERASing the length of hospital stay”

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Disclosures

• None
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• erassociety.org
Objectives

• Discuss the evolution of enhanced recovery protocols
• Consider evidence based outcomes that support enhanced recovery
• Discuss enhanced recovery goals and elements
• Review Mayo Rochester and Florida Experience
Enhanced Recovery is…

- *Attenuation* of pathophysiologic changes occurring during and after surgery
- Using *alternative strategies of management*
- Replaces traditional but *untested practices* of peri-operative care
- Primary goal: to *hasten recovery*

SOME RADICAL CHANGES IN THE AFTER-TREATMENT OF CELIOTOMY CASES.*

BY EMIL RIES, M.D.
PROFESSOR OF GYNECOLOGY, POST-GRADUATE MEDICAL SCHOOL.
CHICAGO.

The purpose of the changes which I have worked out within the last four years has been to free the patients from many irksome and disagreeable features of the after-treatment as usually carried out, and at the same time to make their recovery more rapid and more complete, so that they are able to leave the hospital at a much earlier date than has been customary and in such a condition of strength that they can follow their wonted occupations within a few days after their discharge from the hospital.

“The experience of ages is not to be thrust aside in a minute.”

Dr. C. L. Bonifield
“While no single technique or drug regimen has been shown to eliminate postoperative morbidity and mortality, multimodal interventions may lead to a major reduction in the undesirable sequelae of surgical injury with improved recovery and reduction in postoperative morbidity and overall costs.”
Surgical Stress

• Leads to:
  • Catabolic state with increased cardiac demands; relative tissue hypoxia; increased insulin resistance; impaired coagulation profile; and altered pulmonary and GI functions

• Body’s response:
  • Organ dysfunction; increased morbidity; and delayed convalescence

Kehlet et al. 2008; Ann Surg
Kehlet H. 2006; Reg Anesth Pain Med
Wilmore DW. 2002; Ann Surg
ERAS Goals

• Maintain normal physiology perioperatively
• Optimize patient outcomes with interventions
  • Decrease surgical stress
  • Mitigate negative consequences
Enhanced Recovery After Surgery
Key Components

<table>
<thead>
<tr>
<th>Pre-operative</th>
<th>Intra-operative</th>
<th>Post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-admission counseling</td>
<td>Active warming/room temp</td>
<td>Early oral nutrition</td>
</tr>
<tr>
<td>Early discharge planning</td>
<td>Surgical techniques</td>
<td>Early ambulation</td>
</tr>
<tr>
<td>Reduced fasting</td>
<td>Avoid NG tubes &amp; drains</td>
<td>Early catheter removal</td>
</tr>
<tr>
<td>Carbohydrate loading</td>
<td></td>
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<tr>
<td>No bowel prep</td>
<td>Multi-modal pain management</td>
<td></td>
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<tr>
<td></td>
<td>Multi-modal anti-emetic prophylaxis</td>
<td></td>
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<tr>
<td>Pre-warming</td>
<td>Goal directed per-operative fluid therapy</td>
<td></td>
</tr>
<tr>
<td>Antibiotic prophylaxis</td>
<td>Aggressive glucose control</td>
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<td></td>
<td>VTE prophylaxis</td>
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<tr>
<td>Audit of compliance &amp; outcomes</td>
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</tbody>
</table>

Active Patient Involvement

Whole Team Involvement
Origin of Mayo Enhanced Recovery

• Introduced in colorectal surgery

• Concept:
  • Replace traditional, untested practices of peri-operative care

• Goal:
  • Enhance post-operative recovery
  • Reduce LOS, narcotic use, cost
  • Reduce surgical morbidity
  • Enhance patient satisfaction

Larson, et al. 2010. JACS.
Elements of Enhanced Recovery

• Pre-operative
Elements of Enhanced Recovery

- Pre-operative
  - Intestinal change minimized
- Pain management
- PONV prophylaxis

- Avoid dehydration
  - Liquids until 2 hours before surgery
  - Encourage caloric intake
  - No oral bowel prep (rectal enemas allowed at surgeon discretion)

Preoperative Carbohydrates

• Cochrane review
  • ≥45g carbohydrates within 4 hours of anesthesia start
  • 27 RCTs, 1976 patients
  • Abdominal surgery (18), ortho (4), cardiac (4), thyroidectomy (1)
  • No difference in postop complications
  • No patients dx with aspiration pneumonitis
  • Decreased LOS (.04-.56d)

Preop carb loading options:
  - Apple juice
  - Glucola
  - OTC complex carb drink offerings

Bowel Prep...

- History dates back many years
- Anesthesia, antibiotics, suture material and infection rates were different
- Practice makes logical sense
- Patient satisfaction: low
- Utility has been challenged
- Several small RCTs but all are consistent!
  - Mechanical Prep not needed even for CRS surgery
Mechanical Bowel Prep for Colorectal surgery

• 18 RCTs (5805 pts) – prep vs no prep
  • Included rectal enemas with no change in results

• Anastomotic leak: 4.4% vs 4.5% p=NS

• Wound infection: 9.6% vs 8.5% p=NS

• Conclusions:
  • No evidence that patients benefit from mechanical bowel preps nor rectal enemas.
  • Bowel cleansing can be safely omitted in elective colonic surgery.

Who wants change?

Who wants to change?
Bowel Prep Combined with Oral Antibiotics
Colorectal surgery

- NSQIP study of >8400 patients
  - OAP + MBP associated with half the rate of anastomotic leak, SSI, and ileus

- Meta-analysis of 7 RCT’s, >1700 patients
  - MBP + systemic abx +/- OAP
  - No difference in organ space (4% vs. 4.8%)
  - SSI rate 7.2% vs. 16% favoring use of OAP
  - OAP alone not investigated

Kiran et al; Annals of Surgery. 2015; 262 (3).
Chen et al; Dis Colon Rectum. 2016; 59(1).
Bowel Prep for Gyn Laparoscopy: 3 Arm RCT

- 308 pts randomized to 3 different arms
  - NPO at MN
  - Low residue diet for 2 days then NPO
  - Low residue diet and oral prep (Na picosulfate)

- Minimal but statistically better visualization and bowel handling by 1 point on a 10 pt VAS, but not on verbal descriptor scale
  - At the expense of significantly more: HA, Thirst, weakness and tiredness!

- Conclusion: No need for prep

Elements of Enhanced Recovery

- Pre-operative
  - Intestinal change minimized
- Pain management
- PONV prophylaxis

- Premedication
  - celecoxib 400mg
  - gabapentin 600mg
  - acetaminophen 1g
- Education
Elements of Enhanced Recovery

• Pre-operative
  • Intestinal change minimized
  • Pain management
  • PONV prophylaxis

• Antiemetics
  • Dexamethasone
  • 5HT3 antagonist
  • +/- Scopolamine
Elements of Enhanced Recovery

- Intra-operative
  - Euvolemia
  - Local analgesia
  - Normothermia
  - Limit drains

- Limit IVF
- Colloid > crystalloid
- Maintenance 40mL/hr
- DC IVF when intake 600mL, or 8am POD#1

Elements of Enhanced Recovery

- Intra-operative
  - Euvolemia
  - Local analgesia

- Regional anesthesia
  - Incision site injection
  - Uterosacral ligament injection
    - Bupivicaine 0.5%/epinephrine
    - Case start & end (20mL total)

Uterosacral ligament injection
RCT n=90 Mayo AZ
Narcotic use: 30% lower with injection (16 vs 23 mg, p=0.009)
Urinary retention unchanged (36% injection vs 49% placebo, p=0.29)
0.5% bupivacaine with 1:200,000 epinephrine
10mL each uterosacral ligament (case start & at suture)

Long JG et al. 2009. Int Urogynecol J Pelvic Floor Dysfunct
Epidural Analgesia

• Gold standard for pain control
  • Improvement in ileus?

• Potential disadvantages:
  • Euvolemia vs. pressors/fluid bolus
    • Large volume ascites a concern
  • Sedation/respiratory depression
  • Aggressive thromboprophylaxis
  • Ambulation, efficacy
  • Cost
  • OR time

Epidural Analgesia

- Currently not utilized in MCR enhanced recovery program (<2%)
- Benefits appear to be limited to pain control
- Other methods available to optimize pain control…
Transversus Abdominis Plane (TAP) Block

- Local injection of liposomal bupivacaine resulted in lower pain scores and less opioid use compared to patients randomized to TAP blocks following total abdominal hysterectomy

Liposomal Bupivacaine

- Advantage: longer duration of action
  - Standard bupivacaine: 6-8 hours
  - Liposomal bupivacaine: 2-3 days
- Substitute standard bupivacaine with liposomal bupivacaine (wound infiltration, diluted to 180cc)

Kalogera et al. 2016. Obstet and Gynecol
Elements of Enhanced Recovery

- Post-operative
  - Early mobilization
  - Early feeding
  - Oral analgesia
  - Minimize opiates

- Walk night of surgery, 2 hr out of bed
- POD#1 8hr out of bed
- Chair for all meals
- Discontinue bladder catheter
Elements of Enhanced Recovery

• Post-operative
  • Early mobilization
  • Early feeding
  • Oral analgesia
  • Minimize opiates

• No nasogastric drainage
• Drink 800-2L day of surgery
• Begin with solid food
• Nutritional supplements
• Daily
  • Senna/Docusate (QHS)
Elements of Enhanced Recovery

• Post-operative
  • Early mobilization
  • Early feeding
  • Oral analgesia
  • Minimize opiates

• Schedule Tylenol 1g q 6hr
• Schedule NSAID: Ketorolac/Ibuprofen q6hr
Elements of Enhanced Recovery

• Post-operative
  • Early mobilization
  • Early feeding
  • Oral analgesia
  • Minimize opiates

• Oral narcotic use, Oxycodone/ Tramadol
• IV narcotic if oral ineffective after 1 hr.
• Avoid PCA

Nelson G. a,*, Altman A.D. b, Nick A. c, Meyer L.A. c, Ramirez P.T. c, Achtari C. d, Antrobus J. e, Huang J. f, Scott M. g, h, Wijk L. i, Acheson N. j, Ljungqvist O. k, Dowdy S.C. l


G. Nelson a,*, A.D. Altman b, A. Nick c, L.A. Meyer c, P.T. Ramirez c, C. Achtari d, J. Antrobus e, J. Huang f, M. Scott g, h, L. Wijk i, N. Acheson j, O. Ljungqvist k, S.C. Dowdy l
Evolution of perioperative care at Mayo Clinic: Complex cytoreduction for ovarian cancer

Until 2011

“Conservative management”

- LOS: 8 days
- PCA: 99%

2011-2013

Enhanced Recovery

- LOS: 5 days
- PCA: 30%
- Opioids at 48 hours: 80%
- >$850,000 savings
- >90% pt satisfaction

2013-present

ERP + Liposomal Bupivacaine

- LOS: 5 days
- PCA: 4%
- Opioids at 48 hours: 90%
- Ileus: 50%
- Cost neutral

Results of ERAS Implementation

• No change in:
  • Pain scores
  • Post-op complications (SSI, enteric leaks)
  • Hypotension or acute renal insufficiency
  • Mortality
  • Readmission rates

• Patient satisfaction excellent
  • 95% rated pain control excellent/very good
  • 90% rated n/v control excellent/very good
## Opioid use

<table>
<thead>
<tr>
<th></th>
<th>Complex</th>
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<th>Staging</th>
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<tbody>
<tr>
<td></td>
<td>LB (n=121)</td>
<td>BH (n=81)</td>
<td>P-value</td>
<td>LB (n=72)</td>
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<tr>
<td>Cumulative opioid use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>through 24 hours</td>
<td>30</td>
<td>53.5</td>
<td>.002</td>
<td>30.3</td>
</tr>
<tr>
<td>through 48 hours</td>
<td>37.5</td>
<td>82.5</td>
<td>.005</td>
<td>37.5</td>
</tr>
<tr>
<td>Remaining of LOS</td>
<td>62</td>
<td>100.5</td>
<td>.006</td>
<td>46.5</td>
</tr>
<tr>
<td>Opioid/Tramadol-free</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POD1</td>
<td>19%</td>
<td>12.3%</td>
<td>.01</td>
<td>18.1%</td>
</tr>
<tr>
<td>POD2</td>
<td>40%</td>
<td>28.4%</td>
<td>.004</td>
<td>39.1%</td>
</tr>
<tr>
<td>Remaining of LOS</td>
<td>38.7%</td>
<td>26.3%</td>
<td>&lt;.001</td>
<td>54%</td>
</tr>
<tr>
<td>PCA</td>
<td>4.1%</td>
<td>33.3%</td>
<td>&lt;.001</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

Length of hospital stay (LOS); patient controlled analgesia (PCA); continuous variables: median.
ERAS and Inpatient Opioid Requirements: Complex cytoreductions

• Opioid use first 48 hours after surgery (OME)
  • Conservative management 351 (47 x 5mg oxy)
  • Enhanced recovery 69
  • Enhanced recovery + LB 37.5 (5 x 5mg oxy)

• 40% free of opioids/tramadol at 48 hours

• Reductions since implementation of ERAS is equivalent to about 40,000 pills (just for ovarian cancer)
### MCF ERAS Data with Intrathecal Hydromorphone

**Analgesia Type vs. LOS for all cancer cases (Includes ERP and no ERP timeframes)**

<table>
<thead>
<tr>
<th>Analgesia Type</th>
<th>n</th>
<th>Median LOS</th>
<th>IQR</th>
<th>Range</th>
<th>Mean</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/PO</td>
<td>28</td>
<td>5.5</td>
<td>2-10.25</td>
<td>37</td>
<td>7.42857</td>
<td>4.4224-10.435</td>
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<tr>
<td>PCA</td>
<td>63</td>
<td>5</td>
<td>4-8</td>
<td>22</td>
<td>6.23810</td>
<td>5.2735-7.203</td>
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<tr>
<td>Intrathecal Dilaudid</td>
<td>17</td>
<td>3</td>
<td>2-5</td>
<td>7</td>
<td>3.52941</td>
<td>2.4522-4.607</td>
</tr>
<tr>
<td>Epidural</td>
<td>97</td>
<td>5</td>
<td>4-8</td>
<td>33</td>
<td>6.71134</td>
<td>5.7116-7.711</td>
</tr>
</tbody>
</table>

\[ p < 0.0065 \]
# MCF ERAS Data with Intrathecal Hydromorphone

After ERP implemented: Analgesia type vs. LOS for cancer cases

<table>
<thead>
<tr>
<th>Analgesia Type</th>
<th>n</th>
<th>Median LOS</th>
<th>IQR</th>
<th>Range</th>
<th>Mean</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV/PO</td>
<td>18</td>
<td>5.5</td>
<td>2-9</td>
<td>13.6</td>
<td>6.5</td>
<td>3.9629-9.0371</td>
</tr>
<tr>
<td>PCA</td>
<td>32</td>
<td>4</td>
<td>4-6.75</td>
<td>9.4</td>
<td>5.6875</td>
<td>4.5348-6.8402</td>
</tr>
<tr>
<td>Intrathecal Dilaudid</td>
<td>17</td>
<td>3</td>
<td>2-5</td>
<td>6.2</td>
<td>3.52941</td>
<td>2.4522-4.6066</td>
</tr>
<tr>
<td>Epidural</td>
<td>45</td>
<td>5</td>
<td>4-7</td>
<td>6</td>
<td>5.73333</td>
<td>4.9021-6.5645</td>
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</table>

\[p < 0.0274\]
### Complex Cytoreductive

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Liposomal Bupivacaine (n=121)</th>
<th>Bupivacaine HCL (n=81)</th>
<th>P*</th>
<th>Liposomal Bupivacaine (n=72)</th>
<th>Bupivacaine HCL (n=84)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative pain scores through</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 h</td>
<td>91.3 (62.5–112.5)</td>
<td>88.5 (57.5–126)</td>
<td>.73</td>
<td>82.6 (60.4–110.1)</td>
<td>92 (68.1–119.1)</td>
<td>.19</td>
</tr>
<tr>
<td>48 h</td>
<td>160.8 (119.5–212)</td>
<td>158.3 (98.3–216)</td>
<td>.69</td>
<td>161.8 (111.5–212.3)</td>
<td>160.9 (112.1–223.3)</td>
<td>.57</td>
</tr>
<tr>
<td>Cumulative opioid use through</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 h</td>
<td>30 (15–67.5)</td>
<td>53.5 (15–132)</td>
<td>.002</td>
<td>30.3 (7.5–62)</td>
<td>30.3 (11.5–75.3)</td>
<td>.32</td>
</tr>
<tr>
<td>48 h</td>
<td>37.5 (15–97.5)</td>
<td>82.5 (22.5–225)</td>
<td>.005</td>
<td>37.5 (15–81.3)</td>
<td>37.5 (15–96.8)</td>
<td>.68</td>
</tr>
<tr>
<td>Remaining of hospital stay</td>
<td>62 (15–135)</td>
<td>100.5 (50–390.8)</td>
<td>.006</td>
<td>46.5 (15–108.8)</td>
<td>45.0 (15–117)</td>
<td>.93</td>
</tr>
<tr>
<td>Need for IV opioid rescue</td>
<td>35 (28.9)</td>
<td>45 (55.6)</td>
<td>&lt;.001</td>
<td>11 (15.3)</td>
<td>24 (28.6)</td>
<td>.05</td>
</tr>
<tr>
<td>Time to first dose of IV opioid rescue</td>
<td>4/35 (11.4)</td>
<td>2/11 (18.2)</td>
<td>11/24 (45.8)</td>
<td><strong>9/13 (69.2)</strong></td>
<td>2/13 (15.4)</td>
<td><strong>13 (92.8)</strong></td>
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<tr>
<td>Postoperative day 1</td>
<td>2/35 (68.6)</td>
<td>23/45 (51.1)</td>
<td>0.001</td>
<td>6/11 (54.5)</td>
<td>12/24 (50)</td>
<td>.001</td>
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<tr>
<td>Postoperative day 2</td>
<td>4/35 (11.4)</td>
<td>0</td>
<td>0</td>
<td>2/11 (18.2)</td>
<td>0</td>
<td>.006</td>
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<tr>
<td>Remaining of hospital stay</td>
<td>3/35 (8.6)</td>
<td>1/45 (2.2)</td>
<td>&lt;.001</td>
<td>1/11 (9.1)</td>
<td>1/24 (4.2)</td>
<td>.05</td>
</tr>
<tr>
<td>PCA use</td>
<td>5/45 (11.4)</td>
<td>27 (33.3)</td>
<td>&lt;.001</td>
<td>1/11 (9.1)</td>
<td>7/8 (83)</td>
<td>.05</td>
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<tr>
<td>Duration of PCA (d)</td>
<td>1 (1–2)</td>
<td>2 (2–4)</td>
<td>.22</td>
<td>1 (1–2)</td>
<td>2 (2–4)</td>
<td>.34</td>
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<tr>
<td>Opioid medication breakdown</td>
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<tr>
<td>Postoperative day 1</td>
<td>23 (19)</td>
<td>10 (12.5)</td>
<td>.01</td>
<td>13 (18.1)</td>
<td>12 (14.3)</td>
<td>.06</td>
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<tr>
<td>Opioid only</td>
<td>98 (81)</td>
<td>66 (81.5)</td>
<td>.004</td>
<td>59 (81.9)</td>
<td>66 (78.6)</td>
<td>.71</td>
</tr>
<tr>
<td>Tramadol only</td>
<td>0</td>
<td>5 (6.2)</td>
<td></td>
<td>0</td>
<td>6 (7.1)</td>
<td>.006</td>
</tr>
<tr>
<td>Postoperative day 2</td>
<td>48 (40)</td>
<td>23 (28.4)</td>
<td>.006</td>
<td>27 (39.1)</td>
<td>27 (33.3)</td>
<td>.006</td>
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<tr>
<td>Opioid only</td>
<td>72 (60)</td>
<td>52 (64.2)</td>
<td>.004</td>
<td>42 (60.9)</td>
<td>43 (53.1)</td>
<td>.006</td>
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<tr>
<td>Tramadol only</td>
<td>0</td>
<td>6 (7.4)</td>
<td></td>
<td>0</td>
<td>11 (16.6)</td>
<td>.005</td>
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<tr>
<td>Remaining of hospital stay</td>
<td>43 (38.7)</td>
<td>20 (26.3)</td>
<td>&lt;.001</td>
<td>27 (54)</td>
<td>21 (33.9)</td>
<td>.005</td>
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<tr>
<td>Opioid only</td>
<td>68 (61.3)</td>
<td>47 (61.8)</td>
<td></td>
<td>23 (46)</td>
<td>31 (50)</td>
<td>.005</td>
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<tr>
<td>Tramadol only</td>
<td>0</td>
<td>9 (11.8)</td>
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<td>0</td>
<td>10 (16.1)</td>
<td>.005</td>
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<td>Nausea</td>
<td>30 (24.8)</td>
<td>49 (60.5)</td>
<td>&lt;.001</td>
<td>20 (27.8)</td>
<td>44 (52.4)</td>
<td>.002</td>
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<tr>
<td>Excluding Alvimopan study patients</td>
<td>21/87 (24.1)</td>
<td>49 (60.5)</td>
<td></td>
<td>14/51 (27.3)</td>
<td>44 (52.4)</td>
<td>.005</td>
</tr>
<tr>
<td>48 h</td>
<td>36/120 (30)</td>
<td>45 (55.6)</td>
<td>&lt;.001</td>
<td>14/71 (19.7)</td>
<td>36/61 (44.4)</td>
<td>.001</td>
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<tr>
<td>Excluding Alvimopan study patients</td>
<td>24/86 (27.9)</td>
<td>45 (55.6)</td>
<td></td>
<td>10/50 (20)</td>
<td>36/61 (44.4)</td>
<td>.004</td>
</tr>
<tr>
<td>Vomiting</td>
<td>14 (11.6)</td>
<td>9 (6.6)</td>
<td>.50</td>
<td>9 (12.5)</td>
<td>9 (10.7)</td>
<td>.73</td>
</tr>
<tr>
<td>Excluding Alvimopan study patients</td>
<td>16/120 (13.3)</td>
<td>14 (11.7)</td>
<td>.44</td>
<td>6/79 (8.5)</td>
<td>98/61 (11.1)</td>
<td>.37</td>
</tr>
<tr>
<td>48 h</td>
<td>9/86 (10.5)</td>
<td>14 (11.7)</td>
<td>.20</td>
<td>2/35 (6.9)</td>
<td>30/60 (5)</td>
<td>.37</td>
</tr>
<tr>
<td>Excluding Alvimopan study patients</td>
<td>14/116 (12.2)</td>
<td>9 (6.6)</td>
<td>.04</td>
<td>12/22 (2.8)</td>
<td>5 (6)</td>
<td>.45</td>
</tr>
</tbody>
</table>

### Staging Laparotomy

Intrathecal (n = 14)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Liposomal Bupivacaine (n=72)</th>
<th>Bupivacaine HCL (n=84)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative opioid use through</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48 h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remaining of hospital stay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need for opioid rescue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to first dose of IV opioid rescue</td>
<td>4/35 (11.4)</td>
<td>2/13 (15.4)</td>
<td><strong>9/13 (69.2)</strong></td>
</tr>
<tr>
<td>Postoperative day 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opioid and tramadol-free</td>
<td>4/35 (11.4)</td>
<td>2/13 (15.4)</td>
<td><strong>9/13 (69.2)</strong></td>
</tr>
<tr>
<td>Opioid only</td>
<td>10/13 (71.42)</td>
<td>1/3 (7.7)</td>
<td></td>
</tr>
<tr>
<td>Tramadol only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postoperative day 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opioid and tramadol-free</td>
<td>4/35 (11.4)</td>
<td>2/13 (15.4)</td>
<td><strong>9/13 (69.2)</strong></td>
</tr>
<tr>
<td>Opioid only</td>
<td>10/13 (71.42)</td>
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<td></td>
</tr>
<tr>
<td>Tramadol only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remaining of hospital stay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opioid and tramadol-free</td>
<td>4/9 (44.4)</td>
<td>1/3 (7.7)</td>
<td></td>
</tr>
<tr>
<td>Opioid only</td>
<td>5/9 (55.5)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Tramadol only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to GPO as a result of GI issues</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"This really is an innovative approach, but I'm afraid we can't consider it. It's never been done before."
Minimally Invasive Hysterectomy: Same Day Discharge

• Observation

• Exclusion Criteria
  • BMI >40
  • OSA
  • No care-givers at home
  • Prior anesthesia complication
  • ASA Class 3 or greater
  • Significant comorbidities

• PACU observation 4 hours
  • Involve family
  • Home supervision 24 hrs
  • Telephone follow up

<table>
<thead>
<tr>
<th>FLA Hysterectomy POA</th>
<th>Baseline Yr 2015</th>
<th>Q2 2018 Achieved (EPSI not yet final)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR Minutes per Patient - Benign</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal</td>
<td>193</td>
<td>235</td>
</tr>
<tr>
<td>Laporoscopic</td>
<td>220</td>
<td>199</td>
</tr>
<tr>
<td>Robotic</td>
<td>212</td>
<td>204</td>
</tr>
<tr>
<td>Vaginal</td>
<td>193</td>
<td>193</td>
</tr>
</tbody>
</table>

| OR Minutes per Patient - Malignant | | |
| Abdominal | 255 | 313 |
| Laporoscopic | 195 | 173 |
| Robotic | 252 | 241 |
| Vaginal | - | 165 |

| AVG Patient Days | | |
| Benign | 1.08 | 0.85 |
| Malignant | 1.12 | 1.91 |

| % Same Day Discharge | | |
| Benign | 14.4% | 35.8% |
| Malignant | 1.12 | 25.9% |
| Total | 14.4% | 33.3% |
Feasibility of Minimally Invasive Outpatient Hysterectomy


Predicting failure:
- Surgery > 2 hours length
- Start of surgery after 2pm
- Prior abdominal surgery

ERAS bundle safe in outpatients
Project Team

- Surgeon Champions
- Administrative Champion
- Project Manager
- Gyn Onc Surgeon
- Urogyn Surgeon
- Operations Manager
- Pharmacy

- Anesthesiology
- Residents and Fellows
- Nursing
  - Pre-op
  - Intra-op
  - Post-op
- Preop Evaluation Clinic
Negative Randomized Trial of Enhanced Recovery

- 103 patients
  - 64% cancer
  - 3 bowel surgeries
- ERAS pts received either spinal or epidurals and TAP blocks (could undergo general anesthesia per Anes)
  - 41 pts general anesthesia and regional
  - 62 primarily a regional anesthesia
  - No assessment of euvolemia
  - Bowel preps allowed
- LOS no different: 3 day median
- No assessment of pain control

Conclusions

• The three tenets of enhanced recovery include:
  • Early feeding
  • Multimodal pain management
  • Euvolemic

• Enhanced recovery pathways lower length of stay, reduce cost of care, and decrease opioid requirements, while maintaining patient satisfaction

• Incorporation of evidence-based practice into routine use is the rate-limiting step towards continuous surgical quality improvement