Enhanced Colectomy Recovery: Impact of Postoperative Ileus

Anthony J. Senagore, MD, MS, MBA
VP Research & Education
Spectrum Health
Professor of Surgery
Michigan State University
Grand Rapids, MI
Disclosure

- Ethicon Endosurgery, Advisory Board
- Deltex Medical, Research Support
- Tranzyme Pharmaceutical, Advisory Board
- Adolor Corporation, Advisory Board and Research Support
- Life Cell, Research Support
Table 1. Relative Contribution of 38 Procedures to Adverse Events and Excess Length of Stay in General Surgery, American College of Surgeons – National Surgery Quality Improvement Program, 2005–2008

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Procedures</th>
<th>% of total</th>
<th>Adverse event rate, %</th>
<th>Proportion of all adverse events, %</th>
<th>Average excess length of stay for adverse event, d</th>
<th>Proportion of all excess length of stay, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Colectomy or colostomy</td>
<td>12,767</td>
<td>9.9</td>
<td>28.9</td>
<td>23.3</td>
<td>9.8</td>
<td>23.5</td>
</tr>
<tr>
<td>2. Small intestine resection</td>
<td>3,976</td>
<td>2.8</td>
<td>32.9</td>
<td>7.7</td>
<td>13.9</td>
<td>10.6</td>
</tr>
<tr>
<td>3. Cholecystectomy/without</td>
<td>11,718</td>
<td>9.1</td>
<td>7.3</td>
<td>3.7</td>
<td>8.7</td>
<td>4.9</td>
</tr>
<tr>
<td>4. Ventral hernia repair</td>
<td>7,477</td>
<td>5.8</td>
<td>10.1</td>
<td>4.9</td>
<td>6.3</td>
<td>3.1</td>
</tr>
<tr>
<td>5. Pancreatectomy</td>
<td>1,927</td>
<td>1.5</td>
<td>34.9</td>
<td>4.4</td>
<td>6.8</td>
<td>3.0</td>
</tr>
<tr>
<td>6. Appendectomy</td>
<td>9,016</td>
<td>7.0</td>
<td>7.2</td>
<td>4.5</td>
<td>9.1</td>
<td>1.9</td>
</tr>
<tr>
<td>7. Bariatric procedures</td>
<td>6,167</td>
<td>4.8</td>
<td>8.3</td>
<td>3.4</td>
<td>3.7</td>
<td>1.2</td>
</tr>
<tr>
<td>8. Proctectomy or colectomy or anastomosis</td>
<td>1,402</td>
<td>1.1</td>
<td>31.5</td>
<td>2.9</td>
<td>6.2</td>
<td>1.8</td>
</tr>
<tr>
<td>9. Lysis of adhesions</td>
<td>1,323</td>
<td>1.0</td>
<td>23.1</td>
<td>2.0</td>
<td>10.5</td>
<td>2.1</td>
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<tr>
<td>10. Liver resection</td>
<td>1,045</td>
<td>0.8</td>
<td>27.0</td>
<td>1.9</td>
<td>8.8</td>
<td>1.6</td>
</tr>
<tr>
<td>11. Mastectomy/simple, radical, or subtotal</td>
<td>4,313</td>
<td>3.3</td>
<td>5.6</td>
<td>1.6</td>
<td>0.9</td>
<td>0.1</td>
</tr>
<tr>
<td>12. Cholecystectomy/outpatient</td>
<td>12,258</td>
<td>9.5</td>
<td>1.8</td>
<td>1.5</td>
<td>0.9</td>
<td>0.1</td>
</tr>
<tr>
<td>13. Gastrectomy/total or partial</td>
<td>731</td>
<td>0.6</td>
<td>28.7</td>
<td>1.4</td>
<td>11.8</td>
<td>1.6</td>
</tr>
<tr>
<td>14. Laparoscopic excision of gallbladder</td>
<td>10,270</td>
<td>7.9</td>
<td>2.6</td>
<td>1.4</td>
<td>1.2</td>
<td>0.2</td>
</tr>
<tr>
<td>15. Gastrectomy/perforation or bleeding ulcer</td>
<td>451</td>
<td>0.3</td>
<td>40.6</td>
<td>1.2</td>
<td>16.1</td>
<td>1.9</td>
</tr>
<tr>
<td>16. Suture small or large bowel perforation</td>
<td>301</td>
<td>0.2</td>
<td>49.3</td>
<td>1.0</td>
<td>12.5</td>
<td>1.2</td>
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<tr>
<td>17. Fundoplication or parastomal hernia repair</td>
<td>1,871</td>
<td>1.4</td>
<td>7.9</td>
<td>1.0</td>
<td>10.7</td>
<td>1.0</td>
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<tr>
<td>18. Esophagectomy/total or near total</td>
<td>254</td>
<td>0.2</td>
<td>55.1</td>
<td>0.9</td>
<td>11.6</td>
<td>1.1</td>
</tr>
<tr>
<td>19. Splenectomy/total or partial</td>
<td>659</td>
<td>0.5</td>
<td>20.2</td>
<td>0.9</td>
<td>13.2</td>
<td>1.1</td>
</tr>
<tr>
<td>20. Gastrojejunostomy</td>
<td>381</td>
<td>0.3</td>
<td>34.9</td>
<td>0.9</td>
<td>10.6</td>
<td>0.9</td>
</tr>
<tr>
<td>21. All fistula repairs</td>
<td>362</td>
<td>0.3</td>
<td>34.9</td>
<td>0.8</td>
<td>19.5</td>
<td>1.6</td>
</tr>
<tr>
<td>22. Inguinal or femoral hernia repair/without</td>
<td>1,452</td>
<td>1.1</td>
<td>7.7</td>
<td>0.7</td>
<td>6.1</td>
<td>0.4</td>
</tr>
<tr>
<td>23. Inguinal or femoral hernia repair/outpatient</td>
<td>9,509</td>
<td>7.4</td>
<td>1.3</td>
<td>0.7</td>
<td>0.2</td>
<td>0.01</td>
</tr>
<tr>
<td>24. Above- or below-knee amputation</td>
<td>307</td>
<td>0.2</td>
<td>31.3</td>
<td>0.6</td>
<td>9.2</td>
<td>0.6</td>
</tr>
<tr>
<td>25. Debridement for necrotizing soft tissue infection</td>
<td>222</td>
<td>0.2</td>
<td>43.2</td>
<td>0.6</td>
<td>20.5</td>
<td>1.3</td>
</tr>
<tr>
<td>26. Bifasciectomy anastomosis</td>
<td>278</td>
<td>0.2</td>
<td>33.5</td>
<td>0.6</td>
<td>8.9</td>
<td>0.5</td>
</tr>
<tr>
<td>27. Drain peritoneal abscesses or appendiceal</td>
<td>188</td>
<td>0.1</td>
<td>47.3</td>
<td>0.6</td>
<td>17.5</td>
<td>1.0</td>
</tr>
<tr>
<td>28. Drains pancreas</td>
<td>128</td>
<td>0.1</td>
<td>69.5</td>
<td>0.6</td>
<td>26.6</td>
<td>1.5</td>
</tr>
<tr>
<td>29. Thyroidectomy/total or subtotal</td>
<td>5,192</td>
<td>4.0</td>
<td>1.7</td>
<td>0.6</td>
<td>3.8</td>
<td>0.2</td>
</tr>
<tr>
<td>30. Excision of intrabdominal or retroperitoneal tumor</td>
<td>429</td>
<td>0.3</td>
<td>18.4</td>
<td>0.5</td>
<td>9.0</td>
<td>0.5</td>
</tr>
<tr>
<td>31. Parathyroidectomy</td>
<td>2,521</td>
<td>2.0</td>
<td>2.1</td>
<td>0.3</td>
<td>5.5</td>
<td>0.2</td>
</tr>
<tr>
<td>32. Hypospadias and other genitourinary procedures</td>
<td>65</td>
<td>0.5</td>
<td>6.7</td>
<td>0.5</td>
<td>10.6</td>
<td>0.6</td>
</tr>
<tr>
<td>33. Adrenalectomy</td>
<td>480</td>
<td>0.4</td>
<td>8.3</td>
<td>0.3</td>
<td>12.2</td>
<td>0.3</td>
</tr>
<tr>
<td>34. Reduction of vesical, intussusception, or hernia by laparotomy</td>
<td>138</td>
<td>0.1</td>
<td>22.5</td>
<td>0.2</td>
<td>12.6</td>
<td>0.3</td>
</tr>
<tr>
<td>35. Pelvic exenteration</td>
<td>40</td>
<td>0.03</td>
<td>45.0</td>
<td>0.1</td>
<td>11.1</td>
<td>0.1</td>
</tr>
<tr>
<td>36. Toe or foot amputation</td>
<td>33</td>
<td>0.02</td>
<td>39.4</td>
<td>0.1</td>
<td>2.5</td>
<td>0.02</td>
</tr>
</tbody>
</table>
International Mean LOS

**TABLE 3.** LOS, Morbidity, and Risk Characteristics for Patients Included in Different Models

<table>
<thead>
<tr>
<th></th>
<th>No Complications</th>
<th>Complications Present</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (% of total)</td>
<td>20,039 (86.8%)</td>
<td>3059 (13.2%)</td>
<td>7699 (33.3)</td>
<td>7700 (33.3)</td>
<td>7699 (33.3)</td>
</tr>
<tr>
<td>Mean LOS (d)</td>
<td>6.1</td>
<td>16.1</td>
<td>5.4</td>
<td>7.0</td>
<td>9.9</td>
</tr>
<tr>
<td>SD (d)</td>
<td>3.8</td>
<td>14.2</td>
<td>3.9</td>
<td>5.6</td>
<td>9.7</td>
</tr>
<tr>
<td>Median LOS (d)</td>
<td>5</td>
<td>12</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>&gt;75% ile LOS (d)</td>
<td>8</td>
<td>20</td>
<td>7</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Morbidity rate (%)</td>
<td>0</td>
<td>100</td>
<td>22.4</td>
<td>38.7</td>
<td>60.0</td>
</tr>
<tr>
<td>Mean estimated morbidity risk (%)</td>
<td>12.4</td>
<td>18.8</td>
<td>6.2</td>
<td>10.9</td>
<td>22.6</td>
</tr>
<tr>
<td>Range estimated morbidity risk (%)</td>
<td>0.01–70.2</td>
<td>11.8–87.7</td>
<td>0.01–0.08</td>
<td>0.08–14.2</td>
<td>14.2–87.7</td>
</tr>
</tbody>
</table>
Why the Outliers?

In the UK Too (NBOCAP data)

Variation of LOS between Units

LOS (days)

unit

Spectrum Health
Clinical and Financial Significance

- HCFA data (Medicare): 1999-2000
  - 161,000 major intestinal / colorectal resections
  - Mean post-op stay = 11.3 days
  - 1.8 million hospital bed-days
  - $1.75 billion per annum
There Are Numerous Risk Factors for POI

- Surgical Site
- Extent of Bowel Manipulation
- Operation Time
- Patient Health
- Systemic Infections
- Amount of Opioids
- Patient Age, Gender, Race

Ghrelin:
- Impacts multiple mechanisms involved in POI
- Accelerates gastric emptying
- Induces Migrating Motor Complexes (MMCs)

How Long Can POI Last?

Figure from Steinbrook RA. Contemp Surg. 2005; March(suppl):4;
Inhibitory Effects of Opioids on Bowel Function

**Endogenous opioids**
- Released in response to surgical trauma/manipulation
- Higher degrees of surgical trauma/manipulation → greater inflammation → greater gut paralysis

**Exogenous opioids**
- Commonly administered for postoperative pain
- Relationship between amount of opioid administered and time to return of bowel function

Impact of Technique: Endogenous Morphine

Average Length of Stay: Technique matters

- Fleshman, 99
- Schlacta, 99
- Boccasanta, 99
- Canin-Endre...
- Nelson, 00
- Heah, 00
- Senagore T...

Lap
Open
Clinical Impact of POI\textsuperscript{1-4}

- Increased postoperative pain
- Increased nausea and vomiting
  - Increased risk of aspiration
- Prolonged time to regular diet
  - Delayed wound healing
  - Increased risk of malnutrition/catabolism
- Prolonged time to mobilization
  - Increased pulmonary complications
- Prolonged hospitalization
  - Increased healthcare costs

\begin{itemize}
\item \textsuperscript{2}Kehlet H, Holte K. Am J Surg. 2001;182(5A suppl):3S.
\item \textsuperscript{4}Leslie JB. Ann Pharmacother. 2005; 39:1502.
\end{itemize}

Hospital LOS and Total Costs

Mean duration of hospital stay, days

- No coded POI: 5.4 days
- Coded POI: 10.6 days

*P < 0.01 for patients with coded POI versus patients with no coded POI.

Mean hospital costs per patient, × $1,000

- No coded POI: 9.9 × $1,000
- Coded POI: 16.3 × $1,000
### Cost data I.
**Index admission: SH colectomy**

<table>
<thead>
<tr>
<th></th>
<th>Primary POI (N=41)</th>
<th>Secondary POI (N=10)</th>
<th>Non POI (140)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission</td>
<td>$31,629</td>
<td>$32,499</td>
<td><strong>$17,626</strong></td>
</tr>
<tr>
<td>Hospital</td>
<td>$9,276</td>
<td>$8,891</td>
<td><strong>$3,672</strong></td>
</tr>
<tr>
<td>Pharmacy</td>
<td>$47,118</td>
<td>$7,578</td>
<td><strong>$2,389</strong></td>
</tr>
<tr>
<td>Radiology</td>
<td>$1,135</td>
<td>$1,954</td>
<td><strong>$189</strong></td>
</tr>
<tr>
<td>OR</td>
<td>$11,389</td>
<td>$10,961</td>
<td>$10,391</td>
</tr>
<tr>
<td>Labs</td>
<td>$1,217</td>
<td>$556</td>
<td><strong>$556</strong></td>
</tr>
<tr>
<td>Other</td>
<td>$1,514</td>
<td>$429</td>
<td><strong>$429</strong></td>
</tr>
</tbody>
</table>

* p<0.05 ANOVA
## Cost data II. Readmission: SH colectomy

<table>
<thead>
<tr>
<th></th>
<th>Delayed POI (N=11)</th>
<th>Other (N=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission</td>
<td>$9,862</td>
<td>$11,978</td>
</tr>
<tr>
<td>Hospital</td>
<td>$5,558</td>
<td>$5,988</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>$2,780</td>
<td>$3,257</td>
</tr>
<tr>
<td>Radiology</td>
<td>$1,019</td>
<td>$946</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>$668</td>
</tr>
<tr>
<td>Labs</td>
<td>$381</td>
<td>$592</td>
</tr>
<tr>
<td>Other</td>
<td>$35</td>
<td>$528</td>
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</tbody>
</table>

No statistical significance ANOVA
Cost Data III.
Total cost of care for entire cohort

- POI (primary, secondary, delayed): 56%
- Non POI: 39%
- Other Complications: 5%
<table>
<thead>
<tr>
<th>Study</th>
<th>Placebo (Mean h)</th>
<th>ENTEREG (alvimopan) 12 mg (Mean h)</th>
<th>Difference (Mean h)</th>
<th>Hazard Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>111.8</td>
<td>92.0</td>
<td>19.8</td>
<td>1.533 (1.293, 1.816)</td>
</tr>
<tr>
<td>2</td>
<td>132.0</td>
<td>105.9</td>
<td>26.1</td>
<td>1.625 (1.256, 2.102)</td>
</tr>
<tr>
<td>3</td>
<td>130.3</td>
<td>116.4</td>
<td>14.0</td>
<td>1.365 (1.057, 1.764)</td>
</tr>
<tr>
<td>4</td>
<td>119.9</td>
<td>106.7</td>
<td>13.2</td>
<td>1.400 (1.035, 1.894)</td>
</tr>
<tr>
<td>5</td>
<td>109.5</td>
<td>98.8</td>
<td>10.7</td>
<td>1.299 (1.070, 1.575)</td>
</tr>
</tbody>
</table>

*GI2=time to toleration of solid food and first bowel movement.
CI=confidence interval.

GI2 Recovery: 5 Alvimopan Studies

Prospective Evaluation of Entereg

Post-Operative Ileus

- Primary POI: ALV 9.5%, Control 16.0%
- Total POI: ALV 10.8%, Control 16.0%
- Primary POI: ALV 3.9%, Control 3.5%
- Total POI: ALV 6.6%, Control 3.5%

HALS / Open

LAP
Impact of POI with Entereg

Days

Open/No POI  Open/POI  Lap/No POI  Lap/POI

Spectrum Health
TZP-101 480µg/kg:
Time to BM (Survival Analysis)

TZP-101 CL-005 POI Trial
End of Surgery to First Bowel Movement

Hours After End of Surgery

Percent of Subjects Achieving Endpoint

Placebo
480 ug/kg
Clinical pathway for planned 48hr stay

- 60 patients
- colonic (not rectal) resection
- multimodal pathway:
  - transverse and oblique incisions
  - epidural
  - cathartic
  - prokinetic
- median stay 2 days (mean = 4.1, **28 failed**)
- 9 readmissions (15%), 2 deaths, 2 anastomotic leaks
- Did they go home??

(Basse et al, Ann Surg 2000)
Enhanced Recovery Protocol

• pre-operative information and education

• no NG or epidurals used

• PCA analgesia, supplementary i.v. toredol

• encouraged to ambulate x 5 per day

• liquids *ad lib* after surgery

• diet from evening post-op day 1

• oral analgesia day 2 if tolerating diet
NG tube usage

Time to general diet

RCT of epidural in Lx colectomy (CCF)

- 42 randomized cases, three month period
- Pre-emptive thoracic epidural (marcain + fentanyl)

<table>
<thead>
<tr>
<th></th>
<th>LAC+epi</th>
<th>LAC+PCA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea / vomiting</td>
<td>29%</td>
<td>29%</td>
<td>ns</td>
</tr>
<tr>
<td>Pruritus</td>
<td>14%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>VAS pain 6h</td>
<td>2.2</td>
<td>6.6</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>18h</td>
<td>2.2</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>36h</td>
<td>1.7</td>
<td>2.1</td>
</tr>
<tr>
<td>LOS (d)</td>
<td>2.4</td>
<td>2.3</td>
<td>ns</td>
</tr>
</tbody>
</table>

Senagore, Delaney et al, Br J Surg 2003
Can it Work?
Pre-operative Education

THE CLEVELAND CLINIC FOUNDATION
DEPARTMENT OF COLORECTAL SURGERY

MAJOR ABDOMINAL OPERATIONS

WHAT TO EXPECT DURING YOUR HOSPITAL STAY

This information helps you understand your hospital stay so you have realistic expectations for the first few days after surgery. This complements the booklet “Your Guide to Surgery”.

Following the guidelines on this sheet will help you recover from your surgery as quickly as possible and reduces the risk of some complications.

What to expect on a day to day basis:

Day 0: the afternoon and evening of surgery:

Once you wake up you should start your breathing and leg exercises. If you do not have a stomach tube down your nose, you may be allowed to drink liquids. You will be encouraged to sit in a chair, and to take a short walk.

Day 1: the first post-op day:

If you have a stomach tube down your nose it will probably removed today. You will be given liquids to drink. Drink only what you can comfortably tolerate. Keep doing the breathing exercises. Get out of bed and walk at least five times. Use your pain medications to keep yourself comfortable.

Day 2: the second post-op day:

If you still have a tube in your bladder it will probably be taken out today. You may be allowed thicker liquids, and probably solid food later this evening. Drink or eat only what you can comfortably tolerate. You may be started on pain pills. Keep walking and doing your breathing exercises.

Day 3: the third post-op day:

If you are tolerating oral liquids, your intravenous fluids will be stopped today. You will start some solid food. You will probably be on pain pills. Keep walking and doing your exercises.

Day 4: the fourth post-op day:

If you are doing everything from day 3, you may be going home today. If not, don’t worry. These are only guidelines about how things can go. Everybody is different and sometimes it takes another day or two before you are ready for discharge.

Specific points:

1. **Pain control**: You will have a system for pain relief after surgery (either a patient-controlled analgesia [PCA] pump or an epidural catheter in your back). This will make you feel comfortable and help you do your exercises and ambulate after surgery.

2. **Diet**: Liquids may be started the night of surgery, or the following day. You may drink as much as you like. It is better not to drink too much. Avoid carbonated beverages.

   When you are tolerating fluids, solid food will be started. It is important not to over eat. You may pick and choose what you like off your tray. Indeed, you will probably find that you feel better taking small frequent meals, even after you go home. If you feel bloated or nauseated just stop drinking or eating for an hour or two before trying again. You may need a medication to relieve your nausea.

3. **Bowel activity**: Surgery tends to paralyze the bowel for a variable period of time. This period is minimized by getting active after surgery. Standing and walking promote return of bowel function: lying in bed does not. Minimizing your use of intravenous pain medications also tends to help your bowel recover.

4. **Breathing exercises**: These are extremely important. You should do these every hour during waking hours, taking at least ten deep breaths. This expands the small air sacs in the lungs and minimizes postoperative fever and pneumonia.

5. **Exercise**: Getting up and walking after surgery aids recovery in many ways. Much of the pain after major surgery is from muscle spasm. Getting out of bed, sitting and walking help you loosen up and actually reduce your pain. This also helps your breathing and quickens the recovery of your bowel function. Exercise will not damage your wound or the surgical area in any way.

6. **Day of discharge**: Expect to go home on the third to fifth postoperative day. Make provisional arrangements in advance unless instructed otherwise. Some patients may be able to leave earlier than this.

7. **Going home**: When you go home, expect to be able to drink freely and eat a little. You will be on oral pain medications for any residual pain or discomfort. You will be passing flatus and may have moved your bowels.

   If you live alone, you may wish to make arrangements with family or friends in advance to stay with them for a few days. If you live a long distance away from Cleveland, you may wish to make arrangements with a local hotel to stay nearby for a few days before going home.
ERP Standardized Order Set

Spectrum Health

Physicians’s Orders
COLORECTAL - POST-OPERATIVE
Page 1 of 2

<table>
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<tr>
<th>Date:</th>
<th>Time:</th>
<th>Weight:</th>
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Attending Physician: [Name]

Allergies/Sensitivities: [List]

Diagnosis: [Condition]

ALL DESIRED ORDERS MUST BE CHECKED OR COMPLETED

PROCEDURES/TREATMENTS:

- Post-operative phase
- Call Painter (Surgical Intake) after completion of surgery
- Check for all fees
- Glucagon 50 mg subcutaneously every 6 hours
- Dextrose 5% in water (D5W) every 6 hours

LABORATORY STUDIES:

- Complete blood count in morning
- Magnesium
- Phosphorus

INTRAVENOUS (IV):

- 3% Dextrose and 0.45% sodium chloride with 20 mEq potassium chloride (KCl) at 1 ml/hour
- Intravenous lidocaine
- Midazolam
- Fentanyl

CONTINUED ON PAGE 2 ➔

Spectrum Health

COLORECTAL - POST-OPERATIVE (CONTINUED)
Page 2 of 2

<table>
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<tr>
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Phenergan (Dexamethasone) 5 mg orally or IV push every 6 hours as needed for nausea or vomiting, may repeat dose once in 1 hour if ineffective.

Dopamine (Dopamine) 5 mg orally or IV push every 6 hours as needed for nausea or vomiting.

Diazepam (Valium) 5 mg orally at bedtime as needed for insomnia. If ineffective, may repeat in 1 hour for one time.

UPLIFT REMEDIES:

- Atropine (Atropine) 0.5 mg orally 2 times daily beginning the day after surgery for 7 days
- Metoclopramide (Reglan) 10 mg orally 2 times daily beginning the day after surgery for 7 days
- Oral hydration with 24-hour maximum of 1000 ml/day
- Fluid restricted in hospital until stable

DRUGS:

- Phenergan (Dexamethasone) 5 mg orally or IV push every 6 hours as needed for nausea or vomiting
- Metoclopramide (Reglan) 10 mg orally 2 times daily beginning the day after surgery for 7 days
- Oral hydration with 24-hour maximum of 1000 ml/day
- Fluid restricted in hospital until stable

SEXUAL DYSFUNCTION:

- Levitra (Viagra) 5 mg orally at bedtime as needed for sexual dysfunction.
Results

Visual Analog Pain Scale Scores were significantly lower for the ERP group

Graded on 1-10 severity scale with 10 as the most amount of possible perceived pain

ERP: 3.57 +/- 2.73
Failed: 5.60 +/- 2.93
P < 0.05
Total percent of patients with any medical or surgical complication was lower in the ERP group.

ERP: 14.51%
Failed: 47.94%
P < 0.05
Results

Total percent of patients with an anastamotic leak was lower in the ERP group.

ERP: 0.81%
Failed: 9.59%
P < 0.05
Hospital Length of Stay in days was lower in the ERP group.

ERP: 3.41 +/- 1.2
Failed: 7.22 +/- 5.47
P < 0.05
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<td><strong>DRG 148</strong></td>
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| study team       | 1784      | 9.5    | 185  | 8.6    | 62       | 5.7    *
| other CR teams   | 6459      | 9.8    | 824  | 8.8    | 162      | 10.1   |
| Laparoscopic     |           |        |      |        | 24       | 3.2    *
| **DRG 149**      |           |        |      |        |          |        |
| study team       | 742       | 6.4    | 69   | 5.2    | 44       | 3.5    †
| other CR teams   | 2256      | 6.4    | 327  | 5.1    | 111      | 4.5    |
| Laparoscopic     |           |        |      |        | 18       | 2.5    *
| **DRG 148 & 149**|           |        |      |        |          |        |
| study team       | 2526      | 8.6    | 254  | 7.7    | 106      | 4.7    ‡
| other CR teams   | 8715      | 8.9    | 1151 | 7.7    | 273      | 7.7    |
| Laparoscopic     |           |        |      |        | 42       | 2.9    *

* $p<0.0001$; † $p=0.002$; ‡ $p<0.001$, Student’s t test

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<tr>
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<td>135</td>
<td>11%</td>
<td>3.7/2.0</td>
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Senagore et al 2006 Am J Surg
Does it work elsewhere?

- 20 Lap/fast track vs 20 Open/std
  - OR time 109 min v 250 min
  - Complications 25% v 45%
  - LOS 3.6d v 8.3d
  - Cost $4993 v $11383

A Clinical Pathway to Accelerate Recovery After Colonic Resection

Linda Bassa, MD, Dorthe Hjort Jakobsen, RN, Per Billesballe, MD, Mads Werner, MD, PhD, and Henrik Kehlet, MD, PhD

From the Department of Surgical Gastroenterology and Anesthesiology, Hvidovre University Hospital, Denmark

Objective
To investigate the feasibility of a 48-hour postoperative stay program after colonic resection.

Summary Background Data
Postoperative hospital stay after colonic resection is usually 6 to 12 days, with a complication rate of 10% to 20%. Limiting factors for early recovery include stress-induced organ dysfunction, paralytic ileus, pain, and fatigue. It has been hypothesized that an accelerated multimodal rehabilitation program with optimal pain relief, stress reduction with regional anesthesia, early enteral nutrition, and early mobilization may enhance recovery and reduce the complication rate.

Methods
Sixty consecutive patients undergoing elective colonic resection were prospectively studied using a well-defined postoperative care program including continuous thoracic epidural analgesia and enforced early mobilization and enteral nutrition, and a planned 48-hour postoperative hospital stay. Postoperative follow-up was scheduled at 8 and 30 days.

Results
Median age was 74 years, with 20 patients in ASA group III-IV. Normal gastrointestinal function (defecation) occurred within 48 hours in 57 patients, and the median hospital stay was 2 days, with 32 patients staying 2 days after surgery. There were no cardiopulmonary complications. The readmission rate was 15%, including two patients with anastomotic dehiscence (one treated conservatively, one with colostomy); other readmissions required only short-term observation.

Conclusion
A multimodal rehabilitation program may significantly reduce the postoperative hospital stay in high-risk patients undergoing colonic resection. Such a program may also reduce postoperative ileus and cardiopulmonary complications. These results may have important implications for the care of patients after colonic surgery and in the future assessment of open versus laparoscopic colonic resection.
“The 23 Hour Colectomy”

23-Hour-Stay Laparoscopic Colectomy

T. A. Rockall, F.R.C.S 1

1 Department of Surgery, Minimal Access Therapy Training Unit, Post Graduate Medical School, University of Surrey, Manor Park, Guildford, Surrey, United Kingdom
2 Department of Anaesthesia, Minimal Access Therapy Training Unit, Post Graduate Medical School, University of Surrey, Manor Park, Guildford, Surrey, United Kingdom

PURPOSE: The combination of laparoscopic colorectal surgery with an enhanced recovery program has resulted in short hospital stays. The purpose of this study was to assess the acceptability and safety of a 23-hour-stay protocol developed for patients undergoing laparoscopic colectomy.

METHODS: Patients undergoing elective laparoscopic colorectal resection who met the inclusion criteria were invited to participate in the study. A specific preoperative, anesthetic, and postoperative protocol was used. Patients were discharged 23 hours after the start of surgery. Follow-up was by telephone contact on the evening of the day of discharge with outpatient follow-up at Day 3.

RESULTS: Ten patients were included in the study. All patients were discharged within 23 hours from the commencement of surgery. There were no complications and no readmissions to the hospital. All patients were satisfied with the service, all ten would request to follow the same pathway again if required, and all would recommend it to other patients.

CONCLUSION: A 23-hour-stay laparoscopic colectomy is possible with modification of the enhanced recovery program. Patients find it acceptable and it seems to be safe.

KEY WORDS: Laparoscopy; Colectomy; Colon.

Enhanced recovery programs (ERPs) 1, 2 are increasingly being used in colorectal surgery, because the complementary effects of minimally invasive surgery along with “fast-track” rehabilitation 3 have shown that a targeted multimodal approach decreases the postoperative hospital stay. 4 Although most components of an ERP seem to be beneficial, some factors remain contentious, especially within the context of a laparoscopic approach. Anecdotal experience of a proportion of laparoscopic colectomy patients being clearly fit for discharge the day after surgery prompted this study. The goal was to assess the acceptability and safety of our 23-hour-stay protocol developed for patients undergoing laparoscopic colorectal resection.

PATIENTS AND METHODS
Permission for the study was granted from the local ethics committee. Patients who met the criteria listed in Table 1 were informed of the 23-hour protocol. Patients were excluded if a stoma was created, the operation was converted to an open procedure, or if there was a strong history of previous postoperative nausea and vomiting after surgery. Patients were initially approached in clinic to explain the possibility of the 23-hour-stay protocol. All patients were assessed at a preoperative clinic, and if there were any concerns, they were reviewed by a consultant anesthetist. Patients were admitted on the evening before surgery or on the day of surgery depending on patient choice and on bed availability. When possible, patients who were eligible for the 23-hour-stay protocol were scheduled second on the surgery list to prevent an early morning discharge the next day. Table 2 details the protocol that was followed. Patients undergoing a left-sided resection received a phosphate enema, but no bowel preparation was given to those undergoing a right-sided hemicolectomy. There was no dietary restriction on the day before surgery. All patients were given 100 g of Pre-Load® (Vitafo Ltd., Liverpool, UK), which contains 96 g of carbohydrate and has an osmolality of 285 mOsm, in 800 ml of water on the evening before.
DRG 148 assignment

** p<0.03

- Laparoscopy
- Open

Both
Postop
Preop
Professional Margin: Fee v OR time

Professional Cut to Close Ratio

Prof CM per Day

Prof CM per OR Hour per Case
Is There a Down-side?
Outcome of unplanned readmission (UR)

- 553 resections in 6 months; 56 UR (10%)
- No predictors (complications, WBC, Hb, antibiotics, co-morbidity, fever, urgency, stoma, length of stay)
- Matched non-readmitted cases had shorter primary LOS (6 vs 5 days, p=0.04)
- UR had more periop. steroids (32 vs 17%, p=0.03)
- No adverse event related to delayed diagnosis

Conclusion: UR is unpredictable, not related to LOS, doesn’t affect overall outcome

Kiran, Delaney, Senagore et al, Ann Surg
Why it works

- Fastrack pathways are a win-win situation (reduction of POI and cardiopulmonary complications)
- Include all groups
  - nurses, residents, pharmacists, ET nurses
- Evidence based Decisions not Compromise and consensus
“… a new idea will not win by the strength of its arguments; it will only win when the old generation dies out and the new generation accepts it as fact.”

Max Planck