UC San Diego Pharmacoeconomic Forum
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UC San Diego Health

- 563 licensed beds
- 28,988 Discharges/year
  - ~25% Medicare patients
  - ~20% MediCal patients
- 8992 Inpatient surgeries/year
- Medicare CMI 2.01
- Average LOS 5.5-6 days
- 1700 Surgeries/month
  - Approximately 800 inpatient
- Pharmacy Budget >$100,000,000
  - Inpatient: >$30,000,000
Enhanced Recovery Program Implementation
Colorectal Surgery Group

Elisabeth C. McLemore, MD, FACS, FASCRS
Minimally Invasive Recovery After Surgery Enhanced Recovery Program
Sponsored by The Office of the President, Center for Health Quality and Innovation
M.I.R.A.S. Objectives

Minimally Invasive Recovery after Surgery
An Enhanced Recovery Program

Minimize post-operative complications by reducing Post Operative Ileus:

#1 Promote early ambulation and other physical activities after surgery

#2 Promote the utilization of enhanced gastrointestinal recovery protocols

#3 Promote standardized post-operative care protocols specific to discipline, surgical procedure, and surgeon preference
M.I.R.A.S. Endpoints

Minimally Invasive Recovery after Surgery

MIRAS impact on post-operative complications:

• Length of stay / Hospital Re-admission Rates
  – UHC data, National Logs
  – Surrogate marker of Post Op Ileus
• SCIP Quality Assurance Measures
  – UTI, DVT / PE, Wound Infection, Central Line Infection
• Hospital Patient Satisfaction Surveys
• Post-operative Complications
  – DVT / PE
  – Aspiration Pneumonia
  – Prolonged Ileus
Post Operative Ileus (POI) Prevention Strategies

Medical Therapy

Immediate Ambulation & Early PO Intake
Medications Related to MIRAS

- **Alvimopan**: peripheral mu-opioid receptor antagonist
  - Accelerates time to GI recovery after open bowel resection with primary anastomosis
  - Dosing: 12 mg by mouth pre-operatively, followed by 12 mg twice daily thereafter

Alvimopan (*Enterreg*), package insert. Adolor/GlaxoSmithKline; 2008
Alvimopan: Improved Mean Time to First Bowel Movement

Alvimopan Reduced Time to Discharge Order Written

Mean improvement in time to DOW approximately 13 to 21 hours

Alvimopan blocks the peripheral effects of opioids on GI motility and secretion by competitively binding to GI tract μ-opioid receptors.
Medications Related to MIRAS

- **Alvimopan: peripheral mu-opioid receptor antagonist**
  - Accelerates time to GI recovery after open bowel resection with primary anastomosis
  - Dosing: 12 mg by mouth pre-operatively, followed by 12 mg twice daily thereafter

- **IV Acetaminophen: increase pain threshold by inhibiting prostaglandin synthesis through cyclooxygenase pathway**
  - Mechanism for pain control in the NPO patient
  - Dosing: 1000 mg IV every 6 hours

Alvimopan (*Entereg*), *package insert*. Adolor/GlaxoSmithKline; 2008
Medications Related to MIRAS

- **Alvimopan**: peripheral mu-opioid receptor antagonist
  - Dosing: 12 mg by mouth pre-operatively, followed by 12 mg twice daily thereafter

  **$62.50 per tablet = $125 per day**

  - **IV Acetaminophen**: increase pain threshold by

  **$29.80 per dose = $119.20 per day**

  - Mechanism for pain control in the NPO patient
  - Dosing: 1000 mg IV every 6 hours


Alvimopan (*Entereg*), *package insert*. Adolor/GlaxoSmithKline; 2008
Drug Cost per Patient Day – Pharmacy Budgeting

% of Budgeted Drug Cost Per Patient Day

IV Acetaminophen
Drug Cost per Patient Day – Pharmacy Budgeting

% of Budgeted Drug Cost Per Patient Day

IV Acetaminophen

Alvimopan
Drug Cost per Patient Day – Pharmacy Budgeting

% of Budgeted Drug Cost Per Patient Day

- Alvimopan
- IV Acetaminophen
- Every other med
Thinking Outside of the Pharmacy Silo…

- Goal is to reduce hospital length of stay and hospital readmission rates
- Improve SCIP quality assurance measures
  - UTI, VTE, infection, central line infection
- Patient satisfaction
- Prevent prolonged ileus

*How do you account for the impact of each change made in the MIRAS program?*
IV Acetaminophen: Return of Bowel Function

Return of Bowel Function

Days

APAP
(range 0 - 5 days)
N=25
1

No APAP
(range 1 - 5 days)
N=11
3

Wilcoxon rank-sum p = 0.023
## Alvimopan: Time to First Bowel Movement (BM)

<table>
<thead>
<tr>
<th>Resection Type</th>
<th>Mean Time to BM, SD (days)</th>
<th>Median Time to BM, IQR (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>2.2 ± 1.3</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>1.7 ± 0.7</td>
<td>2 (1-2)</td>
</tr>
<tr>
<td>Overall</td>
<td>2.0 ± 1.1</td>
<td>2 (1-3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kelley et al. 2013</th>
<th>Mean Time to BM, SD (days)</th>
<th>Median Time to BM, IQR (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (N=64)</td>
<td>2.4</td>
<td>2 (1-7)</td>
</tr>
<tr>
<td>Alvimopan (N=26)</td>
<td>1.5</td>
<td>1 (1-4)</td>
</tr>
</tbody>
</table>
IV Acetaminophen: No difference in length of stay

Length of Stay

Days

<table>
<thead>
<tr>
<th>APAP</th>
<th>No APAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>(range 3-27 days) N=25</td>
<td>(range 2-12 days) N=11</td>
</tr>
</tbody>
</table>

Wilcoxon rank-sum p = 0.499
Alvimopan: Length of Stay

<table>
<thead>
<tr>
<th>Resection Type</th>
<th>Mean LOS, SD (days)</th>
<th>Median LOS, IQR (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>5.7 ± 3.9</td>
<td>4 (3-7)</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>4.7 ± 3.4</td>
<td>4 (3-5)</td>
</tr>
<tr>
<td>Overall</td>
<td>5.3 ± 3.7</td>
<td>4 (3-6)</td>
</tr>
</tbody>
</table>
Comparing Outcome to Historical Data

<table>
<thead>
<tr>
<th>Resection Type</th>
<th>Alvimopan</th>
<th>Historical*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>5.7 ± 3.9 days</td>
<td>8.79 days</td>
</tr>
<tr>
<td></td>
<td>(N = 55)</td>
<td>(N = 47)</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>4.7 ± 3.4 days</td>
<td>5.41 days</td>
</tr>
<tr>
<td></td>
<td>(N = 37)</td>
<td>(N = 32)</td>
</tr>
</tbody>
</table>

- Historical UCSDHS length of stay in 2011
- Data reported to University HealthSystem Consortium
### Associated Costs

<table>
<thead>
<tr>
<th>Resection Type</th>
<th>Mean* Difference in LOS (days)</th>
<th>Mean Alvimopan Doses (N)</th>
<th>Cost# Difference/Case ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>-5.74</td>
<td>7.6</td>
<td>- $6,323</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>-0.77</td>
<td>7.0</td>
<td>- $1,124</td>
</tr>
</tbody>
</table>

*Compared to 2011 UCSDHS data

#Based on mean costs for medical/surgical bed hospitalization of $2,200/day and $62.50/dose of alvimopan
Who’s the Winner?

• Hospital budgets account for patients in ‘silos’
• What is good for one department, may be bad for another
• Is the patient the winner?
• What about the outpatient arena where reimbursement is different?