Literature Review on Hospital Costs for Patients Undergoing Colectomy

Brian P.H. Chen, ScM
Jefferson College of Population Health

Hang Cheng
Ethicon Inc., Johnson and Johnson, Cincinnati, Ohio

Martha Romney, RN, MS, JD, MPH
Jefferson College of Population Health, Thomas Jefferson University

Carine Chia-Wen Hsiao
Ethicon Inc., Johnson and Johnson, Cincinnati, Ohio

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LITERATURE REVIEW ON HOSPITAL COSTS FOR PATIENTS UNDERGOING COLECTOMY

Brian Po-Han Chen 1, Hang Cheng 1, Martha Romney 2, Carine Chia-Wen Hsiao 1
1Ethicon Inc., Johnson & Johnson, Cincinnati, OH, USA
2Thompson Jefferson University, PA, USA

Background

- Colectomy is a surgical procedure to remove all or part of the colon.
- In an open colectomy, one long incision is made in the wall of the abdomen and doctors can see the colon directly. In a laparoscopic-assisted colectomy, several small incisions are made and a thin, lighted tube attached to a video camera is inserted through one opening to guide the surgery. Surgical instruments are inserted through the other openings to perform the surgery.
- The clinical benefits of laparoscopy have been demonstrated including decreased complications and mortality. A dramatic increase in the rate of laparoscopic partial colectomy from 2% in 1996 to 31% in 2009.
- The impact of increasing use of laparoscopy on hospital costs across countries have not been thoroughly investigated.
- Most published studies comparing the costs of laparoscopic vs open procedures were conducted only within respective countries.

Objectives

This study aims to identify the range of direct hospital costs associated with a minimally invasive or open colectomy procedure across different countries.

Methods

- A published search was performed using the keywords (Colectomy/McEntire AND Cost or Economic AND laparoscopic). RCT (randomized controlled trials) and observational studies were included.
- Key data abstracted: Country, year, setting, type of study, cost calculation method, approach, OR cost per minute and total direct cost reported.
- Operating room (OR) cost include OR time and equipment cost. Some studies may also include anesthesia cost and do not have the granularity to be teased out.
- We derived the unit cost for OR by dividing the OR cost over the mean OR time (minutes) and the unit total cost by dividing the total cost reported over the mean length of stay (days) reported in each study.
- All cost values were adjusted for inflation and reported as 2016 U.S. dollars.

Table 1. Selected Study Characteristics, Design, and Cost Analysis Methodologies

<table>
<thead>
<tr>
<th>Citation/Year</th>
<th>Country/Setting</th>
<th>Type of Study</th>
<th>Cost Calculation Methodology</th>
<th>Approach</th>
<th>OR Cost (per Min)</th>
<th>Total Direct Cost Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>de Lus Moreira et al., 2010</td>
<td>US</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
<td>$ 18.2</td>
</tr>
<tr>
<td>Ditz et al., 2009</td>
<td>US</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Hand-Assisted Lap</td>
<td>$ 23.0</td>
</tr>
<tr>
<td>Koopmann et al., 2007</td>
<td>US</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic-Assisted</td>
<td>$ 21.4</td>
</tr>
<tr>
<td>Void et al., 2012</td>
<td>US</td>
<td>National Database</td>
<td>Observational</td>
<td>Top-down (Charge)</td>
<td>Laparoscopic</td>
<td>$ 19.2</td>
</tr>
<tr>
<td>Salloum et al., 2006</td>
<td>US</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Open</td>
<td>$ 12.6</td>
</tr>
<tr>
<td>Delaney et al., 2008</td>
<td>US</td>
<td>National Database</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Open</td>
<td>$ 12.6</td>
</tr>
<tr>
<td>Crawshaw et al., 2015</td>
<td>US</td>
<td>National Database</td>
<td>Observational</td>
<td>Top-down (Payment)</td>
<td>Laparoscopic</td>
<td>$ 23.0</td>
</tr>
<tr>
<td>Hinojosa et al., 2007</td>
<td>US</td>
<td>National Database</td>
<td>Observational</td>
<td>Top-down (Cost)</td>
<td>Laparoscopic</td>
<td>$ 19.2</td>
</tr>
<tr>
<td>Akle et al., 2007</td>
<td>US</td>
<td>National Database</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Open</td>
<td>$ 17.2</td>
</tr>
<tr>
<td>Hardy et al., 2014</td>
<td>US</td>
<td>Multi-Center</td>
<td>RCT</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
<td>$ 14.6</td>
</tr>
<tr>
<td>Novelli et al., 2015</td>
<td>UK</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Open</td>
<td>$ 14.6</td>
</tr>
<tr>
<td>Bertani et al., 2011</td>
<td>Italy</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Open</td>
<td>$ 14.6</td>
</tr>
<tr>
<td>Erlich et al., 2015</td>
<td>Finland</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Open</td>
<td>$ 14.6</td>
</tr>
<tr>
<td>Liu et al., 2014</td>
<td>China</td>
<td>Single Center</td>
<td>Observational</td>
<td>N/A</td>
<td>Hand-Assisted Lap</td>
<td>$ 13.8</td>
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<tr>
<td>Sheng et al., 2012</td>
<td>China</td>
<td>Single Center</td>
<td>Observational</td>
<td>N/A</td>
<td>Hand-Assisted Lap</td>
<td>$ 13.8</td>
</tr>
<tr>
<td>Liang et al., 2006</td>
<td>Taiwan</td>
<td>Single Center</td>
<td>RCT</td>
<td>Bottom-up (Cost)</td>
<td>Open</td>
<td>$ 13.4</td>
</tr>
<tr>
<td>Shabbir et al., 2009</td>
<td>Singapore</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
<td>$ 30.6</td>
</tr>
</tbody>
</table>

Results

- Twenty-six of 99 articles were included in the analysis. Ten (38%) studies were conducted in North America with the remaining based in European and Asian-Pacific countries.
- For laparoscopic colectomy, several review studies reported longer operating time (27-92 mins), shorter hospital stays (2-3 days) and less blood loss (99-104 ml).
- The findings from 2 meta-analysis studies reporting total direct costs indicated higher costs for laparoscopies ranging from $117 to $836.
- Direct hospital costs varied dramatically across countries. In North America, the cost of operating rooms (minutes) ranged from $13-$23 for open procedures and $18-$25 for laparoscopies. The anesthesia cost (minutes) ranged from $7-$10 and the hospital cost (day) ranged from $938-$3,080 regardless of procedure type.
- In European countries, the cost of operating rooms (minutes) ranged from $15-$35 for open procedures and $13-$50 for laparoscopies. The hospital cost (day) ranged from $1,577-$2,482.
- In Asia, the cost of operating rooms (minutes) ranged from $5-$32 for open procedures and $13-$54 for laparoscopies. The hospital cost (day) ranged from $345-$765.

Figure 1. Average Total Direct Cost Reported per Day

*Studies reported charge or payment data were excluded

Conclusion

Open procedures seem to result in lower hospital costs across studies conducted in several regions, which is consistent with the cost analysis of a recent meta-analysis19. Asian-Pacific countries have reported lower direct hospital costs. Cost calculations are challenging even for common surgical procedures due to different costing methodologies and categories. A standardized costing methodology guideline is warranted and may shed light on the future considerations of reimbursement strategy.

References

1. Ehrlich et al., 2015
2. Frasson et al., 2009
3. Hinojosa et al., 2007
4. Akle et al., 2007
5. Hardy et al., 2014
6. Novelli et al., 2015
7. Bertani et al., 2011
8. Erlich et al., 2015
9. Liu et al., 2014
10. Sheng et al., 2012
11. Liang et al., 2006
12. Shabbir et al., 2009

Figure 2. Average Total Direct Cost Reported per Day

*Studies reported charge or payment data were excluded