Literature Review on Hospital Costs for Patients Undergoing Hysterectomy

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Background

- Abdominal (open) hysterectomy is a surgical procedure that removes the uterus through an incision in the abdomen.
- Laparoscopic hysterectomy is intended to replace abdominal hysterectomy. It offers the surgeon superior visibility inside the pelvic cavity during abdominal surgery. This is in part because of the possibility to magnify the image on the screen and because the lighting is much better during laparoscopy. Such approach is supposed to offer the prospect of improved outcomes and gains in cost-effectiveness.
- The number of inpatient hysterectomies performed in the United States has declined substantially over the past decade. Abdominal hysterectomy declined from 65% of procedures in 1998 to 54% by 2010. Laparoscopic hysterectomy declined to 9% of procedures in 2010.
- Most published studies comparing the costs of abdominal (open) vs. laparoscopic procedures were conducted only within respective countries.

Objective

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

Methods

- A PubMed search was performed using the keywords: (hysterectomy[MeSH]) AND (cost OR economics) AND ((laparoscopic AND open) NOT robot) with results limited to publications of human subject studies in English.
- Publication dates: January 1, 2006 to November 30, 2015.
- Studies comparing minimally invasive surgical techniques (laparoscopic or laparoscopic-assisted) to open surgical techniques were selected and studies of comparisons other than minimally invasive versus open procedures (e.g. robotic or vaginal) were excluded.
- All abstracts were filtered, including meta-analysis, RCTs and observational studies excluding case studies.
- 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.

Results

- Twenty of 89 articles were included in the analysis. Eleven (55%) studies were conducted in North America with the remaining based in European and Asian-Pacific countries.
- For laparoscopic hysterectomy, two recent meta-analyses reported longer operating time (22-53 mins)[2,22] and shorter hospital stays (3 days)[2] and less blood loss (183-267 mL)[2,24].
- A systematic review reported higher total costs for laparoscopic ($4,467) versus abdominal approach ($3,809).
- Direct hospital costs varied dramatically across countries. In North America, the cost of operating rooms (minute) ranged from $9-539 for open procedures and $7-$45 for laparoscopic. The anesthesia cost (minute) ranged from $6-$12 and the hospital cost (day) ranged from $1,489-$4,884 and $2,414-$13,685 for abdominal and laparoscopic hysterectomy, respectively.
- In European countries, the cost of operating rooms (minute) ranged from $8-529 for open procedures and $14-526 for laparoscopic. The hospital cost (day) ranged from $178-$2,537.
- In Asia, the cost of operating rooms (minute) ranged from $6-$13 for open procedures and $9-$23 for laparoscopies. The hospital cost (day) ranged from $182-$1,797.

Conclusion

Laparoscopic procedures appear to result in higher hospital costs across studies conducted in several regions, which is consistent with the findings from a recent systematic review. US has reported the highest hospitalization costs. The wide variation in addition to perioperative outcomes regarding direct hospital costs in Asian-Pacific countries is relatively limited. Comparison of direct hospital costs is challenging due to different costing structures and variations in reimbursement and clinical practices across countries. A standardized costing methodology guideline is warranted and may shed light on the future considerations of reimbursement strategy.

References

Table 1. Selected Study Characteristics, Design, Cost 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>Barnett et al., 2010</td>
<td>US Single Center</td>
<td>Decision modeling</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
<td>Open</td>
<td>N/A</td>
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<tr>
<td>Wright et al., 2012</td>
<td>National Database</td>
<td>Observational</td>
<td>Top-down (Cost)</td>
<td>Laparoscopic</td>
<td>Open</td>
<td>N/A</td>
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<tr>
<td>Bell et al., 2008</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
<td>Open</td>
<td>$7.3</td>
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<tr>
<td>Landeen et al., 2011</td>
<td>Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
<td>Open</td>
<td>$9.2</td>
</tr>
<tr>
<td>Wright et al., 2012</td>
<td>Multi-Center</td>
<td>Observational</td>
<td>Bottom-up (Charge)</td>
<td>Laparoscopic</td>
<td>Open</td>
<td>$20.3</td>
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<tr>
<td>Yu et al., 2011</td>
<td>US Single Center</td>
<td>Observational</td>
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<td>Open</td>
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<tr>
<td>Jonasdottir et al., 2011</td>
<td>Single Center</td>
<td>Observation</td>
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<td>Venkat et al., 2012</td>
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<td>Bottom-up (Cost)</td>
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<td>$25.4</td>
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<tr>
<td>Abdulmanem et al., 2006</td>
<td>US Single Center</td>
<td>Observation</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
<td>Open</td>
<td>N/A</td>
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<tr>
<td>Reynisson et al., 2013</td>
<td>Iceland</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
<td>Open</td>
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<tr>
<td>Baffert et al., 2015</td>
<td>France Multi-Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic</td>
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<td>Bottom-up (Cost)</td>
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<td>$15.9</td>
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<td>Desile-Gbaguidi et al., 2013</td>
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<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic (endometrial cancer)</td>
<td>Open</td>
<td>$16.6</td>
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<td>Li et al., 2012</td>
<td>China Single Center</td>
<td>Observational</td>
<td>Bottom-up (Cost)</td>
<td>Laparoscopic (cervical cancer)</td>
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<td>Bottom-up (Cost)</td>
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<td>Bijen et al., 2009</td>
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</tbody>
</table>

Figure 1. Average Total Direct Cost Reported per Day

* Studies reported change or payment data were excluded