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# 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 gives the surgeon superior visibility inside the pelvis than 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<sup>1</sup>.
- 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<sup>2</sup>.
- 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

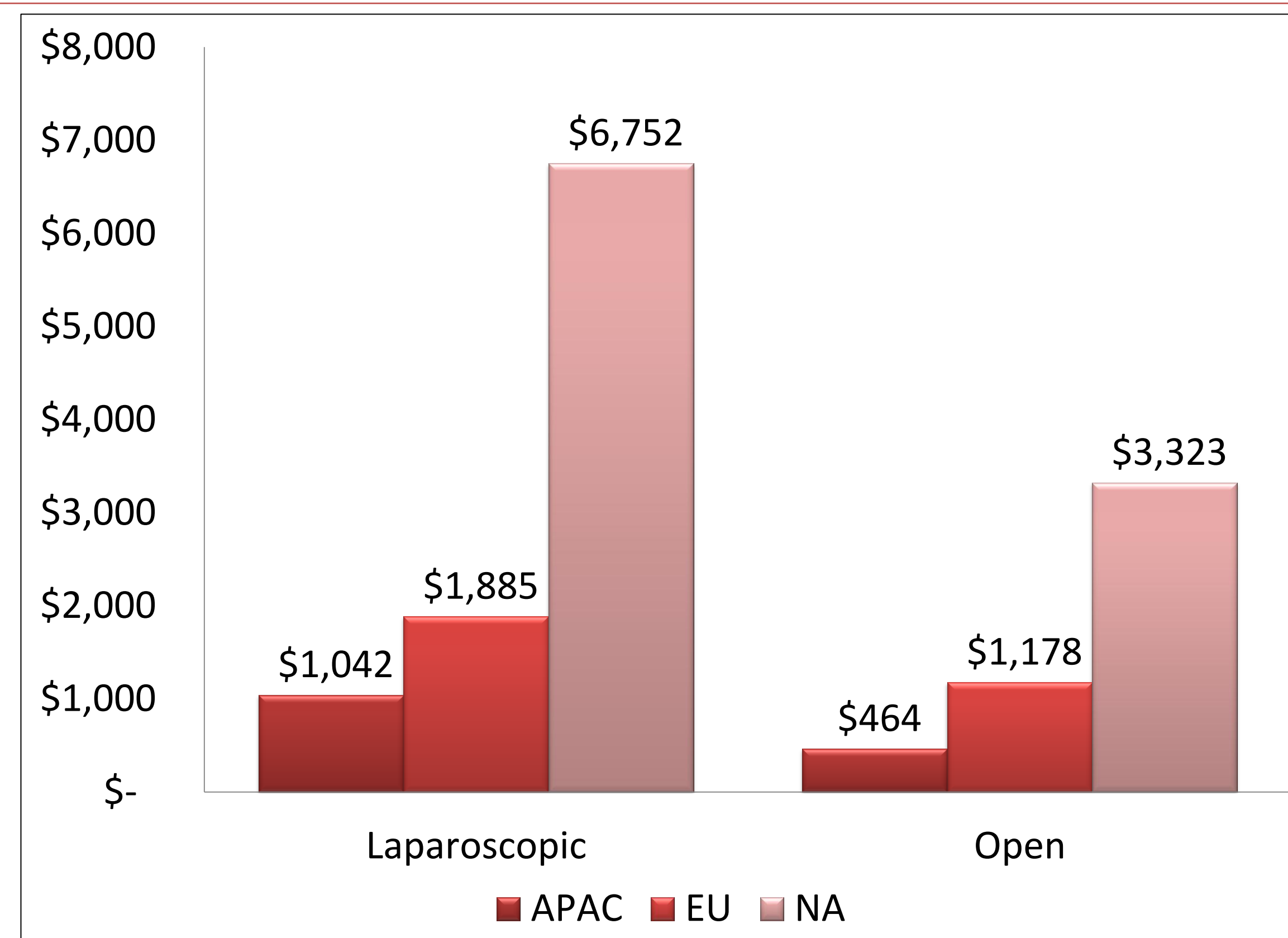
- A PubMed search was performed using the keywords: (Hysterectomy[MeSH]) AND (cost OR economic) AND (laparoscopic AND open) NOT (robot) with results limited to publications of human subject studies in English.
- Publication dates: January, 1, 2006 to November, 30, 2015.
- Studies comparing minimally 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 real U.S. dollars.

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

Citation/Year	Country/Setting	Type of Study	Cost Calculation Methodology	Approach	OR Cost (per Min)	Total Direct Cost Reported
Barnett et al., 2010	US Single Center	Decision modeling	Bottom-up (Cost)	Laparoscopic	N/A	\$ 7,305
				Open		\$ 7,780
Wright et al., 2012	US National Database	Observational	Top-down (Cost)	Laparoscopic	N/A	\$ 12,834
				Open		\$ 10,484
Bell et al., 2008	US Single Center	Observational	Bottom-up (Cost)	Laparoscopic	\$ 7.3	\$ 6,176
				Open	\$ 9.2	\$ 8,218
Landeem et al., 2011	US Single Center	Observational	Bottom-up (Cost)	Laparoscopic	\$ 18.2	\$ 4,967
				Open	\$ 12.9	\$ 4,468
Wright et al., 2012	US Single Center	Observational	Bottom-up (Charge)	Laparoscopic	\$ 203.3	\$ 42,526
				Open	\$ 189.6	\$ 48,420
Yu et al., 2013	US Multi-Center	Observational	Bottom-up (Charge)	Laparoscopic	N/A	\$ 41,294
				Open		\$ 40,506
Jonsdottir et al., 2011	US Single Center	Observational	Bottom-up (Cost)	Laparoscopic	\$ 45.3	\$ 13,685
				Open	\$ 35.2	\$ 14,073
Venkat et al., 2012	US Single Center	Observational	Bottom-up (Cost)	Laparoscopic	\$ 25.4	\$ 8,460
				Open		
Abdelmonem et al., 2006	US Single Center	Observational	Bottom-up (Cost)	Laparoscopic	N/A	\$ 21,222
				Open		\$ 19,537
Reynisson et al., 2013	Sweden Single Center	Observational	Bottom-up (Cost)	Open	\$ 28.7	\$ 13,765
				Laparoscopic		
Baffert et al., 2015	France Multi-Center	Observational	Bottom-up (Cost)	Laparoscopic	\$ 25.6	\$ 15,220
				Open	\$ 15.9	\$ 13,758
Coronado et al., 2012	Spain Single Center	Observational	Bottom-up (Cost)	Laparoscopic	\$ 14.4	\$ 6,163
				Open	\$ 9.8	\$ 6,280
Desille-Gbaguidi et al., 2013	France Single Center	Observational	Bottom-up (Cost)	Laparoscopic (endometrial cancer)	\$ 16.6	\$ 9,664
				Laparoscopic (cervical cancer)	\$ 16.3	\$ 11,312
Bijen et al., 2011	Netherlands Multi-Center	RCT	Bottom-up (Cost)	Laparoscopic	\$ 16.0	\$ 3,673
				Open	\$ 8.2	\$ 3,919
Lu et al., 2012	China Single Center	Observational	Bottom-up (Cost)	Laparoscopic	\$ 9.0	\$ 2,301
				Open	\$ 5.6	\$ 1,818
Lee et al., 2011	Korea Single Center	Observational	Bottom-up (Cost)	Laparoscopic	\$ 22.9	\$ 10,783
				Open	\$ 12.5	\$ 8,958
Tapper et al., 2014	Finland Single Center	Observational	Bottom-up (Cost)	Laparoscopic	N/A	\$ 4,497
				Open		\$ 5,522
Bijen et al., 2009	Netherlands	Systematic review	Top-down (Cost)	Laparoscopic	\$ 20.0	\$ 4,467
				Open	\$ 7.4	\$ 3,809

## 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)<sup>21,22</sup>, shorter hospital stays (3 days)<sup>22</sup> and less blood loss (183-267 mL)<sup>21,22</sup>.
- A systematic review reported higher total costs for laparoscopic (\$4,467) versus abdominal approach (\$3,809)<sup>1</sup>.
- Direct hospital costs varied dramatically across countries. In North America, the cost of operating rooms (minute) ranged from \$9-\$35 for open procedures and \$7-\$45 for laparoscopies. The anesthesia cost (minute) ranged from \$8-\$12 and the hospital cost (day) ranged from \$1,489-\$4,884 and \$2,434-\$13,685 for abdominal and laparoscopic hysterectomy, respectively.
- In European countries, the cost of operating rooms (minute) ranged from \$8-\$29 for open procedures and \$14-\$26 for laparoscopy. The hospital cost (day) ranged from \$784-\$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.



**Figure 1. Average Total Direct Cost Reported per Day**  
\* Studies reported charge or payment data were excluded

## 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<sup>1</sup>. US has reported highest direct hospital costs. The evidence 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.

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