Cost Analysis of Prophylactic Intraoperative Cystoscopic Ureteral Stents in Gynecologic Surgery

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Context: Prophylactic intraoperative ureteral stent placement is performed to decrease operative ureteric injury, though few data are available on the effectiveness of this procedure, and no data are available on its cost.

Objective: To analyze the cost of prophylactic intraoperative cystoscopic ureteral stents in gynecologic surgery.

Methods: All cases of prophylactic ureteral stent placement performed in gynecologic surgery during a 1-year period were identified and retrospectively reviewed through the electronic medical records database of Summa Health System. Costs were obtained through the Healthcare Cost Accounting System. The principles of cost-effective analysis were used (ie, explicit and detailed descriptions of costs and cost-effectiveness statistics). Importantly, we evaluated cost and not charges or financial model estimates. In addition, we obtained the contribution margins (ie, the hospital’s net profit or loss) for prophylactic ureteral stent placement. Other gynecologic procedures were also analyzed.

Results: Among 792 major inpatient gynecologic procedures, 18 cases of prophylactic intraoperative ureteral stents were identified. Median costs were as follows: additional cost of prophylactic intraoperative ureteral stenting, $1580; additional cost of surgical resources, $770; cost of ureteral catheters, $427; cost of surgeons, $383. The contribution margins per case for various gynecologic surgical procedures were as follows: oophorectomy, $2804 profit; abdominal hysterectomy, $2649 profit; laparoscopically assisted vaginal hysterectomy (LAVH), $1760 profit. When intraoperative ureteral stenting was added, the contribution margins changed to the following: oophorectomy, $782 profit; abdominal hysterectomy, $627 profit; LAVH, $262 loss. Overall, the contribution margin profit was decreased by about 85%, from $2400 to $380.

Conclusion: Prophylactic intraoperative ureteral stenting in gynecologic surgery decreases a hospital’s contribution margin. Because of the expense of this procedure, as well as scientific data suggesting a lack of effectiveness, the authors argue that prophylactic intraoperative ureteral stenting should not be used in gynecologic surgery to decrease operative ureteric injury.
“gold standard” used by financial officers for evaluating financial performance.7

Methods
All cases of prophylactic cystoscopic intraoperative ureteral stent placement performed in gynecologic surgery during a 1-year period, from January 1, 2008, to December 31, 2008, were identified using the electronic medical records database of Summa Health System, which is headquartered in Akron, Ohio. These cases were retrospectively reviewed. Approval of Summa Health System’s Institutional Review Board was obtained for the present study.

Importantly, we evaluated costs—not charges or financial model estimates. Although more difficult to obtain, costs (ie, actual hospital costs for wages, supplies, equipment, and other needs) were used rather than charges (ie, hospital bills to patients) because of striking differences in reimbursement. Financial model estimates were not used because such estimates are based on multiple assumptions (eg, various clinical algorithms of possible therapeutic strategies and results) and, thus, they are fraught with potential bias.

Besides evaluating costs, we also obtained and evaluated the contribution margins for prophylactic ureteral stent placement and other gynecologic procedures used with the included patients.

Principles of Cost-Effectiveness Analysis
Three of the 6 principles of cost-effectiveness analysis8-11 were used in the retrospective review of costs. We used principles 1 (explicit description of cost), 3 (detailed description of cost), and 6 (cost-effectiveness statistics), because they apply to the type of cost analysis that we performed. Principles 2 (explicit description of benefits), 4 (adjustment for different time periods), and 5 (sensitivity analysis of assumptions) were not used, because they apply strictly to cost-effectiveness analyses. The following text describes the 3 principles that we applied to the cost analysis of prophylactic intraoperative cystoscopic ureteral stents in gynecologic surgery8-11:

- **Principle 1: Explicit Description of Cost**—The costs evaluated in the present study were the hospital’s costs. Besides prophylactic ureteral stent placement, the gynecologic surgical procedures evaluated in our study were oophorectomy, abdominal hysterectomy, and LAVH. We obtained the contribution margins of each of these procedures over the same 1-year period. Because gynecologic surgical procedures are reimbursed on a Diagnosis-Related Group basis, adding the cost of prophylactic intraoperative ureteral stenting would negatively affect contribution margins.

- **Principle 3: Detailed Description of Cost**—The cost of prophylactic intraoperative ureteral stenting included the additional cost of surgical resources (ie, wages of anesthesiologists, nurses, and other personnel; supplies; equipment; utilities; support services), the cost of ureteral catheters, and the cost of surgeons.

Costs were obtained through the hospital’s finance department using the Healthcare Cost Accounting System (CostFlex Systems Inc, Mobile, Alabama).

- **Principle 6: Cost-Effectiveness Statistics**—Because we did not compare the benefits of prophylactic intraoperative ureteral stenting vs no stenting, a cost-effect ratio calculation was not performed. Instead, the actual additional cost was calculated.

Results
Among 792 major inpatient gynecologic procedures found in our review of the Summa Health System database, we identified 18 cases of prophylactic intraoperative ureteral stent placement. Of these 18 eligible cases, the median age of patients was 42 years (range, 30-77 y), and the median weight of patients was 165 pounds [75 kg] (range, 115-262 lb [52-119 kg]). See the Table for the main recorded characteristics of the patients.

Five patients were diagnosed preoperatively as having pelvic pain, 5 as having an ovarian mass, 4 as having leiomyomas (ie, fibroids), and 4 as having endometriosis. Twelve patients had previous pelvic surgery. The patients’ current surgical procedures were oophorectomy (8 patients), abdominal hysterectomy (7 patients), and LAVH (3 patients).

The median additional cost of prophylactic intraoperative ureteral stenting was $1580: median additional cost of surgical resources was $770, the median cost of ureteral catheters was $427, and the median surgeon cost was $383. The contribution margins per case for the gynecologic surgical procedures were as follows: oophorectomy, $2804 profit; abdominal hysterectomy, $2649 profit; LAVH, $1760 profit. When intraoperative ureteral stenting was added to patients’ care, the con-

| Table. Characteristics of Patients Receiving Prophylactic Intraoperative Ureteral Stents, Summa Health System Database, 2008 (N=18) |
|-----------------|---------------|
| **Characteristic** | **Results**   |
| Age, y (range)   | 42 (30-77)    |
| Weight, lb (range) | 165 (115-262) |
| Preoperative Diagnosis, No. |                |
| Endometriosis    | 4             |
| Leiomyomas       | 4             |
| Ovarian mass     | 5             |
| Pelvic pain      | 5             |
| Surgical Procedure, No. |            |
| Abdominal hysterectomy | 7         |
| LAVH             | 3             |
| Oophorectomy     | 8             |

Abbreviation: LAVH, laparoscopically assisted vaginal hysterectomy.
Conclusion

Our cost analysis of prophylactic intraoperative ureteral stenting in gynecologic surgery confirmed our hypothesis that this procedure decreases a hospital’s contribution margin. We found that adding the cost of prophylactic intraoperative ureteral stenting to that of other gynecologic surgical procedures reduced a hospital’s overall contribution margin by about 85%, and when used with LAVH, stenting resulted in a net loss. Because of the expense and the lack of scientific data demonstrating effectiveness, it is our opinion that prophylactic intraoperative ureteral stenting should not be used in gynecologic surgery to decrease operative ureteric injury.

References