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Operating Room Supply Cost Awareness: A Cross-Sectional Analysis

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Abstract

Introduction: We assessed surgeon knowledge of commonly used instruments and disposable items and described attitudes toward incorporating cost data into daily practice.

Methods: An electronic, e-mail based survey was distributed to faculty and trainees in the University of California San Francisco (UCSF) Department of Urology. The 26-question survey assessed opinions regarding general operating room supply cost information and specific costs of 10 supplies used for laparoscopic nephrectomy. A response was considered accurate when it fell within 50% of the actual cost.

Results: The response rate was 71% among faculty (13) and 90% among trainees (17). Overall 55% of faculty and 82% of trainees considered their knowledge of costs “fair” or “poor.” The overall accuracy of cost estimation for 10 commonly used supply items was 27% (SD ± 45%), with no significant difference between trainees and faculty (p=0.70). Accuracy was not associated with self-reported cost knowledge (p=0.25) or number of laparoscopic nephrectomies performed (p=0.47). Of the faculty 33% and of the trainees 41% reported that having more knowledge of costs would motivate them to decrease their operating room supply costs, and 42% of faculty raised the idea of an incentive program. Overall 75% of study participants believe that there is “too little” or “not enough” emphasis placed on cost awareness.

Conclusions: Trainees and faculty generally have poor knowledge of operating room supply costs. In our academic setting we noted an interest among faculty and residents to make cost data more accessible. These data would provide an opportunity for surgeons to act as cost arbiters in the operating room.

Keywords

equipment and supplies; surgical procedures; operative; costs and cost analysis; laparoscopy; nephrectomy

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Nearly a fifth of the United States gross domestic product is spent on health care, with costs escalating at an unsustainable rate.1 National health spending is projected to increase at an average of 5.6% per year for 2016 to 2025, with health spending projected to grow 1.2 percentage points faster than gross domestic product per year during the same period.2 Physicians have influence over the selection of medical supplies and the delivery of medical care, and by some estimates can carry influence over nearly 60% of health care expenditures.3 Few physicians receive training or education on their role as stewards of cost containment.4

Cost awareness is an important step toward cost containment. Recently published studies in several surgical disciplines demonstrate that physicians across all levels of training have poor knowledge of medical device costs.5 A national survey of orthopedic surgeons across 7 institutions demonstrated that attending surgeons estimate costs correctly only 21% of the time, with estimates ranging from 1.8% of to nearly 25 times the actual price.6 An otolaryngology study of 2 major Canadian institutions found only 30% accuracy in cost estimates of commonly used consumable items.7 Overall there is a paucity of data describing awareness of operating room costs in the urological literature.[8,9]

Surgeons have a large role in supply selection, which has the potential to significantly impact health care costs. We assessed surgeon knowledge of commonly used instruments and disposable items in the operating room. Furthermore, we describe attitudes and perceived barriers toward incorporating cost data into daily practice. Our hypothesis is that surgeon knowledge of operating room costs would lead to greater cost containment.

Methods

We performed a cross-sectional analysis to ascertain attitudes toward and awareness of operating room costs. The study cohort consisted of all the attending surgeons, fellows and residents in the University of California San Francisco Department of Urology in 2017. All participating faculty were based at UCSF Medical Center. We distributed an anonymous electronic survey using REDCap (Research Electronic Data Capture) via e-mail, and sent 2 additional reminders to complete the survey to improve the response rate.

Our questionnaire design was based on similar cost awareness studies used in other disciplines and adapted to reflect our practice environment. The survey comprised 26 questions and was divided into 2 sections. The first section consisted of 9 questions aimed to assess perceived knowledge of operating room cost and engagement in the process of obtaining cost information. The questions used Likert-like scales to elicit the responses and had 2 free response questions to allow physicians to write in responses about motivations and information dissemination preferences (supplementary Appendix, http://urologypracticejournal.com/). The second part of the survey aimed to assess cost awareness by asking the approximate cost in U.S. dollars of 10 commonly used items in the operating room, and by asking participants to choose which was more expensive in a pair of similar supply items. We focused on supplies and materials frequently used in laparoscopic nephrectomy, a commonly performed surgery at our institution across a broad range of subspecialists and one in which we thought most urologists would have had previous

experience. For this study cost was defined as the amount the institution pays for the supply item.

We compared respondent cost estimates to amounts obtained from the price list at our institution. A response was considered accurate when it fell within 50% of the actual cost. We obtained information on level of training and number of laparoscopic nephrectomies performed for each participant. Analyses were conducted using chi-squared and rank sum tests and stratified by level of training. A p value less than 0.05 was considered statistically significant. Institutional review board approval was obtained (IRB No. 17–23813).

Results

The survey response rate was 71% among faculty and 90% among trainees. Of the 30 respondents 13 were attending physicians and 17 were residents or fellows. Of the 12 residents who participated in the study 58.3% were senior residents (postgraduate year 4–6) and 41.7% were junior residents (postgraduate year 2–3). Among the faculty 77% had been in practice for more than 5 years. Across all levels of training 33% of respondents reported participating in more than 10 laparoscopic nephrectomies in the last year, with 60% of those respondents performing more than 20 cases.

The majority of study participants self-rated their cost supply knowledge as “fair” or “poor,” regardless of training level (table 1). When given a free text opportunity to describe how participants would like to be provided with cost information, more than 60% requested an itemized list of supplies that includes cost, with 38% of attendings requesting information about costs of supplies they use as well as possible alternatives. In describing the factors that would motivate attending physicians to decrease their supply costs, 33% listed knowledge of costs as motivation to change behavior and 42% recommended some type of financial incentive model. Overall 69% of faculty members reported that cost “often” or “sometimes” has a role in their choice of supplies and 75% believed that there is “too little” or “not enough” emphasis placed on cost awareness at our institution (fig. 1).

The combined accuracy of cost estimates for the 10 commonly used supply items was 27% (SD 45%) with no statistically significant difference between trainees and faculty (p=0.70, table 2). To pool estimates across different supply items, each item estimate was converted to a percentage of the item’s actual cost and median percent differences and ranges were calculated for each individual item as well as for the aggregate of the items. There was no significant difference in the median relative estimates of supplies between faculty and trainees (median 286% vs 276%, p=0.31, fig. 2). A participant was more likely to overestimate the cost of an item if the cost was relatively low. Among those items for which the costs were overestimated, the average actual cost was $87±18, while items that were underestimated had an average actual cost of $275±44 (p <0.001). When evaluating the more expensive of a pair of supply items with respect to cost estimate accuracy, there was no significant difference in accuracy between the faculty and the residents (p=0.59). Accuracy was not associated with number of laparoscopic nephrectomies performed (p=0.47) or self-reported cost knowledge (p=0.25).

Discussion

Urological trainees and faculty have poor operating room supply cost awareness despite describing an interest in cost knowledge. The overall accuracy of estimation for 10 commonly used supply items was 27% (SD 45%), with no significant difference between trainees and faculty (p=0.70). The majority of study participants recognized that their cost knowledge is “poor” or “fair.” However, reporting that knowledge was “good” or “excellent” did not predict greater accuracy. These results are consistent with similar accuracy findings in other disciplines, ie 12% to 25% in an otolaryngology study7 and 17% to 21% in an orthopedic surgery study.[6] While there is no industry standard for defining accuracy, describing an estimate within 50% of actual cost as “accurate” has been used in other disciplines. Repeating our calculations with a 25% cutoff reveals our overall accuracy estimation to be 11%, which is on the lower edge of other groups.

We noted that our respondents were more likely to overestimate the costs of less expensive items, especially items priced less than $100, and underestimate items that were more expensive, with a median overestimation of 57% for all responders. An otolaryngology group also found that their respondents overestimated the costs of items, with a median overestimation of 10% by faculty and 29% overestimation by trainees, with greater overestimation of lower cost items.7 We did not include anchor numbers in our survey, asking for free text estimates and, thus, these responses indicate true lack of cost awareness among our respondents. Not knowing actual costs diminishes the ability to truly factor costs into the decision making, regardless of internal bias toward overestimation.

Improved cost knowledge and awareness have been demonstrated to lower the costs of care. 10 Emergency departments and primary care settings have recognized the role of educating physicians as an important part of cost containment efforts, and have demonstrated success with these projects.[10,11] A single health system, multidisciplinary study at our institution using individualized monthly surgeon score cards informing surgeons of their median surgical supply costs compared to their peers demonstrated a near 10% supply cost decrease in the intervention group.[12–14] Another multihospital health system reported a 10% reduction in laparoscopic cholecystectomy supply costs and a 21% reduction in laparoscopic inguinal herniorrhaphy supply costs by presenting surgeons with an itemized supply list, including less costly alternatives. This intervention was aimed solely at improving individual knowledge, without standardization or offering any incentive or punitive measures.[15,16]

We have previously reported that even a single institution can have significant supply cost variations for common cases. For example, there was significant variation in expenses between individual surgeons performing the same procedure, with median supply costs ranging from $1,642 to $4,524 for laparoscopic nephrectomy.17 Standardization has the potential to yield significant cost savings. For example, implementation of a standardized preference card for laparoscopic appendectomy at another institution was able to yield a 20% reduction in supply cost per case in a single hospital system.[18] Focus on standardization and optimization of supply lists can contribute to decreasing variability in costs.

Further efforts can incorporate incentives to change surgeon behavior. One successful group used an agreement to standardize to one type of supply item and a 50–50 shared savings incentive program for the surgeons and the hospital, and they were able to report $890,000 in savings by changing 3 specific supply items across 2 years.19 In our study sample many surgeons suggested incentives as a means to encourage cost savings. Some gain sharing models split savings into hospital and department in whole, and others reward physicians who save the institution money with financial support for physician assistants, new equipment or research funding. Although gain sharing models have been explored in general and orthopedic surgery, these interventions have not been replicated in urology.[15,19–21]

Our study demonstrated that most attendings and trainees believe that we should place more emphasis on cost awareness in the operating room, suggesting that a focused effort on cost awareness could lead to changing behavior. Trainees are being evaluated on their ability to "incorporate cost awareness" into patient care as part of the "System Based Practice" competency of the ACGME (Accreditation Council for Graduate Medical Education) resident milestones. Given the low knowledge of costs among faculty in our study and in other reports in the literature, it appears that our expectations from trainees may not be matched by the training they are provided.

We believe that inciting a productive conversation about standardization of costs and meaningful incentives, efforts to reinforce the habits of those already pursuing cost savings, and encouragement of increased participation among those just becoming cost aware can lead to significant strides in this arena. We have started to engage in these discussions at our institution with an overwhelmingly positive response. Urology is at the forefront of integrating expensive technological advances into surgical practice. With the rising costs of health care, we have a responsibility to train knowledgeable surgeons to serve as cost arbiters in providing high quality and high value care.

Although our accuracy findings are consistent with other reports in the literature, it is important to consider the limitations of this study. We sampled a single department in an academic institution, and while this may be generalizable among academic practices, it may not be representative of community and nontraining environments. Private practice groups' profitability can vary based on their ability to contain costs, and they may have more say in ordering practices than academic and Veterans Affairs institutions. In noncapitated compensation models cost containment efforts can conversely reduce profitability by decreasing margins on disposables. Furthermore, prices can fluctuate depending on changes in purchase contracts and staying current on these developments requires a significant time commitment. Another limitation is the large number of subspecialists in our department who may not be performing laparoscopic cases frequently and be less familiar with that equipment. We assessed whether surgeons who perform more laparoscopic nephrectomies have greater accuracy and did not find a statistically significant difference. Lastly, while our response rate among faculty was 71%, our overall response rate was 81%, which limits susceptibility to nonresponder bias.[22,23]

Conclusion

In our single center academic training program survey of 30 urological surgery attendings and trainees, we found poor knowledge of operating room supply costs. We noted a high interest in learning costs of supplies and in making cost data more readily accessible, as well as a desire for greater emphasis on cost awareness. Surgeons have an important role as cost arbiters in the operating room, and having access to these data and appropriate incentives to implement changes in practice are important steps toward health care cost containment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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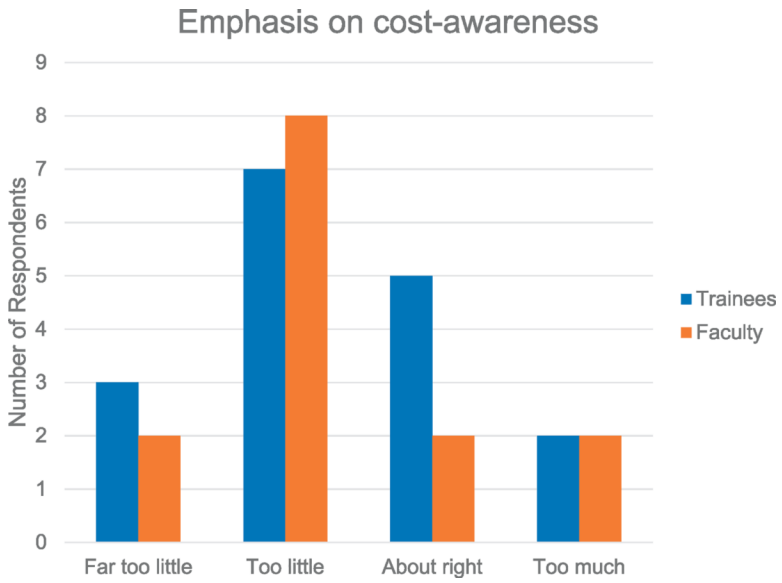

Figure 1.

Faculty and trainee responses to question, “How would you describe the current emphasis placed on cost awareness at UCSF?”.

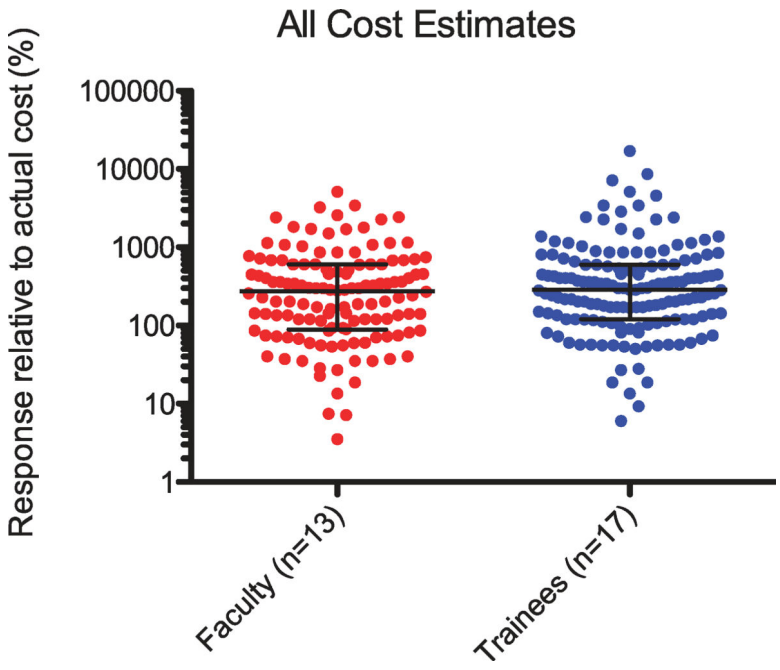

Figure 2.

Distribution of relative cost estimates of operating room supply items, stratified by faculty (red) and trainee (blue), with median and IQR. 100% indicates actual cost.

Table 1.

Participants' questionnaire responses regarding supply cost knowledge, access to cost information and role of cost in choice of operating room supplies

	% Trainees	% Faculty
Self-rate cost supply knowledge "fair" or "poor"	82	57
Have never requested cost supply information	41	21
Find it "somewhat difficult" or "very difficult" to obtain cost information	60	91
Review case preference cards at least annually	Not applicable	86
Cost "often" or "sometimes" has a role in choice of operating room supplies	82	71

Table 2.

Median response costs of commonly used operating room supplies with range of participant responses

	Median $ Cost (range)	% Difference (range)	% Accuracy
Bovie® electrode 4-inch coated (protected) tip	50 (15–500)	+88 (98 to 61)	0
16Fr latex Foley catheter	15 (2–80)	+77 (95 to −67)	17
19Fr Blake abdominal drain (without trochar)	30 (1–750)	+85 (99 to −339)	3
19Fr Blake abdominal drain (with trochar)	55 (1–1,000)	+74 (98 to −1,294)	13
4-zero Monocryl® suture 27-inch	9 (1–80)	+72 (97 to −148)	10
HoverMatt® mattress 39-inch	125 (5–700)	+34 (88 to −1,154)	47
Harmonic® scalpel ACE 23 cm	400 (40–2,000)	−34 (73 to −1,237)	50
LigaSure™ Atlas 10 mm	418 (50–2,500)	+11 (85 to −640)	53
Endo GIA™ stapler multifire 12 mm	300 (50–2,000)	+42 (91 to −250)	37
Metal Endo Clip™ applier 5 mm single use	138 (5–1,000)	−3 (86 to −2,743)	37