Published in final edited form as:

Ann Otol Rhinol Laryngol. 2016 May ; 125(5): 369–377. doi:10.1177/0003489415614864.

Surgeon Awareness of Operating Room Supply Costs

Christopher R. Jackson, MD¹, Roland D. Eavey, MD SM¹, and David O. Francis, MD MS^{1,2,3}

¹Department of Otolaryngology, Institute for Medicine and Public Health, Vanderbilt University Medical Center

²Vanderbilt Voice Center, Institute for Medicine and Public Health, Vanderbilt University Medical Center

³Bill Wilkerson Center for Otolaryngology & Communication Sciences, Center for Surgical Quality and Outcomes Research, Institute for Medicine and Public Health, Vanderbilt University Medical Center

Abstract

Background—The extent to which surgeons understand costs associated with expensive operative procedures remains unclear. The goal of the study was to better understand surgeon cost awareness of operating room supplies and implants.

Methods—This was a cross-sectional study of faculty (n=24) and trainees (fellow and residents [n=27]) in the Department of Otolaryngology. Participants completed surveys to assess opinions on importance of cost, ease in accessing cost data, and asked to estimate the costs of operating room (OR) supplies and implants. Estimates within 20% of actual cost were considered correct. Analyses were stratified into faculty and trainee surgeons.

Results—Cost estimates varied widely, with a low percentage of correct estimations (25% for faculty, 12% for trainees). Surgeons tended to underestimate the cost of high-cost items (55%) and overestimate the cost of low-cost items (77%). Attending surgeons were more accurate at correctly estimating costs within their own sub-specialty (33% vs. 16%, p<0.001). Self-rated cost knowledge and years in practice did not correlate with cost accuracy (p<0.05).

Conclusions—A majority of surgeons were unable to correctly estimate the costs of items/implants used in their OR. An opportunity exists to improve the mechanisms by which cost data is fed back to physicians to help promote value-based decision-making.

INTRODUCTION

The United States spends more on healthcare than any other industrialized nation. In fact, on a per capita basis, it spends 2.5-times the average of other industrialized nations (\$8,745 vs. \$3,484).¹ Healthcare expenditures now account for 17.4% of total gross domestic product (GDP), despite a slowed spending growth between the years 2009 and 2013 (range 3.6% -

Corresponding Author David O. Francis, MD MS, Department of Otolaryngology, Medical Center East, South Tower, Suite 7302, 1215 21st Avenue South, Nashville, TN 37232, Phone: 615.343.7464, david.o.francis@vanderbilt.edu.

Financial Disclosures: None by any author

Conflicts of Interest: None by any author

4.1%).² Future expenditures are projected to grow somewhat faster at an average annual rate of 6.0% from 2015 to 2023 due to a) increased economic growth, b) continued implementation of the Affordable Care Act, and c) the aging of the population, which could increase the healthcare share of GDP to 19.3% by 2023.² This cost trend is unsustainable from a macroeconomic perspective (i.e., that of the economy as a whole).

From a microeconomic perspective (i.e., that of individuals making decisions regarding allocation of limited resources), patients have also been negatively affected by rising healthcare costs. The average cost for a family health insurance policy in 2014 was \$16,834, which represents a 69% increase from 2004.³ In addition to higher premiums, deductibles and co-insurance rates have also grown, creating a new class of “under-insured” patients—those who are covered by insurance, but whose out-of-pocket costs can be financially crippling should they fall ill and require hospitalization or surgery.⁴ As such, medical bills now represent the single largest reason for bankruptcy in the U.S.⁵

While the imperative to understand costs is clear, there have been relatively few studies that look at the financial implications of surgeon decision-making on medical spending. A survey comparing the accuracy of cost estimates for urologic operating room (OR) items showed that attending surgeons were the least accurate, followed by resident surgeons, then OR nursing staff (percentage difference compared to retail cost of 45%, 36%, and 26%, respectively).⁶ More recently an investigation into surgeon awareness of the cost of orthopedic implants found that attending and resident surgeons estimated the correct cost 21% and 17% of the time, respectively.⁷

Given the importance of surgeon decision-making in driving healthcare costs, the relative lack of data regarding surgeon cost awareness and how this awareness relates to actual expenditures, our goal was to better understand surgeon cost perception. We specifically focused on OR items and implants because the surgeon has discretion regarding the type and frequency of use. Thus, the primary aim was to assess the accuracy of surgeons’ cost knowledge, factors that could affect accuracy, and how that accuracy relates to the individual surgeon's self-assessment of cost knowledge.

METHODS

This study was performed in accordance with the Declaration of Helsinki, Good Clinical Practice, and was approved by the Vanderbilt Institutional Review Board (IRB#131964).

Study Cohort

All attending surgeons, fellows, and residents in the Department of Otolaryngology were invited to participate and completed online surveys assessing their understanding of operating room supply and implant costs between March and April 2014. For the purposes of the survey, “cost” was defined as the amount the institution pays to vendors for supplies and implants. Actual supply item and implant cost and utilization data were derived from the Vanderbilt University Medical Center Operating Room Management Information System (ORMIS) from July 2012 through December 2013.

Surveys

Two survey instruments were developed; one for attending surgeons and another for trainees (i.e., resident and fellow physicians). Each consisted of two sections. The first was a common section used to assess the respondent's overall opinion on the importance of costs in the operating room, frequency of use and perceived usefulness of available cost data resources, and a self-assessment of cost knowledge (Figure 1). Currently, the institution does provide cost data resources and feedback to educate surgeons regarding associated operating room supply costs. These resources include: 1) a monthly email with an attachment itemizing OR supply and implant costs by surgeon and procedure, and 2) an online tool that allows surgeons to look up supply and implant costs on a level of granularity that extends down to the items used in individual cases. Usefulness of these resources and feedback was systematically assessed using the survey instrument.

A second section surveyed respondent's estimates of various OR supplies and implants. The items included in the survey were selected based on a Pareto analysis of utilization. Such analyses are regularly used in quality control and performed by frequency ordering the unit of measure, in this case supplies and implants used, in descending order to identify those occurring most commonly⁸. Using this process, the most utilized items and supplies were selected for inclusion in the survey. Frequently used items not directly used and/or handled by the surgeon (e.g., vacuum canisters, clean up kits, foam padding for patient position) were not included in the survey. Only items with both high utilization and direct use by the surgeon were considered for inclusion. This utilization analysis was carried out for each subspecialty and for the department as a whole to select the final list of items to include in the survey. This analysis yielded 59 unique items that met criteria and were included (Table 1). In the survey, each item was identified by a brief description and the corresponding item image. Respondents were reminded that their costs estimates relate to amount the institution pays to vendors for its supplies and implants, **not** the amount charged to the patient for their use.

All questions required answers in a free-text dollar amount. Each attending surgeon was asked to estimate the cost of 20 items. Ten items were asked of all faculty members regardless of specialty (generic). The second ten were specialty-specific items (i.e., head and neck, laryngology, otology, general [e.g., facial plastics, rhinology]) and were presented to faculty members in that area. Trainees were asked to estimate the cost of 25 supply and implants, 20 of which were included in the faculty survey and five were exclusively asked of residents and fellow physicians. More items were asked of faculty in the first section, therefore fewer were asked in the second to provide inter-group balance in overall item number and to prevent survey fatigue.

Data Management

Surveys were distributed and all data stored using the secure web-based REDCap (Research Electronic Data Capture) (1 UL1 RR024975 NCRR/NIH).⁹ REDCap is an application designed to support data capture for research studies providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages;

and 4) procedures for importing data from external sources⁹. There was strict control and supervision of the data entry and access for this study.

Statistical Analysis

Respondent-derived cost estimates were compared to the actual amount paid by the institution for each item. It was determined *a priori* that cost estimates within 20% of the actual cost were considered 'correct' (e.g., for a \$100 item, estimates between \$80 and \$120 were considered correct). This range was benchmarked to prior cost estimate studies in the literature.⁷ Several factors were investigated that could affect knowledge of cost including surgeon subspecialty, frequency of use, years in practice, and confidence in understanding of supply and implant costs. It was predetermined that items would be dichotomized into high (>\$50) and low (<\$50) cost to summarize the relationship between actual and estimated cost. Differences among group responses were compared using the Chi-Square and rank-sum tests, as appropriate. By convention, p-values less than 0.05 were required for statistical significance.

RESULTS

The response rate for the survey was 100% for the faculty (n=24) and trainees (n=27). By attending surgeon specialty, this included four head and neck surgeons, four laryngologists, five otologists/neurotologists, four pediatric otolaryngologists, and four specialists in the general category (two facial plastic surgeons, two rhinologists). Median years in practice among attending surgeons were 7.5 (IQR 3.25-19.75 years; range: 2-33 years). Trainees consisted of 20 residents (4 per year × 5 years) and seven fellows.

Perceptions

Most faculty members reported that costs play a "moderate" or "significant" factor in their decision-making about supply and implant selection in the operating room (Table 2). The majority of both faculty and trainees also reported that the costs of supply items or implants were either "somewhat" or "very difficult" to obtain. Few respondents felt that their knowledge of costs was good, with only 10% (n=5/51) and 2% (n=1/51) of faculty and trainees rating their cost knowledge as "good" or "excellent". Most rated this knowledge as "poor" (n=20/51) "fair", (n=18/51), or "average" (n=7/51). When faculty were asked to rank order the reasons why respondents were concerned about understanding OR costs, the majority (63%), listed the amount the patient will ultimately pay as the most important reason (Figure 3). Cost to society was the second most frequency cited reason (17%), followed by the institution's financial performance (13%), other reasons, and the risk of decreased reimbursement (0%).

Cost Estimates

Cumulative item and supply costs estimates were compared between faculty and trainees (Figure 2). Estimates varied widely in both groups. In general, faculty and trainees overestimated the cost of supplies and implants. Median overestimation was 10% for faculty (IQR of -29% to +188%; total range -99% to +5,126%) and 29% for trainees (IQR -41% -

+234%; total range -99% - +3,384%). Faculty correctly assessed costs in 25% and trainees in 12% of items surveyed (Figure 4).

Overall, respondents more often overestimated lower-cost (77%) and under-estimated high-cost items (55%; Figure 4). Faculty members were significantly more accurate at estimating specialty-specific than generic item costs (33% vs. 16%, $p<0.0001$). There was a non-significant trend toward increased cost accuracy with increased frequency of item use (22% “never used” to 37% “most often used”; correlation coefficient = -0.13). However, post-hoc analysis demonstrated an apparent threshold effect in which those who used an item infrequently (i.e., less than 20% as frequent as surgeons who used that item most) were significantly less likely to correctly estimate an item's cost compared to those who used the item more frequently (20% vs. 39%; $p<0.0001$). Years in practice did not significantly affect the likelihood of correctly estimating cost ($p=0.17$).

Moreover, faculty or trainee self-rating of cost knowledge poorly correlated with their accuracy in cost estimation (Figure 4). Those who rated their cost knowledge as “poor” gave correct responses 16% of the time. Similarly, those who gave themselves a “fair” rating had 13% correct responses. The respondents with “average” ratings had the highest percentage of correct responses (32%). Those with “good” ratings fared slightly less well (23%), and the one respondent who provided a self-assessment of “excellent” gave a correct response for 15% items.

DISCUSSION

Cost transparency and awareness has become increasingly important in the current healthcare environment. Highlighting the pervasiveness of this movement was the release of hospital charge data on the 100 most common Medicare inpatient stays by Centers for Medicare and Medicaid Services (CMS).¹⁰ The report demonstrated a large gap in charges within a single diagnostic group between hospitals nationwide and provided patients and policymakers a glimpse into the variation that exists in the system. In the name of cost transparency, CMS more recently disclosed Medicare payments made to individual physicians for treatment of Medicare beneficiaries. Both of these releases were recognized and widely reported on in the mainstream media.¹¹ In this context, it is ever more incumbent on physicians to better understand the costs of their services, supplies, and implants that they use, as a first step toward cost containment and providing cost-effective care.

The primary aim of the present study was to assess the accuracy of surgeons' cost knowledge for supplies and implant that they use in the operating room. We found significant variation in cost estimates and a low percentage of correct estimations: 25% for faculty and 12% for trainees (i.e. residents and fellows). In general, faculty members were more accurate at estimating costs within their own sub-specialty (33% vs. 16%). Interestingly, faculty and trainee self-rated cost knowledge and years in practice did not correlate with their actual cost accuracy.

Surgeons tended to underestimate the cost of high-cost items (55%) and overestimate the cost of low-cost items (77%). Cost choice can be influenced by the “anchoring effect”; a

psychological heuristic that influences the way in which people intuitively assess probabilities and make estimates.¹²⁻¹⁴ Typically, this phenomenon is triggered implicitly by suggesting a reference point (“anchor”), which affects the final estimate. Our survey did not offer any anchors. Thus, over- and under-estimates in free-text cost estimates were based on apparent internal bias – and cost ignorance - of the respondents.

Gap between Perceived and Actual Costs

Surgeon decision-making and preferences regarding items and implants used in the operating room play an important role in driving healthcare costs.^{15,16} Despite recognition of surgeon cost-ignorance, relatively few studies and only one in the otolaryngology literature¹⁷ have appraised the cost-awareness of surgeons.^{6,7,18-20} Lack of cost-awareness is not necessarily unique to surgeons. Studies of intensive care physicians^{21,22}, family practitioners²³, emergency medicine physicians²⁴, anesthesiologists²⁵ and other medical specialists demonstrate this to be a generalized knowledge deficiency in the current health care system. The present study reinforces that surgeons also tend to have poor knowledge of the costs of supplies and implants.^{6,7} The emphasis on implant costs in orthopedics relates to the frequency of hip and knee replacements. Similarly, otolaryngology implant and supply costs have significant implications for patients, hospitals, the health care system, and society. For example, an estimated 10,000 cochlear implants (~\$20,000/implant) are placed annually in the U.S.^{26,27}, translating into direct total cost of implants alone to nearly \$200 million per year. Hence, a comprehensive understanding of Otolaryngology costs is essential to analyze OR costs.

One of the key components of any cost-control or cost-reduction initiative is to have a firm understanding of the current cost structure. Our results suggest that at least one of the key players in driving costs (i.e., surgeons) lacks this fundamental cost knowledge. Imminent changes to reimbursement models including the incorporation of bundled payments, capitation, and fewer fee-for-service payments in addition to growing payment transparency will make a thorough understanding of costs essential to maintaining financial solvency.

Difficult to Access Cost Data

The majority of surgeons reported that cost plays a moderate to significant role in decisions about supply and implant choices. However, the majority of respondents also stated that access to information about costs was difficult to obtain. There is incongruence between the importance placed on costs by surgeons and others in the healthcare industry and the availability and transparency of cost data. Thus, an opportunity exists to improve the mechanisms by which cost data is fed back to physicians, both when picking items to include on preference cards and when deciding what items to open for specific cases. Various approaches are being piloted and some preliminary data suggests that real-time feedback may reduce operating room costs.^{28,29} Novel interventions and improving accessibility of cost information in the operating room need to be a focus of attention.

Tension between Cost and Quality

Presentation of cost awareness needs to be considered in the broader context of value. A tension remains between efforts on cost control and optimizing quality of each surgical

procedure. One precedent that must be avoided is hospital-purchasing decisions being made with cost-containment as the sole objective. It is tempting to redesign and reduce available operating room supplies and implants to reduce cost. However, there is legitimate concern that cost containment efforts may lead to less effective supplies (e.g., sutures, staplers) and implants that potentially could result in longer operative times and suboptimal results for patients. Processes to reduce operating room costs should be done with improving value as the goal. Value-based costing requires an understanding of the numerator and denominator of the value equation: quality and cost.³⁰ The costs of supplies and implants are relatively easy to determine; harder still is predicting the consequences of cost containment on patient surgical outcomes. Thus, operating surgeons need to be engaged in the process of determining value and need to be provided with tools to better understand the economic consequences of their decisions. If implemented appropriately, value-based approaches can result in significant cost savings.^{31,32}

Limitations

While our survey had a 100% response rate, reducing concerns for response bias, it is subject to several limitations. Results were derived from a single department (otolaryngology) within an academic institution. It is possible that other academic centers or private healthcare enterprises may have different cost feedback mechanisms that could lead to different conclusions regarding cost estimation accuracy. Moreover, otolaryngologists may have a different perspective on and understanding of operative supply and implant costs than other surgical subspecialties. Additionally, the costs considered in this study were the amounts paid by a large institution (with significant purchasing power), and the ultimate costs to the patient or payer were not considered.

CONCLUSIONS

Our survey showed that the majority of surgeons were unable to correctly estimate the costs of items/implants used in their OR. These results are despite the importance that most surgeons placed on costs. The difficulty in obtaining cost data suggests an opportunity to improve surgeon cost awareness. Further study is required to discover if improving surgeon cost knowledge could be a means to lower supply/implants costs in the OR.

REFERENCES

1. Lorenzoni L, Belloni A, Sassi F. Health-care expenditure and health policy in the USA versus other high-spending OECD countries. *Lancet*. 2014; 384:83–92. [PubMed: 24993914]
2. National Healthcare Expenditures Projections. [April 12 2015] 2013-2023. Available at: <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsProjected.html>.
3. Claxton G, Rae M, Panchal N, Whitmore H, Damico A, Kenward K. Health benefits in 2014: stability in premiums and coverage for employer-sponsored plans. *Health affairs*. 2014; 33:1851–1860. [PubMed: 25214470]
4. Schoen C, Collins SR, Kriss JL, Doty MM. How many are underinsured? Trends among U.S. adults, 2003 and 2007. *Health affairs*. 2008; 27:w298–309. [PubMed: 18544591]
5. Himmelstein DU, Thorne D, Warren E, Woolhandler S. Medical bankruptcy in the United States, 2007: results of a national study. *Am J Med*. 2009; 122:741–746. [PubMed: 19501347]

6. Skolarus TAGRL, Connor TM, Andriole GL, Bhayani SB. Operating Room Cost Analysis: A Survey of Cost Awareness Among Urologic Surgery Staff. *J Urology*. 2008; 179:56.
7. Okike K, O'Toole RV, Pollak AN. Survey finds few orthopedic surgeons know the costs of the devices they implant. *Health affairs*. 2014; 33:103–109. [PubMed: 24395941]
8. Ziegenfuss JT Jr. McKenna CK. Ten tools of continuous quality improvement: a review and case example of hospital discharge. *American journal of medical quality : the official journal of the American College of Medical Quality*. 1995; 10:213–220. [PubMed: 8547801]
9. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of biomedical informatics*. 2009; 42:377–381. [PubMed: 18929686]
10. [April 11, 2015] Medicare Provider Utilization and Payment Data: Inpatient. 2015. Available at: <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Inpatient.html>.
11. Abelson, RCS. Sliver of Medicare Doctors Get Big Share of Payouts. *New York Times*; New York: 2014. p. A1
12. Mussweiler T, Strack F. The use of category and exemplar knowledge in the solution of anchoring tasks. *Journal of personality and social psychology*. 2000; 78:1038–1052. [PubMed: 10870907]
13. Tversky A, Kahneman D. The framing of decisions and the psychology of choice. *Science*. 1981; 211:453–458. [PubMed: 7455683]
14. Tversky A, Kahneman D. Judgment under Uncertainty: Heuristics and Biases. *Science*. 1974; 185:1124–1131. [PubMed: 17835457]
15. Soroceanu A, Canacari E, Brown E, Robinson A, McGuire KJ. Intraoperative waste in spine surgery: incidence, cost, and effectiveness of an educational program. *Spine*. 2011; 36:E1270–1273. [PubMed: 21738100]
16. Sathiyakumar V, Jahangir AA, Mir HR, et al. Patterns of costs and spending among orthopedic surgeons across the United States: a national survey. *American journal of orthopedics*. 2014; 43:E7–13. [PubMed: 24490192]
17. Parnes JA, Yeh DH, Glicksman JT, Tewfik MA, Sowerby LJ. Surgeon-estimated costs of common consumables in otolaryngology. *Laryngoscope*. 2015
18. Rohman L, Hadi S, Whitwell G. Surgeons' knowledge about the costs of orthopaedic implants. *Journal of orthopaedic surgery*. 2014; 22:221–223. [PubMed: 25163960]
19. Bade K, Hoogerbrug J. Awareness of surgical costs: a multicenter cross-sectional survey. *Journal of surgical education*. 2015; 72:23–27. [PubMed: 25112174]
20. Niedermeier SR, Apostel A, Bhatia S, Khan SN. Cost estimates of biologic implants among orthopedic surgeons. *American journal of orthopedics*. 2014; 43:25–28. [PubMed: 24490182]
21. Hernu R, Cour M, de la Salle S, Robert D, Argaud L. Cost awareness of physicians in intensive care units: a multicentric national study. *Intensive care medicine*. 2015; 41:1402–1410. [PubMed: 26077058]
22. Anstey MH, Weinberger SE, Roberts DH. Teaching and practicing cost-awareness in the intensive care unit: a TARGET to aim for. *Journal of critical care*. 2014; 29:107–111. [PubMed: 24075293]
23. Carlson J, Dachs RJ. Family medicine residents remain unaware of hospital charges for diagnostic testing. *Family medicine*. 2015; 47:466–469. [PubMed: 26039764]
24. Lee JA, Chernick L, Sawaya R, Roskind CG, Pusic M. Evaluating cost awareness education in US pediatric emergency medicine fellowships. *Pediatric emergency care*. 2012; 28:655–675. [PubMed: 22743747]
25. Wax DB, Schaefer J. Cost awareness among anesthesia practitioners at one institution. *Journal of clinical anesthesia*. 2009; 21:547–550. [PubMed: 20122584]
26. Peters BR, Wyss J, Manrique M. Worldwide trends in bilateral cochlear implantation. *Laryngoscope*. 2010; 120(Suppl 2):S17–44. [PubMed: 20422715]
27. Hochmair, I. [5/8/2015] Cochlear Implant: Facts. 2015. Available at: <http://www.medel.com/cochlear-implants-facts/>.

28. Tabib CH, Bahler CD, Hardacker TJ, Ball KM, Sundaram CP. Reducing Operating Room Costs Through Real-Time Cost Information Feedback: A Pilot Study. *Journal of endourology / Endourological Society*. 2015
29. Malapero RJ, Gabriel RA, Gimlich R. An anesthesia medication cost scorecard - concepts for individualized feedback. *Journal of medical systems*. 2015; 39:226.
30. Kaplan RS, Porter ME. How to solve the cost crisis in health care. *Harvard business review*. 2011; 89:46–52. 54, 56–61. passim. [PubMed: 21939127]
31. Kirkpatrick JR, Smith BM, Zapas JL, Thomas WL. Clinical impact of a value-based decision: a surgical case study. *Journal of the American College of Surgeons*. 2013; 216:800–811. discussion 811-803. [PubMed: 23357725]
32. Kirkpatrick JR, Marks S, Slane Met al. Using value-based analysis to influence outcomes in complex surgical systems. *Journal of the American College of Surgeons*. 2015; 220:461–468. [PubMed: 25726357]

How do you rate your knowledge of the cost of supplies and implants used in your OR? (Poor, Fair, Average, Good, Excellent)

How often have you attempted to obtain cost information from the following sources? (Never, Less than yearly, Yearly, Quarterly, Monthly, Weekly, Daily)

How useful have you found the cost information from the following sources? (Not at all useful, Mildly useful, Somewhat useful, Very useful)

On average, how easy has it been for you to obtain the cost of an OR supply item or implant? (Very easy to obtain, Fairly easy to obtain, Somewhat difficult to obtain, Very difficult to obtain, I have never attempted to obtain cost data)

How would you ideally like to be provided with cost information about OR supply and implant costs?

How often do you review the entire pick list (surgeon's preference card) for any of your procedures? (Never, Once, when I first started here at Vanderbilt, Less than every other year, At least every other year, At least annually, At least quarterly, At least monthly, Greater than monthly)

In the last 6 months, please estimate how many times you've added an item or implant to your pick list? (Enter an integer.)

In the last 6 months, please estimate how many times you've removed an item or implant to your pick list? (Enter an integer.)

To what extent does cost play a role in the following situations? (#1: When reviewing and making changes to your pick list. #2: In the OR when asking for additional items to be opened.)

Please rank the following in order of importance for reasons why you are concerned with understanding OR costs. (Costs to society, Amount the patient will ultimately pay, Vanderbilt's financial performance, Risk of decreased personal reimbursement, Other reason(s))

How would you describe the current emphasis placed on cost awareness in managing patients at Vanderbilt? (Far too little, Too little, About Right, Too Much, Far Too Much)

Who is currently playing the leading role in determining how surgeons are measured and/or compared when it comes to costs? (Federal government, State government, Insurance companies, Hospital administration, Surgical department, Surgeons, Other)

Who should be playing a leading role in determining how surgeons are measured and/or compared when it comes to costs? (Federal government, State government, Insurance companies, Hospital administration, Surgical department, Surgeons, Other)

Figure 1.
Common section of survey

Figure 2.

Variance from actual cost of faculty (blue) and trainee (red) estimates of operating room supplies and implants (horizontal lines=interquartile range, median=black box, 10% for faculty, 29% for trainees)

Figure 3.
Rank ordered reasons why respondents were concerned with understanding operating room costs.

Figure 4. Percentage of correct estimations (green), underestimates (light blue), and overestimations (brown) of item/supply cost based on physician and item/supply characteristics. Inquiries into years in practice were asked only of faculty respondents.

Table 1

Actual costs of supplies and implants included in survey

ITEM DESCRIPTION	COST
Nucleus Freedom Cochlear Implant	\$20,400.10
AlloDerm, 4 × 7 cm	\$914.00
Cusa Tip, tubing and wrench	\$875.09
Air Balloon Dilation System	\$655.00
Duraseal	\$633.21
OmniGuide Carbon Dioxide Laser Fiber	\$500.00
Laryngeal Skimmer Blade	\$418.34
Dusseldorf Type Bell PORP	\$369.19
Cymetra	\$321.00
CRE Pulmonary Balloon Dilatation Catheter	\$306.85
Netterville Phonoform Silicone Block	\$303.99
Microvascular Anastomotic Coupler	\$303.87
Eclipse Stapes Prosthesis	\$299.41
Isocool Bipolar Forceps Tips	\$296.57
NIM EMG Endotracheal Tube	\$279.42
Frontal Sinus Blade	\$278.38
Choanal Atresia Burr	\$264.74
Inferior Turbinate Blade	\$205.69
Tricut Blade, 11 cm × 4.0 mm	\$190.23
Microdebrider Blade, 11 cm × 4.0 mm	\$190.08
Lone Star Retraction System	\$174.94
Curved Sickle Knife (3 mm blade, 10.5' length)	\$158.90
Laser-Shielded Endotracheal Tube	\$148.85
Doppler Probe	\$125.67
Stapes Diamond Synergy Burr, 0.7 mm	\$111.29
Surgifoam Absorbable Gelatin Powder Kit	\$110.96
Surgiflo Hemostatic Matrix	\$110.67
Fibrillar Absorbable Hemostat, 2 × 4"	\$105.19
NIM 2-Channel Facial Nerve Electrodes	\$91.69
NIM 2-Channel Facial Nerve Electrodes, 12 mm	\$83.85
Synthes Locking Screw	\$80.16
3 mm Cutting Burr	\$79.08
5 mm Cutting Burr	\$78.87
3 mm Coarse Diamond Cutting Burr	\$76.20
Endoscrub Sheath	\$59.87
Merocel, 3.5 cm (×2)	\$54.79
Rains Frontal Sinus Stent	\$51.21

ITEM DESCRIPTION	COST
Surgical Nu-Knit (3 × 4")	\$50.27
Thrombin Epistaxis kit	\$46.06
Doyle Splints	\$42.24
Bipolar Forceps, Disposable	\$37.50
6.0 Shiley Tracheostomy Tube	\$35.83
Warming Drape	\$35.06
Pressure Equalization Tube (T-Tube)	\$33.17
Inflation Device	\$32.97
Irrigating Bipolar Cord	\$25.30
Glasscock Dressing	\$25.14
Merocel, 10 cm	\$24.46
Micro Otologic Blade	\$21.12
Oro-Tracheal Needle (27g, 8 mm)	\$19.79
Dura Hooks	\$13.47
3-O Vicryl pop-offs (8 pack)	\$11.70
Armstrong Pressure Equalization Tube	\$10.20
Suction Bovie	\$6.69
2.75" Insulated Bovie Tip	\$4.08
4-O Vicryl Runner	\$3.87
Pencil Bovie	\$2.87
Surgical Gown	\$2.22
Sterile Glove	\$1.64

Table 2

Perceptions of Cost of Operating Room Supplies and Implants

What extent does cost play in...	NA *	None	Minimal	Moderate	Significant	P
Reviewing/making changes to pick list	17%	8%	4%	38%	33%	0.17
In OR when asking for additional items	13%	0%	25%	25%	38%	

Ease obtaining costs	Never attempted	Very easy	Fairly easy	Somewhat difficult	Very difficult	
Faculty	4%	8%	17%	50%	21%	0.27
Trainees	15%	4%	11%	30%	41%	

Self-rated knowledge of costs	Poor	Fair	Average	Good	Excellent	
Faculty	25%	29%	29%	13%	4%	0.02
Trainees	52%	41%	0%	7%	0%	

* NA = not available; answered "none of the above, as the cost data I need is not available to me"