Urologists' estimations of the cost of commonly used disposable devices

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Introduction: *To assess whether urologists are able to accurately estimate the cost of commonly used endourologic disposable devices.*

Materials and methods: *An anonymous questionnaire was presented to resident and attending urologists in one academic healthcare system. Respondents estimated the cost of 15 disposable devices commonly used in ureteroscopy. Twenty-five surgeons (9 resident and 16 attending urologists) participated for a response rate of 96.2%. Respondents' cost estimates were compared to actual institutional costs and considered accurate if the absolute percentage error was within 20%. Additional information obtained included: years in practice, participation in purchasing activities, practice setting, number of ureteroscopy procedures performed monthly, degree of confidence in ability to estimate cost, and the importance of cost in device selection for each respondent.*

Results: *Of 375 total responses, 62 (16.5%) were accurate, 308 (82.1%) were inaccurate, and 5 (1.3%) were unanswered. The mean percentage error (MPE) for all responses was 178.8% (IQR 35.1%-211.4%). Overall, 73% of responses were overestimations and 27% were underestimations. Residents had an MPE of 128.4%, while attending urologists had an MPE of 207.8%. The most inaccurately estimated cost was for an endoscopic y-adapter, while the most accurate estimations were for a 1.5Fr nitinol ureteroscopic stone basket.*

Conclusions: *Neither attending nor resident urologists are able to accurately estimate the cost of commonly used disposable devices. Improving urologists' understanding of device costs is necessary for improved cost control and a reduction in healthcare expenditures.*

Key Words: ureteroscopy, endourology, healthcare cost, device cost

Introduction

In the United States, healthcare costs are projected to compose 20% of the gross domestic product by 2024.[1] It is believed that over 60% of these expenses are in the hands of physicians.[2] Particularly in procedural and surgical settings, it is essential that physicians are aware of the costs associated with the variety of tools utilized. Responsible decisions when selecting disposable devices are an important aspect of cost control for procedural expenses.

One particularly device-heavy procedure in urology is ureteroscopy (URS).[3,4] National healthcare costs attributed to the treatment of urolithiasis range from $5 billion to $10 billion, making it one of the most expensive urologic conditions.[5-7] The cost of disposable devices used in URS constitutes a significant portion of the expenditures surrounding this procedure, and has been estimated to surpass purchase and maintenance costs of the ureteroscope itself in as few as 67 cases.[8] Coupled with the fact that 30% of healthcare expenses have been attributed to wastefulness, urologists must be economically mindful when selecting and handling these devices.[9]

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Currently, however, it is unknown whether urologic attending and resident surgeons are equipped with the knowledge to estimate the cost of these instruments. Previous studies in other subspecialties reveal that surgeons often cannot accurately estimate the cost of their commonly used devices.[10-12] Thus, we aim to assess the accuracy with which urologists can assign prices to disposable ancillary equipment for URS and identify factors that may contribute to greater knowledge of device costs.

Materials and methods

An anonymous questionnaire was distributed to 26 (9 resident and 17 attending) urologists in one academic healthcare system across two hospitals. All attending and resident urologists offered a survey performed a minimum of 5 ureteroscopies per month and participation was voluntary. Respondents were asked to estimate the cost of 15 disposable devices, all of which were available at our institution and commonly used in URS, Figure 1 and Figure 2. All inventory decisions and pricing agreements are handled centrally, ensuring there were no differences in device availability or cost between the two hospitals. Each device was identified by name and an accompanying photograph. The questionnaire also obtained the following information: level of training (attending or resident); practice setting (academic or community); years in practice or training; number of URS cases performed per month; participation in purchasing activities within the past 10 years; confidence in ability to estimate the cost of disposable URS devices (on a 5-point Likert scale); and importance of cost in selecting a device (on a 5-point Likert scale). Approval was granted by the institutional review board before beginning the study. Consent to participate in the study was implied by a respondent's completion of the questionnaire.

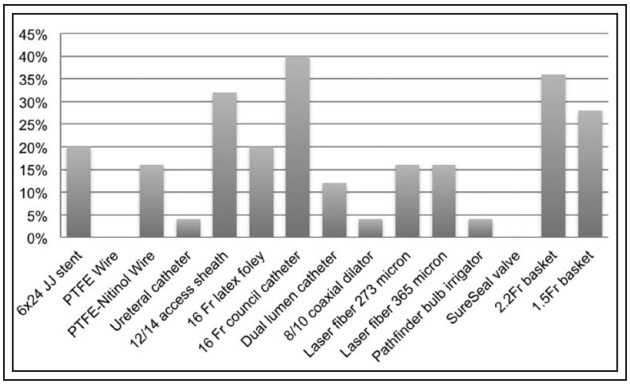

Figure 1. Percent of accurate responses (within 20%) by device.

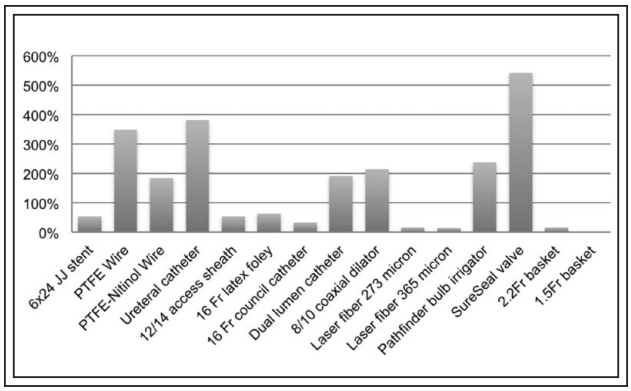

Figure 2. Percent error of estimation by device.

Respondents' cost estimates were compared with the actual institutional reference costs, which were obtained from the computer inventory system and reflect the cost billable to the patient. Estimates within 20% (above or below) of the actual value were considered accurate. To calculate the percentage error, the cost to the institution was subtracted from the participant's estimated cost, and that result was divided by the cost to the institution (percent error = [institution cost - estimated cost]/institution cost). The mean percentage error was calculated for all responses, as well attending and resident subgroups. Chi square analysis and Student's T-test were used to compare differences between groups. Statistical significance was defined as p value < 0.05. Statistical analysis was performed using Microsoft Excel.

Results

Twenty-five urologists (9 resident and 16 attending urologists) participated in the study, yielding a response rate of 96.2% (25/26). Of the 25 respondents, 9 were residents (mean 3.6 years in training, range: 2-6 years) and 16 were attending physicians (mean 16.6 years in practice, range: 1-40 years).

Of 375 total responses, 62 (16.5%) were accurate (within 20% of the actual cost), 308 (82.1%) were inaccurate, and 5 (1.3%) were left unanswered. Residents recorded 22 accurate responses (16.3%), while attendings recorded 40 accurate responses (17%) (p = 0.857). When asked the degree of confidence in their ability to estimate the cost of urologic devices, 12 of 25 participants were undecided, and an additional 9 participants disagreed. The mean percentage error for all responses was 178.8% (IQR 35.1%-211.4%). Residents had a mean percentage error of 128.4%, while attending urologists had a mean percentage error of 207.8% (p = 0.004). Overall,

TABLE 1. **Mean percentage error for each device per group**

Device	Mean percentage error	
	Attending surgeons (n = 16)	Residents (n = 9)
6F x 24 cm JJ stent	94.8	49.8
PTFE 0.35 guidewire	449.5	188.6
Sensor wire	234.4	128.6
5Fr open ended catheter (yellow)	453.2	273
12/14F 45 cm ureteral access sheath	93.5	42.5
16Fr latex foley catheter	140.6	68.8
16Fr councill tip catheter	70.2	62.5
Laser fiber (273 micron)	245.3	122.5
Laser fiber (365 micron)	249	170.5
Dual lumen ureteral catheter	55.5	63.6
8/10 dilator/sheath set	50.5	68.2
Pathfinder device	300.5	147.4
SureSeal adapter	613.9	439.8
2.2Fr Ncircle basket	41.9	50.6
1.5Fr Ncircle basket	39.3	59.2

73% of responses were overestimations and 27% were underestimations. The most inaccurately estimated cost was for an endoscopic y-adapter, while the most accurate estimations were for a 1.5Fr nitinol ureteroscopic stone basket, Table 1.

When asked whether cost was an important factor in the decision to select a device, 13 participants agreed, 5 participants disagreed, 4 participants were undecided, and 1 did not respond.

Discussion

In many aspects of medicine, physicians play an important role in cost containment efforts. Surgical specialties that display an awareness of the monetary value of their disposable devices may be in a better position to make fiscally responsible decisions. Thus, we aimed to identify the accuracy with which a single institution's urology department could accurately identify the price of common disposable devices via a survey-instrument. The endourologic devices chosen are primarily used in ureteroscopic procedures. Ureteroscopy was chosen as a representative procedure due to the fact that it is one of the most common urologic procedures and is familiar to nearly all urologists. Further, ureteroscopy frequently employs a variety of disposable devices, making it a viable target for cost containment as well as a reasonable gauge for assessing knowledge of device pricing.

Our study surveyed nearly an entire academic urology division, with a 96.2% response rate. Most of the respondents (64%) were attending urologists with a mean of 16.6 years in practice, while the 9 residents (36%) had undergone a mean of 3.6 years of training. Of the 375 total survey responses, the majority were inaccurate (82.1%). When attendings (17%) and residents (16.3%) were compared, no difference was observed in the accuracy of estimations ($p = 0.857$). While both residents are attendings were largely inaccurate (20% error threshold) in their responses, the percentage error was significantly greater for attending urologists compared to residents (mean percentage error: 207.8% versus 128.4%; $p = 0.004$). These findings demonstrate a deficiency in knowledge of device pricing at both the resident and attending level, with both resident and attending surgeon groups demonstrating mean percentage errors exceeding 100%. These extreme percentage errors would suggest that disposable device cost is not something that is regularly addressed in the daily practice of the urologists surveyed, which could be explained by the fact that urologists at our institution are not routinely involved in purchasing decisions. There was no correlation ($R^2 < 0.2$) between years of experience and number of devices correctly priced, for either the faculty or resident groups.

In fact, attending urologists had larger percentage errors overall and consistently over-priced items.

Of all the respondents, 84% could not "agree" that they were confident in estimating such costs, indicating an awareness of cost ignorance. Interestingly, 40% could not "agree" that they even consider cost an important factor when selecting a device to use. These results suggest that despite awareness of the expensiveness of disposable devices, as indicated by the majority of responses being cost overestimations (+178.8% mean error for entire cohort), a significant proportion (40%) still do not consider cost an important factor when selecting a device. Even if better equipped with the true knowledge of all prices involved, many urologists may not modify practices unless there is an incentive to work toward cost-efficient care. Physician engagement in cost-consciousness is an area for improvement and is integral to future efforts at cost containment.

Our study has several limitations. First, the small sample size subjects our results to a potential sampling bias and risk of under-coverage. However, our study did have an excellent response rate - capturing nearly all urologists at our institution - indicating that our results are truly representative, at the very least, of our own institution's population. Another limitation is that those surveyed represent a single healthcare system, and so these results may not be generalizable to other institutions. In particular, it may be useful in future studies to assess potential differences between geographic regions and type of practice setting (e.g community practice, academic practice). The results of this study, however, do analyze an academic practice setting and lay the groundwork for future comparisons. Another limitation is that our accuracy results are based on a price accuracy threshold of 20%; however, this definition was established based on other definitions of cost accuracy in the literature. Finally, our use of institutional costs does not represent the retail cost of the items, though the institutional pricing may better represent the billing cost to patients and insurance companies. Overall, while our results are the first in the urologic literature to analyze this important topic, further investigation is needed at a multi-institutional level with a greater sample to validate these results and confirm the need for greater urologist awareness in device cost conscientiousness.

Conclusions

Neither attending nor resident urologists are able to accurately estimate the cost of commonly used disposable devices. Improving urologists' understanding of device costs is necessary for improved cost control and a reduction in healthcare expenditures. □

References

1. Keehan SP, Cuckler GA, Sisko AM et al. National health expenditure projections, 2014-24: spending growth faster than recent trends. *Health affairs (Project Hope)* 2015;34(8):1407-1417.
2. Agrawal S, Taitsman J, Cassel C. Educating physicians about responsible management of finite resources. *JAMA* 2013;309(11):1115-1116.
3. Seklehner S, Laudano MA, Del Pizzo J, Chughtai B, Lee RK. Renal calculi: trends in the utilization of shockwave lithotripsy and ureteroscopy. *Can J Urol* 2015;22(1):7627-7634.
4. Preminger GM, Tiselius HG, Assimos DG et al. 2007 Guideline for the management of ureteral calculi. *Eur Urol* 2007;52(6):1610-1631.
5. Scales CD Jr. Practice patterns in the management of urinary lithiasis. *Curr Urol Rep* 2013;14(2):154-157.
6. Hyams ES, Matlaga BR. Economic impact of urinary stones. *Transl Androl Urol* 2014;3(3):278-283.
7. Litwin MS SC: Urologic Diseases in America. In. Edited by US Department of Health and Human Services PHS, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Washington, DC: US Government Printing Office; 2012.
8. Collins JW, Keeley FX, Jr, Timoney A. Cost analysis of flexible ureterorenoscopy. *BJU Int* 2004;93(7):1023-1026.
9. Committee on the Learning Health Care System in A, Institute of M. In: Best Care at Lower Cost: The Path to Continuously Learning Health Care in America. edn. Edited by Smith M, Saunders R, Stuckhardt L, McGinnis JM. Washington (DC): National Academies Press (US). Copyright 2013 by the National Academy of Sciences. All rights reserved.; 2013.
10. Streit JJ, Youssef A, Coale RM, Carpenter JE, Marcus RE. Orthopaedic surgeons frequently underestimate the cost of orthopaedic implants. *Clin Orthop Relat Res* 2013;471(6):1744-1749.
11. Okike K, O'Toole RV, Pollak AN et al. Survey finds few orthopedic surgeons know the costs of the devices they implant. *Health affairs (Project Hope)* 2014;33(1):103-109.
12. Wang A, Dybul SL, Patel PJ, Tutton SM, Lee CJ, White SB. A cross-sectional survey of interventional radiologists and vascular surgeons regarding the cost and reimbursement of common devices and procedures. *J Vasc Interv Radiol* 2016;27(2):210-218.