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ORIGINAL ARTICLE

Understanding patients' preferences for surgical management of urethral stricture disease

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Abstract
Objectives To understand how prioritization of treatment attributes and treatment choice varies by patient characteristics, we sought to specifically determine how demographic variables affect patient treatment preference.
Patients and methods Male patients with urethral stricture disease participated in a choice-based conjoint (CBC) analysis exercise evaluating six treatment attributes associated with internal urethrotomy and urethroplasty. Demographic and past symptom data were collected. Stratified analysis of demographic variables, including age, education, income, was conducted using a mixed effect logistic regression model to evaluate the coefficient size and confidence intervals between the treatments attribute preferences of each strata.
Results 169 patients completed the CBC exercise and were included in our analysis. Overall success of the procedure is the most important treatment attribute to patients and this persists across strata. Older patients (≥65) express preferences for better success rates and fewer future procedures, whereas younger patients prefer a less invasive approach and are more willing to accept additional procedures if needed. Patients with lower levels of education preferred open reconstruction and had a stronger preference against multiple future procedures, whereas those with higher levels of education preferred endoscopic treatment and had a less strong preference against multiple future procedures. Low-income individuals express statistically significant stronger negative preferences against high copay costs compared to high-income individuals.
Conclusion These results can help to inform physicians' counseling about surgical management of urethral stricture disease to better align patient preferences with treatment selection and encourage shared decision making.

Keywords Urethral stricture · Decision making · Patient preference · Age factors · Socioeconomic factors

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Background

Male urethral stricture disease (USD) affects 229–627 per 100,000 males, with increasing prevalence among men 55 years and older [1]. USD negatively impacts quality of life and can cause urinary retention, infection, bladder

stones, fistulae, sepsis, and renal failure [2–5]. Management for USD includes dilation, endoscopic treatments [such as direct vision internal urethrotomy (DVIU)], and urethroplasty. Treatment options have varying procedure characteristics, costs, side effects, surgical recovery, and long-term outcomes [6]. Urologists take into account many factors when making decisions about how to treat stricture disease including USD etiology, location, length, and prior treatment.

Conjoint analysis is an analytic technique used in market research to determine customer preference. When applied to a clinical setting, conjoint analysis can elucidate the relative importance that patients place on various aspects of treatment. Conjoint analysis has been performed in other medical specialties with success, and allows the identification of treatment attributes that are important to patients [7–11]. The goal is to inform physicians of these preferences, so that they can present the benefits and alternatives of procedures in a way that is understandable and meaningful [12].

Previous work using a choice-based conjoint model found that men with USD place importance on success rates, catheter duration, number of possible future procedures, type of procedure, and copayment cost when considering surgical treatment [13]. Based on calculated relative attribute preferences, treatment success rate was shown to be the most important attribute to participants, followed by: copayment cost, the possibility of future procedures, duration of catheterization, type of procedures performed, and recovery time (Supplementary Figure 1).

The aim of the present study was to understand how prioritization of treatment attributes and treatment choice varies by patient characteristics, specifically seeking to determine how demographic variables affect patient treatment preference. We hypothesize that pre-existing patient demographics will influence patient treatment prioritization and preferences.

Patients and methods

Male USD patients treated at the University of California, San Francisco were invited to participate in an online choice-based conjoint analysis exercise from 7/2014 through 11/2014. Demographic (age, race/ethnicity, education, employment status, and income level) and past treatment data (history of dilation, DVIU, and urethroplasty) were also collected. The study protocol was approved by the University of California, San Francisco Committee for Human Subjects Research.

Our conjoint-based choice design utilized balanced overlap and included six treatment attributes, each with no more than four levels. Treatment attributes and levels were: open vs. endoscopic surgery, success rate (85, 50, and 25%), number of future procedures required (0, 1, 5, and 10), length of time catheter needed (none, ≤1 week, 3 weeks), time to recovery (immediate, 2, 6, and 12 weeks), and copay cost ($0, $100, $1000, and $10,000). These treatment attributes were determined through qualitative interviews and attribute levels (success rate, number of future procedures, catheter duration, recovery duration, and copay cost) were selected to optimize preference determination. The choice-based exercise was developed and administered through SSI Web CAPI module (Sawtooth Software Inc., Sequim, WA, USA). Participants reviewed material describing two surgical treatment options (DVIU vs. urethroplasty) before completing the exercise (Supplementary Figure 2).

Participants were provided 18 random treatment scenarios and asked to select the best treatment option between the two options provided in each scenario. In conjoint analysis, the options are not designed to be "realistic" choices, but to provide scenarios that elicit participant preferences and rankings for treatment attributes (Fig. 1).

This manuscript focuses on a stratified analysis of the original conjoint analysis, where further details about the conjoint analysis methodology can be found [13]. Strata were selected based on demographic and treatment-specific characteristics that were clinically relevant to the treatment decision-making process: age (<65 vs. 65+), education (high school/technical college vs. college/above), and income (<$100,000 vs. $100,000+). To examine these strata, we fit a mixed effect logistic regression model within each stratum and examined the coefficient size and confidence intervals between the subgroups.

We compared the coefficients within attributes to determine the relative preference for a level within each attribute. Comparisons of the degree of overlap of the 95% confidence intervals were used to indicate statistically significant differences between groups. A sensitivity analysis using dummy variables for subgroups found no difference in the significance or values of the coefficients in the models. We used STATA® (Stata Corporation, Texas, USA) for analysis. A p value of <0.05 was considered significant.

Results

There were 324 patients invited to participate either via telephone ($n = 255$) or in clinic ($n = 69$). 191 patients agreed to participate and 183 completed the online survey (96% completion rate). Fourteen (7%) participants were excluded as they answered a fixed scenario question used for internal validity incorrectly, for a total cohort of 169 participants (Table 1).

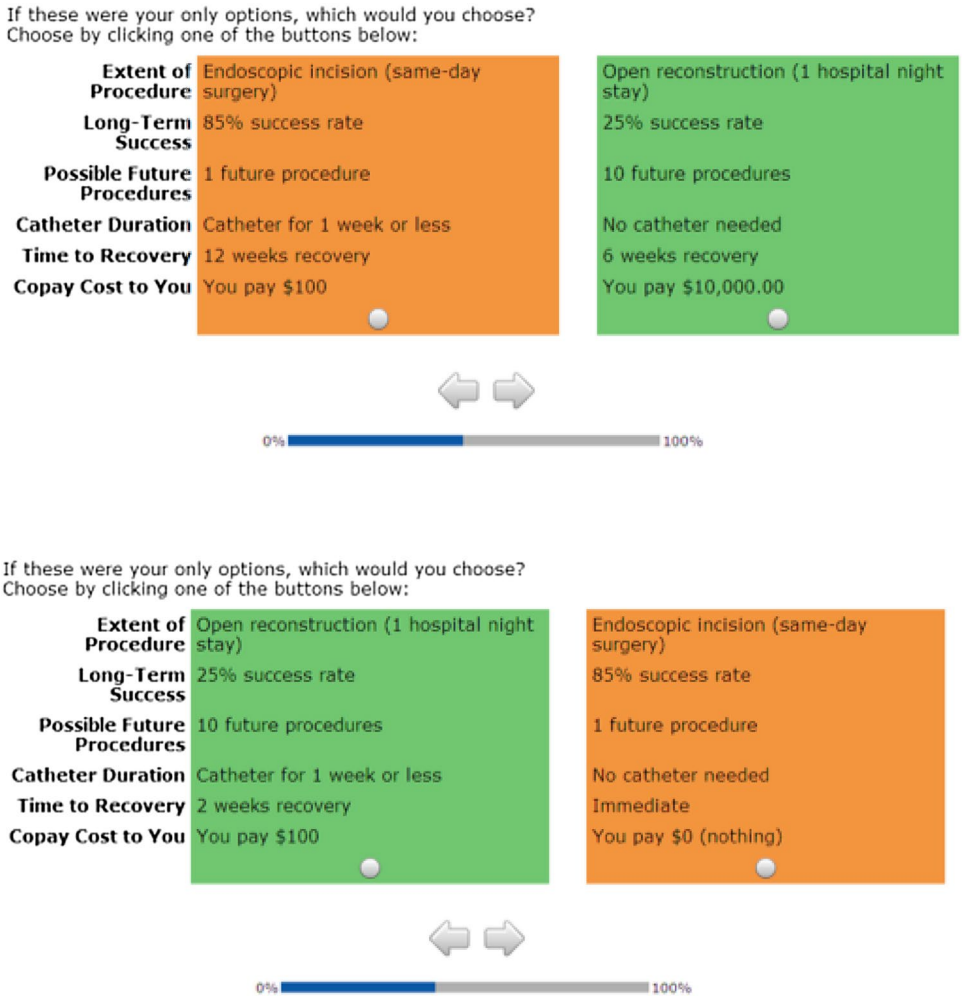

Fig. 1 Case-based conjoint analysis scenarios. Two examples of choice-based case scenarios that participants are required to choose between. The treatment attributes are the same, but the attribute levels are changed in each pair of scenarios

Strata analysis (Fig. 2)

Age

The participants' preferences for procedure type significantly varied by age (Fig. 2a). Older men preferred open reconstruction, whereas younger men preferred endoscopic incision. Both groups preferred to maximize the procedure success rate, although the older group had a stronger negative preference against the 25% success rate procedure. This suggests that older men are less likely to accept a poor success rate. Both groups prioritized success rate over other treatment attributes, but the older group had a stronger preference for no future procedures compared to 1 procedure, whereas the younger group exhibited no significant difference between 0 vs. 1 future procedures.

Education

Subjects with a college education or higher preferred endoscopic incision, whereas subjects with less education preferred open reconstruction (Fig. 2b). Men with less education had a stronger negative preference against five or ten future procedures compared to men with more education. The higher education group's preference for treatment type was as strong as their preferences for 1 week of catheterization and $1000 copayment. The lower education group did not show a strong preference for treatment type.

Income

The lower income group had a stronger preference against higher copayment cost compared to the higher income

Table 1 Participant demographic and treatment data

Characteristic ($N = 169$)	*n* (%)
Age, mean (years) ±95% CI	59.2 ± 17.2
Race, *n* (%)	
Asian	16 (9.5)
Black/African–American	10 (5.9)
White	122 (72.2)
Other	13 (7.7)
Missing/unknown	8 (4.8)
Education, *n* (%)	
High-school grad or less	55 (32.5)
Technical school grad	18 (10.7)
College ± postgrad	96 (56.8)
Employment, *n* (%)	
Employed/self-employed	77 (45.6)
Retired	66 (39.1)
Other *(out of work, student, not working, disability)*	26 (15.4)
Marital status, *n* (%)	
Married/partnered	122 (62.2)
Divorced/widowed	17 (10.1)
Never married	28 (16.6)
Missing	2 (1.2)
Income, *n* (%)	
<$50,000	50 (29.6)
$50,000–<$100,000	49 (30.0)
>$100,000	61 (36.1)
Missing	9 (5.3)
Past treatments	
Urethral dilation	74 (43.8)
Internal urethrotomy	72 (42.6)
Urethroplasty	86 (50.9)

group (Fig. 2c). The higher income group had stronger preference against poorer success rates and against possible future procedures. There was no difference in preference against a long-term success rate of 25% based on income, but the lower income group had strong negative preferences against the $10,000 copay, whereas the upper income group had a stronger negative preference against more future procedures and the 50% long-term success rate as compared to the $10,000 copay cost.

Discussion

Our results provide insight into the treatment attributes that are important to patients in making decisions about surgical treatment for USD. Success rate is the most important treatment attribute across all strata. Outcomes for DVIU vary based on the stricture length and location, but long-term success rates are poor, estimated at 0–30% [6, 14, 15]. Urethroplasty has a high long-term success rates (85–95%) [6, 16]. DVIU has often been championed as the "less invasive" procedure. DVIU offers patients a potential for shorter duration of postoperative catheter and likely lower copay cost, and attributes identified as important by participants. Ultimately, urethroplasty provides patients with a better overall distribution of treatment attributes by offering a higher success rate and the lower likelihood of need for future procedure(s). During surgical counseling, providing patients with success rates and possible need for future procedures will help match patient preference with treatment approach.

Notwithstanding data purporting the benefits of urethroplasty, many patients undergo multiple dilations and DVIUs before being offered urethroplasty [17–19]. The American Urological Association has released guidelines on management of USD recommending offering urethroplasty to patients who have failed endoscopic management, and there are data that repeated endoscopic procedures are not cost-effective [20–22]. Despite this, one survey of US urologists found that 30% of urologists would continue to treat a long bulbar stricture or a short bulbar stricture recurrent after DVIU by minimally invasive means, despite the near certain failure of repeated endoscopic management [19]. In addition, this and another national survey in The Netherlands have shown that a vast majority of urologists believe that urethroplasty should only be offered after repeated failure of endoscopic treatment [18, 19]. There are several studies evaluating treatment patterns of USD that echo these findings, suggesting that urethroplasty is greatly underused [17, 23, 24]. Current practice patterns seem to be in direct contradiction to patients' preferences in our study, which is why understanding patients' preferences is critical to selecting the appropriate treatment option and providing patients with realistic expectations through appropriate preoperative counseling [25].

Age is a strong determinant of treatment preferences. Younger men tend to prefer endoscopic incision compared to open surgery. Older men demonstrate a stronger aversion to poor success rates. Although not statistically significant, older men preferred fewer future procedures, whereas younger men had no difference in preference for 0 vs. 1 additional procedure. Younger men may be willing to undergo a second procedure after a failure of DVIU, whereas older men's preferences for higher success rates and no future procedures suggest that an urethroplasty may improve their satisfaction with treatment. Despite high success rates of urethroplasty among older men, data have shown that rates of urethroplasty are quite low in the older patient population [17, 23, 26]. In an analysis of urethral stricture in Veterans, patients who underwent urethroplasty were significantly younger than

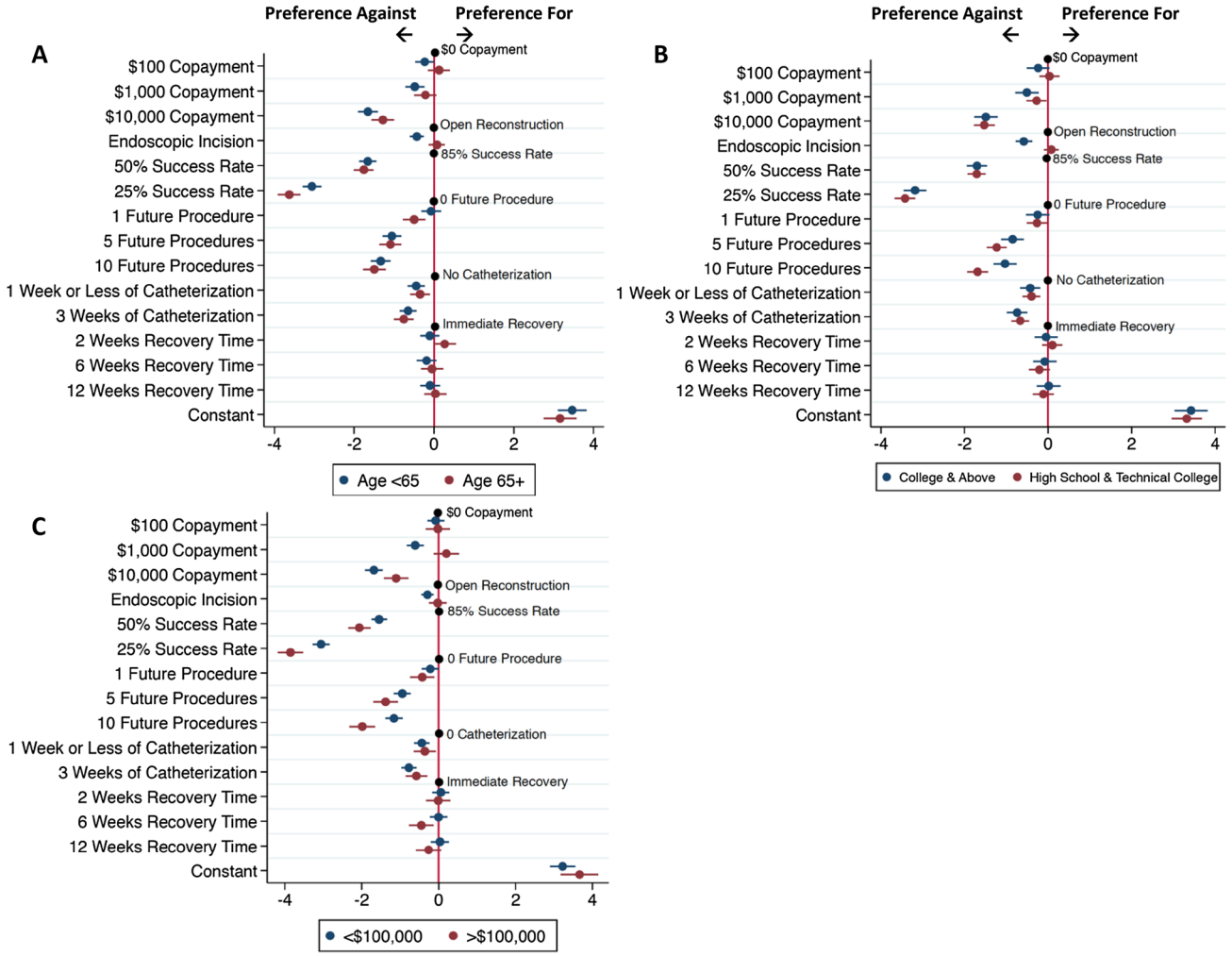

Fig. 2 Patient preference coefficient plots across demographic subgroups. A *positive coefficient* indicates *preference for* the level of interest over the baseline level, whereas a *negative coefficient* indicates preference for the baseline over the level of interest (or *preference against*), with the absolute number representing the strength of the preference (*farther from 0* represents stronger preference)

those who underwent DVIU [23]. This may be because physicians assumed that older men do not want a "more invasive" surgery. We found that older men do not have a preference between open or endoscopic surgery. Given other preferences for higher success rate and fewer future procedures, open reconstruction would likely be a better treatment match to their preferences.

Income bracket resulted in different treatment preferences. The lower income group had a stronger preference against high copayment rates, such that prioritizing payment eclipsed the importance of success rates and number of future procedures. The higher income group, on the other hand, demonstrated stronger preferences against lower success rates than against high copayment rates; thus, men with high-income levels seem to have the luxury to prioritize success rates and number of future procedures over copayment rate. In an era of rising healthcare costs, both patients and providers will be forced to incorporate cost concerns into treatment discussions.

Our results offer an understanding of what is important to patients in making treatment decisions and how we can improve and evaluate their treatment satisfaction. A patient may at the outset prefer a come-and-go procedure that requires a short catheter duration over a more invasive procedure requiring a hospital stay and a longer catheter duration, until he understands that the overall success rate for the "easier" procedure is much lower and has a higher likelihood of requiring future invasive procedures. Ultimately, his treatment goal may be the fewest procedures possible or highest success rate possible, rather than the least invasive procedure possible. Our analysis sheds light on what treatment attributes are important to different groups of patients and what treatment attributes should be given special consideration in

counseling with these groups. This choice-based conjoint analysis could be performed in other reconstructive clinics by patients prior to or during their visit, which could serve to both educate the patient and inform the surgeon about the patients' USD understanding and preferences.

Our study has limitations. The preferences of our USD cohort may not be generalizable to cohorts found in other settings. Another potential limitation is that we focused our exercise on two treatment options, DVIU and urethroplasty, but did not specifically orient the conjoint analysis towards other treatment options for USD, such as urethral dilation or clean intermittent catheterization. This was a calculated decision to keep the conjoint analysis understandable and not over-burdensome for participants. The preference determinations in a conjoint analysis are designed to provide information about preference of individual treatment attributes that are not necessarily tied to one treatment option, so that these preferences can then be applied more broadly. For example, understanding how patients weigh overall success, the length of time a catheter has to be in place, or the number of future procedures that are necessary can inform a discussion about other treatment options for USD, not just urethroplasty or DVIU. For this reason, we feel that the results of this conjoint analysis can be useful in understanding patients overall treatment preferences for management of USD and not merely these two treatment options.

Of note, not all of the patients included in our analysis were treatment-naïve (about three-quarters of patients had undergone some USD-related procedure or surgery in the past). As such, we did perform an additional mixed effect logistic regression model by prior procedure status to ensure that procedural history did not affect decision preferences. This showed that there were no significant differences in preferences based on having previously undergone surgery (DVIU and/or urethroplasty) or a procedure (dilation and/or DVIU and/or urethroplasty) compared to men who had not (Supplementary Figure 3).

Finally, participants were required to read in English and be able to complete an online survey. Our survey did include a fixed internal validity question to identify the few individuals who may not have understood how to properly complete the exercise and these individuals were excluded from the analysis. If conjoint analysis were to be used as a decision tool, it will be critical to ensure that the exercise is made as easy to understand and complete as possible. Given the web-based approach we employed, one could produce a graphics-based conjoint for use with low literacy groups or non-English speakers.

Conclusion

Patients place the vast majority of importance on the overall procedure success and this finding persists across demographic and prior treatment strata. Older patients prefer higher success rates and fewer future procedures, whereas younger patients prefer a less invasive approach and are more willing to accept additional procedures. Cost becomes a factor for low-income individuals when copayment rates rise. Conjoint analysis can be used to help providers understand patient treatment understanding and preferences.

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Author's contributions LAH: project development, data collection/management, data analysis, and manuscript writing. TKL: data analysis and manuscript editing. LW: project development, data analysis, and manuscript editing. IEA: data analysis and manuscript editing. TWG: data collection and manuscript editing. BNB: project development and manuscript editing.

Compliance with ethical standards

Conflict of interest None of the authors have conflict of interest to disclose.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

1. Santucci RA, Joyce GF, Wise M (2007) Male urethral stricture disease. J Urol 177:1667–1674. doi:10.1016/j.juro.2007.01.041
2. Bertrand LA, Bertrand LA, Warren GJ et al (2015) Lower urinary tract pain and anterior urethral stricture disease: prevalence and effects of urethral reconstruction. J Urol 193:184–189. doi:10.1016/j.juro.2014.07.007
3. Rourke K, Rourke K, Hickle J, Hickle J (2012) The clinical spectrum of the presenting signs and symptoms of anterior urethral stricture: detailed analysis of a single institutional cohort. Urology 79:1163–1167. doi:10.1016/j.urology.2012.01.044
4. Nuss GR, Granieri MA, Zhao LC et al (2012) Presenting symptoms of anterior urethral stricture disease: a disease specific, patient reported questionnaire to measure outcomes. J Urol 187:559–562. doi:10.1016/j.juro.2011.10.043

5. Jackson MJ, Jackson MJ, Chaudhury I et al (2013) A prospective patient-centred evaluation of urethroplasty for anterior urethral stricture using a validated patient-reported outcome measure. Eur Urol 64:777–782. doi:10.1016/j.eururo.2013.04.037
6. Hampson LA, McAninch JW, Breyer BN (2014) Male urethral strictures and their management. Nat Rev Urol 11:43–50. doi:10.1038/nrurol.2013.275
7. Pignone MP, Brenner AT, Hawley S et al (2012) Conjoint analysis versus rating and ranking for values elicitation and clarification in colorectal cancer screening. J Gen Intern Med 27:45–50. doi:10.1007/s11606-011-1837-z
8. Bridges JFP, Mohamed AF, Finnern HW et al (2012) Patients' preferences for treatment outcomes for advanced non-small cell lung cancer: a conjoint analysis. Lung Cancer 77:224–231. doi:10.1016/j.lungcan.2012.01.016
9. Wouters H, Maatman GA, Van Dijk L et al (2013) Trade-off preferences regarding adjuvant endocrine therapy among women with estrogen receptor-positive breast cancer. Ann Oncol 24:2324–2329. doi:10.1093/annonc/mdt195
10. Johnson FR, Hauber AB, Ozdemir S, Lynd L (2010) Quantifying women's stated benefit-risk trade-off preferences for IBS treatment outcomes. Value Health 13:418–423. doi:10.1111/j.1524-4733.2010.00694.x
11. Silverman S, Calderon A, Kaw K et al (2013) Patient weighting of osteoporosis medication attributes across racial and ethnic groups: a study of osteoporosis medication preferences using conjoint analysis. Osteoporos Int 24:2067–2077. doi:10.1007/s00198-012-2241-1
12. Hampson LA, Allen IE, Gaither TW et al (2017) Patient-centered treatment decisions for urethral stricture: conjoint analysis improves surgical decision-making. Urology 99:246–253. doi:10.1016/j.urology.2016.07.053
13. Wilson L, Lin TK, Hampson LA et al (2017) Use of conjoint analysis to determine patient preferences for surgical treatment of urethral stricture disease. J Particip Med 9:e1
14. Pansadoro V, Emiliozzi P (1996) Internal urethrotomy in the management of anterior urethral strictures: long-term followup. J Urol 156:73–75. doi:10.1016/S0022-5347(01)65942-1
15. Greenwell TJ, Castle C, Andrich DE et al (2004) Repeat urethrotomy and dilation for the treatment of urethral stricture are neither clinically effective nor cost-effective. J Urol 172:275–277. doi:10.1097/01.ju.0000132156.76403.8f
16. Tinaut-Ranera J, Arrabal-Polo MÁ, Merino-Salas S et al (2014) Outcome of urethral strictures treated by endoscopic urethrotomy and urethroplasty. Can Urol Assoc J 8:E16. doi:10.5489/cuaj.1407
17. Anger JT, Buckley JC, Santucci RA et al (2011) Trends in stricture management among male medicare beneficiaries: underuse of urethroplasty? Urology 77:481–485. doi:10.1016/j.urology.2010.05.055
18. van Leeuwen MA, Brandenburg JJ, Kok ET et al (2011) Management of adult anterior urethral stricture disease: nationwide survey among urologists in the Netherlands. Eur Urol 60:159–166. doi:10.1016/j.eururo.2011.03.016
19. Bullock TL, Brandes SB (2007) Adult anterior urethral strictures: a national practice patterns survey of board certified urologists in the United States. J Urol 177:685–690. doi:10.1016/j.juro.2006.09.052
20. Wessells H, Angermeier KW, Elliott SP et al (2016) Male urethral stricture: American urological association. J Urol 197(1):182–190
21. Wright JL, Wright JL, Wessells H et al (2006) What is the most cost-effective treatment for 1 to 2-cm bulbar urethral strictures: societal approach using decision analysis. Urology 67:889–893. doi:10.1016/j.urology.2005.11.003
22. Rourke KF, Jordan GH (2005) Primary urethral reconstruction: the cost minimized approach to the bulbous urethral stricture. J Urol 173:1206–1210. doi:10.1097/01.ju.0000154971.05286.81
23. Lacy JM, Cavallini M, Bylund JR et al (2014) Trends in the management of male urethral stricture disease in the veteran population. Urology 84:1506–1509. doi:10.1016/j.urology.2014.06.086
24. Burks FN, Salmon SA, Smith AC, Santucci RA (2012) Urethroplasty: a geographic disparity in care. J Urol 187:2124–2127. doi:10.1016/j.juro.2012.01.078
25. Kessler TM, Fisch M, Heitz M et al (2002) Patient satisfaction with the outcome of surgery for urethral stricture. J Urol 167:2507–2511
26. Santucci RA, McAninch JW, Mario LA et al (2004) Urethroplasty in patients older than 65 years: indications, results, outcomes and suggested treatment modifications. J Urol 172:201–203. doi:10.1097/01.ju.0000128810.86535.be