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Equity and Organization in Waiting Lines for Kidney Stone Surgery: Validation of Prioritization Score

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Abstract

Purpose: The SCQ-Score is a prioritization tool for patients awaiting kidney stone surgery. Our aim was to validate the SCQ-Score in Brazil and assess its capacity to classify patient priority in a manner similar to that of endourologists.

Methods: The external validity of the SCQ score was evaluated through an online survey of Brazilian urologists and residents. Calibration from this survey was compared to the original author's using the intraclass correlation coefficient (ICC). The SCQ's ability to assess priorities such as an endourologist was tested by comparing a waiting list of fictional patients, organized once by SCQ-Score and once by expert opinion. These two patient arrangements were compared using the ICC.

Results: The online survey obtained 151 valid responses, and the overall calibration of the original authors demonstrated a good correlation with the Brazilian scenario (ICC 0.503; CI 95% [0.33, 0.74]). The correlation between the waiting lines generated by expert consensus and the Brazilian SCQ score was excellent (ICC 0.740; CI [0.34–0.92]).

Conclusion: The validation of the SCQ score provides a valuable prioritization tool for the waiting line of kidney stone surgery in Brazil.

Introduction

Long waiting lines for surgical procedures pose significant challenges to publicly funded healthcare systems worldwide, affecting both patients and the healthcare system. The economic and public health implications of these waiting lines are substantial, leading to increased healthcare costs, compromised patient outcomes, and added strain on healthcare resources and professionals [1–3]. Although waiting lists vary among different surgical pathologies, kidney stone cases are especially important because of their high prevalence and potentially severe consequences of delayed treatment [4–7]. Moreover, the use of high-cost materials in the treatment of lithiasis is another factor that increases waiting times in countries with limited resources and high demand [8–10].

In response to the challenges posed by long waiting lists, prioritization scores have emerged as valuable tools for improving patient management and optimizing resource allocation [11–13]. These scores aim to assign priority to patients based on their clinical characteristics, helping healthcare professionals identify individuals with a higher risk of complications or more expedited needs for elective surgery. By implementing prioritization scores, healthcare centers can allocate resources more efficiently, potentially reducing waiting times and try to ensure timely and appropriate care for those in most urgent need [14, 15].

Developing a valid and reliable prioritization score requires careful consideration of economic and organizational factors [16]. This process involves selecting relevant clinical parameters, determining their relative weightings, and assessing the internal consistency of the tool. One significant limitation of prioritization scores is their general lack of external validity: although they may be developed and validated in a specific setting, their applicability and accuracy may vary when applied in different healthcare systems or geographic locations. In addition, to ensure the practicality of using these tools, only the most relevant criteria are included, which can limit the assessment of each patient's needs in the same way that an experienced professional in the field would assess them.

The SCQ-Score was developed in Spain as a disease-specific prioritization tool for patients awaiting elective surgery for urolithiasis and demonstrated good intra- and inter-rater reliability in its original setting [17]. However, this initial validation was conducted in a single healthcare system, and the external validity of the SCQ-Score in other organizational and epidemiological contexts remains unknown. We previously translated and culturally adapted the SCQ-Score criteria into Brazilian Portuguese, demonstrating their feasibility and ease of use [18]. That study, however, did not evaluate whether the SCQ-Score retains appropriate calibration or reproduces expert clinical prioritization when applied to Brazilian patients on the waiting list for stone surgery.

To address this gap, the primary objective of this study was to externally validate the Brazilian Portuguese version of the SCQ-Score in a national sample of urologists and residents. Specifically, we assessed the calibration of SCQ item weights compared with those proposed by the original authors. Our secondary objective was to determine whether the SCQ-Score can organize a simulated waiting list of patients in a manner comparable to a consensus panel of experienced endourologists, as measured by the intraclass correlation coefficient between score-based and expert-based queues.

Materials and Methods

To evaluate the external validity of the SCQ score in the Brazilian scenario, we conducted an online questionnaire using the SurveyMonkey platform, directed at practicing urologists and/or urology residents with no prior knowledge of the score's weights (no other inclusion criteria). Participants were invited through email and WhatsApp, which were associated with the Brazilian Society of Urology. They were asked to assign a grade of importance to each criterion of the SCQ score. Grades ranged from 0 to 10, with grade 0 meaning a "non-important criterion" and 10, a "criterion of utmost importance." The same grade could be applied to more than one criterion. Participants subspecialty (endourologist, resident, or other) and practice setting (academic or non-academic, private or public) were also recorded. Using the factorability criterion, we adopted the conventional rule of 10 participants per item. The final scale comprises nine items, one of which was subdivided into four subitems that were analyzed independently, yielding 13 analyzable items; consequently, the minimum sample size was set at 130 participants [19].

In the second step, we assessed the capacity of the validated SCQ-score to organize a patient waiting list in a similar fashion to a panel of endourology experts would, which was considered the standard to decide which patient should be operated first. A simulated waiting list with 12 fictional clinical cases was created and evaluated by the authors (FCV and GG). These cases contained data on symptoms, laboratory and imaging test results, patient demographics and comorbidities, and other important information to determine each case's priority and assign an SCQ score. This number of clinical cases was decided by the authors of this study, as to our knowledge, there is no previous study that compared expert opinion versus a priority score in organizing a queue of patients. Our aim was to ensure that experts could manually rank them in a reliable way and within a reasonable time. The 12 fictional cases are shown in supplementary material.

Endourology experts who met the following criteria were recruited in the second step: urologists who were active in clinical practice, with specialization and at least three years of dedication to endourology. The recruited endourologists participated in two closed meetings. In the first meeting, they ordered a list of fictitious patients according to priority, based exclusively on personal opinion and expertise, under group consensus. This meeting generated a queue of patients, which was considered the standard for comparison. In the second meeting, the same experts organized the list of patients again, this time based exclusively on the SCQ-Score in its translated and validated version. This meeting generated a second queue that was compared with the standard one. These meetings followed the Delphi process, which is a method for stimulating a group of experts to reach a

consensus. In this method, experts answer several rounds of questions on the subject matter of the meeting, moderated by a facilitator [20]. After each round, the facilitator showed a summary of the opinions and why they were expressed, encouraging the experts to revise their judgements in the next round, converging to a “correct” answer after several rounds.

For statistical analysis, the normality of the online survey data obtained was assessed using the Shapiro-Wilk test, and non-parametric variables were compared using the Mann-Whitney U test for groups with two categories and the Kruskal-Wallis H test for groups with three or more categories. Statistical significance was set at $p < 0.05$. To better evaluate the score calibration data between different groups in the online survey, we used the Principal Component Analysis (PCA) statistical technique, which is used to simplify complex datasets by reducing their dimensionality while retaining most of the original variance. It achieves this by transforming the original variables into a new set of uncorrelated variables, called principal components, which are ordered by the amount of variance captured from the data. This allows us to highlight the differences and similarities within the data. The comparison of the online survey calibration with the original scores was evaluated using the intraclass correlation coefficient (ICC), as well as the comparison between waiting lines originating from the SCQ score and the gold-standard queue. For this study, ICC values above 50% were considered good and above 70% excellent. This study was approved by the ethics committee (approval certificate number: CAAE 60865722.0.0000.0068).

Results

The online survey was answered by 153 participants that met the requirements, with a mean age of 45.3 years (SD = 12.3), including 142 males (93%) and 11 females (7%). Only complete questionnaires were evaluated (n=151). Table 1 shows the participants' characteristics regarding their subspecialty, type of hospital they worked at, and main population assisted. Statistically significant weight assignment differences were observed among the different subspecialty groups for questions 1, 3a, 3b, 3p, 5, 6, 7, and 8 ($p<0.05$, Table 2). Post-hoc analysis of these questions, comparing them in "pairwise" groups, showed that most differences were observed between the group of residents and either endourologists or other subspecialties (Supplementary material). Regarding the type of service in which the respondents worked, statistically significant differences ($p<0.05$) were found in questions 3a, 5, and 7 of the SCQ score (Table 3). The post-hoc analysis in this case showed differences primarily between groups working in public services and those in private services (Supplementary Material).

To assess the spread of these different calibration values and their actual relevance in clinical practice, a Principal Component Analysis of the survey data is shown in Figure 1. This analysis shows that while there are statistically significant differences in calibration between groups, there is a significant overlap of areas and great proximity to the central point of each group, showing that even though differences in weight assignment exist between groups, they are extremely similar. Comparing the calibration of endourologists within the public service and academic settings, similar to our panel of experts, with the SCQ-Score original weights showed a good correlation (ICC 0.503; CI 95% [0.33, 0.74]). Maintaining the initial scoring range of 0 to 18 and calculating the proportionality of the calibration obtained with the Brazilian respondents in relation to the original score, there was a change in the scoring of two items on the SCQ. These changes are shown in Figure 2.

Eight endourology experts who met the inclusion criteria were recruited and attended both the Delphi meetings. In the first meeting, several clinical aspects were considered important by the experts to classify prioritization, such as patients that needed reoperation (mainly for residual stones in complex cases), presence of urinary stents, urinary tract dilation, solitary kidney, and chronic kidney disease. The meeting agreed on a final order of prioritization, which was used as the standard for comparison. In the second meeting, the same experts reorganized the waiting list based solely on the SCQ-Score criteria. All criteria were evaluated by the group, aiming to exclude the possibility of divergence in the classification of each item in the SCQ-Score. This resulted in a second waiting line for the comparison. Both waiting lines created in these meetings are shown in Figure 3, and the waiting

list obtained by the SCQ-Score had an excellent correlation with the gold standard line (ICC 0.740; CI 95% [0.34 – 0.92]).

Discussion

To our knowledge, this is the first external validation of the SCQ-Score outside its original development setting and the first study to compare SCQ-based prioritization with expert endourologists' consensus in Brazil, addressing the recognized lack of external validation for disease-specific prioritization tools in stone surgery. This represents an important step towards improving the management of surgical waiting lists, benefiting both patients and healthcare institutions. Using a validated prioritization tool, it is possible to ensure that timely and appropriate interventions are provided to those who need them most on a large scale [21]. However, several key points warrant further discussion in this regard.

First, caution should be exercised when using the SCQ-Score as the sole criterion for prioritization. While our study demonstrated an excellent correlation between the simulated waiting lists created using the SCQ-Score and endourology experts' opinions, there was a wide confidence interval (0.34 – 0.92), which means that there may be significant variations in the ranking of specific patients between the score and the opinion of experts. Therefore, the score should not be used as the only instrument for evaluating the order of patients—clinical assessment is essential. This does not necessarily constitute a weakness of the tool, since the purpose of using the score is to assist in the queue management of a large number of patients, and not for clinical decision-making [16]. Each patient's specific characteristics and clinical conditions must be carefully considered to make informed decisions and optimize patient outcomes, as much valuable and important clinical information is not directly assessed by the score. It is also important to emphasize that the score of each patient within the criteria is not immutable, and that they must be periodically reevaluated to ensure that there is no worsening of the clinical condition, with a consequent increase in the score and priority in the queue

Notably, the waiting time in line is not a criterion considered in the SCQ-Score. Numerous studies have highlighted the significance of incorporating time as a factor in prioritizing patients [22, 23]. Without considering time, patients deemed less urgent may face extended waiting periods, increasing their risk of disease progression and associated complications, including urinary infections and pain. It is argued that if such complications arise, these patients would move up the priority list, enabling them to receive expedited surgical interventions. Conversely, in the absence of complications, there is a risk that some patients may not receive treatment at all, raising both clinical and ethical issues, especially if the number of patients waiting is high. Recent research has suggested methods for integrating time into the existing prioritization framework, ensuring that it remains a key component of patient care [24].

The weight of the time factor can be tailored to each institution. In our hospital, for example, patients earn an additional point to their score for each year on the waiting list after a consensus requirement of the users. This measure was necessary due to exceedingly high waiting times that could reach more than 5 years for non-severe patients, which was considered unacceptable.

The strengths of our study include conducting the first external validation of the SCQ-Score and being the first to implement a validated prioritization tool for kidney stone surgery in our setting. This represents an important step toward standardizing and optimizing access to elective procedures for patients with urolithiasis. The utilization of such a tool has the potential to benefit many patients as well as hospitals in several ways, such as streamlining the allocation of limited surgical resources, assuring ethical and transparent criteria for waiting list management, and potentially preventing urinary stone complications [25]. By ranking patients according to objective and reproducible clinical criteria, the SCQ-Score may help ensure that those at higher risk of adverse events—such as infection, renal function deterioration, or recurrent emergency department visits—receive earlier intervention. From the institutional perspective, this may translate into reduced unplanned admissions, fewer emergency surgeries, and improved operating room efficiency, ultimately contributing to better overall use of healthcare resources. Also, the implementation of validated criteria such as ours could enable future studies to evaluate its effectiveness in real-world clinical practice, including patient-reported outcomes and satisfaction with waiting list management, clinical endpoints such disease complications, as well as economic indicators such as cost reduction while on the waiting list and downstream savings associated with the avoidance of complications.

One of the limitations of our study is the relatively small number of cases (12 fictional patients) used to compare the waiting lists made by expert opinion and SCQ score. A larger sample size might yield more accurate and statistically better results, but that would limit the assessment and manual ordering of the cases by the experts, a step considered fundamental to developing the standard list. Finally, although the number of urologists who responded to the online survey was sufficient, respondents were predominantly male (96%), which, while reflective of the urology workforce demographics, may limit the generalizability of the calibration from a gender perspective. Moreover, there was no minimum sampling by Brazilian region or state, which may restrict the generalization of our findings to all Brazilian territories or services. Nonetheless, queue problems in lithiasis are characteristic of public services – precisely the group that had the best correlation of SCQ-Score calibration with the original authors in this study. In addition, the PCA graph showed an important correlation between the subgroup of

urologists working in public service with the other subgroups and even with the participants in general.

Conclusions

Our study successfully validated the SCQ-Score for the prioritization of patients awaiting kidney stone surgery in a Brazilian setting. Although the correlation between score-based prioritization and expert opinion was high, caution should be exercised to ensure a comprehensive assessment of individual patients. Further research is needed to evaluate the impact of implementing such prioritization tools on patient outcomes and overall health care efficiency.

References

1. Hodge W, Horsley T, Albiani D, et al (2007) The consequences of waiting for cataract surgery: a systematic review. CMAJ 176:1285–1290. https://doi.org/10.1503/cmaj.060962

2. Traylor J, Koelper N, Kim SW, et al (2021) Impact of Surgical Wait Time to Hysterectomy for Benign Gynecologic Disease. J Minim Invasive Gynecol 28:982–990. https://doi.org/10.1016/j.jmig.2020.08.486

3. Ackerman IN, Bennell KL, Osborne RH (2011) Decline in Health-Related Quality of Life reported by more than half of those waiting for joint replacement surgery: a prospective cohort study. BMC Musculoskelet Disord 12:108. https://doi.org/10.1186/1471-2474-12-108

4. Sorokin I, Mamoulakis C, Miyazawa K, et al (2017) Epidemiology of stone disease across the world. World J Urol 35:1301–1320. https://doi.org/10.1007/s00345-017-2008-6

5. Tomer N, Garden E, Small A, Palese M (2021) Ureteral Stent Encrustation: Epidemiology, Pathophysiology, Management and Current Technology. J Urol 205:68–77. https://doi.org/10.1097/JU.0000000000001343

6. Assad A, Nguyen D-D, Sadri I, Bhojani N (2021) The impact of delaying acute kidney stone surgery on outcomes. Can Urol Assoc J 15:E418–E422. https://doi.org/10.5489/cuaj.6877

7. Danilovic A, Dias LPC, Torricelli FCM, et al (2024) High-risk patients for septic shock after percutaneous nephrolithotomy. Int Braz J Urol 50:561–571. https://doi.org/10.1590/S1677-5538.IBJU.2024.0154

8. Lotan Y (2009) Economics and cost of care of stone disease. Adv Chronic Kidney Dis 16:5–10. https://doi.org/10.1053/j.ackd.2008.10.002

9. Mota PKV, Ferreira DB, Florencio RFD, et al (2024) Are very thin patients at a higher risk of complications when submitted to percutane-ous nephrolithotomy? Int Braz J Urol 50:746–753. https://doi.org/10.1590/S1677-5538.IBJU.2024.0341

10. Kolanukuduru KP, Zaytoun O, Tillu N, et al (2024) Safety and efficacy of vacuum-assisted mini-percutaneous nephrolithotomy for the treatment of renal stone disease: an analysis of stone free status and postoperative infectious complications. Int Braz J Urol 50:737–745. https://doi.org/10.1590/S1677-5538.IBJU.2024.0308

11. Amigoni F, Lega F, Maggioni E (2023) Insights into how universal, tax-funded, single payer health systems manage their waiting lists: A review of the literature. Health Serv Manage Res 9514848231186773. https://doi.org/10.1177/09514848231186773

12. Solans-Domènech M, Adam P, Tebé C, Espallargues M (2013) Developing a universal tool for the prioritization of patients waiting for elective surgery. Health Policy 113:118–126. https://doi.org/10.1016/j.healthpol.2013.07.006

13. Taylor MC, Hadorn DC (2002) Developing priority criteria for general surgery: results from the Western Canada Waiting List Project. Can J Surg 45:351–357

14. Seddigh S, Lethbridge L, Theriault P, et al (2021) Association between surgical wait time and hospital length of stay in primary total knee and hip arthroplasty. Bone Jt Open 2:679–684. https://doi.org/10.1302/2633-1462.28.BJO-2021-0033.R1

15. Rathnayake D, Clarke M, Jayasinghe V (2021) Patient prioritisation methods to shorten waiting times for elective surgery: A systematic review of how to improve access to surgery. PLoS One 16:e0256578. https://doi.org/10.1371/journal.pone.0256578

16. Rathnayake D, Clarke M, Jayasinghe V (2025) Global strategies to reduce elective surgery waiting times for sustainable health outcomes: a systematic review. Hosp Pract (1995) 53:2435802. https://doi.org/10.1080/21548331.2024.2435802

17. Pérez Fentes D, Fernández Baltar C, Núñez Otero J, et al (2021) The SCQ-SCORE: initial validation of a new scoring system for elective stone surgery prioritization in the COVID-19 era. Cent European J Urol 74:81–88. https://doi.org/10.5173/ceju.2021.0339.R1

18. Gentile G, Vicentini FC, Montagna E, et al (2025) First Step to Equity and Organization in Waiting Lines for Stone Surgery. Translation of Prioritization Scores. Int Braz J Urol 51:e20250039. https://doi.org/10.1590/S1677-5538.IBJU.2025.0039

19. Wolf EJ, Harrington KM, Clark SL, Miller MW (2013) Sample Size Requirements for Structural Equation Models: An Evaluation of Power, Bias, and Solution Propriety. Educ Psychol Meas 76:913–934. https://doi.org/10.1177/0013164413495237

20. McPherson S, Reese C, Wendler MC (2018) Methodology Update: Delphi Studies. Nurs Res 67:404–410. https://doi.org/10.1097/NNR.0000000000000297

21. Pazin-Filho A, do Valle Dallora MEL, Velasco TR, et al (2024) Surgical waiting lists and queue management in a Brazilian tertiary public hospital. BMC Health Serv Res 24:290. https://doi.org/10.1186/s12913-024-10735-4

22. Rana HS, Umer M, Hassan U, Asgher U (2022) A novel multi-criteria decision-making approach for prioritization of elective surgeries through formulation of “weighted MeNTS scoring system.” Heliyon 8:e10339. https://doi.org/10.1016/j.heliyon.2022.e10339

23. Harry LE, Nolan JF, Elender F, Lewis JC (2000) Who gets priority? Waiting list assessment using a scoring system. Ann R Coll Surg Engl 82:186–188

24. Powers J, McGree JM, Grieve D, et al (2023) Managing surgical waiting lists through dynamic priority scoring. Health Care Manag Sci 26:533–557. https://doi.org/10.1007/s10729-023-09648-1

25. Wennberg EAB, Takata JL, Urbach DR (2020) Elective surgery wait time reduction in Canada: A synthesis of provincial initiatives. Healthc Manage Forum 33:111–119. https://doi.org/10.1177/0840470419900646

Tables and Legends

Table 1 - Descriptive Analysis of Responders for the Online Survey (*n = 151*)

Variable	Description	n = 151	%
Sex	Male	142	96
	Female	9	4
Type of Service	Public + Academic	67	44
	Public + Non-academic	14	9
	Private + Academic	11	7
	Private + Non-academic	59	39
Urologist Group	Endourology	53	35
	Other subspecialties	75	50
	Residents	23	15

Owing to incomplete responses, two respondents were excluded from the calibration analysis for the SCQ score (1. Female/Public-Academic/Resident; 2. Female/Non-Academic Audience/Others).

Table 2: Calibration of the SCQ according to Subspecialty

	Endourology (n=53)		Others (n=75)		Resident (n=23)		
SCQ item	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**p**
scq1	9.02±1.45	10.0 [8.0-10.0]	9.45±1.26	10.0 [10.0-10.0]	8.61±2.31	10.0 [8.0-10.0]	**0.018**
scq2	8.81±1.37	9.0 [8.0-10.0]	8.69±1.47	9.0 [8.0-10.0]	8.61±0.99	9.0 [8.0-9.0]	0.460
scq3a	4.04±3.52	3.0 [0.0-7.0]	4.4±3.28	4.0 [1.5-7.0]	2.17±2.87	1.0 [0.0-3.0]	**0.015**
scq3b	5.7±2.13	6.0 [5.0-7.0]	5.39±2.39	5.0 [4.0-7.0]	4.09±1.9	3.0 [3.0-5.0]	**0.005**
scq3c	7.7±1.53	8.0 [7.0-9.0]	7.09±2.57	8.0 [6.0-9.0]	6.65±1.75	7.0 [5.0-8.0]	0.092
scq3d	9.23±1.09	10.0 [9.0-10.0]	8.51±2.37	10.0 [8.0-10.0]	8.74±1.32	9.0 [8.0-10.0]	0.256
scq3p	6.66±1.44	6.8 [5.5-7.8]	6.35±1.68	6.2 [5.0-7.8]	5.41±1.53	5.2 [4.5-6.2]	**0.007**
scq4	6.87±1.85	7.0 [6.0-8.0]	6.91±2.17	7.0 [5.0-9.0]	6.74±1.71	7.0 [5.0-8.0]	0.829
scq5	7.02±1.53	7.0 [6.0-8.0]	6.97±1.98	7.0 [5.0-8.0]	5.43±2.29	5.0 [4.0-7.5]	**0.011**
scq6	7.23±2.45	8.0 [7.0-9.0]	7.29±2.08	7.0 [6.0-9.0]	6.22±2.49	6.0 [4.5-8.0]	0.114
scq7	8.96±1.4	10.0 [8.0-10.0]	9.24±1.62	10.0 [9.0-10.0]	8.09±2.41	8.0 [7.5-10.0]	**0.006**
scq8	7.66±1.52	8.0 [7.0-9.0]	7.4±2.27	8.0 [5.0-10.0]	5.43±2.19	5.0 [4.0-7.0]	**0.000**
scq9	7.72±2.32	8.0 [6.0-10.0]	6.91±2.34	7.0 [5.0-8.0]	6.26±2.82	6.0 [4.0-9.0]	**0.035**
total	89.94±11.55	92.0 [84.0-98.0]	88.25±13.46	88.0 [79.0-99.0]	77.04±13.9	73.0 [66.5-85.5]	**0.000**

Summary of the values assigned (0–10) for each item of the SCQ in its translated version according to the respondents' subspecialty. Mean values with standard deviation and median with interquartile range. P values lower than 0.05 indicated a statistically significant difference between the values attributed to the different groups. Question 3 was analyzed in each of its alternatives (a, b, c, d) and in its entirety (p)

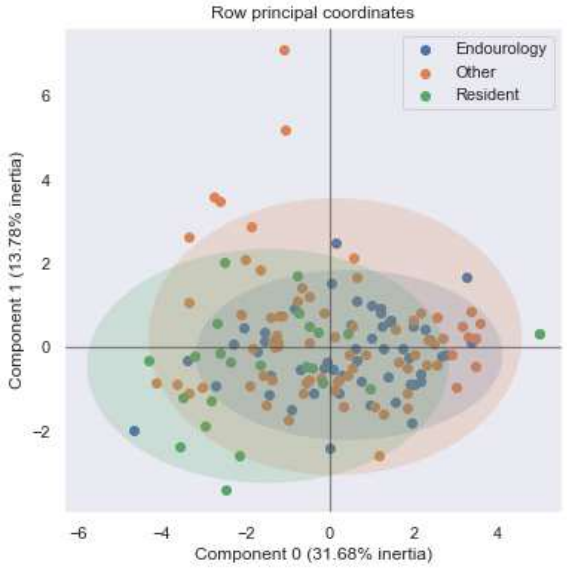
Table 3: Calibration of the SCQ According to Type of Service

	Private Academic (n=11)		Private Non-academic (n=59)		Public Academic (n=67)		Public Non-Academic (n=14)		
SCQ Item	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**p**
scq1	9.45±0.93	10.0 [9.0-10.0]	9.32±1.41	10.0 [9.5-10.0]	8.99±1.74	10.0 [8.5-10.0]	9.21±1.53	10.0 [9.25-10.0]	0.388
scq2	9.09±0.94	9.0 [8.0-10.0]	8.69±1.38	9.0 [8.0-10.0]	8.79±1.26	9.0 [8.0-10.0]	8.21±1.97	9.0 [7.25-9.75]	0.722
scq3a	4.64±3.26	4.0 [2.5-7.0]	4.86±3.1	5.0 [2.0-7.0]	2.94±3.4	2.0 [0.0-5.0]	4.21±3.51	5.0 [1.0-6.0]	**0.004**
scq3b	5.55±2.91	4.0 [3.0-8.0]	5.58±2.21	6.0 [4.0-7.0]	5.06±2.26	5.0 [3.0-6.0]	5.07±2.27	5.0 [5.0-6.0]	0.512
scq3c	7.0±2.05	6.0 [5.5-8.5]	7.41±2.24	8.0 [6.5-9.0]	7.04±2.07	7.0 [6.0-8.5]	7.64±2.41	8.0 [7.0-10.0]	0.393
scq3d	9.0±1.1	9.0 [8.0-10.0]	8.75±2.06	10.0 [8.0-10.0]	8.76±1.93	10.0 [8.0-10.0]	9.0±1.47	10.0 [8.0-10.0]	0.980
scq3p	6.55±1.8	6.2 [5.1-7.5]	6.65±1.53	6.8 [5.35-7.9]	5.95±1.65	5.8 [4.9-7.0]	6.49±1.46	6.35 [5.9-6.88]	0.101
scq4	7.27±1.79	7.0 [6.0-8.5]	6.75±1.77	7.0 [5.5-8.0]	6.99±2.02	7.0 [5.0-8.0]	6.5±2.82	5.5 [5.0-8.75]	0.844
scq5	7.09±1.92	7.0 [6.0-8.0]	7.34±1.38	7.0 [7.0-8.0]	6.25±2.22	7.0 [5.0-8.0]	6.43±2.14	6.0 [5.0-8.0]	**0.024**
scq6	8.36±1.8	8.0 [8.0-10.0]	7.1±2.04	7.0 [6.0-8.0]	7.07±2.38	8.0 [6.0-9.0]	6.29±2.97	7.0 [5.0-8.0]	0.143
scq7	9.18±1.25	10.0 [9.0-10.0]	9.42±1.1	10.0 [9.0-10.0]	8.39±2.17	9.0 [8.0-10.0]	9.64±0.84	10.0 [10.0-10.0]	**0.002**
scq8	7.64±2.01	8.0 [6.0-9.5]	7.31±1.91	8.0 [6.0-9.0]	6.93±2.33	7.0 [5.0-9.0]	7.64±2.37	8.0 [5.5-10.0]	0.611
scq9	7.45±1.97	7.0 [6.0-9.0]	6.93±2.7	8.0 [5.0-9.0]	7.31±2.3	8.0 [6.0-10.0]	6.43±2.41	6.0 [4.25-8.0]	0.598
total	91.73±15.9	89.0 [81.5-103.5]	89.46±12.27	92.0 [79.0-98.0]	84.52±13.81	86.0 [76.5-92.0]	86.29±14.1	88.5 [78.25-97.0]	0.169

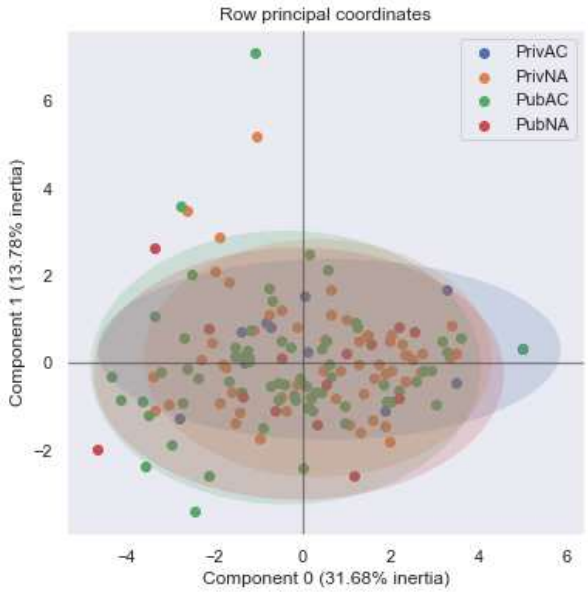
Summary of the values assigned (0–10) for each item of the SCQ in its translated version according to the type of service of the responders. Mean values with standard deviation and median with interquartile range. P values lower than 0.05 indicated a statistically significant difference between the values attributed to the different groups. Question 3 was analyzed in each of its alternatives (a, b, c, d) and in its entirety (p)

Figure 1 - *Principal Component Analysis SCQ score*

PCA 1. Participants were separated by subspecialty.



PCA 2. Participants were separated by the type of service in which they worked.



Principal Component Analysis: The dots on the graph show the calibration performed by each individual within a subgroup, and the shaded area summarizes the calibration results for each subgroup. The overlap of the different subgroups is remarkable, both by specialization and service type. In addition, the central points of each shadow area (equivalent to the final opinion of each group) converged on the same point. There was a good correlation between the public academic urologists (green dots) calibration with that of SCQ original authors (ICC 0.503; CI 95% [0.33, 0.74]).

Figure 2: Translated and Original Versions of the SCQ-Score

Translated SCQ-Score	Original SCQ-Score	Original Weight	Brazilian Validated Weight
Infecção alta no momento da inclusão ou enquanto está na lista de espera	Infection at inclusion or while on waiting list	NO = 0 YES = 3	NO = 0 YES = 3
Obstrução do trato urinário superior enquanto está na lista de espera	UUT obstruction while on waiting list	NO = 0 YES = 3	NO = 0 YES = 3
Tempo de implante de cateter para derivação urinária (Duplo J / Nefrostomia Percutânea) A: sem catéter B: 0-3 meses C: 3-6 meses D: > 6 meses	Urinary diversion indwelling time (DJ/PCN) A: No stent B: 0-3 months C: 3-6 months D: > 6 months	A = 0 B = 1 C = 2 D = 3	A = 0 B = 1 C = 2 D = 3
Internações hospitalares relacionadas ao caso de litíase, enquanto está na lista de espera	**Admissions stone-case related while on waiting list**	**NO = 0 YES = 3**	**NO = 0 YES = 2**
Sintomas no momento da inclusão ou enquanto está na lista de espera	Symptoms at inclusion or while on waiting list	NO = 0 YES = 2	NO = 0 YES = 2
Localização ureteral da litíase	Ureteral location of the stone	NO = 0 YES = 1	NO = 0 YES = 1
Rim único ou subótimo (FRD < 35%)	**Solitary or suboptimal kidney (DRF <35%)**	**NO = 0 YES = 1**	**NO = 0 YES = 2**
Insuficiência renal crônica (RFG < 60 mL/min)	Chronic kidney disease (eGFR < 60 ml/min)	NO = 0 YES = 1	NO = 0 YES = 1
Portador de nefrostomia percutânea	Percutaneous nephrostomy	NO = 0 YES = 1	NO = 0 YES = 1
TOTAL SCORE		0 -18	0 -18

The SCQ-Score is shown in both its original format and in the Brazilian Portuguese translation and culturally adapted version. Criterion weights are shown as assigned by the original authors and after Brazilian validation, which changed the weight of two items (highlighted) . UUT: upper urinary tract obstruction, DJ: double-J, PCN: percutaneous nephrostomy, DRF: differential renal function, eGFR: estimated glomerular filtration rate

Figure 3 – Waiting lines created by endourologists' consensus and SCQ-Score in Brazilian Portuguese version.

FINAL ORDER	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
CONSENSUS	H	G	E	I	K	C	F	L	D	J	B	A
SCQ-Score (BR)	F	I	E	K	H	G	C	J	L	D	B	A

Brief Patient Descriptions			
A	Asymptomatic kidney stone	**G**	Symptomatic and obstructive staghorn stone with nephrostomy
B	Recurrent UTI staghorn stone	**H**	Recent PCNL with nephrostomy and need to reintervention
C	Symptomatic and obstructive pelvic stone	**I**	Symptomatic calcified double J stent
D	Minor symptomatic pelvic stone with recent double J stent	**J**	Obstructive staghorn stone
E	Symptomatic and obstructive kidney stones in solitary kidney	**K**	Kidney stones with kidney impairment and 1 month double J stent
F	Symptomatic bilateral staghorn stone with CKD	**L**	Ureteral stone with recent double J stent

Comparison between the queue generated by the opinion of the endourologists and the queue generated by the SCQ-Score in the Brazilian version after the Delphi meetings, ICC 0.740 (95% CI - 0.34, 0.92). Full clinical cases are available in Supplementary Material. UTI - urinary tract infections ; PCNL - percutaneous nephrolithotomy, CKD - chronic kidney disease.

Supplementary Material

Fictional Clinical Cases

A	Female, 77 years old Asymptomatic patient, with the finding of a 6cm staghorn stone in the left kidney. No pain. No emergency room visits. Performs household tasks and helps care for her grandchildren. CT scan shows kidney with good parenchyma (18mm) and slight dilation. ASA III, Creatinine 0.9 (creatinine clearance 66). Negative urine culture.
B	Female, 40 years old Cystitis (2 to 3 per year) and occasional bilateral lower back pain for a year, uses dipyrone with improvement. Reports finding of kidney stone on routine ultrasound. No emergency room visits but is very worried about her health as she has two young children. CT - left kidney with incomplete 4 cm staghorn stone, good parenchyma (18mm), and slight dilation. Right kidney normal. ASA I, Creatinine 1.0 (creatinine clearance 73). Urine culture with E. coli > 100,000 CFU and resistance to oral medications.
C	Male, 35 years old Right kidney pain for 3 months. Weekly visits to the ER, with worsening in the last two weeks. Using daily home analgesia with severe pain. Unable to work, cries from pain during consultation. Very worried, fears losing his job as he is the family's sole provider. CT with 2.5 cm obstructive right pelviureteric stone, with moderate hydronephrosis, delayed contrast excretion, and significant peri-pelvic inflammation. ASA I, Creatinine 1.4 (creatinine clearance 67). Negative urine culture.
D	Male, 35 years old With right kidney pain for 3 months. Weekly ER visits, with worsening in the last two weeks. During last ER visit 7 days ago, underwent right double J stent placement for colic. Now the pain is controlled, only feels mild discomfort when voiding and hematuria when playing soccer. Using sporadic home analgesia. Has been able to work. Worried as he has a double J and was told it could calcify soon. CT with 3 cm right pelviureteric stone, mild hydronephrosis, and well-placed double J. ASA I, Creatinine 1.4 (creatinine clearance 67). Negative urine culture.
E	Male, 20 years old History of cystine kidney stones since childhood, previously underwent right nephrectomy for renal exclusion due to pyonephrosis, now with intermittent and moderate left lower back pain for 3 months. Takes analgesics with good control but misses college classes 1 to 2 times a week due to pain. The family was very concerned about the possibility of him losing this kidney and becoming dialytic. CT with single left kidney, multiple calyx stones up to 1 cm and a 2 cm pelviureteric stone, parenchyma with areas of retraction, moderate dilation ASA II, Creatinine 2.0 (creatinine clearance 48). Negative urine culture.
F	Female, 56 years old History of recurrent kidney stones for 15 years, with bilateral lower back pain for 1 year and recurrent UTIs. Monthly emergency room visits due to severe pain and infection. Previously underwent bilateral percutaneous nephrolithotomy, having residual stones. Patient depressed as she sees no solution for her case, does not leave the house anymore. CT with incomplete bilateral staghorn stone, parenchyma with areas of retraction and moderate dilation to the left. ASA III, BMI 48, AMI 12 months ago, on clopidogrel, chronic hearth failure with ejection fraction of 50%. Creatinine 2.0 (creatinine clearance 29) and Urine culture with Carbapenem-resistant Escherichia coli.
G	Female, 56 years old History of recurrent kidney stones for 15 years, with bilateral lower back pain for 1 year and recurrent lower UTIs. Had an episode of obstructive pyelonephritis on the left 15 days ago, underwent percutaneous nephrostomy and antibiotic therapy. Patient with mild and constant pain at the nephrostomy site, unable to work, as she is a cook.

	CT with incomplete bilateral staghorn stone, parenchyma with areas of retraction and well-placed left nephrostomy. ASA II, BMI 42. Creatinine 1.6 (creatinine clearance 38). Negative urine culture.
H	Female, 56 years old. Patient with complete left staghorn stone, underwent PCNL 1 week ago, surgery interrupted by bleeding, currently with nephrostomy. 60% of the calculus mass was treated and new surgery is needed. Has moderate pain at the nephrostomy site and is unable to work. ASA II, BMI 35. Creat 1.2 (creatinine clearance 53), hemoglobin 12, and negative urine culture.
I	Female, 70 years old History of recurrent UTI for 5 years. Had a severe case of pyelonephritis 9 months ago, requiring ICU. CT at the time showed an incomplete 4cm left staghorn stones, obstructive, with signs of acute pyelonephritis. Underwent left double J stent placement and antibiotic therapy, with improvement. Returns now, with mild and occasional lower back pain, uses dipyrone with improvement, and mild but daily hematuria and dysuria. Stroke 5 years ago, partial hemiplegia, moves with difficulty, requires a caregiver at home for regular activities. Family very concerned about the situation, saying the double J was forgotten in the patient and now her condition is worse, and that the hospital should be held responsible. Current CT shows left kidney with the same renal stone, but with a 5 cm double J calcified in the bladder and the kidney, near the stone. ASA III. Creatinine 0.9 (creatinine clearance 69) and urine culture with multi-sensitive Proteus and Candida.
J	Female, 35 years old History of recurrent UTI since childhood. History of myelomeningocele and neurogenic bladder, performs clean intermittent catheterization every 4 hours. Moves with a wheelchair, works, and has one child. No pain and no need for emergency services, but requires frequent consultations that disrupt her daily life. Concerned about the possibility of losing her kidney. CT shows right kidney with complete staghorn stone, moderate hydronephrosis, signs of parenchymal and cortical retraction of 10mm, DMSA of this kidney at 25%. Left kidney without calculi, with good parenchyma. ASA II. Creat 1.1 (creatinine clearance 67) and negative urine culture.
K	Male, 18 years old Right double J placed 1 month ago due to refractory renal colic from a 1cm proximal ureteral stone. History of kidney stones for 2 years, previously underwent 2 shock wave lithotripsies and 1 percutaneous nephrolithotomy. No UTIs. Previous stone analysis confirmed Cystine. Constant and severe pain due to double J, missing classes, and may fail the year in college due to pain absences. Ultrasound with mild right hydronephrosis and multiple calculi up to 2 cm. DMSA right kidney 30% ASA II, BMI 16. Creat 1.8 (creatinine clearance 41), Hb 12, negative urine culture.
L	Male, 46 years old Bilateral renal colic for 30 days, with recurrent hospitalizations due to pain and general condition decline. Double J passed 1 week ago due to acute post-renal renal failure. Constant moderate intensity pain by the catheter, missed work once due to discomfort. CT with bilateral ureteral calculi (7 and 9mm) and well-placed bilateral double J. Right pelviureteric stone of 3 cm. ASA I. Cr 1.1 (creatinine clearance 63). Negative urine culture.

Waiting list with 12 fictional clinical cases, created and evaluated by the authors (FCV and GG). These cases contain data on symptoms, laboratory and imaging test results, patient demographics, comorbidities, and other important information to determine each case's priority and assign an SCQ score.

Post-hoc analysis of the Calibration of the SCQ According to Subspecialty

	Endourology (n=53)		Other (n=75)		Resident (n=23)		
SCQ Item	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**p-unc**
scq1	9.02±1.45	10.0 [8.0-10.0]	9.45±1.26	10.0 [10.0-10.0]	-	-	**0.0149**
scq1	-	-	9.45±1.26	10.0 [10.0-10.0]	8.61±2.31	10.0 [8.0-10.0]	**0.0192**
scq3a	4.04±3.52	3.0 [0.0-7.0]	-	-	2.17±2.87	1.0 [0.0-3.0]	**0.0421**
scq3a	-	-	4.4±3.28	4.0 [1.5-7.0]	2.17±2.87	1.0 [0.0-3.0]	**0.0025**
scq3b	5.7±2.13	6.0 [5.0-7.0]	-	-	4.09±1.9	3.0 [3.0-5.0]	**0.0011**
scq3b			5.39±2.39	5.0 [4.0-7.0]	4.09±1.9	3.0 [3.0-5.0]	**0.0127**
scq3p	6.66±1.44	6.8 [5.5-7.8]	-	-	5.41±1.53	5.2 [4.5-6.2]	**0.0011**
scq3p	-	-	6.35±1.68	6.2 [5.0-7.8]	5.41±1.53	5.2 [4.5-6.2]	**0.0175**
scq5	7.02±1.53	7.0 [6.0-8.0]	-	-	5.43±2.29	5.0 [4.0-7.5]	**0.0047**
scq5	-	-	6.97±1.98	7.0 [5.0-8.0]	5.43±2.29	5.0 [4.0-7.5]	**0.006**
scq7	-	-	9.24±1.62	10.0 [9.0-10.0]	8.09±2.41	8.0 [7.5-10.0]	**0.0018**
scq8	7.66±1.52	8.0 [7.0-9.0]	-	-	5.43±2.19	5.0 [4.0-7.0]	**0.0000**
scq8	-	-	7.4±2.27	8.0 [5.0-10.0]	5.43±2.19	5.0 [4.0-7.0]	**0.0006**
scq9	7.72±2.32	8.0 [6.0-10.0]	6.91±2.34	7.0 [5.0-8.0]	-	-	**0.0381**
scq9	7.72±2.32	8.0 [6.0-10.0]	-	-	6.26±2.82	6.0 [4.0-9.0]	**0.0318**

Post-hoc *analysis* comparing "two-by-two" by subspecialty groups. This only shows SCQ items in which there was a statistically significant difference in calibration. Question 3 was analyzed in each of its alternatives (a, b, c, d) and in its entirety (p)

Post-hoc *analysis* of the Calibration of the SCQ According to Service Type

	Private Academic (n=11)		Private Non-academic (n=59)		Public Academic (n=67)		Public Non-Academic (n=14)		
SCQ Item	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**p**
scq3a	-	-	4.86±3.1	5.0 [2.0-7.0]	2.94±3.4	2.0 [0.0-5.0]	-	-	**0.0003**
scq5	-	-	7.34±1.38	7.0 [7.0-8.0]	6.25±2.22	7.0 [5.0-8.0]	-	-	**0.0033**
scq7	-	-	9.42±1.1	10.0 [9.0-10.0]	8.39±2.17	9.0 [8.0-10.0]	-	-	**0.0008**
scq7	-	-	-	-	8.39±2.17	9.0 [8.0-10.0]	9.64±0.84	10.0 [10.0-10.0]	**0.0149**

Post-hoc *analysis* comparing "two-by-two" by service type groups. This only shows SCQ items in which there was a statistically significant difference in calibration. Question 3 was analyzed in each of its alternatives (a, b, c, d) and in its entirety (p)