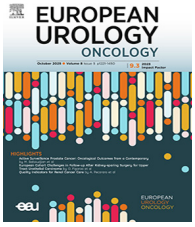
available at www.sciencedirect.com
journal homepage: euoncology.europeanurology.com



European Association of Urology

Original Article

Challenges in Follow-up After Kidney-sparing Surgery for Upper Tract Urothelial Carcinoma: Insights from a Delphi Consensus

Orlane Figaroa [a,b,c,†,*], *Hugo Schuil* [a,b,†], *Guido Kamphuis* [a,b], *Luna van den Brink* [a,b], *Nora Hendriks* [a,b], *Michaël Henderickx* [a,b], *Adriaan Bins* [b,c], *Jeroen van Moorselaar* [b,d], *Leye Ajayi* [e], *Mieke Bus* [f], *Vitor Cavadas* [g], *Cecilia Maria Cracco* [h], *David D Andrea* [i], *Ranan Dasgupta* [j], *Vincent De Coninck* [k], *Otas Durutovic* [l], *Ida Ebbensgaard* [m], *Stefania Ferretti* [n], *Andrea Gallioli* [o], *Etienne Xavier Keller* [p], *Francis Xavier Keeley Jr* [q], *Palle Jörn Sloth Osther* [r], *Marcin Popiolek* [s], *Benjamin Pradere* [t], *Silvia Proietti* [u], *Iliya Saltirov* [v], *Bhaskar Somani* [w], *Thomas Tailly* [x], *Kay Thomas* [y], *Ben Turney* [z], *Øyvind Ulvik* [aa], *Carl Van Haute* [bb], *Bart van der Heij* [cc], *Juan Luis Vasquez* [dd,ee], *Marianne Brehmer* [ff,gg], *Joyce Baard* [a,b]

[a] *Department of Urology, Amsterdam UMC, University of Amsterdam, Amsterdam, The Netherlands;* [b] *Cancer Center Amsterdam, Amsterdam UMC, Amsterdam, The Netherlands;* [c] *Department of Medical Oncology, Amsterdam UMC, Amsterdam, The Netherlands;* [d] *Department of Urology, Amsterdam UMC, Vrije Universiteit, Amsterdam, The Netherlands;* [e] *Department of Urology, Royal Free Hospital, London, UK;* [f] *Department of Urology, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands;* [g] *Department of Urology, Unidade Local de Saúde de Santo António, Centro Hospitalar Universitário Do Porto, Porto, Portugal;* [h] *Department of Urology, Cottolengo Hospital, Torino, Italy;* [i] *Department of Urology, Comprehensive Cancer Center Medical University Vienna, Vienna General Hospital, Vienna, Austria;* [j] *Department of Urology, Imperial College Healthcare NHS Trust, London, UK;* [k] *Department of Urology, AZ Klina, Brasschaat, Belgium;* [l] *Department of Urology, University of Belgrade, Belgrade, Serbia;* [m] *Department of Urology, Herlev Hospital, Copenhagen, Denmark;* [n] *Department of Urology, Hospital and University of Modena and Reggio Emilia, Modena, Italy;* [o] *Department of Urology, Fundació Puigvert, Universitat Autonoma de Barcelona, Barcelona, Spain;* [p] *Department of Urology, University Hospital Zurich, University of Zurich, Zurich, Switzerland;* [q] *Bristol Urological Institute, North Bristol NHS Trust, Bristol, UK;* [r] *Department of Urology, Lillebaelt Hospital, University Hospital of Southern Denmark, Odense, Denmark;* [s] *Department of Urology, Faculty of Medicine and Health, Örebro University, Örebro, Sweden;* [t] *Department of Urology, UROSUD, La Croix du Sud Hôpital, Quint Fonsegrives, France;* [u] *Department of Urology, IRCCS San Raffaele Hospital, Ville Turro Division, Milan, Italy;* [v] *Department of Urology and Nephrology, Military Medical Academy, Sofia, Bulgaria;* [w] *Department of Urology, University Hospital, Southampton, UK;* [x] *Department of Urology, Ghent University Hospital, Ghent, Belgium;* [y] *Department of Urology, Guy's and St Thomas' Hospital, London, UK;* [z] *Department of Urology, Oxford University Hospitals NHS Foundation Trust, Oxford, UK;* [aa] *Department of Urology, Haukeland University Hospital, Bergen, Norway;* [bb] *Department of Urology, Katholieke Universiteit Leuven, University Hospitals Leuven, Louvain, Belgium;* [cc] *Department of Urology, Zuyderland Medical Center, Heerlen, The Netherlands;* [dd] *Department of Urology, Copenhagen University Hospital - Zealand University Hospital Roskilde, Roskilde, Denmark;* [ee] *Department of Clinical Medicine, University of Copenhagen, Copenhagen, Denmark;* [ff] *Department of Urology, Södersjukhuset, Stockholm, Sweden;* [gg] *Department of Clinical Science and Education, Karolinska Institute, Stockholm, Sweden*

Article info

Article history:
Received 30 March 2025
Received in Revised form
10 June 2025
Accepted 15 July 2025
Available online 15 August 2025

Abstract

Background and objective: Kidney-sparing surgery (KSS) is the preferred treatment for patients with low-risk upper tract urothelial carcinoma (UTUC), offering a balance between oncologic efficacy and renal preservation. However, follow-up protocols are lacking due to insufficient evidence, resulting in clinical variability. In response, a Delphi consensus process has been initiated with the aim to refine and establish unified surveillance recommendations following KSS for low-risk UTUC.

† Both these authors contributed equally to this work and share first authorship.
* Corresponding author. Amsterdam UMC, University of Amsterdam, Amsterdam, The Netherlands. Tel. +31 653855745.
E-mail address: o.j.figarora@amsterdamumc.nl (O. Figaroa).

https://doi.org/10.1016/j.euo.2025.07.003
2588-9311/© 2025 The Authors. Published by Elsevier B.V. on behalf of European Association of Urology. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

Associate Editor:
Jeremy Teoh

Keywords:
Delphi consensus
Follow-up
Kidney-sparing surgery
Upper tract urothelial carcinoma
Ureteroscopy

Methods: A multistage Delphi consensus project was conducted by an expert panel, which completed four rounds of questionnaires using both open-ended and Likert scale–based questions, with the goal of achieving consensus on four key topics.

Key findings and limitations: In total, 28 invited experts participated in the Delphi panel, achieving consensus on the primary goals of UTUC follow-up, including tumour recurrence detection, renal function preservation, and maintaining quality of life. While consensus was reached on key diagnostic modalities (kidney function, computed tomography urography, cystoscopy, and ureteroscopy) and follow-up adjustments based on treatment indications, the precise schedules and long-term follow-up duration remained unresolved.

Conclusions and clinical implications: This Delphi project underscores the challenges of standardising follow-up protocols after KSS for UTUC. A balanced approach is needed to ensure early recurrence detection while preserving renal function and quality of life. Robust data on prognostic factors are essential to better identify patients at risk of recurrence and to refine surveillance strategies. Collaborative research remains essential for developing evidence-based follow-up protocols for this rare disease.

© 2025 The Authors. Published by Elsevier B.V. on behalf of European Association of Urology. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

ADVANCING PRACTICE

What does this study add?
In this study, the expert opinion gives valuable insights regarding the expert opinion on follow-up after kidney-sparing surgery in patients with upper tract urothelial carcinoma. Experts agree on the indication, goals, and diagnostic methods for follow-up. However, more collaborative research on the prognostic factors is necessary to help create a standardised follow-up schedule.

Clinical Relevance
Kidney-sparing surgery (KSS) has been increasingly utilised in the management of low-risk upper tract urothelial carcinoma (UTUC), yet high-quality evidence on the follow-up protocol after KSS is lacking. This multi-stage Delphi consensus paper is an important effort trying to standardise the follow-up protocol after KSS for UTUC. Risk stratification is extremely important to refine surveillance strategies, so we can ensure a safe oncological follow-up while avoiding excessive and potentially invasive investigations. More prospective data will be needed to validate the results. Associate Editor: Jeremy Teoh.

Patient Summary
In this study, the expert opinion gives insight regarding the goals, indication, and diagnostic modalities for follow-up in patients after kidney-sparing surgery for upper tract urothelial carcinoma. Future research is needed for a standardised schedule.

1. Introduction

For low-risk upper tract urothelial carcinoma (UTUC), kidney-sparing surgery (KSS) is the preferred treatment option. In selected high-risk cases, KSS can be offered, namely, on imperative indication or in those with only "weak" high-risk criteria (tumour size >2 cm, hydronephrosis, and multifocality) [1]. The optimal postoperative surveillance strategy remains undefined. According to the 2024 European Association of Urology (EAU) guidelines, follow-up for low-risk disease includes ureteroscopy (URS) within 3 mo, cystoscopy and computed tomography (CT) urography at 3 and 6 mo, and then annually for 5 yr [1].

Two recent literature reviews highlighted variations in clinical practice and discrepancies between guidelines and real-world approaches, particularly regarding cytology and URS in follow-up [2,3].

In 2022, a Stockholm consultation of UTUC experts summarised current opinions, resulting in the following statement: "Regular and long-term follow-up, including URS if organ-sparing treatment has been conducted, is essential for managing recurrences, intravesical recurrences, metastases, and tumour progression" [4].

This meeting underscored the need to refine and standardise post-KSS surveillance. In response, the current Delphi consensus project was initiated to systematically gather expert opinion. The primary aim of this study is to achieve consensus on follow-up goals and specifications, in order to move towards a more widely accepted surveillance strategy.

2. Materials and methods

A multistage consensus approach based on the Delphi technique was used to provide a systematic method for gaining consensus from a group of experts in the field of KSS in patients with UTUC [5,6]. A steering committee was formed, comprising members from the local investigation team of initiators (J.B., O.F., H.S., G.K., M.H., and N.H.), an international expert organiser of the UTUC consensus meetings (M.B.), a clinical epidemiologist (J.B.), and a native English-speaking member (L.B.) to ensure questionnaire clarity. No statistician was included.

2.1. Stage 1: identifying current literature

A scoping review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines to evaluate all relevant literature on follow-up after KSS in patients with UTUC. Specifics about the evidence acquisition are described in length in our previous paper [3].

2.2. Stage 2: predefining primary consensus topics and selecting experts

Stage 2 involved predefining the primary consensus topics and selecting experts. The outcomes of the scoping review were used to identify the four key topics for the Delphi consensus. These topics were as follows: (1) the goals of follow-up, (2) the definitions of different indications for KSS, (3) the types of diagnostic modalities that should be performed minimally during follow-up, and (4) the minimal length of follow-up and the minimal frequency of the different diagnostic assessments.

Experts included in the panel are European urologists with demonstrated expertise in KSS UTUC treatment, verified through scientific output (peer-reviewed publications). The steering committee invited 35 experts to participate in the expert panel, of whom 28 participated.

2.3. Stage 3: performing the Delphi consensus project

The project was divided into multiple rounds to eventually gain consensus on our predefined topics. A first round with open-ended questions allowed panel members to state their ideas and opinions on the primary consensus topics. Responses from round 1 were analysed and reviewed by two investigators (O.F. and H.S.) independently, and all given answers were used to create structured quantitative items for the second round. This means that no answers from the first round were retained for further exploration in round 2. These questions were answered on a 9-point Likert scale. Unbeknownst to experts, a score of 1–3 was considered to indicate low agreement, 4–6 intermediate agreement, and 7–9 high agreement. The cut-off for consensus was set at 80% high agreement [7,8]. Experts were provided with feedback on the answers provided in the previous rounds in percentages of high agreement per topic. Questions that did not reach 80% high agreement were reformulated using the commentary provided by the participants. During each round of questionnaires, the expert panel was encouraged to provide the study team with feedback by using the open question field at the end of the questionnaire. In case of nonconsensus items, an extra round was added specifically aimed at re-evaluating these statements. In this extra round, the nonconsensus items alongside anonymised summary feedback from the previous round were presented, allowing the participants to reconsider their positions in light of the group's responses.

Data were collected and stored securely using Castor EDC (Castor, Amsterdam, The Netherlands) and Google Forms (Google LLC, Mountain View, CA, USA).

Fig. 1 outlines the systematic conduction of the Delphi survey.

3. Results

Of the 35 experts invited, 28 (80%) agreed to participate in the Delphi panel. The characteristics of the panel members

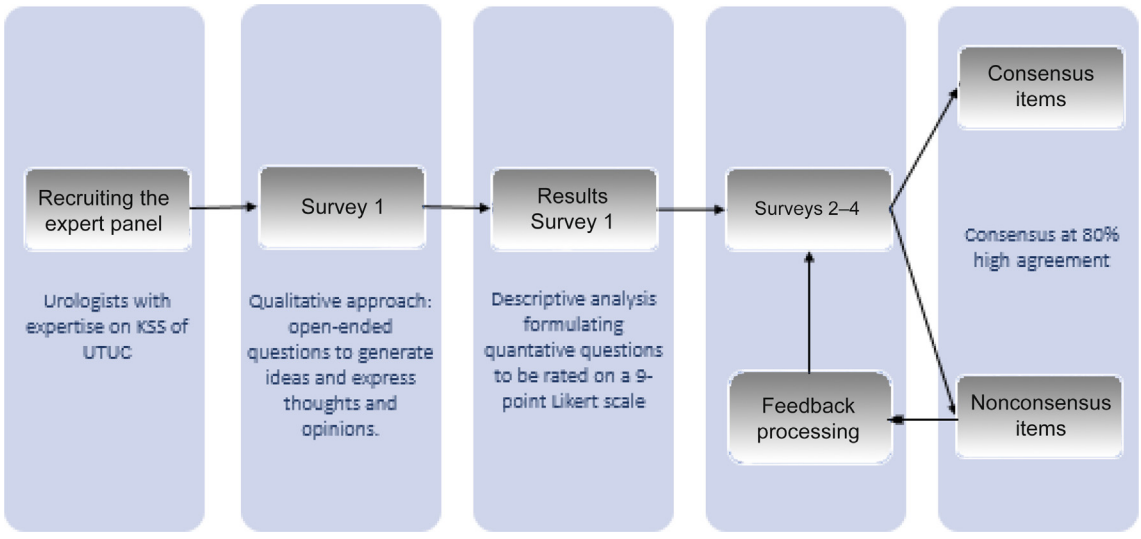


Fig. 1 – Delphi survey flowchart. KSS = kidney-sparing surgery; UTUC = upper tract urothelial carcinoma.

are summarised in Table 1. In total, 75% of the experts were male, 90% worked in an academic hospital, and the median years of experience with UTUC care was 14 (interquartile range 10–20). The majority of experts indicated that UTUC patients are discussed in a multidisciplinary tumour board (93%) and that a local treatment and follow-up protocol is available for UTUC patients (83%).

A total of four survey rounds were conducted. All 28 experts responded to the first round (100%), and 27 out of 28 experts (96%) participated in all four rounds.

3.1. Goals of follow-up

The experts' responses to consensus items on postoperative follow-up goals are summarised in Table 2. In the first round, an open-ended question identified 11 key follow-up objectives for UTUC patients. In subsequent rounds, nine of these achieved high degree of consensus, including detecting residual tumours after initial treatment, identifying postoperative complications, monitoring ipsilateral and intravesical recurrences, recognising disease upgrading and upstaging, preventing and detecting metastases, preserving renal function to avoid dialysis, and maintaining quality of life.

3.2. Definitions of indications for KSS

In the first round, panel members identified the key elements essential for defining elective, imperative, and palliative indications for kidney-sparing treatment in UTUC patients. These elements were evaluated separately in subsequent rounds and later refined into combined statements. For all three indications, a definition was formulated, which achieved a high level of consensus. The complete definitions are presented in Table 3.

3.3. Follow-up diagnostics

Table 2 includes the results on diagnostic modalities and consensus statements regarding follow-up details. In the first round, an open-ended question on diagnostic modalities identified 15 diagnostic methods, which were scored in the subsequent rounds. Consensus was reached on a minimum diagnostic set, including renal function tests (creatinine/estimated glomerular filtration rate/cystatin C [96%], CT urography [100%], cystoscopy [100%], and URS [with biopsy if indicated; 96%]).

Within the expert panel, there was additional agreement on the inclusion of a systematic cystoscopy during a URS (100%).

Table 1 – Characteristics of the expert panel members (*n* = 28)

Age, median (IQR)	48 (42–57)
Male gender, *n* (%)	21 (75)
Type of hospital [a],*n* (%)	
Academic	25 (90)
Nonacademic	2 (7)
Private practice	2 (7)
Years of experience, median (IQR)	14 (10–20)
Number of new UTUC patients per year, median (IQR)	22 (15–32)
Number of patients treated by means of KSS per year, median (IQR)	10 (8–18)
UTUC patients are discussed in multidisciplinary tumour board—yes, *n* (%)	26 (93)
Local treatment and follow-up protocol available for UTUC patients—yes, *n* (%)	24 (82)

IQR = interquartile range; KSS = kidney-sparing surgery; UTUC = upper tract urothelial carcinoma.
[a] More than one answer was possible per expert.

3.4. Follow-up schedule per treatment indication

3.4.1. Elective

The frequency and timing of diagnostic modalities were evaluated in rounds 3 and 4. Table 4 and Supplementary Fig. 1 summarise these results.

Consensus was not reached on the optimal frequency and time points for the agreed-upon diagnostic methods. However, there was strong agreement (96% and 89%, respectively) on annual renal function tests and CT urography for the first 5 yr of follow-up. Additionally, cystoscopy was supported widely (>90%), though its recommended frequency varied.

A plurality of the panel stated to perform cystoscopies twice during the 1st (41%) and the 2nd (56%) years, and annually during the 3rd (52%), 4th (74%), and 5th (70%) years. Regarding URS, 3.7% of the experts stated that it could be omitted in the 1st year, while 33%, 41%, 48%, and 48% stated that it could be omitted in the 2nd, 3rd, 4th, and 5th years, respectively. Overall, most experts agreed that a URS should be included in the annual follow-up. Regarding the timing of the first follow-up URS after initial KSS, 26% of the experts stated it to be within 8 wk, 63% after 3 mo, and 7.4% after 6 mo.

Concerning the total follow-up duration, all the experts agreed on a minimum of 5 yr. Additionally, 15 of 27 experts (56%) stated that they would continue follow-up beyond 5 yr, with four of them recommending follow-up extending beyond 10 yr.

In case of a recurrent tumour during follow-up, there was high agreement (93%) to reset the follow-up protocol to the initial starting point.

3.4.2. Imperative and palliative

Among experts, there was high agreement (81%) that follow-up schedules should be tailored to the indication for KSS—elective, imperative, or palliative. Additionally, the panel reached high consensus (93%) that follow-up for patients with a palliative indication should be individualised.

The expert panel did not reach consensus on establishing a standard follow-up schedule for patients who underwent KSS for an imperative indication (74%). Those opposing a standardised approach cited the heterogeneity of this patient group as a key reason for not providing a general recommendation.

4. Discussion

In this Delphi project, we aimed to reach consensus on four key topics of follow-up after KSS for patients with UTUC.

Table 2 – Consensus statements on follow-up after KSS

	Degree of consensus (%)	Consensus Yes/no (round)
Goals of follow-up after KSS		
Detection of residual tumour after initial treatment	93	Yes (2)
Detection of postoperative complications	81	Yes (2)
Detection of ipsilateral recurrences	96	Yes (2)
Detection of intravesical recurrences	100	Yes (2)
Disease upgrading	100	Yes (2)
Disease upstaging	96	Yes (2)
Prevention/detection of metastases	89	Yes (2)
Preservation of renal function/to avoid dialysis	89	Yes (2)
Maintaining quality of life	93	Yes (2)
Detection of contralateral recurrence	74	No
Preservation of endoscopic treatment options/to avoid RNU	63	No
Follow-up schedule		
Diagnostic modalities that should minimally be employed during follow-up		
Renal function (creatinine/eGFR/cystatin C laboratory)	96	Yes (2)
CT urography (multiphase)	100	Yes (2)
Cystoscopy	100	Yes (2)
Ureteroscopy (with biopsy if indicated)	96	Yes (2)
Physical examination	30	No
Urine test strip	48	No
Cytology: voided urine	52	No
Cytology: bladder washout	28	No
Cytology: selective ipsilateral upper tract urine	52	No
Cytology: ipsilateral barbotage	52	No
Urine biomarkers	26	No
Abdominal ultrasound	26	No
Retrograde pyelography	7.5	No
CT thorax	37	No
MRI urography	26	No
PET CT	11	No
During follow-up, you always perform a cystoscopy when performing a ureteroscopy to screen for intravesical recurrences	100	Yes (4)
When an upper tract recurrence is treated (without upstaging or upgrading), the follow-up schedule should be reset	93	Yes (3)
The indication for treatment (elective/imperative/palliative) should result in alteration of the standardised follow-up schedule for UTUC patients after KSS treatment	81	Yes (2)
It is possible to create a minimum follow-up scheme for patients after KSS for an imperative indication	74	No
Patients who have undergone KSS for a palliative indication should be considered for follow-up if indicated and judged on an individual basis	93	Yes (3)

CT = computed tomography; eGFR = estimated glomerular filtration rate; KSS = kidney-sparing surgery; MRI = magnetic resonance imaging; PET = positron emission tomography; RNU = radical nephroureterectomy; UTUC = upper tract urothelial carcinoma.

Table 3 – Consensus statements on definitions of indications for KSS

	Degree of consensus (%)	Consensus Yes/no (round)
Elective: patients with upper tract urothelial carcinoma with low-grade histopathology and no signs of invasion on CT (clinical Ta), who are willing and (medically) able to comply with an endoscopic FU schedule	96	Yes (2)
Imperative: patients with upper tract urothelial carcinoma who do not meet the elective criteria for KSS, but are (medically) unable or unwilling to undergo RNU due to patient-related factors, bilateral tumours, solitary kidney, or renal impairment, are considered to have an imperative indication for KSS	96	Yes (3)
Palliative: patients with upper tract urothelial carcinoma who have no curative treatment options, but require surgery due to symptoms and to maintain quality of life or prevent or delay dialysis, are considered to have a palliative indication for KSS	89	Yes (3)

CT = computed tomography; FU = follow-up; KSS = kidney-sparing surgery; RNU = radical nephroureterectomy.

After four rounds, consensus was reached on the goals of follow-up, diagnostic methods that should be included in follow-up, clear definitions on treatment indication (elective, imperative, and palliative), and the need to tailor follow-up strategies based on the treatment indications. Furthermore, we reached an agreement to reset the follow-up schedule in the event of tumour recurrence. Lastly, we agreed on a recommendation for palliative patients, stating that a follow-up scheme should be tailor-made and patient specific.

In the second round of the Delphi project, there was low consensus (range 28–52%) on the use of urine cytology (voided, bladder washout, selective, or barbotage cytology) as a diagnostic modality in the follow-up scheme. Urine cytology as a diagnostic test has been debated due to wide variation in sensitivity, ranging from 17% to 76% [9–12]. Although the sensitivity and accuracy results of cytology using the focal barbotage technique show results comparable with those of tumour biopsies, only 52% of the expert panel had a high level of agreement to include this modality in the follow-up regimen [13]. The EAU guidelines acknowledge the ambiguity in literature and states that "the role of ureteroscopies of the ipsilateral upper urinary tract during follow-up after endourologic kidney-sparing treatment vs CT urography and voided urinary cytology is unknown".

While conducting this Delphi project, EAU guidelines at that time recommended endoscopic follow-up only in the 1st year for low- and high-risk tumours [1]. The results of our Delphi consensus project suggest that endoscopic follow-up should be longer and more frequent. In total, the majority stated that an annual URS should be part of a minimal follow-up schedule. However, 3.7% stated that a URS can be omitted during the 1st year, and 33%, 41%, 48%, and 48% said so for years 2, 3, 4, and 5, respectively. While consensus was not achieved, these findings indicate that the majority of experts consider that the current EAU guidelines on endoscopic follow-up are not comprehensive enough. This perspective is supported by two of the largest published retrospective cohort studies on long-term outcomes of endoscopic management [14,15]. These studies found that strict and long-term protocols, including a URS, diagnosed and managed tumour recurrences in patients treated with KSS, while maintaining good survival outcomes. The newly presented EAU 2025 guidelines state that

Table 4 – Experts' responses to frequency of diagnostics during follow-up after kidney-sparing surgery for an elective case

	Frequency		Renal function	CT urography	Cystoscopy	Ureteroscopy
		n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Total *N* (%)		27 (100)	27 (100)	27 (100)	27 (100)	27 (100)
Year 1	Zero		–	2 (7.4)	1 (3.7)	1 (3.7)
	Once		3 (11)	9 (33)	5 (19)	9 (33)
	Twice		8 (30)	15 (56)	11 (41)	7 (26)
	Three times		7 (26)	1 (3.7)	6 (22)	7 (26)
	Four times		5 (19)	–	4 (15)	3 (11)
	Five times		4 (15)	–	–	–
Year 2	Zero		–	3 (11)	2 (7.4)	9 (33)
	Once		13 (48)	16 (59)	10 (37)	7 (26)
	Twice		13 (48)	8 (30)	15 (56)	11 (41)
	Three times		–	–	–	–
	Four times		1 (3.7)	–	–	–
Year 3	Zero		1 (3.7)	1 (3.7)	2 (7.4)	11 (41)
	Once		17 (63)	20 (74)	14 (52)	9 (33)
	Twice		9 (33)	6 (22)	11 (41)	7 (26)
Year 4	Zero		–	1 (3.7)	1 (3.7)	13 (48)
	Once		19 (70)	22 (81)	20 (74)	11 (41)
	Twice		8 (30)	4 (15)	6 (22)	3 (11)
Year 5	Zero		–	1 (3.7)	1 (3.7)	13 (48)
	Once		20 (74)	23 (85)	19 (70)	12 (44)
	Twice		7 (26)	2 (7.4)	7 (26)	2 (7.4)
Continue FU after year 5?	Yes	15 (56)				
	No	12 (44)				
Total *N* (%)		15 (100)	15 (100)	15 (100)	15 (100)	15 (100)
Year 6	Zero		1 (6.7)	1 (6.7)	2 (7.4)	6 (40)
	Once		12 (80)	13 (87)	12 (44)	7 (47)
	Twice		2 (13)	1 (6.7)	1 (3.7)	2 (13)
Year 7	Zero		1 (6.7)	2 (13)	3 (11)	7 (47)
	Once		12 (80)	12 (80)	11 (41)	7 (47)
	Twice		2 (13)	1 (6.7)	1 (3.7)	1 (6.7)
Year 8	Zero		2 (13)	2 (13)	2 (7.4)	7 (47)
	Once		11 (73)	12 (80)	12 (44)	7 (47)
	Twice		2 (13)	1 (6.7)	1 (3.7)	1 (6.7)
Year 9	Zero		1 (6.7)	2 (13)	2 (7.4)	1 (6.7)
	Once		11 (73)	12 (80)	12 (44)	7 (47)
	Twice		3 (20)	1 (6.7)	1 (3.7)	7 (475)
Year 10	Zero		1 (6.7)	2 (13)	2 (7.4)	7 (47)
	Once		11 (73)	12 (80)	12 (44)	7 (47)
	Twice		3 (20)	1 (6.7)	1 (3.7)	1 (6.7)
Continue FU after year 10?	Yes	4 (27)				
	No	11 (73)				

CT = computed tomography; FU = follow-up.

follow-up beyond the 1st year may be conducted "with or without a URS", underscoring the on-going uncertainty and complexity in advising on the use of a URS [16]. Additionally, only 26% of experts recommend a URS within 8 wk, which is currently recommended as a so-called "second-look URS" by the EAU guidelines for low- and high-risk patients [1]. Recent studies also suggest that the timing and prognostic value of a second-look URS is controversial. A recent study by Gallioli et al [17] found that it is safe to postpone the second-look URS after 8 wk in patients with low-grade and small tumours. Furthermore, a study by Figaroa et al [15] found that the result of a second-look URS between 6 and 8 wk was not a prognostic factor for tumour recurrence or treatment conversion.

There was a high level of agreement on the definitions of elective, imperative, and palliative treatment indications. Additionally, the expert panel emphasised that UTUC surveillance should be guided by treatment indication rather than solely by risk stratification (high vs low risk). These findings suggest that current recommendations should shift towards an approach that tailors surveillance protocols to treatment indication, resulting in more personalised strategies that account for patients' individual situations and needs. Our findings align with the current 2025 EAU guidelines emphasising the importance of risk stratification in UTUC. The expert panel reached strong consensus that the treatment indication is the main determinant for follow-up, independent of "weak" high-risk features such as tumour size >2 cm, hydronephrosis, or multifocality. These criteria are not included in the definitions of elective or imperative indications, which are primarily based on tumour grade and stage. This supports the eligibility of patients with weak high-risk features for elective KSS when low-grade histology and no invasion are present, in line with the current EAU guidelines.

We did not reach consensus on a detailed follow-up scheme for elective and imperative patients. This may be explained due to the wide variation between clinical practices and is supported by the results of our scoping review, conducted in the first stage of this Delphi consensus project. This variability is shown not only among different centres, but also between the recommendations in the EAU guidelines and the real-world practice [3]. The recommendations for follow-up in the current EAU and American Urological

Association (AUA) guidelines are based on the available evidence, consisting of retrospective studies only, characterised as "weak" recommendations by the EAU and as "expert opinion" by the AUA [1,18]. Additionally, most studies involve a single centre, with limited sample sizes, and varying inclusion criteria and presented outcomes, resulting in recommendations less suitable for broader extrapolation or generalisation.

4.1. Strengths and limitations

This Delphi project, which aimed to reach consensus on a follow-up strategy for patients with UTUC after KSS, provided important results regarding the goals of follow-up and the definition of treatment indications. For this Delphi project, we included a broad panel consisting of 28 experts in the field of UTUC. The response rates were high (at least 96% per questionnaire) and the experts covered a considerable part of Europe. Different regions have their own guideline frameworks (eg, AUA guidelines in the USA) that reflect regional variations in practice patterns and health care structures. Therefore, we focused on European experts familiar with the EAU framework and guidelines. As expertise was demonstrated by scientific output, most of the included urologists (90%) were from an academic setting, incurring a potential selection bias. Additionally, it is important to note that a Delphi consensus project is based on expert opinions, so subjective biases are inevitable. Results of a Delphi project may serve as a placeholder when high-quality evidence is lacking; findings should be interpreted as expert guidance rather than definitive standards, especially for nonconsensus items. Two key items resulted in an almost even split among panel members: whether to continue URS beyond year 2 and whether to maintain any form of follow-up after year 5. Continuation of URS in years 3, 4, and 5 was supported by 59%, 52%, and 52% of panellists, respectively. Meanwhile, 56% deemed it necessary to continue follow-up beyond year 5. Further rounds of the Delphi process were unlikely to resolve this lack of consensus, given the absence of high-quality evidence to convincingly support either position.

4.2. Future recommendations

We need to improve follow-up care of UTUC patients after KSS. Given that UTUC is a rare disease, collaboration between centres may result in conduction of well-powered prospective studies and may provide a more accurate representation of the real-world practice, making findings easier to extrapolate. Additionally, enhanced prognostication is needed to tailor follow-up schedules accordingly.

Specialised care for UTUC patients could potentially lead to better outcomes by concentrating expertise in centres. This approach has been proved effective for various rare diseases, for example, for penile cancer, another rare malignancy [19]. UTUC patients in rural areas face worse cancer-specific survival despite similar disease characteristics, likely due to differences in care delivery compared with expert centres in urban areas [20]. The current study contributes to shaping a uniform approach to patient care, with the goal to improve patient outcomes. Furthermore, nonconsensus outcomes of this study can provide a framework for design of future prospective studies to generate good-quality evidence in this challenging clinical area. Multidisciplinary collaboration and multidisciplinary tumour board discussion of UTUC patients are essential for providing high-quality care of patients with this rare disease, as researched previously [21].

5. Conclusions

This Delphi consensus underscores the complexity of establishing a standardised follow-up protocol after KSS for UTUC. An optimal strategy must balance early detection of recurrence with the preservation of renal function and quality of life. Essential components of follow-up include kidney function assessment, CT urography, cystoscopy, and URS. However, further research is needed to refine surveillance intervals and duration based on recurrence and progression risks. On-going collaboration among experts in clinical care and research is essential to advancing knowledge and optimising patient outcomes.

***Author contributions*:** Orlane Figaroa had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Figaroa, Schuil, Kamphuis, van den Brink, Hendriks, Henderickx, Bus, Brehmer, Baard.
Acquisition of data: Figaroa, Schuil, Kamphuis, van den Brink, Hendriks, Henderickx, Bus, Brehmer, Baard.
Analysis and interpretation of data: Figaroa, Schuil, Kamphuis, van den Brink, Hendriks, Henderickx, Bus, Brehmer, Baard.
Drafting of the manuscript: Figaroa, Schuil, Kamphuis, van den Brink, Hendriks, Henderickx, Bus, Brehmer, Baard.
Critical revision of the manuscript for important intellectual content: Figaroa, Schuil, Kamphuis, van den Brink, Hendriks, Henderickx, Bus, Baard, Bins, van Moorselaar, Ajayi, Brehmer, Cavadas, Cracco, D'Andrea, Dasgupta, De Coninck, Durutovic, Ebbensgaard, Ferretti, Gallioli, Keller, Keeley, Osther, Popiolek, Pradere, Proietti, Saltirov, Somani, Tailly, Thomas, Turney, Ulvik, Van Haute, van der Heij, Vasquez.
Statistical analysis: Figaroa, Schuil, Bus, Brehmer, Baard.
Obtaining funding: Baard.
Administrative, technical, or material support: Figaroa, Schuil, Kamphuis, van den Brink, Hendriks, Henderickx, Bus, Brehmer, Baard.
Supervision: Bus, Brehmer, Baard.
Other: None.

Financial disclosures: Orlane Figaroa certifies that all conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject matter or materials discussed in the manuscript (eg, employment/affiliation, grants or funding, consultancies, honoraria, stock ownership or options, expert testimony, royalties, or patents filed, received, or pending), are the following: None.

***Funding/Support and role of the sponsor*:** This study was supported by Cure for Cancer.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.euo.2025.07.003.

References

[1] EAU. EAU guidelines. Presented at the EAU Annual Congress Paris; 2024.
[2] Klemm J, Bekku K, Abufaraj M, et al. Upper tract urothelial carcinoma: a narrative review of current surveillance strategies for non-metastatic disease. Cancers (Basel) 2023;16:44.
[3] Schuil HW, Figaroa OJA, Hendriks N, et al. Navigating the aftermath: a comprehensive scoping review on follow-up strategies after kidney-sparing surgery for upper tract urothelial carcinoma. Eur Urol Open Sci 2024;66:82–92.
[4] Sydén F, Baard J, Bultitude M, et al. Consultation on UTUC II Stockholm 2022: diagnostics, prognostication, and follow-up-where are we today? World J Urol 2023;41:3395–403.
[5] Jones J, Hunter D. Consensus methods for medical and health services research. BMJ 1995;311:376–80.
[6] Beiderbeck D, Frevel N, von der Gracht HA, Schmidt SL, Schweitzer VM. Preparing, conducting, and analyzing Delphi surveys: cross-disciplinary practices, new directions, and advancements. MethodsX 2021;8:101401.
[7] Shang Z. Use of Delphi in health sciences research: a narrative review. Medicine (Baltimore) 2023;102:e32829.
[8] Diamond IR, Grant RC, Feldman BM, et al. Defining consensus: a systematic review recommends methodologic criteria for reporting of Delphi studies. J Clin Epidemiol 2014;67:401–9.
[9] Figaroa OJA, Hendriks N, Kamphuis GM, van Moorselaar RJA, Bins AD, Baard J. Positioning the role of urine cytology within the diagnostic pathway for UTUC: supportive but inconclusive. World J Urol 2023;41:3429–35.
[10] Messer J, Shariat SF, Brien JC, et al. Urinary cytology has a poor performance for predicting invasive or high-grade upper-tract urothelial carcinoma. BJU Int 2011;108:701–5.
[11] Lodde M, Mian C, Wiener H, Haitel A, Pycha A, Marberger M. Detection of upper urinary tract transitional cell carcinoma with ImmunoCyt: a preliminary report. Urology 2001;58:362–6.
[12] Dev HS, Poo S, Armitage J, Wiseman O, Shah N, Al-Hayek S. Investigating upper urinary tract urothelial carcinomas: a single-centre 10-year experience. World J Urol 2017;35:131–8.
[13] Malm C, Grahn A, Jaremko G, Tribukait B, Brehmer M. Diagnostic accuracy of upper tract urothelial carcinoma: how samples are collected matters. Scand J Urol 2017;51:137–45.
[14] Scotland KB, Hubbard L, Cason D, et al. Long term outcomes of ureteroscopic management of upper tract urothelial carcinoma. Urol Oncol 2020;38:850.e17–e26.
[15] Figaroa OJA, Hendriks N, Kamphuis GM, et al. Longer is better for endoscopic follow-up of upper tract urothelial carcinoma after ureteroscopic treatment: an evaluation spanning 10 years of data. Eur Urol Oncol 2024;7:853–9.
[16] EAU. EAU guidelines. Presented at the EAU Annual Congress Madrid; 2025.
[17] Gallioli A, Basile G, Territo A, et al. The importance of second-look ureteroscopy implementation in the conservative management of upper tract urothelial carcinoma. World J Urol 2023;41:2743–9.
[18] Coleman JA, Clark PE, Bixler BR, et al. Diagnosis and management of non-metastatic upper tract urothelial carcinoma: AUA/SUO guideline. J Urol 2023;209:1071–81.
[19] Jakobsen JK, Pettaway CA, Ayres B. Centralization and equitable care in rare urogenital malignancies: the case for penile cancer. Eur Urol Focus 2021;7:924–8.
[20] Collà Ruvolo C, Stolzenbach LF, Nocera L, et al. Higher cancer mortality in rural upper urinary tract urothelial carcinoma patients. Urol Int 2021;105:624–30.
[21] Tay LJ, Chatterton K, Colemeadow J, Nair R, Bultitude M, Thomas K. Improving management of upper tract urothelial carcinoma. BJU Int 2020;126:5–6.