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International consensus panel for transurethral resection of bladder tumors metrics: assessment of face and content validity

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Abstract

Objective: To develop performance metrics that objectively define a reference approach to a TURBT procedure, seek consensus on the performance metrics from a group of international experts.

Materials and methods: The aim of the study was to characterize the TURBT procedure, identifying phases and explicitly defined procedure events (i.e., steps, errors, and critical errors). An international panel of experienced urologists (i.e., Delphi panel) was then assembled to scrutinize the metrics using a modified Delphi process. Based on the panel's feedback, the proposed metrics could be edited, supplemented, or deleted. A voting process was conducted to establish the consensus level on the metrics. Consensus was defined as the panel majority (i.e., >80%) agreeing that the metric definitions were accurate and acceptable. The number of metric units before and after the Delphi meeting were presented.

Results: A core metrics group (i.e., characterization group) deconstructed the TURBT procedure. The reference case was identified as an elective TURBT on a male patient, diagnosed after full diagnostic work-up with ≤ 3 bladder tumors, of ≤ 3 cm. The characterization group identified six procedure phases, 60 procedure steps, 43 errors, and 40 critical errors. The metrics were presented to the Delphi panel which included fifteen experts from six countries. After the Delphi, six procedure phases, 63 procedure steps, 47 errors, and 41 critical errors were identified. The Delphi panel achieved a 100% consensus.

Conclusion: Performance metrics to characterize a reference approach to TURBT were developed and an international experts panel reached 100% consensus on them. This consensus supports their face and content validity. The metrics can now be used for a proficiency-based progression training curriculum for TURBT.

Keywords: Bladder cancer; Transurethral resection of bladder tumors; Performance metrics; Proficiency-based progression training; Surgical education;

Introduction

Transurethral resection of bladder tumors (TURBT) plays a crucial role in both the diagnosis and treatment of bladder cancer (BCa).¹ Although sometimes considered a simple procedure, refined skills and the use of complex instruments are required to perform a TURBT safely and effectively.^{2,3} Procedural challenges include working in a narrow space, with limited view and constrained control of the instruments (i.e., due to the fulcrum effect and reduced degrees of freedom) whilst dealing with delicate structures. On the other hand, TURBT is a widespread surgical operation and should be mastered by every urologist.⁴ Despite its significance, numerous studies have raised concerns about European urology residents' capacity and confidence to perform TURBT.⁵⁻¹³ These findings underscore the urgent need to improve the quality of surgical training in this specific procedure and ensure that residents acquire the necessary skills and confidence to perform it safely, effectively and efficiently. Not surprisingly, TURBT has been identified as one of the procedures with the highest priority for developing simulation-based training programs.¹⁴ To address this pressing concern, the European Training in uRology (ENTRY) project aims to develop a structured training curriculum for TURBT. The ENTRY project is a cooperative partnership between Humanitas University, ORSI Academy, and Fundació Puigvert, and aims to enhance the training of European urology residents in minimally invasive procedures.¹⁵ The European Commission supports the project with an ERASMUS grant (KA220-HED Cooperation partnerships in higher education). To ensure effective training, the ENTRY partners identified a well validated and scientific approach to training (i.e., proficiency-based progression (PBP)) for the development of their training curriculum for TURBT. This methodology follows a systematic process that involves detailed characterization of the procedure for the development of surgical performance metrics, validation of these metrics, quantitatively defined proficiency benchmarks based on the objectively assessed performance of experienced surgeons' performance and deliberate practice training with metric-based feedback to the trainee until they meet the proficiency benchmark(s).^{16,17} The initial step to establish a PBP training curriculum for TURBT involves the identification of performance metrics which characterize optimal and suboptimal performance to a reference approach to the procedure. By doing so, the ENTRY project seeks to equip European urology trainers with evidence-based and high-quality teaching tools which establishes a standardized European metrics-based training curriculum for TURBT.

The primary aim of the current study was to develop explicitly defined performance metrics that characterizes a reference approach to the performance of a TURBT procedure. The secondary aim was to refine the metrics and seek consensus from a group of international procedure experts in a modified Delphi meeting.

Methods

Study endpoint

The primary aim of the study was to develop performance metrics which objectively characterize a straightforward (or reference) TURBT procedure, identifying the phases and explicitly defined procedure events (i.e., steps, errors, and critical errors). The second aim was to obtain evidence to support face and content validity (i.e., the metrics are accurate and acceptable as written) using a modified Delphi process.

Procedure Characterization

To characterize the TURBT, a procedure characterization group consisting of 4 urological surgeons (NB, AB, JP, RH) and a Behavioral Scientist (AGG) conducted face-to-face and online meetings to discuss and refine the procedure characterization methods (described elsewhere).^{16,17} A glossary containing specific terms used in the study was used to ensure consistency and clarity.¹⁸

Face and content validation

A panel was then assembled to scrutinize the metrics using a modified Delphi process. The panel consisted of experienced urologists with expertise in TURBT. At the beginning of the meeting, the concept of PBP, the metrics characterization process and the glossary were introduced to the Delphi panel. The metrics for TURBT were then presented a phase at a time. The panel engaged in extensive discussions regarding the steps, errors, and critical errors for each phase for the complete TURBT procedure. Based on discussion and feedback from the Delphi panel, the proposed metrics were edited in real time until consensus was reached among the panel members. Metrics could be edited, supplemented, or deleted as needed. A voting process was conducted to establish the consensus on the metrics. Consensus was defined as the panel majority agreeing that the metric definitions were accurate and acceptable. The success of the Delphi process was determined by reaching a clear majority (i.e., >80%) consensus among the panel members. The number of metric units before and after the Delphi meeting are presented as descriptive statistics. The complete process for characterizing and assessing the face and content validity of procedural metrics is illustrated in Figure 1.

Results

Procedure Characterization

During six 4-hour video-conferencing meetings and one half-day in person meeting, the characterization group identified the procedural metrics. To support the metric development the team reviewed three anonymized and unedited complete TURBT videos performed by surgeons with varying levels of experience. Any discrepancies or ambiguities in the interpretation or definition of the metrics were identified and addressed to ensure reliable scoring and agreement. As a result, the characterization group deconstructed the procedure identifying six procedure phases, 60 procedure steps, 43 errors, and 40 critical errors (Table 1a). Each phase was defined with specific beginning and ending points and each metric element was constructed using unambiguous operational definitions which explicitly defined when an event was observed. This approach facilitates objective and reliable scoring. The metrics included the order of steps, instruments used, and instructions on their use. The characterization group also defined operator performances deviating from optimal performance as errors and critical errors. Errors represented actions that should not be done, and critical errors represented major deviations from optimal performance with a likelihood of causing harm to the patient or compromising the safe completion of the procedure. The metrics were designed to ensure observability, eliminating ambiguity and assumptions.

Delphi meeting participants

Following the metric development phase, a modified Delphi meeting was conducted to present the final version of the procedure metrics to a panel of experts. The Delphi meeting took place in Barcelona on November 25th, 2022. Fifteen experts from six countries were included. Twelve experts attended the meeting *in person*, while three individuals attended the meeting online. The median age of the experts attending the Delphi panel meeting was 52 (interquartile range 47-62) years.

Delphi meeting results

During the meeting, the metrics for each phase of the TURBT procedure was presented and openly discussed, voted on by the panel members with the goal of achieving consensus. After scrutinizing and discussing the metrics the international experts panel edited 14 steps, 10 errors and four critical errors. The changes have been made to enhance the clarity of definitions (e.g., “Confirm that the irrigation fluid is correct and connect the irrigation fluid tube to the correct entrance of the sheath”) or the precision of instructions for trainees (e.g., “Explore the anterior wall by rotating up to 180° the instruments without changing the camera orientation. Push with one hand (or ask your assistant to do so) on the patient abdomen or switch to a 70° scope for full exploration if necessary”; “Activate the energy before touching the mucosa.”). Three steps, four errors, one critical error were added *de novo*

(Table 1b). These have included instructions on performing steps of the procedure (e.g., “perform a dilation if needed”; “Perform a bimanual palpation”) or errors to avoid in order to increase the safety of the procedure itself (e.g., “Failure to verify: pressure points, contact with the metals, position on the edge”; “Failure to verify the integrity of the instrumentations”). At the end of the Delphi, six procedure Phases, 63 procedure Steps, 47 Errors, and 41 Critical Errors were identified. The six phases of TURBT identified are as follows: 1. Patient positioning and preparation; 2. Preparation of instrumentation and operative field; 3. Insertion of the instrument into the bladder; 4. Diagnostic evaluation of the bladder; 5. Tumour resection, hemostasis, and evacuation; 6. Instrument removal. A list of unique TURBT procedure metric steps are reported in table 2. A list of unique TURBT procedure metric errors and critical errors are reported in Table 3. The panel consensus on the TURBT metrics was 100%.

Discussion

In this study we characterized a TURBT procedure for the development of performance metrics for training purpose. We then sought consensus on the TURBT metrics with an international panel of procedure experts. As a result, we developed performance metrics that objectively defines a reference approach to the performance of a TURBT procedure. The results from a Modified Delphi panel of international procedure experts also provides support for the face and content validity of the metrics. This is the crucial first step in developing a training curriculum for TURBT - the ultimate goal of the ENTRY project.

The ENTRY project is a cooperative partnership between Humanitas University, ORSI Academy, and Fundació Puigvert, aimed at improving and standardizing the training of European urology residents in minimally invasive procedures.¹⁵ Evidence shows that European urology residents possess limited surgical exposure, confidence, and overall satisfaction with their training in conducting invasive procedures.⁵⁻⁷ The ENTRY project aims to develop a comprehensive educational program consisting of three essential components: an eLearning module, a hands-on simulation phase, and a quality-assured methodology for training in the operating room (OR). To achieve this goal, the partners of the ENTRY project first selected a training methodology supported by high-quality scientific evidence. Effective simulation can provide safe and controlled environments outside the OR where residents can acquire surgical skills without compromising patient safety.^{16-17,19} However, since training is time and resource-consuming, it is imperative to apply high-quality scientific methods to provide simulation-based training efficiently and effectively. After a process of discussion and comparison, the ENTRY partners determined to implement the PBP training methodology in their project.¹⁵ This methodology has been shown to reduce performance errors by

60% and procedural time by 15% compared to traditional training programs, including the "traditional" Halstedian model and newer approaches such as simulation-based training, mastery learning, and proficiency-based learning.²⁰

The project primarily focused its efforts on TURBT for several compelling reasons. Firstly, this procedure allows for removing bladder cancer through a minimally invasive approach, providing crucial diagnostic information and enabling appropriate therapeutic interventions.¹ Given the prevalence and likelihood of recurrence of bladder cancer, as well as the fact that non-invasive tumors constitute a significant proportion of all bladder cancer cases, this procedure is extremely common.^{3,4} Extensive literature has demonstrated that adequate tumor resection can greatly impact patient prognosis and the likelihood of tumor recurrence.^{21,22} Improving the quality of resection consequently means improving patient outcomes and potentially reducing the significant economic burden of bladder cancer on healthcare systems.²²⁻²⁵ Furthermore, from a training perspective, characterizing TURBT means having a set of performance metrics that can be used, either partially or entirely, for several other endourological procedures. Several critical steps of the procedure, including urethroscopy and cystoscopy, overlap with diagnostic flexible cystoscopy, transurethral resection of the prostate, ureteral stenting, and other endourological procedures of the upper urinary tract (albeit with some variations). For all these reasons, the priority of the ENTRY project was to develop a PBP training curriculum for TURBT to offer to European urology residents.

Several authors have attempted to standardize TURBT and created checklists to improve the quality of resection, which is also useful for training purposes.^{2,23,26-32} Their work has been an invaluable basis for developing our metrics, along with urological society guidelines and clinical experience. However, unlike previous efforts, our metrics include a list of steps to be performed (*do's*) and errors to be avoided (*don'ts*). Errors are defined in a binary manner to provide trainees with precise, unambiguous, and constructive feedback.^{18,19,33} Once the construct validation of the metrics is completed, they will be used as a basis to develop TURBT metrics-based simulation models and clinical teaching tools. Proficiency benchmarks based on the mean performance of experts will also be established through the construct validity process. These elements will be used to develop the first PBP-based training curriculum for TURBT, as part of the European School of Urology effort to develop and implement an innovative training program for urology residents.³⁴ This approach will standardize and enhance the training and assessment of this procedure and verifying proficiency outside the OR before operating on real patients. Given the evidence linking surgeons' skills and patient outcomes, we believe that such a curriculum has the potential to significantly improve TURBT outcomes.³⁵

Our study has several limitations that should be acknowledged. First, the reported metrics primarily apply to a piecemeal resection approach and may not fully capture the nuances of other techniques, such as en-bloc resection, or alternative tools, such as lasers.^{36,37} It is important however to recognize that the reference approach and metrics described in our study are primarily intended for training novice surgeons at the beginning of their learning curve. Additionally, the metrics we have identified may not account for the wide range of patient variations and tumor characteristics that can influence the procedure. Each case is unique, and factors such as tumor size, location, and morphology may introduce additional complexity and variations in surgical techniques. Furthermore, it is worth noting that our study may have excluded rare mistakes or errors since the true number of potential errors is unknown. While we have made every effort to define the metrics comprehensively, it is important to recognize that there may be rare occurrences or specific scenarios that were not captured in our analysis. Despite these limitations, our study provides valuable insights into the development of performance metrics for TURBT and serves as a foundation for further research and refinement in this area.

Conclusions

In this study we deconstructed a reference approach for the performance of a TURBT procedure and established performance metrics that characterize the procedure. Consensus on the metrics by an international panel of experts further strengthens the supporting validation evidence. The integration of these metrics into a PBP training curriculum holds significant potential for improving clinical performance in terms of safety and efficacy. This is an important step towards advancing the training and practice of TURBT, ultimately benefiting patients.

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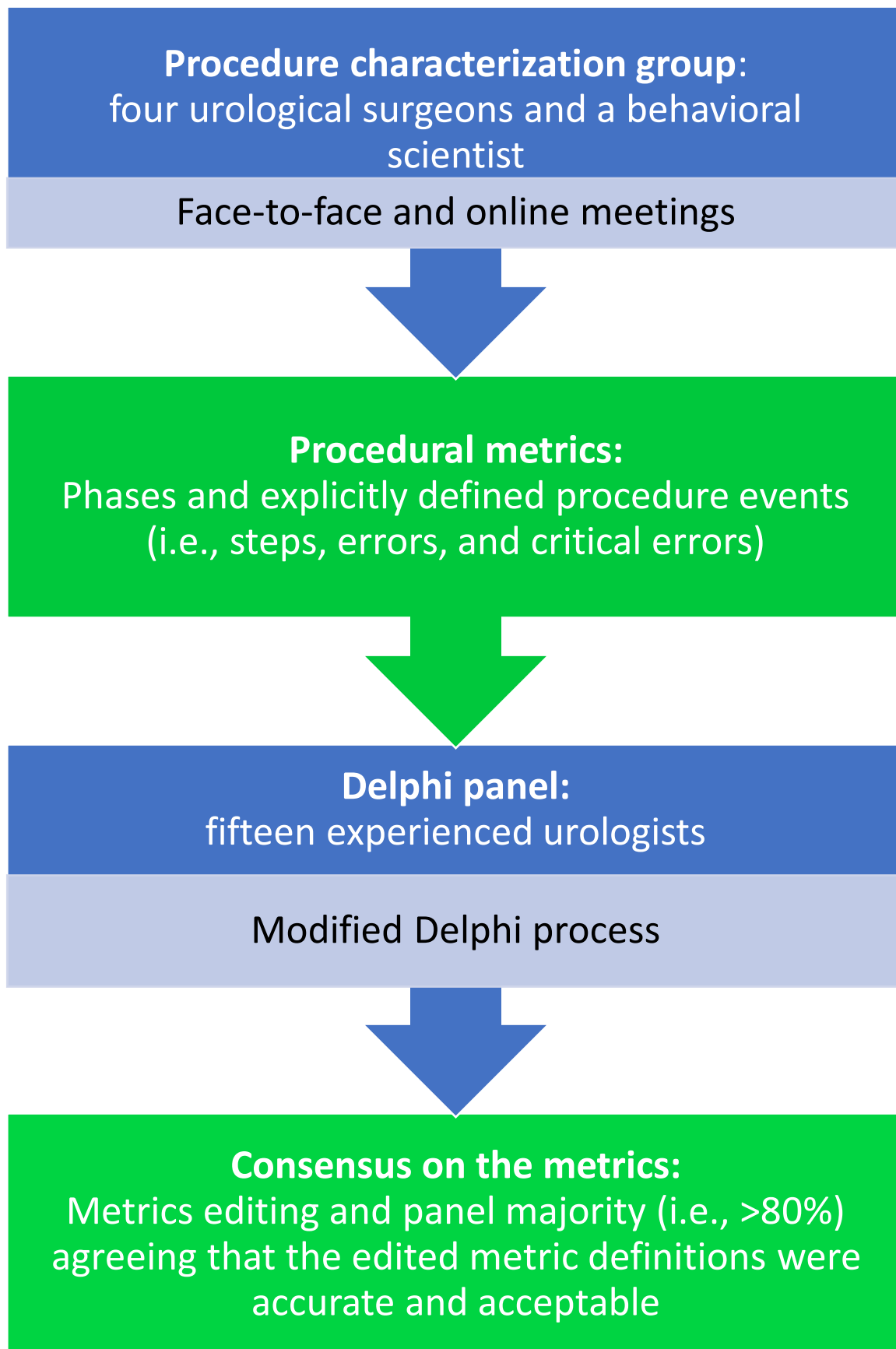


Figure 1. Process for characterizing and assessing face and content validity of the procedural metrics

Table 1. Metrics for transurethral resection of bladder tumors (TURBT).

1a. Metrics developed by the procedure characterization group and presented at the Delphi meeting.

Phases	No. of steps	No. of errors	No. of critical errors
Patient positioning and preparation	5	2	4
Preparation of instrumentation and operative field	9	12	1
Insertion of the instrument into the bladder	10	9	11
Diagnostic cystoscopy	9	5	4
Tumour resection and evacuation	18	10	15
Instrument removal	9	5	5

1b. Metrics after Delphi and summary of changes.

Phases	No. of steps (S)	No. of errors (E)	No. of critical errors (CE)	Summary of changes
Patient positioning and preparation	5	3	4	1 E added <i>de novo</i> 1 CE edited to E
Preparation of instrumentation and operative field	9	13	1	3 S edited 2 E edited 1 E added <i>de novo</i>
Insertion of the instrument into the bladder	12	9	12	2 S added <i>de novo</i> 1 S edited 2 E edited 1 E added <i>de novo</i> 1 CE edited
Diagnostic evaluation of the bladder	9	6	4	4 S edited 2 E edited 1 E added <i>de novo</i>
Tumour resection, hemostasis, and evacuation	18	10	15	4 S edited 3 E edited

Instrument removal	10	6	5	1 S edited 1 S added <i>de novo</i> 1 E edited 1 E added <i>de novo</i>
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Table 2. Summary of different RARP procedure metric phases and steps

Phase I: Patient positioning and preparation
1. WHO checklist completed (Instruments according to procedure/surgeon)
2. Time-out completed (including patient history, available imaging and tumor characteristics) [didactics]
3. Put the patient legs onto the stirrups with (a) the anus on the edge of the lower end of the table and (b) both legs in the stirrups
4. Verify the fixation of the patient (to ensure there is no movement of the patient while operating)
5. Verify that the diathermy pad is attached to patient
Phase II: Preparation of instrumentation and operative field
6. To create a sterile field to the genital area
7. Drape the patient to expose the genital area
8. Plug-in camera and energy cables and place their sterile part on the sterile field
9. Confirm that the irrigation fluid is correct and connect the irrigation fluid tube to the inflow of the sheath
10. Open the flow of the irrigation tube to check its functioning and remove the air from the the irrigation tube (circuit)
11. Confirm that the energy settings are correct (monopolar vs bipolar; level of energy) and connect the energy cables to the resectoscope
12. Connect the camera to the optic, perform the white balance and focus the camera
13. Confirm (to the nurse) that the resectoscope is provided mounted with the correct loop (monopolar vs bipolar) and its functioning
14. Verify that the footpedal is in position (can be comfortably operated)
Phase III: Insertion of the instrument into the bladder
15. Perform a bimanual palpation
16. Identify and expose the meatus
17. Inject lubricant gel into the urethra
18. Perform a dilation if needed

19. Open the inflow while keeping the outflow closed
20. Insert the instrument (sheath, Smith cannula, obturator) into the distal urethra
21. Remove the obturator
22. Insert and attach the 0° or 12° scope to the sheath
23. Verify correct camera orientation
24. Perform urethroscopy of the whole urethra, verify and report: <ul style="list-style-type: none"> • the status of the mucosa • sphincter status • presence of lesions • presence of strictures • presence and estimated size of the prostate, morphology of the prostatic urethra • configuration of the bladder neck
25. Tilt the instrument to follow urethral curves until the tip in the instrument is in the bladder, keeping the lumen of the urethra in the centre of the view
26. Remove the scope, close the inflow and empty the bladder
Phase IV: Diagnostic evaluation of the bladder
27. Insert and attach a 30° or 70° scope to the sheath while the inflow is fully opened
28. Fill the bladder to distend the bladder walls
29. Regulate the inflow and outflow to maintain the bladder distension
30. Identify the trigone and the ureteral orifices (UO), report the UOs characteristics
31. Explore the posterior wall and the dome, identify the “air bubble”
32. Explore the lateral walls by rotating up to 90° the instruments without changing the camera orientation
33. Explore the anterior wall by rotating up to 180° the instruments without changing the camera orientation. Push with one hand (or ask your assistant to do so) on the patient abdomen or switch to a 70° scope for full exploration if necessary
34. Identify and report all the lesion(s) and their characteristics on the bladder map
35. Remove the scope and Smith cannula
Phase V: Tumour resection, hemostasis, and evacuation
36. Insert resectoscope and attach it to the sheath, with the loop close to the optic

37. Fill the bladder to distend the bladder walls
38. Regulate inflow and outflow open and maintain a stable bladder distension
39. Verify the loop is connected to the energy and is functioning
40. Decide a resection strategy. Put the tumour in view and check if you are able to reach the distal edge of the tumour using the loop without moving the scope
41. Perform piecemeal resection starting from the lateral and superficial area of the tumour while keeping the loop under vision. Activate the energy before touching the mucosa. Keep the instrument stable whilst resecting.
42. Coagulate to control any bleeding that prevents procedure progression and/or clear visualization of tissues
43. Retrieve the specimens
44. Provide explicit information to the OR nurse about the label for the specimen
45. If needed, perform resection of the tumour bed until the muscle layer is exposed
46. Retrieve the specimens of the deep layers
47. Provide explicit information to the OR nurse about the label for the specimen
48. Coagulate the resection bed starting with any visible bleeding vessel, and then circumvent the border of the tumour. Coagulate the resection bed at the end.
49. Perform piecemeal resection of other tumours working from the smallest to the largest, following the steps and sequence described above [40-48]
50. Stop the inflow and the outflow
51. Identify possible source of active bleeding and coagulate
52. Identify specimens left in the bladder and evacuate them
53. Final cystoscopy: identify possible missed tumours and identify the UOs
Phase VI: Instrument removal
54. Detach and remove resectoscope and camera
55. Insert and attach the obturator to the sheath
56. Remove the instrument
57. Perform a bimanual palpation if a muscle-invasive tumor is suspected
58. Inject lubricant gel into the urethra

59. Insert the urinary catheter
60. Inflate the balloon after observing outflow of urine or irrigation fluid (either spontaneous or after manual bladder irrigation)
61. Connect the continuous bladder irrigation if needed
62. Check for a non-haematic outflow
63. Connect the catheter bag

Table 3. List of unique TURBT procedure metric errors and critical errors.

• <i>WHO checklist was not completed</i> CE
• <i>Time-out was not completed</i> CE
• <i>Patient position on the operating table: the anus was not on the edge of the lower end of the table</i> E
• <i>Patient position on the operating table: both legs were not correctly positioned in the stirrups</i> E
• <i>Failure to verify the fixation of the patient on the stirrups</i> CE
• <i>Failure to verify: pressure points, contact with the metals, position on the edge</i> CE
• <i>Diathermy pad was not attached to patient</i> E
• <i>Incorrect handling of the instrument</i> E
• <i>Violation of the aseptic technique</i> CE
• <i>Did not drape the patient to expose genital area</i> E
• <i>Failure to verify the integrity of the instrumentations</i> E
• <i>Camera and energy cables not correctly plugged in</i> E
• <i>Failure to confirm that the irrigation fluid is correct</i> E
• <i>Failure to connect the irrigation fluid tube to the inflow of the inner sheath</i> E
• <i>Failure to open the flow and remove the air from the circuit</i> E
• <i>Failure to confirm that the energy settings are correct</i> E
• <i>Failure to connect the energy cables to the resectoscope</i> E
• <i>Failure to connect the camera to the optic</i> E
• <i>Failure to perform the white balance and focus the camera</i> E
• <i>Failure to use the correct loop</i> E
• <i>Failure to verify that the footpedal is in position (can be comfortably operated)</i> E
• <i>Failure to perform a bimanual palpation</i> E
• <i>Failure to identify and expose the meatus</i> CE

• Failure to identify and deal with anatomical abnormalities <i>CE</i>
• Failure to place the lubricant gel into the urethra <i>CE</i>
• Failure to fully open the inflow before inserting the instrument <i>E</i>
• Failure to stretch the penis while inserting the instrument <i>E</i>
• Inserting the instrument (sheath, Smith cannula, obturator) further than the distal urethra <i>CE</i>
• Failure to identify a navicular fossa stricture and perform a dilation <i>CE</i>
• Inserting the instrument into the bladder without using the scope <i>CE</i>
• Failure to use a 0° or 12° scope <i>E</i>
• Failure to remove the obturator <i>E</i>
• Failure to perform the urethroscopy with the flow fully open <i>CE</i>
• Failure to insert and attach the scope <i>E</i>
• Performing the urethroscopy with an incorrect orientation <i>CE</i>
• Failure to maintain the focus during urethroscopy <i>E</i>
• Causing urethral injuries <i>CE</i>
• Failure to identify urethral lesions, strictures, and characteristics <i>CE</i>
• Failure to follow the urethral curves <i>CE</i>
• Failure to reach the bladder <i>CE</i>
• Causing bleeding of the prostate/bladder neck <i>E</i>
• Failure to remove the scope, stop the inflow and empty the bladder <i>E</i>
• Failure to insert the scope with the inflow fully open <i>CE</i>
• Failure to regulate the inflow and outflow, and to fill the bladder to fully explore all the areas of the bladder and avoid overdistention <i>E</i>
• Failure to remove possible air bubbles between endoscope and loop <i>E</i>
• Failure to identify one or both the UOs and their characteristics <i>CE</i>
• Failure to identify the “air bubble” <i>E</i>
• Failure to explore all the areas of the bladder <i>CE</i>

<ul style="list-style-type: none"> • Failure to remove clots or working with obscured view <i>E</i>
<ul style="list-style-type: none"> • Failure to identify and report all the lesions and their characteristics on the bladder map <i>CE</i>
<ul style="list-style-type: none"> • Failure to remove the scope and Smith cannula <i>E</i>
<ul style="list-style-type: none"> • Failure to insert the resectoscope and attach it to the sheath <i>E</i>
<ul style="list-style-type: none"> • Entering the bladder with the loop distant from the optic <i>CE</i>
<ul style="list-style-type: none"> • Failure to maintain steady flow and stable bladder distension <i>CE</i>
<ul style="list-style-type: none"> • Failure to start the resection with a small tumour <i>E</i>
<ul style="list-style-type: none"> • Failure to keep the instrument at the correct [see step 40] distance when performing the resection <i>E</i>
<ul style="list-style-type: none"> • Failure to activate the loop before starting the resection <i>E</i>
<ul style="list-style-type: none"> • Resecting the tumour without activating cutting electrocautery <i>E</i>
<ul style="list-style-type: none"> • Start the resection from the central part of the tumour <i>E</i>
<ul style="list-style-type: none"> • Failure to keep the instrument stable whilst resecting <i>E</i>
<ul style="list-style-type: none"> • Failure to completely close the loop whilst resecting <i>E</i>
<ul style="list-style-type: none"> • Resecting from front to back <i>CE</i>
<ul style="list-style-type: none"> • Failure to control bleeding that prevents clear visualization of tissues and/or procedure progression <i>CE</i>
<ul style="list-style-type: none"> • Failure to resect the tumour bed exposing the deep layer <i>CE</i>
<ul style="list-style-type: none"> • Failure to give explicit information about the label for the specimen <i>CE</i>
<ul style="list-style-type: none"> • Failure to coagulate the resection bed starting with any visible bleeding vessel, then circumvent the border of the tumour, then the resection bed <i>E</i>
<ul style="list-style-type: none"> • Failure to close the inflow and outflow while checking for the haemostasis <i>E</i>
<ul style="list-style-type: none"> • Failure to achieve a complete haemostasis at the end of the phase <i>CE</i>
<ul style="list-style-type: none"> • Failure to evacuate all the specimens <i>CE</i>
<ul style="list-style-type: none"> • Failure to identify both the UOs <i>CE</i>
<ul style="list-style-type: none"> • Failure to resect all the lesions <i>CE</i>
<ul style="list-style-type: none"> • Incomplete resection of any tumour <i>CE</i>

<ul style="list-style-type: none"> • <i>Bladder perforation</i> CE
<ul style="list-style-type: none"> • <i>Injury to the UO</i> CE
<ul style="list-style-type: none"> • <i>Activating cutting instead of coagulation</i> CE
<ul style="list-style-type: none"> • <i>Failure to detach and remove resectoscope and camera</i> E
<ul style="list-style-type: none"> • <i>Failure to insert and attach the obturator to the sheath</i> E
<ul style="list-style-type: none"> • <i>Failure to remove all the instrument</i> E
<ul style="list-style-type: none"> • <i>Failure to perform a bimanual palpation if a muscle-invasive tumor is suspected</i> E
<ul style="list-style-type: none"> • <i>Failure to place a urinary catheter or Urethral damage while placing the urinary catheter</i> CE
<ul style="list-style-type: none"> • <i>Placement of the wrong urinary catheter</i> CE
<ul style="list-style-type: none"> • <i>Failure to inflate the balloon</i> CE
<ul style="list-style-type: none"> • <i>Failure to connect bladder irrigation</i> CE
<ul style="list-style-type: none"> • <i>Failure to check for a non-haematic outflow</i> CE
<ul style="list-style-type: none"> • <i>Failure to connect the catheter bag</i> E