

Mapping a competency-based surgical curriculum in urology: Agreement (and discrepancies) in the Canadian national opinion

Keith Francis Rourke, MD;¹ Andrew E. MacNeily, MD²

¹Divisions of Urology and Surgery, University of Alberta, Edmonton, AB, Canada; ²Department of Urological Sciences, University of British Columbia, Vancouver, BC, Canada

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Abstract

Introduction: Urology residency training in Canada is quickly evolving from a time-based to a competency-based model. We aim to better define core surgical competencies that would comprise a surgical curriculum and assess any discrepancies in opinion nationally.

Methods: A web-based survey was validated and sent to the 536 practicing members of the Canadian Urological Association (CUA) in August and October 2014. The survey consisted of questions regarding practice demographics, fellowship training, and evaluated the 76 most common urological procedures (using a five-point Likert scale) in the context of the question, "After completion of residency training in Canada a urologist should be proficient in..." A core procedure was defined as one for which there was $\geq 75\%$ agreement. Descriptive statistics and non-parametric testing were used to summarize the findings.

Results: A total of 138 urologists completed the survey (25.7% response rate) with representation from all geographic regions. Respondents included 40.6% community and 59.4% academic urologists. The survey identified 16 procedures with 90–100% agreement and a total of 30 core procedures with $\geq 75\%$ agreement. When comparing community and academic urologists, there was statistically significant disagreement on 27 procedures, including 11 core procedures, most notably cystectomy (88.5% agreement vs. 67.1%; $p=0.002$), open pyeloplasty (84.6% vs. 65.8%; $p=0.04$), simple prostatectomy (78.9% vs. 69.7%; $p=0.03$), perineal urethrostomy (80.8% vs. 67.1%; $p=0.02$), open radical prostatectomy (96.1% vs. 80.3%; $p=0.007$), and Boari flap (90.4% vs. 76.3%; $p=0.004$). Regional discrepancies were also found, demonstrating eight procedures deemed uniquely core and three core procedures deemed less important regionally.

Conclusions: This national survey has provided some consensus on 30 procedures that should comprise a core surgical curriculum in urology. However, there are some key differences of opinion (most notably between community and academic urologists) that must be considered.

Introduction

Urological training in Canada is changing. This is undeniable and related to work-hour restrictions, sub-specialization, disruptive technology, decreased surgical volume during residency training, and most recently, the planned transition to a competency-based training model beginning November 2015.¹⁻⁴ This will be a wholesale change from a traditional time-based model to a curriculum based on a competency model of education and assessment. Competency-by design (CBD), as coined by the Royal College of Physicians and Surgeons of Canada (RCPSC) is meant to represent a learning continuum beginning in residency then continuing through practice until retirement.⁵ This curriculum is designed to address societal health needs and globally address patient outcomes. This multiyear process will involve redefining the stages of specialist learning, redeveloping our clinical and surgical milestones, creating key entrustable professional activities (EPAs), and culminate in the development of robust assessment tools. Canadian urologists are not alone in this shift. The U.S. has already undergone a major change with the Accreditation Council for Graduate Medical Education (ACGME) Urology Milestones Project.^{6,7} A competency-based model of graduate medical education is also being adopted in other jurisdictions, such as Australia and Europe.^{8,9} Globally, this represents a shift toward the teaching and evaluation of resident performance within a set of core clinical competencies.

There has been considerable debate about what constitutes core clinical and procedural competencies.¹⁰⁻¹² In urology, the determination of surgical competence is based on the assessment of post-graduate trainees by teaching faculty, the program director, and at a national level, the Urology Specialty Committee of the RCPSC.¹³ The level of surgical competence is based on a list of specified surgical procedures categorized as an A, B, or C distinction. Category A is generally regarded as being the most important for certification, as it requires a trainee to demonstrate "competence to individually perform." It has been argued that the current surgical objectives in urology do not accurately reflect the

current standard of residency training and that residency programs should remove some key surgical competencies to reflect this discrepancy.¹⁰ Conversely, some educators feel that residency-training programs are not adequately preparing residents for surgical practice and a change in the teaching of core surgical competencies is long overdue in order to address these deficiencies.¹⁴ A curriculum change to a competency-based model represents an opportunity to address these deficiencies and better prepare residents for contemporary clinical practice. Given that training and evaluation of core surgical competencies will be resource-intensive and the term “competency” remains a somewhat vague concept, it behooves us to better define core surgical competencies for newly graduated urologists.^{15,16} We aim to define core surgical urology competencies in Canada and assess any discrepancies in the national opinion. Our hypothesis is that there will be general consensus among many urologists on what constitutes core surgical competencies, however, there is likely to be discrepancy among community and academic urologists.

Methods

An online survey based on the surgical objectives of the current RCPSC objectives of training in urology was designed in July 2014. In August 2014 the survey underwent test-retest validity among the members of the RCPSC Urology Specialty Committee. Then on two separate occasions in August and October 2014, all 536 practicing members of the Canadian Urological Association (CUA) were surveyed via email using the CUA member directory.

The survey was created using the REDCap web-based data capture application and received ethics approval through the University of British Columbia and University of Alberta Health Ethics Research boards. The survey consisted of 11 questions in both French and English (visit the online version of this article at www.cuaj.ca after June 15 for a sample of the questionnaire). Questions 1–5 focused on practice demographics, including level of practice, location of practice (British Columbia, Prairies, Ontario, Quebec, or Atlantic), number of years in practice, group vs. solo practice status, and population of the centre of practice. Questions 6–7 inquired about community vs. academic practice status and current resident training involvement. Questions 8–10 asked about completion and type of fellowship training.

The 11th question examined the 76 most common urological procedures based on the current RCPSC objectives of training in urology. This was done using a five-point Likert scale. Respondents were asked, “After completion of residency training in Canada a urologist should be proficient in...” and indicated their level of agreement ranging from strongly disagree to strongly agree. Procedures with $\geq 75\%$ agreement were defined as a core procedure. Agreement

among respondents was defined as answering either agree or strongly agree on the five-point Likert scale.

Descriptive statistics and non-parametric testing were used to summarize and analyze the findings for agreement and discrepancies. Statistical significance was set at a *p* value of 0.05.

Results

A total of 138 different urologists completed the survey for a 25.7% response rate. There was representation from all geographic regions in Canada, without any geographic discrepancy noted (Table 1). The majority of survey participants worked in a group practice environment (72.6%) and the survey included participation from urologists in both community (40.6%) and academic (59.4%) practice. This anecdotally appears consistent with CUA survey completion across Canada. The majority (72.6%) of respondents had pursued fellowship training, with endourology/stones, oncology, and pediatric urology being the three most commonly completed fellowships.

The survey identified 16 procedures with 90–100% agreement (Table 2) and another 14 procedures with $\geq 75\%$ agreement (Table 3). This constituted a total of 30 procedures that

Table 1. Demographics of survey respondents

Location of practice	% of respondents
British Columbia	16.4%
Prairies	12.5%
Ontario	40.6%
Quebec	18.7%
Atlantic	11.7%
Type of practice	
Community	40.6%
Academic	59.4%
Group	72.6%
Solo	27.4%
Fellowship status	
None	27.3%
Endourology/stones	15.6%
Oncology	14.8%
Pediatrics	12.5%
Minimally invasive surgery	8.6%
Female urology/ incontinence	8.6%
Reconstruction	3.9%
Transplant	3.9%
Andrology	3.1%
Other	1.6%
% of clinical practice spent working directly with residents	
$\leq 25\%$	46.1%
26–50%	7.8%
51–75%	16.4%
76–100%	29.7%

Table 2. 16 “definitely” core procedures with 90–100% agreement among Canadian urologists responding to the survey

Procedure	% agreement
Cystoscopy and insertion of stent	100%
Direct vision internal urethrotomy	100%
Transurethral resection of prostate	100%
Transurethral resection of bladder tumour	100%
Ureteroscopy and laser lithotripsy of ureteral stone	100%
Hydrocelectomy	100%
Radical orchiectomy	100%
Reduction of testicular torsion	100%
Circumcision	99.2%
Ureteroscopy and lithotripsy of renal stone	98.4%
Open cystostomy	98.4%
Open radical nephrectomy	97.7%
Vasectomy	96.1%
Distal cavernosal shunt	93.7%
Laparoscopic radical nephrectomy	93.7%
Pelvic lymph node dissection	93.0%

are most likely to represent core procedures among most Canadian urologists, using $\geq 75\%$ agreement as a cut-point for majority agreement.

There were 17 procedures identified as being “watershed” procedures, with 50–74% agreement that could, in the opinion of some, represent “core” urological procedures (Table 4). Nine of these watershed procedures were deemed core in some instances based on either a community urologist distinction or based on geographic disparity. The most notable procedures were laparoscopic adrenalectomy, laparoscopic pyeloplasty, pediatric inguinal hernia repair, laparoscopic partial nephrectomy, extracorporeal shockwave lithotripsy (ESWL), perineal urethrostomy, open adrenalectomy, open pyeloplasty, and simple prostatectomy.

When comparing community and academic urologists (Fig. 1), there was statistically significant disagreement on 27 procedures, including 11 core procedures, most notably radical cystectomy (88.5% agreement vs. 67.1%; $p=0.002$), open pyeloplasty (84.6% vs. 65.8%; $p=0.04$), simple prostatectomy (78.9% vs. 69.7%; $p=0.027$), perineal urethrostomy (80.8% vs. 67.1%; $p=0.016$), open radical prostatectomy (96.1% vs. 80.3%; $p=0.007$), and Boari flap (90.4% vs. 76.3%; $p=0.004$). In general, community-based urologists tended to rate procedures as core more often than their academic counterparts.

Several region-related discrepancies were also found for some core or potentially core procedures, including laparoscopic adrenalectomy, laparoscopic pyeloplasty, pediatric hernia repair, laparoscopic partial nephrectomy, ESWL, perineal urethrostomy, radical urethrectomy, open adrenalectomy, female mid-urethral sling, varicocelectomy,

Table 3. Additional procedures with $\geq 75\%$ agreement among survey respondents

Procedure	% agreement
Creation ileoconduit	89.1%
Open radical prostatectomy	86.7%
Drainage of perinephric abscess	86.7%
Open partial nephrectomy	85.2%
Partial penectomy	85.9%
Mid-urethral sling (female)	85.2%
Ureteroneocystostomy (reimplant)	83.6%
Open ureterolysis	82.8%
Varicocelectomy	82.0%
Insertion testicular prosthesis	82.0%
Boari flap	82.0%
TRUS biopsy	76.6%
Radical cystectomy	75.8%
Testes biopsy	75.8%

and transrectal ultrasound (TRUS) biopsy (Table 5). Most of these variations were unlikely to elevate or demote a procedure’s core status, with the exception of ESWL, which had a substantial discrepancy between Ontario and the remainder of Canada.

Discussion

As the practice and training of urology evolves in response to CBD and other factors, such as sub-specialization, regional variations in practice, and decreasing surgical volumes, it will be critically important to accurately define our core surgical competencies.^{1–5} CBD will represent several stages of resident training, including transition to residency, foundations of discipline, core of discipline, and transition-to-practice. At the end of the core of discipline, residents will write the RCPSC examination, with the final stage (transition-to-practice) designed to prepare residents for clinical practice. Given that the current surgical objectives may not accurately reflect the expectations of residents in training or may not adequately prepare residents for surgical practice, an opportunity to address these deficiencies in a competency-based surgical curriculum should be openly welcomed by urologists.¹⁴ Although surgical competency remains a vague concept and there has been much debate about what constitutes core procedural competencies, it is clearly important to better define our core surgical procedures.^{10–12,15,16} This has been done in the U.S. as part of the ACGME Outcome Project and in Canada by orthopedic surgery.^{6,7,17} This survey has identified 30 procedures that the majority ($\geq 75\%$) of urologists in Canada agree urology residents should be proficient in upon graduation. These procedures will likely comprise a large portion of the technical competencies taught and assessed in the core years of urology training (currently PGY2–4).

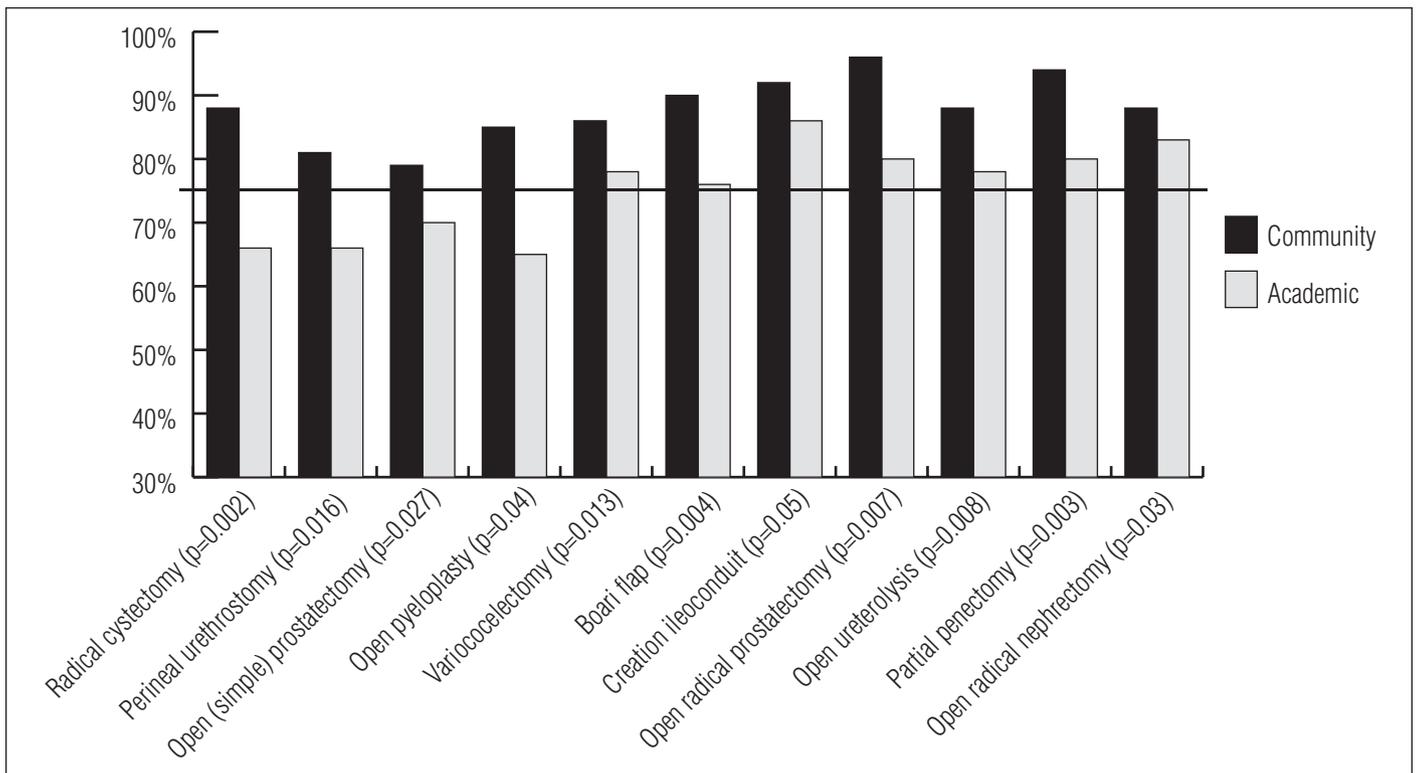


Fig. 1. Core procedures or potentially core procedures with significant discrepancies between community and academic urologists.

The survey also identified 17 procedures that represent a watershed in agreement among Canadian urologists. Many of these procedures, for example pyeloplasty, simple prostatectomy, adrenalectomy, and percutaneous nephrolithotripsy, likely have their place in residency training and com-

munity practice without further fellowship training. Training in these watershed procedures could conceivably occur during the transition-to-practice final phase of residency training in the CBD curriculum. Additionally, procedures that were not deemed core likely have their place in a competency-based core curriculum in order to teach core technical skills that make up overall surgical competency. For example, the penile anatomy, closure of corporotomy defects, and development of tissue planes learned during implantation of an inflatable penile prosthesis (a non-core procedure) would nonetheless be very applicable for a core procedure such as partial penectomy.

Although there was national agreement on 30 core procedures, there were discrepancies noted when comparing community and academic urologists, as well as significant geographic discrepancies. Procedures deemed core by community urologists that were not deemed core by the majority of respondents included open pyeloplasty, perineal urethrostomy, and simple prostatectomy. Some may argue that these procedures are no longer the standard of care, but it may be possible that certain procedures are unique and more common in the community urology setting. In some cases, residents interested in community practice may benefit from rotations in a community setting during residency training to better prepare them for practice. Nonetheless, these procedures deemed core by community urologists warrant careful consideration when designing a core surgical curriculum.

Table 4. 17 watershed procedures with 50–74% agreement among survey respondents

Procedure	% agreement
Open pyeloplasty	73.4%
Open simple prostatectomy	73.4%
Perineal urethrostomy	72.7%
Incision of ureterocele	71.9%
Uretero-ureterostomy	71.9%
Percutaneous nephrolithotripsy	68.0%
Orchidopexy	68.0%
Laparoscopic pyeloplasty	64.8%
Extracorporeal shock wave lithotripsy	58.6%
Open adrenalectomy	56.2%
Radical penectomy	55.5%
Pediatric hernia repair	54.7%
Endopyelotomy	52.3%
Laparoscopic partial nephrectomy	51.6%
Laparoscopic adrenalectomy	51.6%
Repair of vesicovaginal fistula	50.0%
Plication of Peyronie's curvature	50.0%

Table 5. Regional variations in core or potentially core procedures by respondents in specific regions of Canada

Procedure	Specific region (%)	Remaining regions (%)	p value
Laparoscopic adrenalectomy	British Columbia (76.2%)	46.7%	p=0.03
Laparoscopic pyeloplasty	British Columbia (76.2%)	53.7%	p=0.01
Pediatric hernia repair	British Columbia (85.7%)	43.0%	p=0.01
Laparoscopic partial nephrectomy	British Columbia (90.4%)	38.9%	p=0.002
Extracorporeal shock wave lithotripsy	British Columbia (76.2%), Prairies (81.3%), Atlantic (86.7%)	Ontario 28.8%	p<0.001
Perineal urethrostomy	British Columbia (100%), Atlantic (86.7%)	64.8%	p<0.01
Radical urethrectomy	Atlantic (80.0%)	43.4%	p=0.01
Open adrenalectomy	Atlantic (80.0%)	53.1%	p=0.03
Mid-urethral sling	Prairies (68.8%)	87.5%	p<0.001
Varicocelectomy	Ontario (73.1%), Atlantic (73.3%)	91.8%	p=0.001
Transrectal ultrasound biopsy	British Columbia (57.2%), Prairies (56.3%)	84.6%	p<0.001

Conversely, some procedures deemed core by the majority of respondents were not deemed core by academic urologists. For example, radical cystectomy was felt by 88.5% of community urologists to be a core procedure, while 67.1% of academic urologists felt this to be true. This may represent a move toward sub-specialization and regionalization of care in academic centres, which may not be present to the same extent in community centres. Although quite possibly many community centres may regionalize cystectomy care, this finding may represent a schism between community and academic practice patterns. Few would deny the value of radical cystectomy in residency training when it comes to learning the anatomy, principles, and techniques used in pelvic surgery.

There were also geographic discrepancies found for 11 procedures. In most cases non-core procedure were deemed core by certain regions in Canada. This may represent geographic differences in practice patterns throughout Canada and highlights the need for continuing professional development (CPD) after completion of residency in order to meet the demands of urologists practicing in locations that differ from their residency program. Of particular note is ESWL being deemed core by all regions except Ontario, which may require CPD training for urologists trained in Ontario, but practicing elsewhere in Canada.

Limitations of this study include a less than ideal response rate of 25.7%. Nonetheless, it likely represents a valid sampling of urologist opinion across Canada, with representation from all regions and types of practice. The list of core procedures was not randomly ordered in the web-based survey and this may have created the opportunity for respondent fatigue, resulting in a bias toward procedures listed earlier in the survey. However, core procedures with $\geq 75\%$ agreement were found throughout all parts of the survey, making substantial respondent fatigue unlikely. Lastly our cut-point

for a core procedure was somewhat arbitrarily decided as $\geq 75\%$ agreement among respondents. We have included the procedures with 50–74% agreement among urologists and analyzed discrepancies by practice type and region to ensure all possibilities were reported.

Conclusion

This national survey has provided some consensus on 30 procedures that should comprise a core surgical curriculum in urology. However, there are some key differences of opinion (most notably among community and academic urologists) that should be considered when developing a core surgical curriculum.

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Correspondence: Dr. Keith Rourke, Divisions of Urology and Surgery, University of Alberta, Edmonton, AB, Canada; krourke@ualberta.ca



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Appendix A: Web-based survey

Dear fellow CUA member:

The Postgraduate Educational Committee of the CUA needs your help. In order to develop a national curriculum for residency training we need your input. As you may be aware, the Royal College is changing the approach to residency training from a time-based model to a form of competency-based medical education. As a specialty, we need to define what the core surgical competencies are for newly minted urologists without further fellowship training. Please take a few moments to complete the survey on what you feel new graduates from our training programs need to be proficient in so that these future urologists meet the needs of your patient population. The results of this survey will shape our specialty and better define core.

Please complete the survey below.

Thank you!

Demographics

1. What is your current level of practice?
 - Resident
 - Fellow
 - Staff
 - Retired
2. Where in Canada do you currently practice?
 - British Columbia
 - Prairies (Alberta, Saskatchewan, Manitoba)
 - Ontario
 - Quebec
 - Atlantic (PEI, NB, NS, NFLD)
3. How many years have you been in practice?
 - 0
 - 1–5
 - 6–10
 - 11–20
 - 21–30
 - >30
4. Are you in a group or solo practice?
 - Group
 - Solo
5. What is the population of the centre you practice in?
 - <50 000
 - 51 000–100 000
 - 100 001–250 000
 - 250 001–500 000
 - 500 001–1 000 000
 - >1 000 000

Resident involvement and fellowship training

6. Do you consider yourself in a community or academic practice?
 - Community
 - Academic
7. What percentage of your clinical practice is spent working directly with residents?
 - 0%
 - 1–25%
 - 26–50%
 - 51–75%
 - 76–100%
8. Did you pursue fellowship training after residency?
 - Yes
 - No

Appendix A: Web-based survey (cont'd)

9. What was your area of fellowship training?

- Pediatric urology
- Endourology/stones
- Oncology
- Minimally invasive surgery
- Andrology/erectile dysfunction
- Female urology/urodynamics
- Reconstruction
- Transplant
- Other (Please specify): _____

10. What percentage of your current operative practice relates directly to your fellowship training?

- 0%
- 1–25%
- 26–50%
- 51–75%
- 76–100%

Core surgical procedures

11. Please rate each procedure in the context of the statement, "After completion of residency training in Canada a urologist should be proficient in:"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Cystoscopy and placement of ureteral stent					
Direct vision/endoscopic urethrotomy					
Transurethral resection of prostate					
Laser ablation or enucleation of the prostate					
Transurethral resection of bladder tumour					
Transurethral incision/resection of ureterocele					
Ureteroscopy and laser lithotripsy for ureteral calculi					
Ureteroscopy and laser lithotripsy for renal calculi					
Open suprapubic catheter placement					
Circumcision					
Correction of penile curvature (plication)					
Correction of penile curvature (grafting)					
Percutaneous nephrolithotripsy					
Testicular biopsy					
Repair of distal/glanular hypospadias					
Repair of proximal hypospadias					
Vasectomy					
Hydrocelectomy/spermatoclectomy					
Varicocelectomy					
Distal cavernosal shunt for priapism					
Proximal cavernosal shunt for priapism					
Pediatric inguinal hernia repair					
Orchidopexy for cryptorchidism					
Repair of testicular torsion					
Urethral sling for female stress incontinence					
Urethral sling for male sphincteric incontinence					
Ureteroneocystostomy					
Mobilization of a Boari flap					
Repair of vesicovaginal fistula					
Radical cystectomy					
Creation of ileal conduit					
Creation of neobladder					

Appendix A: Web-based survey (cont'd)**Core surgical procedures**

11. Please rate each procedure in the context of the statement, "After completion of residency training in Canada a urologist should be proficient in:"

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Pelvic lymph node dissection					
Open pyeloplasty					
Laparoscopic pyeloplasty					
Laparoscopic radical					
Open radical nephrectomy					
Open partial nephrectomy (for cancer)					
Laparoscopic partial nephrectomy (for cancer)					
Uretero-ureterostomy					
Open radical prostatectomy					
Laparoscopic radical prostatectomy					
Robot assisted laparoscopic prostatectomy					
TRUS biopsy of prostate					
Resection of posterior urethral valves					
Endopyelotomy					
Extra-corporal shockwave lithotripsy (ESWL)					
Open ureterolysis					
Cutaneous pyelostomy					
Creation of vesicostomy					
Vasovasostomy					
Perineal urethrostomy					
Trans-uretero-ureterostomy					
Inguinal lymph node dissection for penile cancer					
Radical penectomy					
Partial penectomy					
Radical urethrectomy					
Augmentation cystoplasty					
Continent diversion					
Drainage of perinephric or retroperitoneal abscess					
Living-related donor nephrectomy					
Open adrenalectomy					
Laparoscopic (or minimally invasive) adrenalectomy					
Insertion of testicular prosthesis					
Insertion of penile prosthesis					
Insertion of artificial urinary sphincter					
Open simple prostatectomy					
Radical nephrectomy with caval thrombectomy					
Laparoscopic orchidopexy					
Retroperitoneal lymph node dissection for testicular cancer					
Repair of bladder exstrophy					
Renal transplant					
Urethroplasty					
Epididymo-vasostomy					