APPENDIX

Supplementary Table 1. Guideline recommendations by CUA	
Question	**CUA**
What is the definition of phimosis?	Pathologic phimosis is an uncommon pediatric diagnosis (0.6–1.5% of boys) and is diagnosed by the presence of a whitish, fibrotic preputial ring. This is different from physiological phimosis, where gentle retraction during examination will show "flowering" or pouting of the preputial orifice and lack of the cicatricial ring.
What is the first-line treatment in symptomatic phimosis?	Topical steroids are the first-line treatment for persistent physiological phimosis requiring treatment with good success rates and low risk of complications.
How is phimosis treated surgically?	Alternative treatments, such as preputioplasty, dorsal slit, or steroid therapy, can be circumcision may be the only curative option when true phimosis is diagnosed. Topical steroids may be attempted, but depending on the severity of the scar tissue.
What is the best treatment for asymptomatic phimosis in infants with a risk of recurrent urinary tract infections?	In the absence of clinical findings of scarring suggesting pathological phimosis and history of recurrent urinary tract infections (UTIs) or balanoposthitis, no intervention is required for physiological phimosis. Indications for urological consultation in this age group include suspicion of true phimosis with evident scarring of the preputial ring, recurrent episodes of balanitis, genital lichen sclerosis, or UTI. If the foreskin is not open by 8–10 years of age, there may be an indication for steroid therapy and gentle retraction, though there is no prescribed, evidence-proven age cutoff for this process. Persistent physiological phimosis in an asymptomatic child should not be an indication for circumcision. Physiological phimosis requires treatment if associated with true balanoposthitis or recurrent UTIs. A stronger effect of neonatal circumcision in pre-venting UTIs in boys with urological abnormalities has been demonstrated and, therefore, it is recommended that a discussion with the parents is advisable for this subgroup of neonates.
How is pediatric paraphimosis treated?	Medical attention should be sought promptly so that the foreskin can be put back in the normal position. Treatment consists of manual compression of the edematous tissue with retraction of the foreskin over the glans penis. Dorsal incision of the constrictive ring may be required.
What is the definition of undescended testicle?	Cryptorchidism is one of the most common congenital anomalies in males, characterized by inability to palpate the testicle in the expected normal anatomical position (i.e. within its respective hemi-scrotum). It represents an abnormality of testicular descent and development associated with long-term concerns, including infertility, hypogonadism, and development of neoplasms.
What is the role of imaging studies in the investigation of undescended testicle?	Imaging in cryptorchidism is not cost-effective, may delay referral and surgical treatment, and as such cannot be recommended as a standard adjunct to preoperative assessment of the children.
When should treatment be initiated for undescended testicles?	Orchidopexy is recommended between six and 18 months of age.

What is the role of medical therapy for undescended testicle	Hormone therapy has a limited role in the management of cryptorchidism and should not be recommended as first-line therapy.
What is the surgical approach to non-palpable testes?	An important step in surgery is a thorough re-examination once the boy is under general anaesthesia, since a previously non-palpable testis might be identifiable and subsequently change the surgical approach to standard inguinal orchidopexy. Otherwise, the easiest and most accurate way to locate an intra-abdominal testis is diagnostic laparoscopy. In uncertain cases or when tissue analysis is not consistent with atrophic testicular tissue, laparoscopic exploration should be strongly considered.
What is the definition of a pediatric acute scrotum?	Acute scrotum is a paediatric urological emergency, most commonly caused by torsion of the testis or appendix testis, or epididymitis/epididymo-orchitis.
What is the approach to managing pediatric testicular torsion?	The diagnosis of torsion is best made by a careful history and physical exam, which is usually definitive. Imaging tests are usually not helpful, but can be done to rule out differential diagnoses, such as epididymitis, tense hydrocele, inguinoscrotal hernia, or torsion of testicular appendage if testicular torsion is not highly suspected. Ultrasound should not be done if there is a high clinical suspicion for testicular torsion, as it delays the surgery. Ultrasound will reveal absence of blood flow and an inhomogeneous parenchyma. Bell Clapper deformity is a transverse lie of the testis due to a high fixation in the scrotum. Patients with recurrent testicular torsion-detorsion should have elective bilateral scrotal orchidopexy to avoid a missed torsion and potential loss of the testis. The treatment of a confirmed testicular torsion is surgical. The patient is brought immediately to the operating room for midline scrotal exploration. If the testis is salvageable, a bilateral orchidopexy is done using sutures. If there is doubt about the testicular perfusion, a small incision in the tunica albuginea will help confirm the presence of bright arterial bleeding. A dead testis with signs of early necrosis of the epididymis is best managed with ipsilateral orchiectomy and pexy of the contralateral testis. Despite attempts to preserve a testis, it may progress to atrophy due to the ischemia. There is a theoretical time window of six hours from the onset of torsion to the surgery, which is believed to give the highest chance of testicular survival. Manual spermatic cord detorsion at the bedside is controversial, as it can make the torsion worse.
Should contralateral orchidopexy be performed for treatment of testicular torsion?	Contralateral orchidopexy is recommended for neonatal torsion, and for testicular torsion with an affected testicle requiring orchiectomy.
Does torsion of the appendix testis require surgery?	The treatment is conservative with anti-inflammatories and analgesics. Ultrasound may show a normal testis, good arterial flow, and an enlarged inflamed epididymis with hyperemia; a round avascular nodule represents the torted appendix.
What is the definition of hypospadias? How is it classified?	Hypospadias, a condition where the urethra opens on the underside of the penis with associated ventral penile curvature, is the second most common genital birth defect in boys, following cryptorchidism. The initial diagnosis of hypospadias is typically made after birth during physical exam, where boys with hypospadias are found to have a ventral skin deficiency with a dorsal hood of foreskin and an abnormally located meatus with varying degrees of ventral penile curvature. The standard classification of hypospadias is based on location of the urethral meatus: distal, midshaft, or proximal.

Which patients with hypospadias require complete work-up to exclude DSD (Differences in Sexual Development?	Approximately one-third of patients with proximal hypospadias and at least one undescended testicle (particularly if non-palpable) have a DSD. DSD has not been observed in patients with the association of distal hypospadias and UDT. Therefore, we recommend performing a karyotype in patients with at least one undescended testicle and proximal hypospadias, especially in the setting of non-palpable gonads. In cases of proximal hypospadias associated with unilateral or bilateral non-palpable cryptorchidism, disorders of sexual differentiation are noted in 17–29% of patients. Therefore, initial evaluation should include serum electrolytes, 17-hydroxyprogesterone (17-OHP), karyotype, abdominal ultrasound to assess for Mullerian structures, and endocrine referral.
What age is recommended for primary hypospadias repair?	Surgical intervention for hypospadias can be performed at any age, however, most authors recommend operative intervention at 6–18 months. The American Academy of Pediatrics suggests this time interval to limit psychological stress and subsequent behavioural problems seen in toddlers undergoing genital surgery. There are conflicting reports regarding whether increasing age at surgery leads to a higher complication rate.
What conditions should be monitored for in hypospadias repair follow-up?	Postoperative complications can usually be identified early on in the first few months after surgery in most cases, but long-term followup is mandatory because delayed presentation with a urethral fistula and recurrent curvature of the penis following puberty spurt have been documented. Postoperative assessments may include observed voiding and post-void residue assessments or formal uroflowmetry. The common complications following hypospadias repair include: 1.Urethrocutaneous fistula 2.Meatal stenosis 3.Urethral stenosis 4.Glans dehiscence 5.Urethral diverticulum or urethrocele, which can lead to infections and post-void dribbling 6.Cosmetic issues: Excess residual skin, skin tags, inclusion cysts, skin bridges, suture tracts 7.Hair-bearing urethra 8.Recurrent or persistent penile curvature 9.Spraying or misdirected urinary stream and/or irritative symptoms 10.Erectile dysfunction 11.Balanitis xerotica obliterans of the urethra leading to strictures.
How is VUR diagnosed?	Voiding cystourethrography (VCUG). Delayed imaging after the post-void image may be required if there is VUR into a dilated renal pelvis or ureter so as to assess for concomitant UPJO and UVJO. A cyclical study with at least two fill and void cycles will increase the detection of VUR. Nuclear cystography is more sensitive for VUR with less radiation exposure and is generally recommended for surveillance studies or, where indicated, sibling screening.
Do pediatric patients with VUR need continuous antibiotic prophylaxis?	According to the 2010 SFU consensus statement on HN (hydronephrosis), CAP (continuous antibiotic prophylaxis) should be recommended only for infants with HGHN and those with VUR.

What surgical options exist and are recommended for VUR?	SFU Grade 3–4, APD >15 mm with Abnormal Mag3 can be considered for surgery. Strong indications for reconstructive surgery include loss of DRF of >5% on serial renography or worsening HN with worsening drainage times on renography. In older children, flank pain or vomiting are also suggestive of obstruction, especially if exacerbated by fluid intake. Hypertension and renal calculi can rarely be signs of obstruction. Relative indications for surgery include UTI, low DRF on initial renogram, palpable giant HN, concern over non-compliance with followup imaging protocols, and family preference in cases of persistent HGHN requiring repeated renographic evaluation. Surgical treatment can be carried out by endoscopic injection of bulking agents or ureteral re-implantation.
How should low-grade VUR in pediatric patients be managed?	In a small RCT conducted on children <3 years with low-grade VUR (Grade 1–3) randomized to antibiotic prophylaxis and prophylaxis plus circumcision groups, the authors noted significantly lower positive peri-urethral cultures in the circumcised group up until nine months of followup, following which, results equalized. The authors also showed a significantly lower positive culture rate by urethral catheterization in the circumcised group, but did not comment these patients were symptomatic. Treatment should be focused on reducing UTI and observation. Followup with RBUS until at least 18months.
What type of stones do pediatric patients develop? What type is most common?	Dietary factors, such as sodium and purine intake, low urine volume, and climate are thought to play a role in increased stone risk. Obesity may not have the same effect on stone risk in children as it does in adults. Prematurity, medications (e.g., loop diuretics), and genetic factors also increase the risk of pediatric stone disease. In a population-based U.S. study, metabolic abnormalities in children were as follows: hypercalciuria (62%), hyperoxaluria (18%), and hypocitraturia (12%), with hyperuricosuria relatively rare compared to adults (9%). Calcium oxalate containing stones are most common in pediatric stone disease.
What is the initial approach to medical management in a pediatric patient with calcium stones?	Increase fluid consumption, decrease salt intake The optimal management of ureteral stones in children is dependent on patient and stone factors, similar to adults, but the anatomic spectrum of pediatric patients, and the subsequent management, varies much more widely. Unless there is an indication to intervene acutely, a trial of passage of at least two weeks is the first-line management in children with urolithiasis <5 mm. If urinary drainage is urgently required, ureteral stent insertion is preferred in children due to decreased complications compared to percutaneous decompression. Evidence suggests medical expulsion therapy in children may be effective and safe (alpha blockers).
What is the role of imaging in pediatric stone disease?	Due to concerns regarding radiation exposure in children, US is used more commonly than in adults as the first-line diagnostic modality when renal colic is suspected. However, similar to adults, there are sensitivity issues with US, in particular for mid-ureteral calculi. The addition of conventional radiography (KUB X-ray) can improve diagnostic accuracy, but as in adults, NCCT has the highest sensitivity and specificity. The use of ultra-low-dose NCCT can mitigate radiation exposure to levels similar to KUB X-ray, while maintaining diagnostic performance.
What metabolic evaluations are done for pediatric patients with stones?	An in-depth metabolic evaluation has historically been recommended in all children. In toilet-trained children, an in-depth evaluation with a 24-hour urine collection is recommended by most experts. In

	non-toilet-trained children, or when a 24-hour urine collection is not possible in a toilet-trained child, a spot or random urine collection may suffice. This would include a urinalysis, spot urine calcium, oxalate, citrate, cystine, protein, and uric acid. 1. Serum: Creatinine, sodium, potassium, calcium, albumin, uric acid, and bicarbonate, (Parathyroid hormone (PTH) level if high or high-normal serum calcium, or if idiopathic hypercalciuria with normocalcemia, Vitamin D level if PTH is elevated 2. 24-hour urine collection: Volume, creatinine, calcium, sodium, potassium, oxalate, citrate, uric acid, magnesium, Cystine if known or suspected cystine stone 3. Spot urine: Urinalysis with urine pH
Do all pediatric patients with stones require surgery?	Medical expulsion therapy is recommended for children with smaller (<5 mm) stones. Shockwave lithotripsy is a safe and effective option for ureteral stones in children. If ureteral dilation is required, passive dilation is preferred. It is recommended that ureteroscopes <8 French be used for ureteroscopy in children. Data does not support routine pre-stenting prior to URS in children. However, failed retrograde access is more common in children (30–70%) than adults. In these situations, pre-stenting and repeat URS after passive dilation may be preferable to active dilation with catheters, balloon dilators, and sheaths due to risk of significant ureteric trauma. This is especially true in younger children. Postoperative stenting should be performed at the discretion of the attending physician, with similar indications as in adults.

Supplementary Table 2. Guideline recommendations by AUA

Question	AUA
What is the definition of phimosis?	Phimosis: When the foreskin cannot be retracted behind the glans penis (which is a normal finding in children < 5 yrs). May be congenital or acquired; acquired is much more common and is caused by accumulation of smegma beneath the foreskin due to poor hygiene; may also be secondary to BXO or balanoposthitis. Histologic features: chronic inflammation, fibrosis, edema, and vascular congestion.
What is the first-line treatment in symptomatic phimosis?	In cases where BXO is not present and patients are symptomatic, topical application of steroid ointment can be utilized. There have been two randomized controlled trials evaluating topical steroids versus placebo for the treatment of phimosis with reported success rates between 50 and 74% utilizing different strengths of betamethasone with and without hyaluronidase. Our clinical practice is to utilize 0.1% betamethasone ointment along with gentle foreskin stretching three times a day for up to 2 months. In cases where medical therapy is not effective, circumcision, if elected by the parents, is curative.
How is phimosis treated surgically?	In cases where medical therapy is not effective, circumcision, if elected by the parents, is curative.
What is the best treatment for asymptomatic phimosis in infants with a risk of recurrent urinary tract infections?	In male infants, performing a circumcision or treating physiologic phimosis with a steroid cream may decrease risk of recurrent UTI.

How is pediatric paraphimosis treated?	Paraphimosis is considered a medical emergency. In most cases the paraphimosis can be manually reduced. Maneuvers to assist in this include a penile block for analgesia and oral or parenteral pain medication. Compression of the edematous foreskin may also help in reduction. Other methods that have been described include wrapping the penis in a gauze soaked with hyper-osmolar solution and making holes in the edematous foreskin with a needle to allow the tissues to drain. If conservative maneuvers are not successful a dorsal slit or circumcision may be required.
What is the definition of undescended testicle?	Cryptorchidism, or undescended testis (UDT), is defined as failure of a testis to descend into a scrotal position. This situation most commonly refers to a testis that is present but in an extrascrotal position, but may also lead to identification of an absent testis. In the latter situation, the testis is most commonly referred to as vanishing (or vanished); consistent with evidence suggesting that it was present initially but disappeared during development most likely due to spermatic cord torsion or vascular accident.
What is the role of imaging studies in the investigation of undescended testicle?	Providers should not perform ultrasound (US) or other imaging modalities in the evaluation of boys with cryptorchidism prior to referral as these studies rarely assist in decision making. At this time, there is no radiological test that can conclude with 100% accuracy that a testis is absent. Therefore, a surgical exploration, such as diagnostic laparoscopy (or open exploration), must be performed on all nonpalpable unilateral and many bilateral cryptorchid patients. Diagnostic laparoscopy is the gold standard with high sensitivity and specificity.
When should treatment be initiated for undescended testicles?	In the absence of spontaneous testicular descent by six months (corrected for gestational age), specialists should perform surgery within the next year. Orchidopexy in the first 18 months of life is recommended to preserve available fertility potential
What is the role of medical therapy for undescended testicle	Providers should not use hormonal therapy to induce testicular descent as evidence shows low response rates and lack of evidence for long-term efficacy.
What is the surgical approach to non-palpable testes?	In prepubertal boys with palpable, cryptorchid testes, surgical specialists should perform scrotal or inguinal orchidopexy. In prepubertal boys with nonpalpable testes, surgical specialists should perform examination under anesthesia to reassess for palpability of testes. If nonpalpable, surgical exploration and, if indicated, abdominal orchidopexy should be performed. At the time of exploration for a nonpalpable testis in boys, surgical specialists should identify the status of the testicular vessels to help determine the next course of action. In boys with a normal contralateral testis, surgical specialists may perform an orchiectomy (removal of the undescended testis) if a boy has a normal contralateral testis and either very short testicular vessels and vas deferens, dysmorphic or very hypoplastic testis, or postpubertal age.
What is the definition of a pediatric acute scrotum?	A list of potential medical conditions that can present as acute pain or swelling of the scrotum are found below: Ischemia: Torsion of the testis (synonymous with torsion of the spermatic cord) Intravaginal; extravaginal (prenatal or neonatal) Appendiceal torsion (of the appendix testis or appendix epididymis) Testicular infarction due to compressive hydrocele or hernia Testicular infarction due to other vascular insult (cord injury,thrombosis)

	Trauma: Testicular rupture Intratesticular hematoma, testicular contusion HematoceleInfectious conditions: Acute epididymitis Acute epididymo-orchitis Acute orchitis Abscess (intratesticular, paratesticular, scrotal skin, cutaneous cysts) Gangrenous infections (Fournier's gangrene) Infectious conditions: Acute epididymitis Acute epididymo-orchitis Acute orchitis Abscess (intratesticular, intravaginal, scrotal skin, cutaneous cysts) Gangrenous infections (Fournier's gangrene) Inflammatory conditions: Henoch-Schonlein purpura (HSP) vasculitis of scrotal wall Fat necrosis, scrotal wall Hernia: Simple, or incarcerated, strangulated inguinal hernia, with or without associated testicular ischemia Acute on chronic events: Spermatocele, rupture, hemorrhage or infection Hydrocele, rupture, hemorrhage or infection Testicular tumor with rupture, hemorrhage, infarction or infection Varicocele
What is the approach to managing pediatric testicular torsion?	When torsion is diagnosed, urgent surgical exploration and detorsion is mandated, as testicular torsion is a true vascular emergency. Testicular preservation is excellent when corrected within 4-6 hours of onset. Beyond 12 hours, the risk of subsequent testis atrophy is significant with detorsion. Testis salvage is often still appropriate if the testicular appearance at exploration improves with observation following detorsion, manually or otherwise. Manual detorsion is typically performed via the "opening the book" maneuver, as most testes torse toward the septum of the scrotum, however this should be considered an adjunct to definitive treatment. In the acute setting (<24 hours of symptom onset), detorsion should be attempted at the presenting institution when technically feasible, as in some studies, salvage rates are lower for patients who are transferred to another hospital.
Should contralateral orchidopexy be performed for treatment of testicular torsion?	In patients with torsion, it is assumed the bell-clapper deformity is bilateral, and thus the contralateral testis is delivered, confirmed to be in proper orientation, and then orchidopexy with permanent suture is performed to prevent torsion on that side.

Does torsion of the appendix testis require surgery?	This process is often self-limited, with the infarcted appendage undergoing atrophy with time, but can occasionally be intermittent. In general, pain control with over-the-counter pain medications (e.g., NSAIDs) is sufficient. Surgical exploration is generally not warranted, but if an exploration is pursued, the appendage is simply excised and no orchidopexy is needed.
What is the definition of hypospadias? How is it classified?	Hypospadias is fairly common, being found in about 1 in every 200 boys. It is a condition where the urethral opening (meatus) isn't at the tip of the penis. Instead, the opening may be any place along the underside of the penis. The meatus is most often near the end of the penis (which is called a "distal" position). In some cases, it can be on the middle of the penile shaft, the base of the penis or even within the scrotum (called "proximal" positions).
Which patients with hypospadias require complete work-up to exclude DSD (Differences in Sexual Development?	Difference of sex development (DSD) should be considered when hypospadias is associated with undescended testis (especially if bilateral or non-palpable) or with micropenis, or if severe. In such cases a karyotype and a hormonal work-up should be considered.
What age is recommended for primary hypospadias repair?	Surgeons prefer to do hypospadias surgery in full-term and otherwise healthy boys between the ages of 6 and 12 months. When this isn't possible, hypospadias can be fixed in children of any age, even in adults. If the penis is small, your doctor may suggest testosterone (male hormone) treatment before surgery.
What conditions should be monitored for in hypospadias repair follow-up?	Complications to monitor include: Recurrent curvature, preputial dehiscence or secondary phimosis, glans dehiscence, urethral fistula, urethral breakdown, meatal stenosis, urethral stricture, urethral stricture owing to BXO, urethral diverticulum, hairy urethra, abnormal skin configuration, skin deficiency
How is VUR diagnosed?	VUR is diagnosed with a voiding cystourethrogram (VCUG), with either radiopaque contrast medium or a nuclear radioisotope. An advantage of fluoroscopic VCUG over the nuclear cystogram at least for the initial study is that associated abnormalities such as bladder diverticula, bladder wall trabeculation, ureteral duplication, and urethral anomalies can be diagnosed.
Do pediatric patients with VUR need continuous antibiotic prophylaxis?	The AUA guideline recommends CAP for children under 1 year of age with a history of febrile UTI or dilating reflux (i.e, grades III-V) and children with VUR and BBD; CAP remains an option in other patients. There is little evidence or consensus about the management of VUR in older school-age patients or about the length of time that the clinician should observe a child non-operatively before recommending surgery. Treatment decisions must be carefully individualized after a thorough discussion of all the treatment options with the parents.
What surgical options exist and are recommended for VUR?	While the decision to perform anti-reflux surgery must be carefully individualized, indications for surgical correction of VUR include (1) progressive renal injury; (2) documented failure of renal growth; (3) breakthrough pyelonephritis; and (4) intolerance or non-compliance with antibiotic suppression. Other relative indications for correction of VUR are high grade (IV–V) reflux in young children after a year of conservative follow-up, pubertal age with nephropathy at diagnosis, parental preference, and failure to spontaneously resolve after a period of watchful waiting. Ureteral Reimplantation:

	The established principles of successful ureteral reimplantation include: (1) adequate ureteral exposure and mobilization; 2) meticulous preservation of the ureteral blood supply; and (3) creation of a valvular mechanism whose submucosal tunnel length to ureteral diameter ratio ideally exceeds 5:1. These goals can be attained by a variety of procedures, most commonly via an open Pfannenstiel approach, but can also be achieved laparoscopically or robotically. Endoscopic Anti-reflux surgery: In 1984, a minimally invasive endoscopic procedure for the correction of VUR was reported. This subureteral transurethral injection (STING) utilized polytetrafluoroethylene (Teflon) and has been used successfully outside the United States for many years. Many different injectable materials have subsequently been investigated and reported. This ambulatory procedure performed under a brief general anesthetic has low morbidity and children may return to full activity as soon as the next day. The initial success rates were promising; however, they did not match those of ureteral reimplantation
How should low-grade VUR in pediatric patients be managed?	Non-operative management (i.e., watchful waiting) of VUR is successful in many patients, particularly in asymptomatic patients with low-grade reflux. Good hydration, perineal hygiene, and bowel management are crucial and apply to all patients. The use of continuous antibiotic prophylaxis (CAP) is considered a non-specific approach for prevention of recurrent UTIs. se with low grade reflux. It is reasonable to observe an asymptomatic toilet-trained child with low-grade reflux and normal kidneys without antibiotic prophylaxis; however, the clinician must use caution in treating children with risk factors for recurrent UTI and renal scarring, including high grade VUR with bowel and bladder dysfunction.
What type of stones do pediatric patients develop? What type is most common?	Multiple genetic conditions predispose to kidney stone formation, particularly inborn errors of metabolism. These genetic conditions have highly variable pathogenetic mechanisms and include primary hyperoxaluria, cystinuria, and Lesch-Nyhan syndrome, among others. Calcium-oxalate stones are most common (70%)
What is the initial approach to medical management in a pediatric patient with calcium stones?	most medications for management or secondary prevention of nephrolithiasis that are used in adults are not FDA approved for those indications in children: (Thiazide diuretics, citrate supplementation, cysteine binders, pyridoxine, RNA inhibitors). Fluid intake is the most effective strategy in reducing future kidney stone formation, as supported by level 1 evidence arising from adult studies. While complementary studies in children are limited, the low risk of hydration-based strategies and proven evidence in adults leads to strong recommendations for fluid intake in all ages with some caveats. First, infants less than 12 months of age should not be provided free water and water intake should be judicious in younger children. Second, age-based recommendations via the Institute of Medicine (IOM). Dietary recommendations are founded in principles of improving urinary parameters for kidney stone risk. In adults, high-level evidence supports low salt, moderate calcium, low animal protein diets to reduce risk of kidney stones and similar to the fluid studies, many of these recommendations can be translated to children with important caveats. First, children should not be counseled to reduce their protein intake as their metabolic needs are different than adults, and it should be noted these dietary

	studies have not been reproduced in children. Second, calcium intake need vary in children and therefore moderate calcium diets should be specified so adolescents understand their recommended daily allowance of calcium actually may be greater than that of adults. However, sodium recommendations may be provided to children, as the risk of introducing reasonable sodium limitations in children is low and there may be benefits owing to the interactions of sodium and calcium reabsorption along the nephron.
What is the role of imaging in pediatric stone disease?	Ultrasound-first imaging strategies have been instituted at pediatric centers without demonstrable negative impact in missed diagnoses or emergency department revisits. For preoperative planning purposes or when first-line imaging is unclear, however, CT is an appropriate second-line option in children.
What metabolic evaluations are done for pediatric patients with stones?	Because children are at high risk to have an identifiable metabolic disorder and to develop a stone recurrence, all children with urolithiasis should be offered a metabolic evaluation in accordance with AUA guidelines, which should include a 24-hour urine chemistry. Notably, the AUA does not specifically identify age as an independent risk factor to be considered in evaluating an index stone event.
Do all pediatric patients with stones require surgery?	Surgical intervention is not always warranted. Observation can be done for asymptomatic patients with urolithiasis, as well as medical expulsive therapy. Ureteroscopy is an ideal treatment modality for multiple renal stones each less than 1 cm when intervention is deemed necessary. Larger stones can be approached utilizing ureteroscopy however stone free rates are lower as stone burden increases relative to more invasive technique such as percutaneous nephrolithotomy. AUA Guidelines recommend that in pediatric patients with a total renal stone burden ≤ 20 mm, clinicians may offer SWL or ureteroscopy as first-line therapy.

Supplemental Table 3 – Guideline Recommendations by EAU

Question	EAU
What is the definition of phimosis?	In phimosis the inability to retract the foreskin over the glans penis is due to a narrow ring in the prepuce. Several factors have been suggested to aid in the gradual dilation of this ring: histological changes in the prepuce, hormonal factors and stretching due to erections. While erections occur even antenatally, these may be insufficient to stretch the foreskin if it is relatively long, and therefore relative phimosis can be present for a prolonged period.
What is the first-line treatment in symptomatic phimosis?	Physiological phimosis and adhesions do not need treatment, unless there are accompanying urogenital abnormalities. Conservative medical treatment is a valid option for primary pathological phimosis. Topical corticoid (0.05-0.1%) can be administered twice a day over a period of 4-8 weeks with a success rate of > 80%. While all types of phimosis may respond to corticosteroid treatment, the success rate may be lower in pathological phimosis.

How is phimosis treated surgically?	The type of operative treatment of phimosis in children is dependent on the caregivers' preferences and can be preputioplasty or circumcision. In preputioplasty the objective is to preserve the prepuce while achieving a wider foreskin circumference with full retractability. Several surgical techniques have been described to achieve this goal: dorsal incision, partial circumcision, trident preputial plasty, combining two Z-plasties and Y-plasty
What is the best treatment for asymptomatic phimosis in infants with a risk of recurrent urinary tract infections?	In boys with increased risk of urinary tract infections (UTIs) due to congenital upper tract abnormalities, circumcision may be performed to reduce the risk of UTIs. Male circumcision significantly reduces the bacterial colonisation of the glans penis with regard to both non-uropathogenic and uropathogenic bacteria. However, resolution of phimosis by corticosteroid treatment may have similar results as it was also associated with substantial reduction in recurrent UTI in uncircumcised infants.
How is pediatric paraphimosis treated?	Treatment of paraphimosis consists of manual compression of the oedematous tissue with a subsequent attempt to retract the tightened foreskin over the glans penis. If this maneuver fails, a dorsal incision of the constrictive ring is required. Following acute redressing of the foreskin, additional treatment is recommended to correct any anomalies which increase the chance of recurrence. Patients should be counselled regarding prevention of paraphimosis by correctly redressing their foreskin after retraction.
What is the definition of undescended testicle?	A true undescended testis is on its normal path of descent but is halted on its way down to the scrotum. Depending on the location, the testes may be palpable or not, as in the case of testes arrested in the inguinal canal
What is the role of imaging studies in the investigation of undescended testicle?	Imaging studies cannot determine with certainty that a testis is present or not. Ultrasound (US) lacks the diagnostic sensitivity to detect the testis confidently or establish the absence of an intra-abdominal testis. Consequently, the use of different imaging modalities, such as US or magnetic resonance imaging (MRI), for undescended testes is limited and only recommended in specific and selected clinical scenarios (e.g., identification of Müllerian structures in cases with suspicion of DSDs.
When should treatment be initiated for undescended testicles?	Treatment should be started at the age of six months. After that age, undescended testes rarely descend. Any kind of treatment leading to a scrotally positioned testis should be finished by twelve months, or eighteen months at the latest, because histological examination of undescended testes at that age has already revealed a progressive loss of germ cells and Leydig cells.
What is the role of medical therapy for undescended testicle	Hormonal therapy using hCG or gonadotropin-releasing hormone (GnRH) is based on the hormonal dependence of testicular descent, but has a limited success rate of only 20%. However, it must be taken into account that almost 20% of these descended testes have the risk of re-ascending later. In general, success rates depend on testicular location. The higher the testis is located prior to therapy, the lower the success rate, suggesting that testicular position is an important determinant of success. Some authors recommend combined hCG-GnRH treatment. Unfortunately, it is poorly documented and the treatment groups were diverse. Some studies reported successful descent in up to 38% of non-responders to monotherapy. The Panel consensus is that endocrine treatment to achieve testicular descent is not recommended.
What is the surgical approach to non-palpable testes?	An important step in surgery is a thorough re-examination once the boy is under general anaesthesia, since a previously non-palpable testis might be identifiable and subsequently change the surgical

	approach to standard inguinal orchidopexy. Otherwise, the easiest and most accurate way to locate an intra-abdominal testis is diagnostic laparoscopy. Subsequent removal or orchidolysis and orchidopexy can be carried out using the same approach to achieve the therapeutic aims. Some tend to start with inguinal surgical exploration, with possible laparoscopy during the procedure. If an ipsilateral scrotal nubbin is suspected, and contralateral compensatory testicular hypertrophy is present, a scrotal incision with removal of the nubbin, thus confirming the vanishing testis, is an option avoiding the need for laparoscopy. During laparoscopy If there is a vanishing testis, the procedure is finished once blind-ending spermatic vessels are clearly identified. If the vessels enter the inguinal canal, an atrophic testis may be found upon inguinal exploration or a healthy testis that needs to undergo standard orchidopexy. A peeping testis can be placed down in the scrotum laparoscopically or via an inguinal incision. Placement of an intra-abdominal testis can sometimes be a surgical challenge. Usually, testes lying > 2 cm above the internal inguinal ring may not reach the scrotum without division of the testicular vessels. Under such circumstances, a Fowler-Stephens orchidopexy may be an option.
What is the definition of a pediatric acute scrotum?	Acute scrotum is a paediatric urological emergency, most commonly caused by torsion of the testis or appendix testis, or epididymitis/epididymo-orchitis. Other causes of acute scrotal pain are idiopathic scrotal oedema, mumps orchitis, varicocele, scrotal haematoma, incarcerated hernia, appendicitis or systemic disease (e.g. Henoch-Schönlein purpura). Trauma can also be a cause of acute scrotum due to post-traumatic haematomas, testicular contusion, rupture, dislocation or torsion. Scrotal fat necrosis has also been reported to be an uncommon cause of mild-to-moderate scrotal pain in pre-pubertal overweight boys after exposure to cold.
What is the approach to managing pediatric testicular torsion?	Manual detorsion of the testis is done without anaesthesia, and should be attempted in all patients if possible, because it is associated with improved surgical salvage rates. It should initially be done by outward rotation of the testis - like opening a book -, unless the pain increases or if there is obvious resistance. Success is defined as the immediate relief of all symptoms and normal findings at physical examination. Bilateral orchiopexy is still required after successful detorsion. This should not be done as an elective procedure, but rather immediately following detorsion. External cooling before exploration may be effective in reducing ischaemia reperfusion injury and preserving the viability of the torsed and the contralateral testis.
Should contralateral orchidopexy be performed for treatment of testicular torsion?	During exploration, fixation of the contralateral testis is also performed. It is good clinical practice to also perform fixation of the contralateral testis in prenatal and neonatal torsion, although there is no literature to support this, and to remove an atrophied testicle. Recurrence after orchidopexy is rare (4.5%) and may occur several years later. There is no consensus recommendation about the preferred type of fixation and suture material.
Does torsion of the appendix testis require surgery?	Torsion of the appendix testis can be managed non-operatively with the use of anti-inflammatory analgesics. Surgical exploration is done in equivocal cases and in patients with persistent pain. Although metachronous torsion of the appendix testis may occur in up to 8.5%, it is not necessary to explore the contralateral side, given the benign nature of the problem.

What is the definition of hypospadias? How is it classified?	Hypospadias are usually classified based on the anatomical location of the proximally displaced urethral orifice: 1. distal-anterior hypospadias (located on the glans or distal shaft of the penis and the most common type of hypospadias); 2. intermediate-middle (penile); 3. proximal-posterior (penoscrotal, scrotal, perineal).
Which patients with hypospadias require complete work-up to exclude DSD (Differences in Sexual Development?	Severe hypospadias with unilaterally or bilaterally impalpable testis, or with ambiguous genitalia, requires a complete genetic and endocrine work-up immediately after birth to exclude DSD, especially congenital adrenal hyperplasia.
What age is recommended for primary hypospadias repair?	The age at surgery for primary hypospadias repair is usually 6-18 (24) months. Age at surgery is not a risk factor for urethroplasty complication in pre-pubertal tubularised incised plate urethroplasty (TIP) repair. Complication rate after primary TIP repair was 2.5 times higher in adults than in the paediatric group according to a recent prospective controlled study.
What conditions should be monitored for in hypospadias repair follow-up?	Long-term follow-up is necessary up to adolescence to detect urethral stricture, voiding dysfunctions and recurrent penile curvature, diverticula, glanular dehiscence. Up to half of complications requiring re-operation present after the first year post-operatively. Obstructive flow curve is common after hypospadias repair and while most are not clinically significant, long-term follow-up is required. Urine flow is significantly lower in patients after hypospadias surgery, especially in those who had corrected chordee, but without significant association with lower urinary symptoms.
How is VUR diagnosed?	The diagnostic work-up should aim to evaluate the overall health and development of the child, the presence of UTIs, renal status, the presence of VUR, and LUT function. A basic diagnostic work-up comprises a detailed medical history, physical examination including blood pressure measurement, urinalysis (assessing proteinuria), urine culture, and serum creatinine in patients with bilateral renal parenchymal abnormalities. The standard imaging tests include renal and bladder US, VCUG and nuclear renal scans. Ultrasound and VCUG could be considered as complementary techniques. The criterion standard in diagnosis of VUR is VCUG, especially at the initial work-up. Radionuclide studies for detection of reflux have lower radiation exposure than VCUG, but the anatomical details depicted are inferior. Recent studies on alternative imaging modalities for detection on VUR have yielded good results with voiding US and magnetic resonance VCUG. Contrast enhanced voiding urosonography (ceVUS) with intravesical instillation of different ultrasound contrast agents has been shown to be highly sensitive giving comparable results with conventional VCUG while avoiding exposure to ionising radiation. However, despite the concerns about ionising radiation and its invasive nature, conventional VCUG still remains the gold standard because it allows better determination of the grade of VUR and assessment of the bladder and urethral configuration
Do pediatric patients with VUR need continuous antibiotic prophylaxis?	Offer close surveillance without antibiotic prophylaxis to children presenting with lower grades of reflux and without symptoms. It is clear that antibiotic prophylaxis may not be needed in every reflux patient. Trials show the benefit of CAP is none or minimal in low-grade reflux. Continuous antibiotic prophylaxis is useful in patients with grade III and IV reflux in preventing recurrent infections but its

	use in preventing further renal damage is not proven. Toilet-trained children and children with LUTD derive better benefit from CAP. The benefit of prophylaxis was insignificant in patients with grade III or IV VUR and in the absence of LUTD.
What surgical options exist and are recommended for VUR?	Surgical treatment can be carried out by endoscopic injection of bulking agents or ureteral re-implantation. With the availability of biodegradable substances, endoscopic subureteric injection of bulking agents has become an alternative to long-term antibiotic prophylaxis and open surgical intervention in the treatment of VUR in children. High-grade VUR in infants can be treated with injection therapy and the resolution rate is higher than that of prophylaxis. However, this can not be recommended for all high-grade infants with VUR since not all are symptomatic and also resolution or downgrading can be achieved with favourable conditions such as unilaterality, grade IV and low residual urine. Various intra- and extravesical techniques have been described for the surgical correction of reflux. The most popular and reliable open procedure is cross trigonal re-implantation described by Cohen. Alternatives are suprahiatal reimplantation (Politano-Leadbetter technique) and infrahiatal re-implantation (Glenn-Anderson technique). If an extravesical procedure (Lich-Gregoir) is planned, cystoscopy should be performed pre-operatively to assess the bladder mucosa and the position and configuration of the ureteric orifices.
How should low-grade VUR in pediatric patients be managed?	There is no evidence that correction of persistent low-grade reflux (grades I-III) without symptoms and normal kidneys offers a significant benefit. Treatment should be focused on LUTD and reducing UTI.
What type of stones do pediatric patients develop? What type is most common?	More than 70% of stones in children contain calcium oxalate, while infectious stones are found more frequently in younger children. Stones are classified as: Calcium stones, Uric acid stones, Cystine stones, infection stones (struvite).
What is the initial approach to medical management in a pediatric patient with calcium stones?	Initial management is always to increase fluid intake and urinary flow. Dietary modification is a mandatory part of effective therapy. The child should be referred to a dietician to accurately assess the daily intake of calcium, animal protein, and sodium. Dietary sodium restriction is recommended as well as maintenance of calcium intake consistent with the daily needs of the child. A brief trial of a low calcium diet can be carried out to determine if exogenous calcium intake and/or calcium hyperabsorption is contributing to high urinary calcium. Any recommendation to restrict calcium intake below the daily needs of the child should be avoided. Moreover, low calcium intake is a risk factor for stone formation. Hydrochlorothiazide and other thiazide-type diuretics may be used to treat idiopathic hypercalciuria, especially with calcium renal leak.
What is the role of imaging in pediatric stone disease?	Generally, US should be used as a first approach. Renal US is very effective for identifying stones in the kidney. Many radiopaque stones can be identified with a simple abdominal flat-plate examination. The most sensitive test for identifying stones in the urinary system (especially for ureteric stones) is non-contrast helical CT scanning. It is safe and rapid, with 97% sensitivity and 96% specificity. Despite its high diagnostic accuracy, because of the potential radiation hazards, its use should be reserved for cases with non-informative US and/or plain abdominal radiographs. Low dose protocols have also been developed with the goal of reducing radiation dose with adequate image quality. Intravenous pyelography is rarely used in children, but may be needed to delineate the caliceal anatomy prior to percutaneous or open surgery.

What metabolic evaluations are done for pediatric patients with stones?	Metabolic evaluation includes: 1. family and patient history of metabolic problems and dietary habits; 2. analysis of stone composition (following stone analysis, metabolic evaluation can be modified according to the specific stone type); 3. electrolytes, blood/urea/nitrogen (BUN), creatinine, calcium, phosphorus, alkaline phosphatase, uric acid, total protein, carbonate, albumin, and parathyroid hormone (if there is hypercalcaemia); 4. spot urinalysis and urine culture, including ratio of calcium to creatinine; 5. urine tests, including a 24-hour urine collection for calcium, phosphorus, magnesium, oxalate, uric acid citrate, protein, and creatinine clearance; 6. 24-hour cystine analysis if cystinuria is suspected (positive sodium nitroprusside test, cystine stone, cystine hexagonal crystals in urine).
Do all pediatric patients with stones require surgery?	Observation may be considered for small stones in asymptomatic patients. Medical expulsion therapy is an option for small stones. Shockwave lithotripsy is the first choice for surgically treating most renal paediatric stones. However, ureteroscopic management or percutaneous renal surgery should be used for larger and complex stones.