DESCRIPTION OF COURSE UNIT FOR DOCTORAL STUDIES AT VILNIUS UNIVERSITY

Scientific Area/eas, Field/ds of Science	Medical and Health Sciences (M 000): Medicine (M 001)			
Faculty, Institute, Department/Clinic	Faculty of medicine Institute of Clinical Medicine Clinic of Children's Diseases			
Course unit title (ECTS credits, hours)	**Paediatric Nephrology** 6 kreditai (162 val.)			
Study method	**Lectures**	**Seminars**	**Consultations**	**Self-study**
Number of ECTS credits	-	0.5	0.5	5
Method of the assessment (in 10 point system)	An oral exam with three questions according to the question bank prepared in Clinic of Children's Diseases which is regularly revieqed and prepared by lecturers responsible for the program.			

PURPOSE OF THE COURSE UNIT

To introduce the peculiarities of urinary tract anatomy and function in children, its syndromes, terminology of kidney and urinary tract, as well as their diseases: etiology, clinical features, novel diagnostic and management methods, genetic characteristics and prevention.

THE MAIN TOPICS OF COURSE UNIT

Anatomical and functional peculiarities of urinary tract in children. Glomerular circulation and function. Anatomy of urinary tract. Functions of urinary tract: filtration, secretion, concentration, hormonal.

Evaluation of urinary tract in children. Laboratory (biochemical, immunological), instrumental, imaging and genetic tests, and evaluation of their results.

Fluid and electrolyte balance. Homeostasis. Calcium, phosphate, potassium, magnesium and sodium balance. Acid-base balance and its disorders. Disorders of electrolytes and acid-base balance. Genetics of fluid and electrolyte balance disorders.

Nephrological syndromes in childhood. Leukocyturia, hematuria, proteinuria, poliuria, anuria, hypoisosteuria, azotemia, hypertension, edema and their clinical relevance.

Pediatric urinary tract infection (UTI). Morbidity, etiology, risk factors, clinical features, imaging, differential diagnosis, treatment. UTI prophylaxis.

Acquired glomerulopathies in childhood. Morbidity, etiology, principal pathophysiological mechanisms. Most relevant clinical and morphological forms: post-infectious glomerulonephritis, membranous nephropathy, C3 glomerulopathy, rapidly progressing glomerulonephritis, IgA nephropathy, dense deposit disease. Diabetic nephropathy. Kidney diseases manifesting with nephrotic syndrome (NS): minimal change NS, focal segmental glomerulosclerosis. Steroid resistant, dependent and sensitive NS. Genetic diagnostics. Diagnostics, histological differentiation and treatment of glomerulopathies. Long-term outcomes of glomerulopathies.

Systemic diseases with kidney involvement. IgA vasculitis, systemic lupus erythematosus, ANCA-associated vasculitis. Immunological diagnostics. Immunosuppressive therapy. Prognosis.

Tubulointerstitial nephritis. Etiology, clinical and laboratory diagnostics, treatment. Toxic and drug-induced and nephropathies.

Inherited kidney diseases. Congenital NS. Alport syndrome; Cystic kidney diseases: autosomal dominant polycystic kidney disease, autosomal recessive polycystic kidney disease, juvenile nephronophtisis. Fabry disease.
Tubulopathies. Distal renal tubular acidosis. Proximal renal tubular acidosis. Genetic diseases manifesting with Fanconi syndrome: Dent's disease, cystinosis, tyrosinemia type I, galactosemia, Lowe syndrome. Mixed renal tubular acidosis. Bartter syndrome. Gitelman syndrome. Renal glucosuria. Nephrogenic diabetes insipidus.
Pediatric nephrolithiasis. Pathophysiology and risk factors. Diagnostic algorithm of nephrolithiasis. Monogenic causes of nephrolithiasis. Prevention of nephrolithiasis in children.
Disorders of calcium balance. Vitamin D resistant rickets; hypervitaminosis D; infantile hypercalcemia.
Disorders of phosphorus balance. X-linked hypophosphatemic rickets.
Congenital anomalies of kidney and urinary tract. Most common forms. Kidney dysplasia and hypoplasia, vesicoureteral reflux and its grades, hydronephrosis. Cystic dysplasia. Syndromes and kidney anomalies. Diagnostics and management approaches. Genetic predisposition.
Arterial hypertension. Epidemiology, etiology, pathophysiology, differential diagnosis. Evaluation of a child with elevated blood pressure. Ambulatory blood pressure monitoring. Pharmacological and non-pharmacological management. Target organ damage.
Urination disorders. Daytime urinary incontinence and nocturnal enuresis. Neurogenic bladder. Monosymptomatic and non-monosymptomatic nocturnal enuresis. Psychological and psychiatric aspects of urination disorders. Dysfunctional urination. Diagnostics and urodynamic investigations. Pharmacological therapy, urotherapy.
Acute kidney injury. Most common causes, clinical features and course, outcomes. Types: pre-renal, renal, post-renal. Neonatal acute kidney injury and its management. Conservative therapy, indications for kidney replacement therapy. Hemolytic-uremic syndrome, its forms and outcomes. Genetic diagnostics. Medication prescription in children with impaired kidney function.
Chronic kidney disease. Most common causes in childhood, clinical features, laboratory features. Chronic kidney disease stages. Renal osteodystrophy, growth impairment, acidosis, anemia, renal hypertension. Hepatorenal syndrome. Nutritional and pharmacologic management. Immunization of children with chronic kidney disease.
Kidney replacement therapy. Indications for kidney replacement therapy and its modalities. Pediatric peritoneal dialysis and its peculiarities. Automated peritoneal dialysis. Peritonitis. Advantages of hemodialysis, contraindications. Immunological work-up before and after kidney transplantation. Follow-up of children after kidney transplantation. Intensive care early after kidney transplantation, transplantation stages. Immunosuppression after kidney transplantation. Complications of kidney transplantation. Acute kidney transplant rejection. Chronic kidney transplant rejection. Infections and immunosuppression.
Medications and kidney. Medication nephrotoxicity. Contrast imaging and kidneys.

RECOMMENDED LITERATURE SOURCES

1. KDIGO CKD Work Group. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. Kidney Int Suppl 2013; 3: 1–150.

2. Kidney Disease: Improving Global Outcomes (KDIGO) Glomerular Diseases Work Group. KDIGO 2021 Clinical Practice Guideline for the Management of Glomerular Diseases. Kidney Int. 2021 Oct;100(4S): S1-S276.
3. Okarska-Napierała M, Wasilewska A, Kuchar E. Urinary tract infection in children: Diagnosis, treatment, imaging - Comparison of current guidelines. J Pediatr Urol. 2017 Dec;13(6):567-573.
4. Savige J, Lipska-Zietkiewicz BS, Watson E, Hertz JM, Deltas C, Mari F, Hilbert P, Plevova P, Byers P, Cerkauskaite A, Gregory M, Cerkauskiene R, Ljubanovic DG, Becherucci F, Errichiello C, Massella L, Aiello V, Lennon R, Hopkinson L, Koziell A, Lungu A, Rothe HM, Hoefele J, Zacchia M, Martic TN, Gupta A, van Eerde A, Gear S, Landini S, Palazzo V, Al-Rabadi L, Claes K, Corveleyn A, Van Hoof E, van Geel M, Williams M, Ashton E, Belge H, Ars E, Bierzynska A, Gangemi C, Renieri A, Storey H, Flinter F. Guidelines for Genetic Testing and Management of Alport Syndrome. Clin J Am Soc Nephrol. 2022 Jan;17(1):143-154.
5. Gimpel C, Bergmann C, Bockenhauer D, Breysem L, Cadnapaphornchai MA, Cetiner M, Dudley J, Emma F, Konrad M, Harris T, Harris PC, König J, Liebau MC, Marlais M, Mekahli D, Metcalfe AM, Oh J, Perrone RD, Sinha MD, Titieni A, Torra R, Weber S, Winyard PJD, Schaefer F. International consensus statement on the diagnosis and management of autosomal dominant polycystic kidney disease in children and young people. Nat Rev Nephrol. 2019 Nov;15(11):713-726.
6. Guay-Woodford LM, Bissler JJ, Braun MC, Bockenhauer D, Cadnapaphornchai MA, Dell KM, Kerecuk L, Liebau MC, Alonso-Peclet MH, Shneider B, Emre S, Heller T, Kamath BM, Murray KF, Moise K, Eichenwald EE, Evans J, Keller RL, Wilkins-Haug L, Bergmann C, Gunay-Aygun M, Hooper SR, Hardy KK, Hartung EA, Streisand R, Perrone R, Moxey-Mims M. Consensus expert recommendations for the diagnosis and management of autosomal recessive polycystic kidney disease: report of an international conference. J Pediatr. 2014 Sep;165(3):611-7.
7. Lurbe E, Agabiti-Rosei E, Cruickshank JK, Dominiczak A, Erdine S, Hirth A, Invitti C, Litwin M, Mancia G, Pall D, Rascher W, Redon J, Schaefer F, Seeman T, Sinha M, Stabouli S, Webb NJ, Wühl E, Zanchetti A. 2016 European Society of Hypertension guidelines for the management of high blood pressure in children and adolescents. J Hypertens. 2016 Oct;34(10):1887-920.
8. Trepiccione F, Walsh SB, Ariceta G, Boyer O, Emma F, Camilla R, Ferraro PM, Haffner D, Konrad M, Levtchenko E, Lopez-Garcia SC, Santos F, Stabouli S, Szczepanska M, Tasic V, Topaloglu R, Vargas-Poussou R, Wlodkowski T, Bockenhauer D. Distal renal tubular acidosis: ERKNet/ESPN clinical practice points. Nephrol Dial Transplant. 2021 Aug 27;36(9):1585-1596.
9. Konrad M, Nijenhuis T, Ariceta G, Bertholet-Thomas A, Calo LA, Capasso G, Emma F, Schlingmann KP, Singh M, Trepiccione F, Walsh SB, Whitton K, Vargas-Poussou R, Bockenhauer D. Diagnosis and management of Bartter syndrome: executive summary of the consensus and recommendations from the European Rare Kidney Disease Reference Network Working Group for Tubular Disorders. Kidney Int. 2021 Feb;99(2):324-335.
10. Boyer, O., Schaefer, F., Haffner, D. et al. Management of congenital nephrotic syndrome: consensus recommendations of the ERKNet-ESPN Working Group. Nat Rev Nephrol (2021).
11. IPNA clinical practice recommendations for the diagnosis and management of children with steroid-resistant nephrotic syndrome. Pediatr Nephrol 2020; 35: 1529-1561
12. Urinary stone disease. In: Tekgul S, Riedmiller H, Gerharz E, Guidelines on paediatric urology. Arnhem: European Association of Urology, European Society for Paediatric Urology. 2015, 51-58. Prieiga per internetą: http://uroweb.org/guideline/paediatric-urology/
13. Critical Care Pediatric Nephrology and Dialysis: A Practical Handbook. Springer, 2019; 378 p.; eBook ISBN 978-981-13-2276-1

14. Paediatric Nephrology (3 ed.). Oxford University Press, 2019; 719 p. ISBN 9780198784272
15. Comprehensive Pediatric Nephrology. Mosby, 2008; 1076 p. ISBN 978-0-323-04883-5

CONSULTING LECTURERS
1. Coordinating lecteurer: Augustina Jankauskiene (Prof. Dr.).
2. Rimante Cerkauskiene (Prof. Dr.).
3. Karolis Ažukaitis (Assist. Prof. Dr.)
APPROVED:
By Council of Doctoral School of Medicine and Health Sciences at Vilnius University: 29th of September 2022
Chairperson of the Board: Prof. Janina Tutkuvienė