

MEDTEC SCHOOL

Course: Organ system disease 2: Kidney and Genito-urinary system

Year (1st-2nd-3rd-4th-5th-6th): __4th__

Period (1st-2nd semester – annual): __1st semester__

Credits: __5__

Objectives

Nephrology:

This module is designed to provide comprehensive teaching of the pathophysiology and clinical aspects of kidney diseases, electrolytes and acid-base disorders.

The most recent diagnostic and therapeutic tools in the management of patients with kidney diseases, included innovations in dialysis, will be discussed.

Students are invited to refer to the textbooks to deepen the issues covered in the lessons.

Urology:

This module will provide a complete overview on Urology diseases (diagnosis and preoperative

Contents

NEPHROLOGY

Lesson 1 – Introduction to Nephrology

- x Describe the physiology and the major functions of the kidneys:
 - o excretion of waste products
 - o control of body fluids and pressure
 - o electrolyte homeostasis and acid-base balance
 - o production of hormones
- x Discuss glomerular filtration rate (GFR) regulation under physiological and pathological conditions (e.g. intravascular volume depletion or fluid overload)
- x Discuss how GFR is measured or estimated, knowing the pros and cons of estimated GFR formulas
- x Collect a detailed clinical history and perform an in-depth physical examination in order to diagnose renal diseases and their causes
- x Discuss the causes and the differential diagnosis between acute and chronic kidney dysfunction
- x Describe normal and pathological urinalysis and normal and pathological urine sediment
- x Recall the main immunological investigations required for the diagnosis of some causes of intrinsic acute renal failure

Lesson 2 – Imaging of the urinary tract

- x Describe the main techniques used to assess the genitourinary tract (conventional radiography and intravenous urography/pyelography, ultrasound, computed tomography, magnetic resonance, kidney scintigraphy)
- x Discuss how kidney function may be evaluated with kidney scintigraphy
- x Briefly describe the main radiological alterations in nephrology: kidney cysts and masses, nephrolithiasis, kidney infections, renal artery stenosis, prostatic disease
- x Describe the radiological appearance at renal ultrasound of the kidneys in chronic kidney disease

Lesson 3 – Extracellular Fluid Volume and Sodium Disorders

- x Describe causes, clinical features, diagnostic approach and principles of therapy of disorders of sodium and water homeostasis (hypernatremia and hyponatremia)
- x Discuss the forces involved in edema formation
- x Describe the pathogenesis of edema. Discuss how edema forms in congestive heart failure, cirrhosis and nephrotic syndrome
- x Discuss the rationale and the clinical use of diuretics in fluid overload and edema

Lesson 4a – Potassium disorders

- x Describe causes, clinical features, diagnostic approach and principles of therapy of hyperkalemia and hypokalemia

Lesson 4b – Calcium and Phosphorus Disorders

- x Describe the physiology of calcium and phosphorus metabolism

- x Describe the renal involvement in systemic vasculitides, with particular attention to the etiopathogenesis and to the natural history and prognosis of these diseases
- x Briefly discuss the epidemiology, etiopathogenesis and clinical features of systemic lupus erythematosus (SLE)
- x Describe renal involvement in SLE (lupus nephritis)
- x Describe the renal histopathological patterns of vasculitis and SLE
- x Describe the main therapies for SLE and its prognosis
- x Discuss anti-GBM disease
- x Define pathogenesis of monoclonal gammopathy of renal significance (MGRS), focusing on the different types of renal involvement in B-cell or plasma-cell clonal disorders
- x Discuss how to evaluate patients with suspected MGRS
- x Discuss the management of MGRS

Lesson 9 – Acute Kidney Injury(AKI): overview and Pre-renal AKI

- x Define AKI considering its current classification (KDIGO Clinical Practice Guideline for Acute Kidney Injury)
- x Discuss the current epidemiology of AKI, considering the differences between community- and hospital-acquired AKI
- x Describe symptoms and signs of AKI and those of the conditions that can precipitate it
- x List the most threatening consequences of AKI that may require an urgent dialytic treatment
- x Describe the etiopathogenetic classification of AKI (pre-renal, intra-renal, post-renal), bearing in mind the principal causes of AKI in each category
- x Describe the diagnostic approach to a patient with AKI
- x Describe the pathophysiological bases of kidney damage in pre-renal AKI
- x Describe the main causes, the diagnostic approach and the principles of therapy of pre-renal AKI
- x Discuss what options are available for volume resuscitation and the guiding principles behind intravenous fluid replacement

Lesson 10 – Acute Kidney Injury(AKI): intra:Tp €

- x Discuss the most relevant aspects in the preparation of CKD patients for renal replacement therapies
- x Describe the effects of CKD on mineral metabolism, including secondary and tertiary hyperparathyroidism and renal osteodystrophy
- x Discuss the major therapeutic approaches to bone disorders in CKD
- x Discuss the clinical features of anemia in CKD patients
- x Discuss the therapeutic approaches to anemia in CKD, including erythropoiesis-stimulating agents (ESAs)
- x Discuss the pathophysiological basis of cardiovascular disease in CKD

Lesson 14 – Cystic Diseases and Other Hereditary Kidney Disorders

- x Define the clinical criteria for diagnosis of autosomal dominant polycystic kidney disease (ADPKD) and describe the pathogenesis and clinical history of ADPKD, autosomal recessive polycystic disease, cystic disease of the renal medulla, and acquired cystic kidney disease
- x Describe inherited disorders associated with generalized dysfunction of the proximal tubule (renal tubular acidosis [RTA] type 2 and Fanconi syndrome)
- x Describe inherited disorders associated with specific distal tubule transport defects (RTA Type 1 and 4, Bartter syndrome, Gitelman syndrome, Liddle syndrome)
- x Describe the epidemiology, clinical presentation and clinical course of Alport syndrome and Fabry disease

Lesson 15 – Dialysis

- x Briefly describe the features of hemodialysis and peritoneal dialysis, recalling the underlying physical principles
- x Briefly describe the continuous renal replacement therapy types, recalling the underlying physical principles
- x Describe the types of vascular access for hemodialysis

Lesson 16 -Technical approach to the renal replacement therapy: circuit, membrane and prescription in acute and chronic kidney disease

- x Describe the dialysis circuit, focusing on its components and their functioning
- x Discuss the indications for dialysis in the setting of AKI and CKD

Lesson 17 – Kidney Transplantation

- x Briefly describe kidney transplantation, knowing the steps and the procedures that precede the transplantation
- x Describe the pathophysiology of the different types of rejection (hyperacute, acute and chronic; cellular and antibody-mediated) in kidney allotransplantation
- x Describe the main pathologic events other than acute rejection that can occur in the early and in the late post-transplant period
- x Describe the immunosuppressive drugs used to protect transplanted kidney from rejection, outlining pros and cons of these drugs

Lesson 18 – Conclusion of the Nephrology Module (students' questions, clinical cases, exam simulation)

- x Learn how to discuss a clinical case
- x Self-assessment

UROLOGY

Lesson 1 Urothelial carcinoma

- x Describe the epidemiology and main aetiological factors at the basis of urothelial carcinomas
- x Discuss the clinical manifestations of bladder and upper urinary tract carcinomas
- x Describe the diagnostic work of haematuria
- x Understand the pathological distinction and natural history of non-invasive bladder cancer and muscle-invasive bladder cancer
- x Overview of the main treatment options available for non-invasive bladder cancer (transurethral resection, intravesical chemotherapy)
- x Overview of the natural history of invasive bladder cancer and the available treatments

Lesson 2 Kidney tumors

- x Overview of the natural history of kidney cancer and the surgical and medical treatments available
- x Describe the epidemiology and clinical manifestations of renal cancer
- x Define the pathological classification and natural history of benign and malignant renal cancer including renal cyst classification.
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- x Describe the main treatment options for localized prostate cancer
- x Describe the natural history of advanced prostate cancer and medical therapy available

Lesson 5 Testicular and Penile Cancer

- x Describe the epidemiology of testicular and penile cancer
- x Describe the main characteristics of testicular cancer: clinical manifestations, risk factors, histological classification
- x Describe the main characteristics of penile cancer: clinical manifestations, risk factors, histological classification
- x Describe the diagnostic work of patients with testicular and penile cancer
- x Describe the therapies available for testicular cancer: surgery, including orchiectomy, retroperitoneal lymph node dissection, subsequent therapies and systemic therapies
- x Describe the therapies available for penile cancer: surgery, including local and lymph management and systemic therapies

Lesson 6 Urinary Tract Infection

- x Describe the epidemiology of urinary tract infections (UTI), their pathogenesis and risk factors
- x Describe how to classify infections from an anatomical and clinical perspective
- x Describe the clinical presentations of UTI and the most frequently associated pathogens
- x Define the approach of a patient with UTI, describing the diagnostic work including laboratory and imaging tests
- x Define the main therapeutic options in patients with UTI

SURGERY

LESSON 1 : Preoperative management of patients undergoing surgery

- Describe the management of patients before surgery, evaluation of risk factor for complication, selection of the right candidate for surgery, prehabilitation, nutritional status, the emotional status as a proxy of complications.

LESSON 2 Intraoperative and postoperative management (minimally invasive surgery and enhanced recovery pathway)

- Describe an operative room set up and tools for minimally invasive approach, basic concepts and definition of minimally invasive surgery, impact of minimally invasive surgery on body homeostasis, advantages of laparoscopic surgery, patients selection in minimally invasive surgery, concept of single incision laparoscopy and possible advantages over multiport laparoscopy, basic concepts of enhanced recovery program after surgery (management of pain, thrombosis risk, postoperative ileus).

LESSON 3 Intraoperative fluid administration during general surgery

Oral exam: student scoring at least 60% in the written exam may, optionally, access the oral exam in order to redefine the final score for whole the module. The oral exam is a discussion of one key topic in Nephrology, Urology and General Surgery. The student will possibly also be asked to contextualize these topics in a clinical case.

Texts

- x National Kidney Foundation Primer on Kidney Diseases, 8th Edition, Elsevier (recommended)
- x Comprehensive Clinical Nephrology, 6th Edition, Elsevier (just for the deepening of selected topics)

Online resources

- x