

**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 Anesthesiology and Intensive Care			
Course unit title (ECTS credits, hours)	Multiple Organ System Failure 10 credits (270 hours)			
Study method	Lectures	Seminars	Consultations	Self-study
Number of ECTS credits	-	-	1	9
Method of the assessment (in 10 point system)	Written and oral exam. Two questions from the block of questions are answered in written form, followed by an oral discussion. The assessment is as follows: 10 (Excellent): Excellent performance, outstanding knowledge and skills. 9 (Very good): Strong performance, good knowledge and skills. 8 (Good): Above the average performance, knowledge and skills. 7 (Highly satisfactory): Average performance, knowledge and skills with unessential shortcomings. 6 (Satisfactory): Below average performance, knowledge and skills with substantial shortcomings. 5 (Sufficient): Knowledge and skills meet minimum criteria.			
PURPOSE OF THE COURSE UNIT				
To provide theoretical and practical knowledge based on the latest research-based knowledge on the causes of disorders of vital organ functions, pathological physiology, diagnostics, prognosis of critically ill patients and intensive therapy.				
THE MAIN TOPICS OF COURSE UNIT				
<p><u>Introduction.</u> Historical review of multiple organ dysfunction syndrome (DODS). Definition and classification of organ failure. Innate immunity and inflammatory response.</p> <p><u>Pathological physiology of organ system disorders.</u> Disruption of the balance of coagulation activation and inhibition. Immunosuppression and apoptosis. Inflammation mediators. Cellular factors. Humoral mediators. Laboratory markers of infection and inflammation: procalcitonin, CRP. Local inflammation. Systemic inflammatory response.</p> <p><u>Pathological physiology of organ dysfunction.</u> Criteria for impairment of major organ systems. Organ dysfunction assessment systems (SOFA, LODS, MODS and others), their significance for prediction.</p> <p><u>Shock.</u> Hemodynamic features of various shocks. Classification, diagnostic and general principles of treatment.</p> <p><u>Septic shock.</u> Haemodynamic disorders in septic shock. Systemic and regional blood flow.</p> <p><u>Monitoring and treatment of septic shock.</u> Objectives and tactics of septic shock treatment. Early, goal-directed treatment of septic shock. Infusion therapy, objectives and monitoring. Choice of infusion solutions. Crystalloid and colloidal solutions. Blood transfusion therapy. Efficacy and complications of infusion and transfusion therapy. Vasopressors, inotropes and corticosteroids for the treatment of septic shock.</p> <p><u>Sepsis and acute respiratory distress.</u> Acute respiratory distress syndrome. Clinical symptoms, diagnosis, Etiological factors and developmental risk, pathogenesis, epidemiology, outcomes.</p> <p><u>Treatment of respiratory disorders.</u> Non-invasive ventilation, its methods and techniques. Artificial lung ventilation. Acute lung injury due to artificial lung</p>				

ventilation. Lung-friendly ventilation. Positive end-expiratory pressure (PEEP). Permissive hypercapnia. Changing the position of the patient's body. Disconnection from an artificial lung ventilator. Tracheostomy. Infusion therapy. Corticosteroids. Nitric oxide. Surfactant and other treatments. Extracorporeal membrane oxygenation.

Systemic inflammatory response syndrome in critically ill patients. Significance for the development of organ dysfunction. Risk factors for multiple organ dysfunction syndrome. Development of multiple organ dysfunction syndrome in severe trauma. Significance of primary and secondary damage in the development of multiple organ dysfunction syndrome.

Epidemiology of multiple organ dysfunction syndrome, risk factors, and outcome in therapeutic and surgical patients. Systemic inflammatory response in case of trauma, infection and extracorporeal circulation. The body's response to injury, activation and release of mediators. Mediators that promote and inhibit inflammation. The role of cytokines and endocrine hormones in apoptosis. Bacterial translocation through the intestinal wall, its significance for the development of multiple organ dysfunction syndrome. Ischemic and reperfusion injury, components and prevention.

Monitoring of vital signs. Monitoring of patients with multiple organ dysfunction syndrome in the intensive care unit. Possibilities of hemodynamic monitoring in severe illness.

Cardiovascular dysfunction, etiology, characterization and classification. Oxygen transport in critically ill patients. Effects of inflammatory factors on cardiac function.

Nosocomial infection in the intensive care unit. Pathogens of hospital acquired pneumonia, pathophysiology, diagnosis, treatment and prevention. Catheter related bloodstream nosocomial infection, pathogenesis, pathogens, diagnosis, treatment and prevention.

Peritonitis, pathophysiology, pathogens, diagnosis and treatment, significance for the development of multiple organ dysfunction syndrome.

Etiology, pathophysiology, diagnosis and treatment of organ systems disorders.

Cardiovascular system dysfunction, etiology, pathophysiology, diagnosis, prevention and treatment. Renal impairment, etiology, pathophysiology, diagnosis, prevention and treatment. Central nervous system dysfunction, etiology and pathophysiology. Disseminated intravascular coagulation syndrome, etiology, pathophysiology, diagnosis and treatment. Hepatic impairment, etiology, pathophysiology, diagnosis and treatment. Modulation of the hypermetabolic response after injury and burns. Clinical nutrition: parenteral and enteral nutrition. The role of enteral nutrition in the prevention of the syndrome. New methods for the treatment and prevention of multiple organ dysfunction syndrome.

Coronavirus disease and multiple organ dysfunction. Peculiarities, principles of diagnosis and prevention.

RECOMMENDED LITERATURE SOURCES

1. Mark F. Newman, Lee A. Fleisher, Clifford Ko, Michael Mythem. Perioperative Medicine. Managing for Outcome. 2nd edition, 2021:

<https://www.elsevier.com/books/perioperative-medicine/newman/978-0-323-56724-4>

2. Andrew Lumb, Caroline Thomas. Nunn and Lumb`s Applied Respiratory Physiology. 9th edition, 2020:

<https://www.elsevier.com/books/nunn-and-lumb's-applied-respiratory-physiology/978-0-7020-7908-5>

3. Andrew D. Bersten, Jonathan M. Handy. Oh`s Intensive Care Manual. 8th edition, 2018:

<https://www.elsevier.com/books/ohs-intensive-care-manual/bersten/978-0-7020-7221-5>

4. Jennifer Pai Lee, Pharm D. ICU Quick Drug Guide. 1st edition, 2020:

<https://www.store.elsevierhealth.com/asia/icu-quick-drug-guide-9780323680479.html>

5. Clifford S. Deutschman, Patrik J. Neligan. Evidence-Based Practice of Critical Care. 3rd edition, 2019:
<https://www.elsevier.com/books/evidence-based-practice-of-critical-care/deutschman/978-0-323-64068-8>
6. Jean-Louis Vincent, Edward Abraham, Frederick A. Moore, Patrick M. Kochanek, Mitchell P. Fink. Textbook of Critical Care. 7th edition, 2016:
<https://www.elsevier.com/books/textbook-of-critical-care/vincent/978-0-323-37638-9>
7. Joseph E. Parrillo, R. Phillip Dellinger. Critical Care Medicine. Principles of Diagnosis and Management in the Adult. 5th edition, 2018:
<https://www.elsevier.com/books/critical-care-medicine/parrillo/978-0-323-44676-1>
8. John G. Toffaletti, Craig R. Rackley. Blood Gases and Critical Care Testing. Physiology, Clinical Interpretations, and Laboratory Applications. 3rd edition, 2021:
<https://www.elsevier.com/books/blood-gases-and-critical-care-testing/toffaletti/978-0-323-89971-0>
9. Polly E. Parsons, Jeanine P. Wiener-Kronish, Renee D. Stapleton, Lorenzo Berra. Critical Care Secrets. 6th edition, 2018:
<https://www.elsevier.com/books/critical-care-secrets/978-0-323-51064-6>
10. Zalalem Temesgen, Larry M. Baddour, Stacey Rizza. A Rational Approach to Clinical Infectious Diseases. A Manual for House Officers and Other Non-infectious Diseases Clinicians. 1st edition, 2020:
<https://www.elsevier.com/books/a-rational-approach-to-clinical-infectious-diseases/978-0-323-69578-7>
11. Adnan I. Qureshi, Omar Saeed, Uzma Syed. Coronavirus Disease. From Origin to Outbreak. 1st edition, 2021:
<https://www.elsevier.com/books/coronavirus-disease/qureshi/978-0-12-824409-8>
12. Ron M. Walls, Robert S. Hockberger, Marianne Gausche-Hill. Rosens` s Emergency Medicine. Concepts and Critical Practice. 9 th edition, 2017:
<https://www.elsevier.com/books/rosens-emergency-medicine-concepts-and-clinical-practice/walls/978-0-323-35479-0>

ONLINE:

13. Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021:
<https://link.springer.com/article/10.1007/s00134-021-06506-y>

CONSULTING LECTURERS

1. Coordinating lecturer: Jūratė Šipylaitė (Prof. Dr. HP).
2. Donata Ringaitienė (Assoc. Prof. Dr.).
3. Saulius Vosylius (Assoc. Prof. Dr.).
4. Andrius Klimašauskas (Assoc. Prof. Dr.).
5. Mindaugas Šerpytis (Assoc. 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