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FACULTY OF MEDICINE No.2

STUDY PROGRAM 0912.1 MEDICINE

CHAIR OF ANESTHESIOLOGY AND REANIMATOLOGY No. 1 „VALERIU GHEREG”

APPROVED

at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum

Faculty Medicine

Minutes No. 7 of 6.03.18

Chairman, Associated professor,

D.habil.Med.Sc.

Suman Serghei

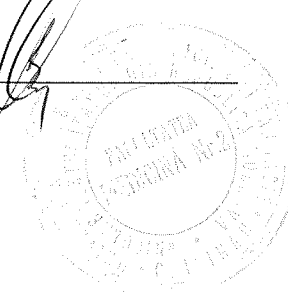
APPROVED

at the Council meeting of the Faculty of Medicine No 2

Minutes No. 6 of 20.03.18

Dean of Faculty, Associated professor,
D.Med.Sc.

Bețiu Mircea



APPROVED

approved at the meeting of the chair of Anesthesiology and reanimatology No.1 „Valeriu Ghereg”

Minutes No. 4 of 29.12.2017

Head of chair, Associated professor, D.Med.Sc.

Șandru Serghei

SYLLABUS

DISCIPLINE ANESTHESIOLOGY AND INTENSIVE CARE

Type of course: **Compulsory**

Chișinău, 2017



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I. INTRODUCTION

- **General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional / specialty training program**

Anesthesiology and intensive care is a medical speciality concerned with care of patients before, during and after surgery as well as with the diagnosis and management of life-threatening conditions (acute respiratory failure, acute heart failure, kidney injury, liver failure, shock, acute consciousness disorders, hydroelectrolytic and acid-base disturbances).

- **Mission of the curriculum in professional training**

The aim of Studying Anesthesiology and intensive care is to acquire knowledge and some practical skills necessary to carry out general and locoregional anesthesia as well as managing critically ill patients.

- **Languages of the course:** Romanian, Russian, English, French.
- **Beneficiaries:** students of the V year, faculty Medicine No.2.

II. MANAGEMENT OF THE DISCIPLINE

Code of discipline		S.10.O.092	
Name of the discipline		ANESTHESIOLOGY AND INTENSIVE CARE	
Person(s) in charge of the discipline		Serghei Șandru , Associated Professor, D.Med.Sc.	
Year	V	Semester	X
Total number of hours, including:			
Lectures	16	Practical hours	20
Seminars	20	Self-training	28
Clinical internship			6
Form of assessment	DC	Number of credits	3

III. TRAINING AIMS WITHIN THE DISCIPLINE

At the end of the discipline study the student will be able to:

- **at the level of knowledge and understanding:**
 - to know the definition and principles of care of critically ill patients;
 - to know the organizational structure of Anesthesia and Intensive Care Units;
 - to know the components of general anesthesia;
 - to know simple anesthetic techniques (general and locoregional anesthesia);
 - to have a basic understanding of anesthetics agents and anesthesia equipment;
 - to know the etiology, pathophysiology, classification, clinical signs and symptoms, treatment of acute respiratory failure;



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- to know the etiology, pathophysiology, classification, clinical signs and symptoms, treatment of acute heart failure;
- to understand different types of shock (hypovolemic, cardiogenic, distributive, obstructive);
- to know types of fluids and blood components;
- to know general principles of nutrition support in ICU patients;
- to know the most common causes of consciousness disorders and mechanisms regulating intracranial pressure, determinants of cerebral blood flow, management of the comatose patient, criteria for diagnosis of brain death;
- to know acid-base and water-electrolyte disturbances and their clinical significance;
- to know the etiology, clinical manifestations and intensive care of patients with acute liver failure;
- to know the mechanisms of acute kidney injury and intensive care of patients with acute kidney injury;
- to know the principles of pain assessment and principles of analgesic use in the treatment of acute pain.

- ***at the application level:***

- to be able to identify patients with acute respiratory and heart failure, shock and coma patients, as well as patients with acute liver failure and acute kidney injury;
- to be able to manage airway obstruction;
- to be able to ventilate the patient with self-inflating balloon;
- to be able to perform oxygen therapy;
- to be able to interpret monitored parameters in critically ill patients;
- to be able to interpret acid-base and hydroelectrolytic disturbances;
- to be able to assess pain syndrome using specific basic tools and questionnaires tailored to special patient groups (communicable adult / elderly, noncommunicable adult / elderly, child).

- ***at the integration level:***

- to be able to make connections with basic medical sciences;
- to be able to make connections between anesthesiology and intensive care and other clinical disciplines;
- to keep professional development continuous.

IV. PROVISIONAL TERMS AND CONDITIONS

Anesthesiology and intensive care is an interdisciplinary speciality. In order to learn this discipline, a good knowledge of human physiology and pathophysiology, pharmacology, surgery, internal medicine, emergency medicine is essential. Professors during lectures and practical classes make connections with such basic medical sciences as anatomy, human physiology and pathophysiology, biochemistry (discussing structural and functional changes at molecular, cellular, and organ systems level), clinical pharmacology (drugs, mechanisms of action) - horizontal integrations as well as vertical - surgery, internal medicine, emergency medicine, imaging (identification of diseases that can lead to the development of critical states, diagnosis methods, general principles of management).



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V. THEMES AND ESTIMATE ALLOCATION OF HOURS

Lectures, practical hours/seminars and self-training

No. d/o	THEME	Number of hours			
		Lectures	Seminars	Practical hours	Self-training
1.	The organization of Anesthesia and Intensive Care units. Management principles of the critically ill patient.	0	2	3	0
2.	General and locoregional anesthetics.	2	2	3	4
3.	Acute pain management	1	0	0	0
4.	Acute respiratory failure. High fidelity simulation at the University Center of Simulation in Medical Training (clinical scenario "Anaphylaxis") .	2	3	2	4
5.	Monitoring of cardiovascular function. Acute heart failure. High fidelity simulation at the University Center of Simulation in Medical Training (clinical scenarios "Cardiogenic shock in acute coronary syndrome" and "Acute heart failure in hypertensive crisis") .	2	2	3	4
6.	Transfusion and fluid therapy. Nutrition support in the critically ill patients.	2	0	0	2
7.	Shock. High fidelity simulation at the University Center of Simulation in Medical Training (clinical scenario "Sepsis and septic shock") .	2	3	2	4
8.	Hydroelectrolytic and acid-base disturbances.	2	3	2	4
9.	Acute consciousness disorders. Brain death. High fidelity simulation at the University Center of Simulation in Medical Training (clinical scenario "Severe traumatic brain injury") .	2	2	3	4
10.	Acute liver failure.	0	2	1	1
11.	Acute kidney injury	1	1	1	1
12.	Practical training	6			
		16	20	20	28
Total		90			



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VI. REFERENCE OBJECTIVES OF CONTENT UNITS

Objectives	Content units
Theme 1. The organizational structure of Anesthesia and Intensive Care Units. Management principles of the critically ill patient.	
<ul style="list-style-type: none"> to know the definition of critically ill patients; to know criteria for ICU admission; to know the role and responsibilities of anesthesiologists and intensive/critical care doctors. 	<p>Definition of critically ill patients. Management principles of the critically ill patient. The organizational structure of Anesthesia and Intensive Care Units.</p>
Theme 2. General and locoregional anesthesia.	
<ul style="list-style-type: none"> to know the definition of anesthesia; to know the basic components of general anesthesia and drugs used for general anesthesia; to be able to perform orotracheal intubation on the manikin; to know ASA Physical Status Classification System and Mallampati score; to be able to select an anesthesia method and to carry out pre-anesthetic assessment; to know the anatomical aspects of epidural and spinal anesthesia; to know local and regional anesthesia techniques; to know local anesthetics, classification, mechanism of action and side effects; to know major complications of general and locoregional anesthesia. 	<p>Basic components of general anesthesia. Inhalational and intravenous anesthetics. Muscle relaxants: types, mechanism of action. Opioid analgesics. Pre-anesthetic assessment and premedication. Preoperative assessment and medication. ASA Physical Status Classification System. Phases of general anesthesia. Monitoring during anesthesia. Local anesthetics: mechanism of action. Differential nerve block. Classification and comparison of local anesthetics. Loco-regional anesthesia techniques. Spinal anesthesia. Epidural anesthesia. Complications of general and locoregional anesthesia.</p>
Theme 3. Acute pain management.	
<ul style="list-style-type: none"> to be aware that "pain is the fifth vital sign", "Access to pain management is a fundamental human right"; to know the problem of pain. to know the national and international pain organizations; to know the terms "nociception", "pain", „nociceptive pain”, „neuropathic pain” and semiology of the pain syndrome; to be able to diagnose acute and chronic pain syndromes; to be able to use pain assessment tools; to know general principles of pain management; 	<p>IASP pain terminology (nociception, pain, nociceptive pain, neuropathic pain, somatic pain, visceral pain, cancer pain, hyperalgesia, allodynia, hyperpathia). General principles of management of acute and chronic pain. The physiology of nociception. Modulation of pain, adaptive and maladaptive neuroplasticity. Theories of pain (intensive theory, specificity theory, gate control theory, neuromatrix theory). Tools and questionnaires for acute pain assessment in special patient groups (children,</p>



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Objectives	Content units
<ul style="list-style-type: none"> to know the general principles of acute pain management; to know the myths about pain and pain management. 	<p>communicable adult/elderly, noncommunicable adult/elderly).</p> <p>Principles of acute pain management. The biopsychosocial approach to pain.</p> <p>Pharmacological and non-pharmacological interventions for pain management.</p> <p>Analgesic drugs combinations in the treatment of pain.</p> <p>Multidisciplinary treatment of pain.</p>
Theme 4. Acute respiratory failure. High fidelity simulation at the University Center of Simulation in Medical Training (clinical scenario „Anaphylaxis”).	
<ul style="list-style-type: none"> to know the definition of hypoxemic and hypercapnic respiratory failure; to know the pathophysiology of acute respiratory failure; to know arterial O₂ content equation; to know the management of patients with acute respiratory failure; to know the management of airway obstruction; to know diagnostic criteria of acute respiratory distress syndrome; to know therapeutic principles of acute respiratory distress syndrome; to know lung ventilation strategies for acute respiratory distress syndrome; to know the methods of oxygen administration and complications of oxygen therapy; to know the basic principles of mechanical ventilation; to know respiratory monitoring in the ICU. 	<p>Acute respiratory failure. Definition and classification.</p> <p>Hypoxemic and hypercapnic respiratory failure. Causes. Mechanisms of hypoxemia and hypercapnia. Symptoms.</p> <p>Management of airway obstructions.</p> <p>Acute respiratory distress syndrome. Etiology. Symptoms. Diagnosis. Treatment.</p> <p>Severe exacerbation of bronchial asthma. Symptoms. Treatment.</p> <p>Oxygen therapy. Indications. Complications.</p> <p>Mechanical ventilation. Indications. Complications.</p> <p>Respiratory monitoring in the ICU.</p>
Theme 5. Cardiovascular monitoring. Acute heart failure. High fidelity simulation at the University Center of Simulation in Medical Training (clinical scenarios “Cardiogenic shock in acute coronary syndrome” and „Acute heart failure in hypertensive crisis”).	
<ul style="list-style-type: none"> to know the components of cardiac output, determinants of tissue perfusion and factors affecting oxygen transport; to know the components of cardiac output (preload, afterload, contractility, heart rate); to know differentiation between cardiogenic and noncardiogenic pulmonary edema; to know the symptoms of acute left-sided heart failure (pulmonary edema) and to understand the acute heart failure is a medical emergency; 	<p>The definition of acute heart failure. Causes of right-sided, left-sided, global ventricular failure and diastolic failure.</p> <p>Components of oxygen transport. Components of cardiac output.</p> <p>Definition of preload and afterload. Factors affecting preload and afterload.</p> <p>Cardiogenic pulmonary edema: causes, symptoms, treatment.</p>



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Objectives	Content units
<ul style="list-style-type: none"> to know central hemodynamic parameters and interpretation of changes; to know the symptoms and management of acute heart failure. 	<p>Cardiovascular monitoring in anesthesia and ICU.</p> <p>Intra-aortic balloon pump counterpulsation.</p> <p>Cardiac output measurement techniques.</p> <p>Treatment of life-threatening arrhythmias.</p> <p>Vasoactive and inotropic agents used in the treatment of acute heart failure (epinephrine, norepinephrine, phenylephrine, dobutamine, dopamine, ephedrine).</p>
Theme 6. Shock. Transfusion and fluid therapy. Nutrition support in the critically ill patients. High fidelity simulation at the University Center of Simulation in Medical Training (clinical scenario "Sepsis and septic shock").	
<ul style="list-style-type: none"> to know the definition of shock; to know the classification of shock; to know the etiology, pathophysiology, clinical signs and symptoms, diagnostic tests and treatment of shock; to be able to integrate theory with practice during treatment of shock; to know blood components and indications for their use; to know types of intravenous fluids and indication for intravenous fluid therapy; to know the indications for parenteral nutrition and components of parenteral nutrition; to be able to write a total parenteral nutrition order. 	<p>Shock. Definition. Classification.</p> <p>Pathophysiology.</p> <p>The hypovolemic shock. Etiology, pathogenesis. Clinical manifestations. Treatment.</p> <p>Cardiogenic shock. Etiopathogenesis. Clinical manifestations. Treatment.</p> <p>Septic shock. Etiopathogenesis. Clinical manifestations. Treatment.</p> <p>Anaphylactic shock. Etiopathogenesis. Clinical manifestations. Treatment.</p> <p>Neurogenic shock. Etiopathogenesis. Clinical manifestations. Treatment.</p> <p>Pulmonary artery embolism. Etiopathogenesis. Clinical manifestations. Treatment.</p> <p>Indications for perioperative transfusion.</p> <p>Red cell concentrate. Fresh frozen plasma. Cryoprecipitate. The platelet concentrate.</p> <p>Infusion therapy. Electrolyte and colloidal solutions.</p> <p>Indications for parenteral nutrition. Components.</p>
Theme 7. Hydroelectrolytic and acid-base disturbances.	
<ul style="list-style-type: none"> to know the principles of water exchange between fluid compartments (Starling equation); to know the role of glycocalix in regulation of endothelial vascular tissue; latent hypovolemia: modern concepts and detection (tilt-table test, signs and symptoms of dehydration, volume loading test); to be able to diagnose type of fluid disorder (dehydration, hyperhydration) and forms 	<p>Hydric sectors (intravascular, extravascular, transcellular, intracellular).</p> <p>Solutions for infusion: characteristics and general indications of use.</p> <p>Fluid compartments (extracellular fluid (intravascular, interstitial, transcellular) and intracellular fluid)).</p> <p>Solutions for intravenous fluid therapy.</p> <p>Hypovolemia and hypervolemia (forms, symptoms, treatment).</p> <p>Hypo- and hypernatremia (etiology,</p>



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Objectives	Content units
<p>depending on serum osmolarity (isotonic, hypertonic hypotonic);</p> <ul style="list-style-type: none"> to be able to select solutions for intravenous fluid therapy; to know principles of intravenous fluid therapy; to know the acid-base balance parameters; to know pulmonary and renal regulation of acid-base balance; to be able to interpret arterial blood gases in critically ill patients. 	<p>symptoms, treatment).</p> <p>Hypo- and hyperpotasemia (etiology, symptoms, treatment).</p> <p>Tests for detection of latent hypovolemia.</p> <p>Acid-base balance parameters.</p> <p>Regulation of acid-base balance.</p> <p>Metabolic and respiratory acidosis.</p> <p>Metabolic and respiratory alkalosis.</p>
Theme 8. Acute consciousness disturbances. Brain death. High fidelity simulation at the University Center of Simulation in Medical Training (clinical scenario "Severe traumatic brain injury").	
<ul style="list-style-type: none"> to know the altered levels of consciousness; to know ABCDE approach for the immediate assessment and treatment of comatose patient; to know Monroe-Kellie's doctrine and options for managing raised intracranial pressure; to know factors influencing cerebral blood flow; to know the difference between primary and secondary brain injury; to know the factors that influence secondary brain injury and principles of treatment for patients with altered state of consciousness. 	<p>Degrees of neurological status impairment.</p> <p>Coma etiology.</p> <p>Key concepts in neurologic/neurosurgical intensive care.</p> <p>Determinants of cerebral blood flow and intracranial pressure.</p> <p>Coma diagnosis: medical history, physical examination, neurologic evaluation, paraclinical investigation).</p> <p>General principles of treatment of coma.</p> <p>Brain death: diagnostic criteria. Patient with brain death as potential organ donor.</p>
Theme 9. Acute liver failure.	
<ul style="list-style-type: none"> to know the definition of acute liver failure; to know the causes of acute liver failure; to know the clinical manifestations of acute liver failure; to know the intensive care management of acute liver failure. 	<p>Acute liver failure: definition and causes.</p> <p>Specific therapy of acute liver failure depending on aetiology.</p> <p>Supportive treatment in acute liver failure (Hemodynamic failure, respiratory failure, treatment of cerebral edema and intracranial hypertension, bleeding, infection, acute renal failure).</p>



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Objectives

Content units

Theme 10. Acute kidney injury.

- | | |
|---|---|
| <ul style="list-style-type: none">• to know diagnostic criteria for acute kidney injury;• to know risk factors and causes of acute kidney injury;• to know the most common types of acute kidney injury in critically ill patients;• to know management of acute kidney injury;• to know indication for renal replacement therapy in ICU. | <p>Acute kidney injury: definition, classification, causes.</p> <p>Diagnostic criteria for acute kidney injury.</p> <p>Risk factors and the most common causes of acute kidney injury in critically ill patients.</p> <p>Clinical manifestations and management of acute kidney injury.</p> <p>Renal replacement therapy. Indications and techniques.</p> |
|---|---|

VII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY OUTCOMES

• Professional (specific) (SC) competences

- PC1. To know the definition of critically ill patients.
- PC2. To know basic components of general anesthesia.
- PC3. To know loco-regional and general anesthesia techniques.
- PC4. To be able to interpret monitored data in critically ill patient.
- PC5. To treat patients with acute respiratory failure, acute heart failure, acute kidney injury, acute liver failure, different types of shock, acute consciousness disorders.
- PC6. To know the methods of oxygen administration.
- PC7. To know the management of airway obstruction;
- PC9. To be able to identify patients with altered levels of consciousness.
- PC10. To know ABCDE approach for the immediate assessment and treatment of comatose patient;
- PC11. To know factors influencing secondary brain injury

• Transversal competences (TC)

- TC1. To be able to integrate knowledge from the fundamental and clinical disciplines in order to solve a problem (to carry out pre-anesthetic assessment, to select an anesthesia method and to monitor the patient during anesthesia).
- TC2. To interact with multi-disciplinary team of doctors, nurses and allied health professionals in order to treat critically ill patients admitted to the Anesthesia and Intensive Care Unit.
- TC3. To be able to use modern equipment (anesthetic machine, monitors, syringe pumps, oxygen delivery devices).
- TC4. To be able to handle large volumes of data.
- TC5. To be able to make rapid treatment decisions for critically ill patients.
- TC6. To be able to work with multiple sources of information.



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• Study outcomes

- To know definition of critically ill patients and criteria for ICU admission.
- To know the particularities in diagnosis, monitoring and treatment of critically ill patients (with acute respiratory failure, acute heart failure, acute liver failure, acute consciousness disturbances, shock).
- To know anesthetic techniques (general and locoregional anesthesia) and drugs used for general anesthesia and locoregional anesthesia;
- To carry out pre-anesthetic assessment and prepare patient for surgery, to perform orotracheal intubation on the manikin and to be able to use modern equipment (anesthetic machine, monitors, syringe pumps, oxygen delivery devices).
- To know the organizational structure of Anesthesia and Intensive Care Units.

VIII. STUDENT'S SELF-TRAINING

No.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Working with information sources	To be aware of where to look for information, how to access it and how to use it (monographs, scientific articles, the Internet), to read texts carefully, synthesize relevant information.	Ability to extract the important information, the volume of work.	During the course
2.	Preparing and making presentations	To prepare a presentation in PowerPoint: title, purposes, results, conclusions, practical applications, bibliography.	The structure of presentation, connections with other disciplines, originality of the presentation, credibility of sources, proper image use, correct use of terms, keeping to time.	During the course

IX. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

• *Teaching and learning methods used*

The course of Anesthesiology and Intensive Care is held in a classical manner: lectures and practical classes. Professors deliver the lectures using in teaching multimedia presentations. During the practical classes students can see the work in the operating rooms, intensive care units, observe general and loco-regional anesthesia techniques, as well as management of critically ill patients. Students discuss theoretical material, debate clinical cases and problem solving situations. Students strengthen their theoretical and practical knowledge by clinical case simulations at the University Center of Simulation in Medical Training (CUSIM).



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- ***Applied teaching strategies / technologies***

Interactive lectures, questioning, brainstorming, individual study, work with textbook and scientific articles, discussion, discussion of clinical cases, simulation session.

- ***Methods of assessment***

Current: Different types of assessment methods are used: oral answers, written tests, case studies.

Throughout the course, students' knowledge are assessed by 3 tests, which include all the study material. During the course student's knowledge is assessed on a 10 point scale (grade ranging from 0 to 10). Students with the average mark less than 5 and students with absences at practical classes are not admitted to the final test.

Final: Upon completion of the course, students pass a final exam that includes a computer-based testing and oral examination.

The tests and theoretical questions for the colloquium are discussed and approved at the chair meeting. The oral test consist of two questions and is assessed with grades ranging from 0 to 10.

Computer test consists of 15 tests randomly selected by the computer for each student out of the whole test (40% of the tests are single choice and 60% multiple choice questions). Computer test is assessed with grades ranging from 0 to 10.

The final grade consist of three components:

1. Average mark of three tests (multiplied by coefficient 0.5).
2. Mark at for computer exam (multiplied by coefficient 0.2.)
3. Mark in the oral exam (multiplied by coefficient 0.3).

The grading system is defined as follows:

Grade and description	ECTS grade	Percentage score
10 or "excellent"	A	91-100%
9 or "very good"	B	81-90%
8 or "good"	C	71-80%
7 or "satisfactory"	D	66-70
6 or "satisfactory"	D	61-65
5 or "weak"	E	51-60%
4 or "unsatisfactory"	FX	41-50%
3 or "unsatisfactory"	FX	31-40%
1 and 2 or "unsatisfactory"	F	0-30%



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The average mark of three tests and the marks in the oral exam are expressed in numbers according to the mark scale (according to the table), and the final grade is expressed in number with two decimals, which is transferred to student's record-book.

Method of mark rounding

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System	ECTS Equivalent
1,00-3,00	2	F
3,01-4,99	4	FX
5,00	5	E
5,01-5,50	5,5	
5,51-6,0	6	
6,01-6,50	6,5	D
6,51-7,00	7	
7,01-7,50	7,5	C
7,51-8,00	8	
8,01-8,50	8,5	B
8,51-8,00	9	
9,01-9,50	9,5	A
9,51-10,0	10	

X. RECOMMENDED LITERATURE:

A. Compulsory:

1. P.G. Barash et al. Handbook of Clinical Anesthesia, 2013
2. Marino P.L. The ICU book, 2014.
<https://ia802501.us.archive.org/0/items/MarinosTheICUBook4thEd/Marino%27s%2C%20The%20ICU%20Book%2C%204th%20ed.pdf>
3. Hines R.L., Marschall K.E. Handbook of Stoelting's anesthesia and coexisting disease, 2013.

B. Additional:

1. Oxford handbook of anaesthesia, 2011.
2. Hines R.L., Marschall K.E. Handbook of Stoelting's anesthesia and coexisting disease, 2013
3. Raymer K. Understanding Anesthesia. A Learner's Handbook, 2013.
http://anesthesiology.queensu.ca/assets/Clerks/UnderstandingAnesthesia1_1_2.pdf
4. Loscalzo J. Harrison's Pulmonary and Critical Care Medicine, 2010.
http://umsha.ac.ir/uploads/Harrisons_Pulmonary_and_Critical.pdf