

MOCA Content Outline

CONTINUING CERTIFICATION IN ANESTHESIOLOGY

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THE AMERICAN BOARD OF
ANESTHESIOLOGY

TABLE OF CONTENTS

I. FUNDAMENTAL TOPICS IN ANESTHESIOLOGY 5

I.A. Anesthesia Machines and Breathing Systems	5
I.B. Mechanical or Assisted Ventilation	5
I.C. Monitoring	5
I.D. Electrical and Fire Safety	6

II. PHARMACOLOGY 6

II.A. General Concepts	6
II.B. Anesthetic Gases and Vapors	7
II.C. Intravenous Anesthetics: Opioid and Non-Opioid	7
II.D. Local Anesthetics	7
II.E. Neuromuscular Blocking Agents: Depolarizing and Non-Depolarizing	8

III. CLINICAL SCIENCES: ANESTHESIA PROCEDURES, METHODS AND TECHNIQUES 8

III.A. Patient Evaluation and Preoperative Preparation	8
III.B. Perioperative Management of Patients with Chronic Disease States	9
III.C. Regional Anesthesia	10
III.D. General Anesthesia	11
III.E. Monitored Anesthesia Care and Sedation	11
III.F. Asanguineous Intravenous Fluid Therapy during Anesthesia	11
III.G. Perioperative Complications: Types, Prevention, Treatment	11
III.H. Postoperative Period	12

IV. ORGAN-BASED BASIC AND CLINICAL SCIENCES 12

IV.A. Central and Peripheral Nervous Systems	12
IV.B. Respiratory System	13
IV.C. Cardiovascular System	15
IV.D. Gastrointestinal/Hepatic Systems	16
IV.E. Renal and Urinary Systems/Electrolyte Balance	17
IV.F. Hematologic System	17
IV.G. Endocrine and Metabolic Systems	18
IV.H. Neuromuscular System	19

V. CLINICAL SUBSPECIALTIES 20

V.A. Pain Management	20
V.B. Pediatric Anesthesia	20
V.C. Obstetric Anesthesia	22
V.D. Otorhinolaryngology (ENT) Anesthesia	24
V.E. Anesthesia for Plastic Surgery	24
V.F. Anesthesia for Laparoscopic Surgery	25

V.G. Ophthalmologic Anesthesia.....	25
V.H. Orthopedic Anesthesia	26
V.I. Trauma Anesthesia	26
V.J. Anesthesia for Ambulatory Surgery	27
V.K. Geriatric Anesthesia/Aging	28
V.L. Critical Care Anesthesia.....	28
V.M. Neuroanesthesia	30
V.N. Thoracic Anesthesia.....	31
V.O. Cardiac Anesthesia	32
V.P. Vascular Anesthesia.....	33
V.Q. Regional Anesthesia	34
V.R. Acute Pain Management	35
VI. SPECIAL PROBLEMS OR ISSUES IN ANESTHESIOLOGY	37
VI.A. Electroconvulsive Therapy.....	37
VI.B. Organ Donors.....	37
VI.C. Non-Operating Room Anesthesia (NORA)	37
VI.D. Physician Impairment or Disability	38
VI.E. Ethics, Practice Management and Medicolegal Issues	38
VII. QUALITY IMPROVEMENT	39
VII.A. Quality Assurance and Performance Improvement	39
VII. OVERVIEW OF ANESTHESIOLOGY TOPICS	40
VIII.A. Review of Current Topics in Anesthesiology.....	40
IX. CRITICAL CARE MEDICINE	40
IX.A. Basic Pathophysiology	40
IX.B. Critical Illness Diagnosis and Management	44
IX.C. Specialized Areas	53
X. PAIN MEDICINE	55
X.A. Background Concepts	55
X.B. Assessment of Pain.....	57
X.C. Treatment of Pain – Pharmacology: Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, and Indications/Contraindications	58
X.D. Treatment of Pain: Procedural Treatments	59
X.E. Treatment of Pain: Psychological, Physical, and Integrative Therapies	61
X.F. Clinical States: Taxonomy	62
X.G. Clinical States: Widespread Pain	63
X.H. Clinical States: Acute Pain, Pain due to Trauma, Postoperative Pain	63
X.I. Clinical States: Musculoskeletal Pain.....	64
X.J. Clinical States: Cancer Pain.....	66

X.K. Visceral Pain.....	67
X.L. Headache and Orofacial Pain	68
X.M. Neuropathic Pain.....	69
X.N. Special Cases.....	70
XI. PEDIATRIC ANESTHESIOLOGY 72	
XI.A. Basic Science.....	72
XI.B. Organ-Based Basic and Clinical Sciences	73
XI.C. Clinical Subspecialties.....	77
XI.D. Clinical Science of Anesthesia	79
XI.E. Special Problems or Issues.....	80
XII. ADULT CARDIAC ANESTHESIOLOGY 80	
XII.A. Foundations of Adult Cardiac Anesthesiology.....	80
XII.B. Cardiothoracic Diseases (Pathophysiology, Pharmacology, and Clinical Management)	81
XII.C. Patient Evaluation.....	84
XII.D. Perioperative Imaging and Monitoring.....	84
XII.E. Pharmacodynamics and Pharmacokinetics	85
XII.F. Devices	86
XII.G. Surgical Procedures	87
XII.H. Postoperative and Perioperative	87
XII.I. Other Topics	88

I. FUNDAMENTAL TOPICS IN ANESTHESIOLOGY

I.A. Anesthesia Machines and Breathing Systems

I.A.1. Components

TAGS:

- Circuit Types
- CO₂ Absorbers
- High- and Low-Pressure Components
- MRI Compatibility
- Oxygen Supply Systems
- Valves
- Vaporizers
- Waste Gas Evacuation Systems

I.A.2. Safety Features

TAGS:

- Troubleshooting

I.A.3. Design and Ergonomics

I.B. Mechanical or Assisted Ventilation

I.B.1. Classifications

TAGS:

- High-Frequency Ventilation
- Modes of Mechanical Ventilation
- Noninvasive Techniques

I.B.2. Parameters

TAGS:

- Ventilator Settings and Controls

I.B.3. Drug Delivery Systems

TAGS:

- Inhaled Pulmonary Vasodilators
- Inhaled Bronchodilators
- Nebulizers

I.B.4. Ventilation Monitors

TAGS:

- Apnea
- FiO₂
- Airway Pressure Monitoring

I.C. Monitoring

I.C.1. Basic Physiologic

TAGS:

- Capnography
- ECG
- Neuromuscular Blockade
- Noninvasive Blood Pressure
- Pulse Oximetry
- Temperature

I.C.2. Advanced Physiologic

TAGS:

- Arterial Wave Form Analysis
- Cardiac Output

- Cerebral Oximetry
- EEG
- Neurophysiologic Monitors
- Point-of-Care Ultrasound
- Noninvasive Cardiac Monitoring
- TEE
- TTE

I.C.3. Intraoperative Blood Monitoring

TAGS:

- Arterial Blood Gas
- Coagulation
- Glucose
- Point-of-Care Laboratory Testing

I.D. Electrical and Fire Safety

I.D.1. National Fire Protection Association (NFPA) Standards

I.D.2. Fire and Explosion Hazards

TAGS:

- Fuels
- Oxidizers
- Sources of Ignition

I.D.3. Electrical Safety Systems

TAGS:

- Isolated and Grounded Power Systems
- Line Isolation Monitors

I.D.4. Electrical Hazards

TAGS:

- Electrosurgery and Safety (Macro- and Microshock)

II. PHARMACOLOGY

II.A. General Concepts

II.A.1. Pharmacogenetics

TAGS:

- Butyrylcholinesterase (Pseudocholinesterase) Deficiency
- Genetic Factors in Drug Dose-Response Relationships
- Malignant Hyperthermia (MH)
- Polymorphisms of Drug Metabolism

II.A.2. Drug Interactions

TAGS:

- Drug-Drug Binding
- Enzyme Induction
- Enzyme Inhibition
- Perioperative Implications of Alternative and Herbal Medicines
- Synergistic Drug Interactions

II.A.3. Drug Reactions

TAGS:

- Anaphylactoid
- Anaphylaxis
- Idiosyncratic

- II.A.4. Substance Use Disorder
 - TAGS:**
 - Anesthetic Implications
 - Pharmacologic Mechanisms
 - Physiologic Effects
- II.A.5. Agonists and Antagonists
- II.B. Anesthetic Gases and Vapors**
 - II.B.1. Indications and Contraindications
 - II.B.2. Pharmacokinetics
 - TAGS:**
 - Delivery Systems: Vaporizers
 - Metabolism and Excretion
 - Uptake and Distribution
 - II.B.3. Pharmacodynamics
 - TAGS:**
 - Effects on Central Nervous System
 - Effects on Circulation
 - Effects on Other Organs
 - Effects on Ventilation
 - II.B.4. Drug Interactions
 - II.B.5. Side Effects and Toxicity
 - TAGS:**
 - Atmospheric Waste
- II.C. Intravenous Anesthetics: Opioid and Non-Opioid**
 - II.C.1. Indications and Contraindications
 - II.C.2. Pharmacokinetics
 - TAGS:**
 - Distribution and Redistribution
 - Metabolism and Excretion
 - II.C.3. Pharmacodynamics
 - TAGS:**
 - Effects on Circulation
 - Effects on Other Organs
 - Effects on the Central Nervous System
 - Effects on Ventilation
 - II.C.4. Drug Interactions
 - II.C.5. Side Effects and Toxicity
 - TAGS:**
 - Shivering
- II.D. Local Anesthetics**
 - II.D.1. Indications and Contraindications
 - II.D.2. Pharmacokinetics
 - TAGS:**
 - Metabolism and Excretion
 - Uptake and Distribution
 - II.D.3. Pharmacodynamics
 - TAGS:**

- Effects on Circulation
- Effects on Other Organs
- Effects on the Central Nervous System
- Effects on Ventilation

- II.D.4. Drug Interactions

- II.D.5. Side Effects and Toxicity

- TAGS:**

- Local Anesthetic Systemic Toxicity

- II.E. Neuromuscular Blocking Agents: Depolarizing and Non-Depolarizing**

- II.E.1. Indications and Contraindications

- II.E.2. Pharmacokinetics

- TAGS:**

- Distribution and Redistribution

- Metabolism and Excretion

- Prolongation of Action

- II.E.3. Pharmacodynamics

- TAGS:**

- Differential Effects on Muscle Groups

- Effects on Neuromuscular Transmission

- II.E.4. Drug Interactions

- II.E.5. Side Effects and Toxicity

- TAGS:**

- Anaphylaxis

- Critical Illness Myopathy

- II.E.6. Reversal of Blockade

- TAGS:**

- Antagonism

- Chelation

III. CLINICAL SCIENCES: ANESTHESIA PROCEDURES, METHODS AND TECHNIQUES

- III.A. Patient Evaluation and Preoperative Preparation**

- III.A.1. History and Physical Examination

- III.A.2. Airway Evaluation

- TAGS:**

- Predictors of Difficult Laryngoscopy and Intubation

- Predictors of Difficult Mask Ventilation

- III.A.3. Standards and Guidelines

- TAGS:**

- ACC/AHA Guidelines on Perioperative Cardiovascular Evaluation

- ASA Physical Status Classification

- Indications for Preoperative Testing

- Preoperative Fasting Guidelines

- III.A.4. Preoperative Management of Chronic Medications

- TAGS:**

- Anticoagulants and Antiplatelet Medications

- Antihyperglycemics

- Cannabinoids

Cardiovascular Medications
Central Nervous System Medications

III.A.5. Premedication

TAGS:

Antibiotics
Anxiolysis
Aspiration Prophylaxis
PONV Prophylaxis

III.A.6. Patients with Specific Disease States

TAGS:

Cardiovascular Disease
Morbid Obesity
Pulmonary Disease

III.B. Perioperative Management of Patients with Chronic Disease States

III.B.1. Central and Peripheral Nervous System

TAGS:

Chronic Pain States
Deep Brain and Vagal Nerve Stimulators
Dementia
Multiple Sclerosis
Parkinson
Spinal Cord Injury

III.B.2. Respiratory System

TAGS:

Asthma
COPD
Sleep Apnea
Smoking

III.B.3. Cardiovascular System

TAGS:

Coronary Artery Disease/Stents
Heart Failure
Pacemakers/Defibrillators
Valvular Disease

III.B.4. Gastrointestinal/Hepatic Systems

TAGS:

Eating Disorders
GERD
Liver Failure

III.B.5. Renal and Urinary Systems

TAGS:

End-Stage Renal Disease and Dialysis

III.B.6. Hematologic System

TAGS:

Anemia
Coagulopathies
Sickle Cell

III.B.7. Endocrine and Metabolic Systems

TAGS:

Diabetes
Morbid Obesity
Pheochromocytoma
Thyroid Disease

III.B.8. Neuromuscular Diseases

TAGS:

Muscular Dystrophies
Myasthenic Syndromes
Myopathies

III.B.9. Special Problems

TAGS:

Allergic Reactions
Chemotherapy
Chronic Alcohol Use
Chronic Cannabinoid Use
Chronic Immunosuppression
Malignancy
Previous Organ Transplant
Substance Use Disorder

III.C. Regional Anesthesia

III.C.1. General Topics

TAGS:

Guidelines and Standards
Indications and Contraindications
Local Anesthetic Systemic Toxicity
Nerve Stimulator Guidance
Ultrasound Guidance

III.C.2. Neuraxial

TAGS:

Complications
Factors Influencing Onset and Duration
Indications and Contraindications
Medications: Local Anesthetics, Opioids, Adjuncts
Types: Caudal, Epidural, Spinal, Combined Spinal-Epidural

III.C.3. Regional Blocks

TAGS:

Anatomy
Catheters
Complications
Factors Influencing Onset and Duration
Indications and Contraindications
Intraneural Injections
Medications: Local Anesthetics, Opioids, Adjuncts
Specific Blocks: Head and Neck, Upper and Lower Extremity, Truncal

III.C.4. IV Regional

TAGS:

Complications

Factors Influencing Onset and Duration

Indications and Contraindications

Medications: Local Anesthetics, Opioids, Adjuncts

III.D. General Anesthesia

III.D.1. Techniques

TAGS:

Combined General/Regional

Inhalational

Total Intravenous

III.D.2. Airway Management

TAGS:

Airway Management Devices and Adjuncts

ASA Difficult Airway Algorithm

Complications

Emergency Surgical Airway

Endotracheal Tube Types

Flexible Fiberoptic Bronchoscopy

High-Frequency Jet Ventilation

Postoperative Considerations

Regional Airway Blocks

III.E. Monitored Anesthesia Care and Sedation

III.E.1. Guidelines and Standards

III.E.2. Levels of Sedation

III.E.3. Sedation Guidelines for Non-Anesthesiologists

III.F. Asanguineous Intravenous Fluid Therapy during Anesthesia

III.F.1. Indications and Contraindications

TAGS:

Colloids

Crystalloids

Hypertonic Saline

III.F.2. Complications

III.G. Perioperative Complications: Types, Prevention, Treatment

III.G.1. Types

TAGS:

Air Embolism

Anaphylaxis

Arterial Thrombosis

Aspiration of Gastric Contents

Bronchospasm

Burns

Cerebrovascular Accident

Corneal Abrasions

Esophageal Injury

Hypothermia and Hyperthermia

Laryngospasm

- Myocardial Ischemia/Infarction
- Positioning Complications
- Postobstructive Pulmonary Edema
- Postoperative Visual Loss
- Shivering
- Tourniquet, Adverse Effects of
- Unintended Intraoperative Awareness
- Vascular Trauma
- Venous Thromboembolism
- III.G.2. Prevention and Treatment
 - TAGS:**
 - Aspiration of Gastric Contents
 - Fire Prevention and Management
 - Management of Intraoperative Patient Temperature
 - Perioperative Anticoagulation

III.H. Postoperative Period

- III.H.1. Emergence and Recovery of Airway Reflexes
- III.H.2. Acute Pain Management
 - TAGS:**
 - Field Block
 - Multimodal Analgesia Strategies
 - Opioids
 - Patient-Controlled Analgesia (PCA)
 - Regional Anesthesia/Nerve Blocks
 - Systemic Local Anesthetics
- III.H.3. Respiratory Complications in the PACU
- III.H.4. Cardiovascular Complications in the PACU
 - TAGS:**
 - Arrhythmias
 - Hypertension
 - Hypotension
 - Myocardial Ischemia
- III.H.5. Nausea and Vomiting
 - TAGS:**
 - Prophylactic Medications
 - Risk Factors
- III.H.6. Residual Neuromuscular Blockade
- III.H.7. Neurologic Consequences of Surgery and Anesthesia
 - TAGS:**
 - Cognitive Dysfunction
 - Delirium
 - Failure to Emerge from Anesthesia
 - Stroke

IV. ORGAN-BASED BASIC AND CLINICAL SCIENCES

IV.A. Central and Peripheral Nervous Systems

- IV.A.1. Anatomy
 - TAGS:**

- Autonomic Nervous System
- Central Nervous System
- Peripheral Nervous System

IV.A.2. Physiology

TAGS:

- Autoregulation
- Drug Effects
- Intracranial Pressure (ICP)
- Metabolism
- Spinal Reflexes
- Vagal Reflex

IV.A.3. Pharmacology

TAGS:

- Anticonvulsants
- Drug Effects on CNS Blood Flow
- Drug Effects on CNS Metabolism
- Osmotic Agents

IV.A.4. Clinical Science

TAGS:

- Abscess
- Air Embolism
- Airway Management in the Patient with Cervical Spine Disease
- Autonomic Dysfunction
- Autonomic Hyperreflexia
- Cerebrovascular Accident (CVA)
- Coma
- Drug Intoxication
- Fluid Management
- Hydrocephalus
- Pituitary Adenomas
- Postural Orthostatic Hypotension Syndrome (POTS)
- Prone and Sitting Positioning: Implications
- Seizures
- Spinal Shock
- Subdural and Epidural Hematomas
- Trans-Sphenoidal Hypophysectomy
- Ventriculostomy

IV.B. Respiratory System

IV.B.1. Anatomy

TAGS:

- Alveoli/ Lung Parenchyma
- Innervation
- Larynx
- Musculoskeletal
- Tracheobronchial Tree
- Vascular Supply

IV.B.2. Physiology: Lung Functions and Cellular Processes

TAGS:

Alveolar-Arterial O₂ Gradient (A-aDO₂)
Anion Gap
Apneic Oxygenation
Arterial-Alveolar CO₂ Gradient (A-aDCO₂)
Central and Peripheral Chemoreceptors
CO₂ and O₂ Response Curves
Dead Space
Diffusion Hypoxia
Hypercarbia and Hypocarbia
Hypoxia and Hyperoxia
Hypoxic Pulmonary Vasoconstriction
Lung Mechanics
Nonrespiratory Functions of Lungs: Immune and Metabolic
Pleural Pressure Gradient
V/Q Mismatch

IV.B.3. Pharmacology

TAGS:

Anti-inflammatory Medications
Bronchodilators

IV.B.4. Clinical Science

TAGS:

Abdominal Compartment Syndrome
Acute Respiratory Distress Syndrome (ARDS)
Arterial Blood Gas Interpretation
Asthma
Atelectasis
Barotrauma
Bronchiectasis
Bronchitis
Bronchopleural Fistula
Bronchopulmonary Dysplasia
Bronchospasm: Management
Cancer
Chest Trauma
Chest X-Ray: Indications and Interpretation
Complications and Side Effects of Mechanical Ventilation
COPD
Cystic Fibrosis
Empyema
Foreign Body
Hemothorax
Lung Abscess
Mediastinal Masses
Nonventilatory Respiratory Management
Obstructive Sleep Apnea (OSA)
Oxygen Therapy and Toxicity

- Pleural Effusion
- Pneumonia
- Pneumothorax
- Postoperative Extubation Criteria
- Postoperative Mechanical Ventilation
- Pulmonary Fibrosis
- Respiratory Distress Syndrome (ARDS)
- Respiratory Failure Management

IV.C. Cardiovascular System

IV.C.1. Anatomy

TAGS:

- Conduction System
- Congenital Heart Disease
- Coronary Circulation
- Innervation
- Transesophageal Echocardiography (TEE) Views

IV.C.2. Physiology

TAGS:

- Baroreceptor Function
- Cardiac Output
- Coronary Blood Flow Regulation
- Determination of Myocardial Oxygen Demand
- Diastolic Dysfunction
- Intracardiac Pressures
- Mixed Venous Oxygen Tension and Saturation
- Rhythm
- Systemic and Pulmonary Vascular Resistance
- Systolic Dysfunction
- Valvular Dysfunction

IV.C.3. Pharmacology

TAGS:

- Angiotensin Converting Enzyme Inhibitors
- Angiotensin Receptor Blockers
- Antianginal Drugs
- Antiarrhythmics
- Beta-Blockers
- Calcium Channel Blockers
- Chronotropic Agents
- Digitalis
- Inotropes
- Statins
- Vasodilators
- Vasopressors

IV.C.4. Clinical Management of Disease States

TAGS:

- Cardiac Ischemia
- Cardiac Tamponade and Constrictive Pericarditis

- Cardiogenic Shock
- Cardiomyopathy
- Carotid Artery Disease
- Dysrhythmia
- Hypertrophic Cardiomyopathy
- Intracardiac Defects
- Myocardial Infarction and Acute Coronary Syndrome
- Myocarditis
- Peripheral Vascular Disease
- Pulmonary Embolism
- Pulmonary Hypertension
- Right or Left Ventricular Dysfunction
- Valvular Abnormalities

IV.C.5. Special Considerations in Cardiovascular Anesthesia

TAGS:

- Cardiac Catheterization
- Cardiac Implantable Electrical Device Management: AICD and Pacemakers
- Electrophysiologic Studies and Procedures
- Left Atrial Appendage Occlusion
- Left Ventricular Assist Devices
- Percutaneous Valvuloplasty and Valve Replacement
- Perfusion Studies

IV.D. Gastrointestinal/Hepatic Systems

IV.D.1. Anatomy

TAGS:

- Vascular Supply
- Innervation: Sympathetic, Parasympathetic, and Enteric
- Liver Anatomy

IV.D.2. Physiology

TAGS:

- Cytochrome P450 Function and Variants
- Excretory Functions
- Factors Affecting Splanchnic Circulation
- Metabolic and Synthetic Functions
- Portal Hypertension

IV.D.3. Pharmacology

TAGS:

- Drug Metabolism/Elimination
- Hepatotoxicity

IV.D.4. Clinical Science

TAGS:

- Acute Hepatitis
- Anesthetic Management: Full Stomach
- Anesthetic Management: Intestinal Obstruction
- Cricoid Pressure
- Esophageal Disease

- Hepatic Resection
- End-Stage Liver Disease
- Liver Transplantation
- Morbid Obesity/Anesthesia for Bariatric Surgery
- Postoperative Hepatic Dysfunction
- Postoperative Ileus

IV.E. Renal and Urinary Systems/Electrolyte Balance

IV.E.1. Clinical Science

TAGS:

- Factors Affecting Glomerular Filtration
- Factors Impacting Renal Blood Flow
- Hormonal Regulation of Extracellular Fluid
- Hormonal Regulation of Osmolality
- Pathophysiology of Renal Disease
- Regulation of Acid-Base Balance
- Regulation of Blood Volume
- Renal Drug Excretion
- Renal Function Tests
- Tubular Reabsorption and Secretion
- Water and Electrolytes: Distribution and Balance

IV.E.2. Pharmacology

TAGS:

- Diuretics
- Drug Effects on Electrolytes and Acid-Base Balance
- Pharmacologic Protection and Treatment of Renal Failure

IV.E.3. Clinical Management of Disease States

TAGS:

- Anesthetic Management for Patients on Renal Replacement Therapy
- Arteriovenous (AV) Shunts
- Chronic Renal Insufficiency and Renal Failure
- Perioperative Oliguria and Anuria
- Preservation of Renal Function
- Nephrectomy
- Renal Transplantation
- Risk Factors for Acute Renal Failure

IV.E.4. Special Considerations with the Renal System

TAGS:

- Transurethral Resection of Prostate (TURP): Complications
- Urologic Surgery: Lithotripsy

IV.F. Hematologic System

IV.F.1. Anatomy

IV.F.2. Physiology

TAGS:

- Hemostasis

IV.F.3. Pharmacology

TAGS:

- Anticoagulants and Antagonists

- Antifibrinolytics
- Antiplatelet Drugs
- Blood Substitutes
- Coagulation Factor Concentrates
- Erythropoietin
- Immunosuppressive and Antirejection Drugs
- Iron Therapy

IV.F.4. Clinical Science

TAGS:

- Alternatives to Transfusion
- Anemias
- Autologous Blood Donation
- Blood Products
- Carboxyhemoglobinemia
- Citrate Toxicity
- Congenital and Acquired Factor Deficiencies
- Disseminated Intravascular Coagulation (DIC)
- Fibrinolysis
- Hemoglobinopathies
- Heparin-Induced Thrombocytopenia (HIT)
- IgA Deficiency
- Massive Transfusion
- Methemoglobinemia
- Porphyrias
- Thrombocytopenia and Thrombocytopathy
- Transfusion Complications: TACO/TRALI
- Transfusion Indications
- Transfusion: Infection Risks (Cytomegalovirus, HIV, Hepatitis)
- Viscoelastic Testing

IV.G. Endocrine and Metabolic Systems

IV.G.1. Anatomy

IV.G.2. Physiology

TAGS:

- Adrenal Cortex and Pancreas
- Adrenal Medulla
- Hypothalamus
- Parathyroid
- Pituitary: Anterior and Posterior
- Thyroid

IV.G.3. Pharmacology

TAGS:

- Antihyperglycemic Drugs
- Glucocorticoid Supplementation
- Mineralocorticoid Supplementation
- Somatostatin/Octreotide

IV.G.4. Clinical Science

TAGS:

- Acromegaly
- Addison Disease
- Carcinoid Syndrome
- Cerebral Salt-Wasting Syndrome
- Cushing Syndrome
- Diabetes Insipidus
- Diabetes Mellitus
- Diabetic Ketoacidosis
- Endocrine Tumors
- Goiter
- Hyperosmolar Coma
- Pancreas Transplantation
- Parathyroid Disease: Hyper- and Hypoparathyroidism
- Pheochromocytoma
- Pituitary Disease: Hyper and Hypopituitarism
- Primary Aldosteronism
- Recurrent Laryngeal Nerve Injury
- Syndrome of Inappropriate ADH Secretion
- Thyroid Disease: Hyper and Hypothyroidism
- Thyroid Storm Management
- IV.G.5. Biochemistry of Normal Body Metabolism

TAGS:

- Fluid Homeostasis
- Glucose Homeostasis
- Surgical Stress Response

IV.H. Neuromuscular System

IV.H.1. Anatomy

TAGS:

- Acetylcholine Receptor

IV.H.2. Physiology

TAGS:

- Factors Impacting Muscle Strength
- Neuromuscular Transmission

IV.H.3. Pharmacology

TAGS:

- Antagonists: Anticholinesterases
- Antagonists: Selective Relaxant Binding Agents
- Neuromuscular Blocking Agents: Depolarizing
- Neuromuscular Blocking Agents: Nondepolarizing

IV.H.4. Diseases and Disorders: Clinical Science

TAGS:

- Diseases of the Neuromuscular Junction
- Inflammatory Myopathies
- Metabolic Diseases of the Muscle
- Motor Neuron Diseases
- Peripheral Nerve Diseases

V. CLINICAL SUBSPECIALTIES

V.A. Pain Management

V.A.1. Pathophysiology

TAGS:

- Acute Pain
- Cancer-Related Pain
- Chronic Pain States
- Complex Regional Pain Syndrome (CRPS): Types I and II
- Diabetic Neuropathy
- Neuropathic Pain States
- Peripheral Neuropathies
- Phantom Limb
- Postherpetic Neuralgia
- Post-Stroke Pain
- Somatic Pain Conditions
- Substance Use Disorder

V.A.2. Diagnostic Strategies

TAGS:

- Diagnostic Blocks
- Electromyography (EMG)
- Imaging Modalities

V.A.3. Treatment of Painful Disease States

TAGS:

- Acupuncture
- Electrical Stimulation
- Neuraxial Analgesia
- Neurolytic and Non-Neurolytic Blocks
- Patient-Controlled Analgesia
- Peripheral Nerve Blockade and Catheters
- Pharmacologic Therapy
- Sympathetic Nerve Blocks

V.B. Pediatric Anesthesia

V.B.1. Clinical Science

TAGS:

- Airway Selection
- Behavioral Development
- Infants: Fluid and Glucose Management
- Infants: Respiratory Physiology
- Infants: Thermoregulation
- Malignant Hyperthermia: Susceptibility and Management
- Neonatal Resuscitation Guidelines
- Neonates: Transitional Circulation
- Organ Function Changes During Development
- Pediatric Advanced Life Support (PALS)
- Parental Presence
- Upper Respiratory Infections (Colds)

V.B.2. Pharmacology

TAGS:

Age-Related Pharmacodynamics and Pharmacokinetics
Anesthetic Drugs and Adjuvants
Induction Techniques
Inhalational Anesthetics
Intravenous Anesthetics
Local Anesthetics
Opioid Tolerance and Sensitivity
Succinylcholine: Complications

V.B.3. Clinical Management of Disease States**TAGS:**

Anemias: Congenital and Acquired
Bronchopulmonary Dysplasia
Cerebral Palsy
Chromosomal Abnormalities
Coagulopathies: Congenital and Acquired
Congenital Heart Disease
Congenital Tumors: Wilm's and Neuroblastoma
Cystic Fibrosis
Developmental Abnormalities
Diaphragmatic Hernia
Endocrine Diseases: Childhood Diabetes
Endocrine Diseases: Congenital Adrenal Hyperplasia
Epiglottitis
Hydrocephalus and Shunts
Inborn Errors of Metabolism
Inherited Musculoskeletal Disorders
Juvenile Rheumatoid Arthritis
Laryngotracheobronchitis
Myelomeningocele
Obesity
Obstructive Sleep Apnea
Omphalocele and Gastroschisis
Patent Ductus Arteriosus
Peritonsillar Abscess
Pyloric Stenosis
Scoliosis
Tracheoesophageal Fistula
Trauma

V.B.4. Special Considerations in Pediatric Anesthesia**TAGS:**

Airway Foreign Bodies
Apnea of Prematurity
Bladder and Urethral Malformations
Bronchoscopy: Flexible and Rigid
Bronchospasm
Cleft Lip and Palate

- Congenital Hip Dysplasia
- Craniofacial Abnormalities
- Difficult Airway Management
- Difficult IV Access
- Emergence Delirium
- Intubation and Extubation Complications
- Jet Ventilation
- Laryngoscopy Techniques
- Laser
- Pediatric Regional Anesthetic Techniques
- Pediatric Respiratory Adverse Events (PRAE)
- Pediatric Sedation
- PONV
- Postoperative Pain Management: Codeine
- Premedication Techniques
- Propofol Infusion Syndrome
- Strabismus
- Stridor
- Tonsillectomy and Adenoidectomy
- Upper Respiratory Infection
- Urologic Procedures

V.C. Obstetric Anesthesia

V.C.1. Clinical Science

TAGS:

- Anesthetic Complications
- Anesthetic Risks
- Coagulation Changes
- Neuraxial Anesthetic Techniques: Epidural, Spinal, Combined Spinal-Epidural, and Caudal
- Neuraxial Labor Analgesia
- Paracervical Block
- Physiology of Labor
- Pudendal Block
- Systemic Labor Analgesia

V.C.2. Pharmacology

TAGS:

- Anesthetic Drugs and Adjuvants
- Drug Effects on Newborn
- Drug Metabolism
- Fetal Disposition of Drugs
- Magnesium Sulfate
- Mechanisms of Placental Transfer
- Oxytocic Drugs
- Protein Binding of Drugs
- Tocolytic Drugs

V.C.3. Clinical Management of Disease States

TAGS:

Amniocentesis
Amniotic Fluid Embolism
Antepartum Fetal Therapy
Antepartum Hemorrhage
Anticoagulant Therapy
Cardiovascular Disease
Ectopic Pregnancy
Endocrine Disease
Ex-utero Intrapartum Treatment (EXIT)
Fetal Malposition
Fetal Malpresentation
Fever and Infection
Gestational Trophoblastic Surgery Disease
Hematologic Disease
Maternal Cardiopulmonary Resuscitation
Multiple Gestation
Neurologic Disease
Obesity
Placenta Abruption
Placenta Accreta Spectrum
Placenta Previa
Postpartum Hemorrhage
Preeclampsia and Eclampsia
Preterm Labor
Renal Disease
Respiratory Disease
Resuscitation of Newborn
Retained Placenta
Rh and ABO Incompatibility
Spontaneous Abortion
Substance Use Disorder
Trial of Labor after Cesarean (TOLAC)
Umbilical Cord Blood Gas Measurements
Umbilical Cord Prolapse
Uterine Atony
Uterine Rupture

V.C.4. Special Considerations in Obstetric Anesthesia

TAGS:

Antepartum Fetal Assessment
Aorto-Caval Compression
Cesarean Delivery: Elective Anesthesia
Cesarean Delivery: Emergency Anesthesia
Difficult Airway
Gastroesophageal Sphincter Function
Influence of Anesthetic Technique on Labor
Neonatal Assessment: Apgar Score
Nonobstetric Anesthesia in Pregnancy

- Operative Vaginal Delivery
- Pulmonary Aspiration
- Regulation of Uterine Blood Flow
- Thermoregulation
- V.C.5. Maternal Physiology
 - TAGS:**
 - Acid-Base Changes
 - Airway Changes
 - Anatomic Position
 - Barrier Function
 - Cardiovascular Changes
 - Coagulation Changes
 - Gastrointestinal Changes
 - Hematologic Changes
 - Nervous System Changes
 - Renal Changes
 - Respiratory Changes
- V.C.6. Maternal-Fetal Considerations
 - TAGS:**
 - Intrapartum Fetal Monitoring
 - Intrauterine Fetal Resuscitation
- V.C.7. Pathophysiology of Complicated Pregnancy
- V.D. Otorhinolaryngology (ENT) Anesthesia
 - V.D.1. Surgical Procedures
 - TAGS:**
 - Airway Endoscopy
 - Microlaryngeal Surgery
 - Radical Neck Dissection
 - Sinus Endoscopy
 - Tonsillectomy
 - Transoral Robotic Surgery
 - Uvulopalatopharyngoplasty
 - V.D.2. Laser Surgery
 - TAGS:**
 - Airway Fires
 - Lasers: Safety Implications
 - Laser-Safe Endotracheal Tubes
 - V.D.3. Anesthetic Management
 - TAGS:**
 - Airway Management
 - Anesthesia for Vascular Flaps
 - Effects of Radiation Therapy
 - Ventilation Strategies, Including Jet Ventilation
- V.E. Anesthesia for Plastic Surgery
 - V.E.1. Surgical Procedures
 - TAGS :**
 - Breast Surgery

- Facial Aesthetic Procedures
 - Free Flap Reconstruction
 - Gender-Affirming Surgery
 - Liposuction
 - Orthognathic Surgery
- V.E.2. Pharmacology
 - TAGS:**
 - Botulinum Toxin
 - Dermal Fillers
 - Tumescent: Volume Overload, LAST
- V.E.3. Anesthetic Management
- V.E.4. Special Considerations in Plastic Surgery
 - TAGS:**
 - Fire Risk
- V.F. Anesthesia for Laparoscopic Surgery**
 - V.F.1. Surgical Procedures
 - TAGS:**
 - Appendectomy
 - Bariatric Surgery
 - Cholecystectomy
 - Gynecologic Procedures
 - Hiatus Hernia Repair
 - V.F.2. Anesthetic Management
 - TAGS:**
 - Monitoring
 - Patient Positioning
 - Physiology
 - Robotic Procedures
 - Ventilation
 - V.F.3. Risks
 - TAGS:**
 - CO₂ Embolism
 - Hemorrhage
 - Hypercapnea
 - Hypotension
 - Subcutaneous Emphysema
 - Vascular or Organ Perforation
- V.G. Ophthalmologic Anesthesia**
 - V.G.1. Clinical Science
 - TAGS:**
 - Retrobulbar and Peribulbar Blocks
 - V.G.2. Pharmacology
 - V.G.3. Clinical Management of Disease States
 - TAGS:**
 - Open Eye Injuries
 - V.G.4. Special Considerations in Ophthalmologic Anesthesia
 - TAGS:**

ASA Preoperative Testing Guidelines
Preoperative Selection

V.H. Orthopedic Anesthesia

V.H.1. Tourniquet Management

TAGS:

Ischemia
Nerve Injury
Reperfusion

V.H.2. Spine Surgery

TAGS:

Anesthetic Technique
Antifibrinolytics
Cervical Spine Disease
Neurophysiologic Monitoring
Postoperative Visual Loss

V.H.3. Complications

TAGS:

Blood Loss
Fat Embolism
Methyl Methacrylate
Positioning Injury
Venous Air Embolism

V.H.4. Anesthetic Techniques

TAGS:

Regional vs. General Anesthesia

V.H.5. Special Considerations in Orthopedic Surgery

TAGS:

Ankylosing Spondylitis
Compartment Syndrome
Postoperative Analgesia
Rheumatoid Arthritis
Scoliosis
Thromboprophylaxis

V.I. Trauma Anesthesia

V.I.1. Primary Survey and Resuscitation

TAGS:

Emergency Airway
Hemorrhagic Shock
Initial Evaluation
Mass Casualty Response
Penetrating vs. Blunt Trauma
Prehospital and EMS
Team Function in Trauma
Triage

V.I.2. Secondary Survey and Stabilization

TAGS:

Fluid Management

- Hemostatic Resuscitation
- Hypothermia
- Massive Transfusion
- Monitoring
- Nuclear, Biological, and Chemical Injury
- POCUS
- Protection of Cervical Spine

V.I.3. Organ System Trauma

TAGS:

- Abdominal Trauma
- Aortic and Vascular Trauma
- Orthopedic and Soft Tissue Trauma
- Spinal Cord
- Thoracic Trauma
- Traumatic Brain Injury
- Traumatic Coagulopathy

V.I.4. Thermal and Electrical Injury

TAGS:

- Airway Management
- Carbon Monoxide/Carboxyhemoglobin
- Fluids and Electrolytes
- Inhalation Injury
- Nondepolarizing Muscle Relaxants
- Succinylcholine Use
- Vasoconstrictor Effects and Complications

V.I.5. Special Considerations in Trauma Anesthesia

TAGS:

- Decontamination
- Exposure/Hypothermia
- Geriatrics
- Near Drowning
- Nuclear, Biological, and Chemical Injury
- Pain Management

V.J. Anesthesia for Ambulatory Surgery

V.J.1. Patient Selection and Preoperative Management

TAGS:

- ACC/AHA Guidelines on Perioperative Cardiovascular Evaluation
- Malignant Hyperthermia
- Obesity
- Preoperative Selection
- Risk Factors for Admission

V.J.2. Anesthetic Management

TAGS:

- Ambulatory Regional Anesthesia
- Continuous Nerve Blocks

V.J.3. Discharge Criteria and Postoperative Follow-Up

TAGS:

- Discharge Criteria
- V.J.4. Office-Based Anesthesia
 - TAGS:**
 - Equipment
 - Organization
 - Patient Management
 - Safety
- V.K. Geriatric Anesthesia/Aging
 - V.K.1. Preoperative Evaluation
 - TAGS:**
 - Coexisting/Chronic Disease Processes
 - Medication Management
 - Risk Reduction and Stratification
 - V.K.2. Organ Function Changes with Aging
 - TAGS:**
 - Cardiovascular System
 - Central Nervous System
 - Endocrine System
 - Hematologic System
 - Hepatic System
 - Renal System
 - Respiratory System
 - V.K.3. Pharmacology
 - TAGS:**
 - Adverse Response to Medications
 - Beers Criteria
 - Changes in PK/PD with Aging
 - V.K.4. Anesthetics
 - TAGS:**
 - General
 - Local
 - Sedation
 - Regional
 - V.K.5. Fluid Management
 - V.K.6. Pain Management
 - V.K.7. Thermoregulation
 - V.K.8. Ethics and Informed Consent
 - V.K.9. Postoperative Care and Transitions of Care
 - TAGS:**
 - Delirium
 - Postoperative Cognitive Dysfunction
 - V.K.10. Patient Safety
- V.L. Critical Care Anesthesia
 - V.L.1. Central Nervous System Dysfunction
 - TAGS:**
 - Altered Mental Status
 - Brain Death

- Brain Trauma
- Delirium
- Metabolic Encephalopathy
- Neuromuscular Pathology
- Spinal Cord Compromise
- Stroke: Ischemic or Hemorrhagic
- Subarachnoid, Epidural Bleed
- V.L.2. Cardiovascular Dysfunction/Failure
 - TAGS:**
 - Cardiac Interventions: Lysis, Catheter, PCI, Pacer
 - Cardiogenic Shock
 - Congestive Heart Failure
 - Device Management
 - Dysrhythmias
 - ECMO
 - Myocardial Ischemia/Infarction
 - POCUS
 - Pulmonary Hypertension
 - Vascular Disease: Aneurysm, Dissection, Thrombosis
- V.L.3. Respiratory Dysfunction/Failure
 - TAGS:**
 - Acute Lung Injury/Acute Respiratory Distress Syndrome
 - Acute or Chronic Respiratory Insufficiency or Failure
 - Aspiration
 - ECMO
 - Mechanical Ventilation
 - Noninvasive Ventilatory Support
 - POCUS
 - Thromboembolic Disease: DVT/PE
- V.L.4. Immune Dysfunction/Infection
 - TAGS:**
 - Antimicrobial Resistance
 - Antimicrobials: Antibiotics, Antivirals, Antifungals, Antiparasitics
 - Autoimmune Disease
 - General and Universal Precautions
 - Hand Washing
 - Hospital-Acquired Infection
 - Immunosuppression Infection Control
 - Needle Stick Injury
 - Sepsis
 - Septic Shock
- V.L.5. Hepatic Dysfunction/Failure
 - TAGS:**
 - Acute Hepatic Failure
 - Chronic Hepatic Failure
 - End-Stage Liver Disease
- V.L.6. Renal Dysfunction/Failure

TAGS:

Acute Kidney Injury
Chronic Kidney Disease
End-Stage Renal Disease
Renal Replacement Therapy

V.L.7. Hematologic Dysfunction

TAGS:

Anemia, Neutropenia, Thrombocytopenia, Pancytopenia
Anticoagulation/Antiplatelet/Antifibrinolytic Therapy
Bone Marrow Transplant
Coagulopathy: DIC, Consumptive, Dilutional
Transfusion Therapy

V.L.8. Gastrointestinal Dysfunction

TAGS:

Hemorrhage
Ileus
Inflammatory/Infectious

V.L.9. Endocrine Dysfunction

TAGS:

Adrenal
Pancreatic
Pituitary
Thyroid

V.L.10. Dermatologic Dysfunction

TAGS:

Pressure Injury

V.L.11. Additional Critical Care Topics

TAGS:

Drug Overdose
Epidemic Management
ICU Management/Organization
ICU Monitoring
ICU Procedures
Multi-Organ Failure
Nutritional Support
Targeted Temperature Management
Toxicology
Transplantation Management

V.M. Neuroanesthesia

V.M.1. Clinical Science

TAGS:

Cerebral Ischemia
Cerebral Vasospasm
Factors Impacting Cerebral Blood Flow
Factors Impacting Intracranial Pressure

V.M.2. Pharmacology

TAGS:

- Anesthetics
- Anticonvulsants
- Anti-Parkinsonian Medications
- Diuretics
- Fluid Management
- Steroids
- Vasodilators and Vasoconstrictors

V.M.3. Clinical Management of Disease States

TAGS:

- Arteriovenous Malformations
- Cerebral Herniation
- Cervical Spine Disease
- Coma
- Hydrocephalus, VP Shunts, Ventriculostomy
- Intracranial Aneurysm
- Intracranial Hypertension
- Intracranial Masses
- Intracranial Vascular Lesions
- Moyamoya Disease
- Pituitary Adenomas
- Posterior Fossa Procedures
- Skull-Base Tumors
- Traumatic Brain Injury

V.M.4. Special Considerations in Neuroanesthesia

TAGS:

- Deep Brain and Vagal Nerve Stimulators
- External Ventricular Drains
- Interventional Radiology
- Intraoperative MRI
- Neurophysiologic Monitoring
- Patient Positioning
- Seizures
- Spinal Drains
- Venous Air Embolism

V.N. Thoracic Anesthesia

V.N.1. Clinical Science

TAGS:

- Anesthetic Techniques for Thoracotomy and Thoracoscopy
- Complications: Cardiac Herniation
- Hypoxic Pulmonary Vasoconstriction
- Lung Separation Techniques: Double-Lumen Tubes and Endobronchial Blockers
- One-Lung Ventilation
- Preoperative Assessment and Optimization
- Pulmonary Function Tests (PFTs)

V.N.2. Pharmacology

TAGS:

Bronchodilators
Fluid Management
Pulmonary Vasodilators

V.N.3. Clinical Management of Disease States

TAGS:

Bronchopulmonary Fistula
Bullae/Recurrent Pneumothorax
Chronic Obstructive Pulmonary Disease
Empyema
Endocrine-Secreting Tumors
Mediastinal Masses
Myasthenia Gravis/Myasthenic Syndromes
Pleural Disease
Reactive Airways Disease
Restrictive Pulmonary Disease

V.N.4. Special Considerations in Thoracic Anesthesia

TAGS:

Esophageal Resection
Jet Ventilation
Lung Resection
Mediastinoscopy
Pain Management
Pneumonectomy
Postoperative Complications
Rigid Bronchoscopy
Thymectomy
Tracheal Resection

V.O. Cardiac Anesthesia

V.O.1. Clinical Science

TAGS:

Factors Impacting Cardiopulmonary Pressures
Factors Impacting Contractile Heart Function
Factors Impacting Coronary Blood Flow
Myocardial Ischemia/Reperfusion

V.O.2. Pharmacology

TAGS:

Antiarrhythmics
Antiplatelet Agents
Beta-Adrenergic Blockers
Chronotropic Agents
Heparin and Alternatives
Inotropes
Protamine
Statins
Vasodilators and Vasoconstrictors

V.O.3. Clinical Management of Disease States

TAGS:

- Aortic Aneurysm: Thoracic
- Aortic Dissection
- Aortic Insufficiency
- Aortic Stenosis
- Arrhythmias
- Atrial Septal Defects
- Carcinoid Heart Disease
- Congenital Heart Disease
- Congestive Heart Failure
- Diastolic Dysfunction/Heart Failure
- Endocarditis
- Hypertrophic Cardiomyopathy
- Ischemic Cardiomyopathy
- Ischemic Heart Disease
- Mitral Regurgitation
- Mitral Stenosis
- Nonischemic Cardiomyopathy
- Pericardial Effusion/Tamponade
- Post-Cardiac Arrest Care/Normothermia/Hypothermia
- Pulmonary Valve Disease
- Tricuspid Regurgitation
- Tricuspid Stenosis
- Ventricular Septal Defects

V.O.4. Special Considerations in Cardiac Anesthesia

TAGS:

- Anticoagulation and Reversal
- Blood Conservation
- Circulatory Assist Devices
- ECMO (VA, VV)
- Extracorporeal Circulation
- Heparin-Induced Thrombocytopenia
- Pacemaker Management
- Thoracoabdominal Aortic Aneurysm
- Transesophageal Echocardiography
- Unintended Intraoperative Awareness

V.P. Vascular Anesthesia

V.P.1. Clinical Science

TAGS:

- Cardiac Risk Assessment and Preoperative Optimization
- Factors Affecting Organ/Peripheral Perfusion

V.P.2. Pharmacology

TAGS:

- Heparin
- Protamine
- Statins

V.P.3. Clinical Management of Disease States

TAGS:

- Aortic Aneurysm
- Carotid Endarterectomy, Stent Procedures
- Peripheral Vascular Disease

V.P.4. Special Considerations in Vascular Anesthesia

TAGS:

- Anticoagulation and Reversal
- Aortic Clamping
- Carotid Clamping
- Endovascular Surgery
- Renal Protection

V.Q. Regional Anesthesia

V.Q.1. General Topics

TAGS:

- Anticoagulation in Regional Anesthesia
- Guidelines and Standards
- Indications and Contraindications
- Nerve Localization: Nerve Stimulator, Landmarks, Ultrasound
- Nerve Structural Anatomy
- Sedation and Monitoring

V.Q.2. Pharmacology

TAGS:

- Liposomal Bupivacaine
- Local Anesthetics and Adjuncts

V.Q.3. Neuraxial Anesthesia

TAGS:

- Anatomy and Sonoanatomy
- Caudal Anesthesia
- Combined Spinal-Epidural Anesthesia
- Complications
- Epidural Anesthesia
- Epidural Blood Patch
- Factors Influencing Onset and Duration
- Indications and Contraindications
- Medications: Local Anesthetics, Opioids, Adjuncts
- Patient-Controlled Epidural Analgesia
- Spinal Anesthesia

V.Q.4. Upper Extremity Regional Anesthesia

TAGS:

- Brachial Plexus Anatomy and Sonoanatomy
- Brachial Plexus Blocks: Interscalene, Supraclavicular, Infraclavicular, Axillary

- Cervical Plexus Blocks: Superficial, Deep
- Other: Musculocutaneous, Wrist Blocks
- Suprascapular/Shoulder Blocks

V.Q.5. Lower Extremity Regional Anesthesia

TAGS:

- Ankle Block and Anatomy

- Inguinal Region Nerve Blocks: Femoral, LFCN, Obturator, Fascia Iliaca, 3-in-1
 - Lumbar Plexus, Femoral, and Saphenous Anatomy and Sonoanatomy
 - Saphenous, Adductor Canal Blocks
 - Sciatic Nerve and Sacral Plexus Anatomy and Sonoanatomy
 - Sciatic Nerve Blocks: Popliteal, Transgluteal, Infragluteal
- V.Q.6. Truncal Regional Anesthesia
 - TAGS:**
 - Abdominal Wall Blocks: TAP, Ilioinguinal, Iliohypogastric, Rectus Sheath
 - Anterior and Lateral Chest Blocks: PECS, Serratus
 - Paravertebral Anatomy and Sonoanatomy
 - Paravertebral Blocks
 - Posterior Truncal Blocks: Quadratus Lumborum, Erector Spinae, Retrolaminar
 - Truncal Block Anatomy and Sonoanatomy
- V.Q.7. Complications and Side Effects
 - TAGS:**
 - Falls
 - Hematoma
 - Horner Syndrome
 - Infection/ Abscess
 - Intraneural Injections
 - Local Anesthetic Systemic Toxicity
 - Neuropraxia, Nerve injury
 - Opioid
 - Phrenic Nerve Block
 - Postdural Puncture Headache
 - Rebound Pain
- V.Q.8. Ultrasound-Guided Regional Anesthesia
 - TAGS:**
 - Image Generation and Display
 - Needle and Probe Alignment
 - Ultrasound Artifacts
 - Ultrasound Physics
- V.Q.9. Continuous Regional Anesthesia
 - TAGS:**
 - Indications and Contraindications
 - Perineural Infusions: Medications, Pumps, Dosing Parameters
- V.Q.10. IV Regional
 - TAGS:**
 - Complications
 - Factors Influencing Onset and Duration
 - Indications and Contraindications
 - Medications: Local Anesthetics, Opioids, Adjuncts
- V.R. Acute Pain Management
 - V.R.1. Analgesic Pharmacology
 - TAGS:**

- Acetaminophen
- Alpha-2 Agonists
- Anticonvulsants
- Antidepressants
- Gabapentinoids
- Intravenous Local Anesthetic Infusions
- Intravenous Medications
- Multimodal Analgesia
- Muscle Relaxants
- NMDA Antagonists
- NSAIDs/COX-2 Inhibitors
- Opioid Agonists, Antagonists
- Opioids
- Oral/Transdermal Opioids
- Parenteral Medications
- Patient-Controlled Analgesia
- Transdermal Medications

V.R.2. Alternative Analgesic Modalities

TAGS:

- Acupuncture
- Complementary Therapies
- Hypnosis
- TENS Therapy

V.R.3. Acute Pain Evaluation and Treatment

TAGS:

- Acute on Chronic Pain
- Cancer Pain
- Discharge Planning
- Escalation of Therapy
- Inflammatory Pain
- Neuropathic Pain
- Nociceptive Pain
- Opioid Conversion
- Opioid Tolerance
- Opioid-Induced Hyperalgesia
- Oral Therapy
- Parenteral Therapy
- Patient-Controlled Analgesia
- Physical Therapy
- Psychiatric Comorbidities
- Substance Use Disorder
- Transdermal Therapy
- Transition to Chronic Pain

V.R.4. Monitoring and Safety

TAGS:

- Cardiopulmonary Monitoring
- Complications and Side Effects

Controlled Substance Prescribing
Drug Testing
Legal Issues
Level of Care

VI. SPECIAL PROBLEMS OR ISSUES IN ANESTHESIOLOGY

VI.A. Electroconvulsive Therapy

VI.A.1. Physiology

TAGS:

Central Nervous System Effects
Hemodynamic Effects

VI.A.2. Pharmacology

TAGS:

Anticholinergics
Beta-Blockers
Sedative-Hypnotics
Vasodilators

VI.B. Organ Donors

VI.B.1. Pathophysiology

VI.B.2. Clinical Management

TAGS:

Criteria for Brain Death
Donation after Cardiac Death
Donation after Brain Death

VI.C. Non-Operating Room Anesthesia (NORA)

VI.C.1. MRI

TAGS:

Anesthetic Management
Monitoring
Risks/Contraindications

VI.C.2. Electrophysiology

TAGS:

Ablation Procedures/Cardioversion
Cardiac Implantable Devices

VI.C.3. Interventional Radiology

TAGS:

Angiography/Thrombolysis
CT-Guided Procedures
Intravenous Contrast
Transhepatic Intrahepatic Portosystemic Shunt

VI.C.4. Gastrointestinal Endoscopy

TAGS:

Colonoscopy/Upper Endoscopy
Endoscopic Retrograde Cholangiopancreatography
Invasive Endoscopic Procedures
Monitored Anesthesia Care (MAC) vs. General Anesthesia

VI.C.5. Neurointerventional Procedures

TAGS:

- Acute Stroke/Cerebral Revascularization
 - Cerebral Vasospasm
 - Intracranial Aneurysms
- VI.C.6 Bronchoscopy Procedures
 - TAGS:**
 - Endobronchial Ultrasound (EBUS)
 - Pulmonary Hemorrhage
- VI.C.7. Cardiac Catheterization Procedures
 - TAGS:**
 - Left Atrial Appendage Occlusion Procedures
 - Mitral Valve Repairs
 - Transfemoral Aortic Valve Replacement (TAVR)
- VI.C.8. Transesophageal Echocardiography
- VI.C.9. Radiation Therapy
- VI.D. Physician Impairment or Disability**
 - VI.D.1. Substance Use Disorder
 - VI.D.2. Fatigue
 - VI.D.3. Aging
 - VI.D.4. Visual and Auditory Impairment
 - VI.D.5. Americans with Disabilities Act (ADA)
 - VI.D.6. Abusive or Disruptive Physicians
 - VI.D.7. Sexual Harassment
 - VI.D.8. Physician Burnout and Wellness
- VI.E. Ethics, Practice Management and Medicolegal Issues**
 - VI.E.1. Professionalism and Licensure
 - VI.E.2. Ethics
 - TAGS:**
 - Do-Not-Resuscitate (DNR) Orders and Advance Directives
 - End-of-Life Issues (Withholding/Withdrawal)
 - Jehovah's Witness Patient Care
 - Mandatory Reporting
 - VI.E.3. Informed Consent
 - TAGS:**
 - Components of Informed Consent
 - Principles
 - VI.E.4. Malpractice
 - TAGS:**
 - Closed Claims Findings
 - Legal Actions and Consequences
 - National Practitioner Data Bank
 - Professional Liability Insurance
 - VI.E.5. Practice Management
 - TAGS:**
 - Health Insurance Portability and Accountability Act (HIPAA)
 - Medicare/Medicaid Requirements
 - Patient Privacy
 - VI.E.6. Costs of Medical/Anesthesia Care

TAGS:

Operating Room Management

VI.E.7. Patient Safety

TAGS:

Disclosure of Errors to Patients

Medication Errors: Assessment and Prevention

VI.E.8. Healthcare Disparities

TAGS:

Reducing Disparities

Cultural Competency

Effects of Disparities on Access to and Quality of Care, Outcomes, and Health Status

Social Determinants of Health

VI.E.9. Diversity, Equity, and Inclusion (DEI) in the Healthcare Workplace

TAGS:

Approaches to Improving DEI in Healthcare

Equity in the Workplace

Threats to DEI, Including Unconscious Bias, Microaggressions, and Stereotype Threat

VII. QUALITY IMPROVEMENT

VII.A. Quality Assurance and Performance Improvement

VII.A.1. Design and Implementation of a QI Project

TAGS:

Tools for Process Improvement

QI Methods

VII.A.2. Communication and Reporting

TAGS:

Outcomes Registries

Public Reporting

VII.A.3. Analysis/Assessment of Information

TAGS:

Artificial Intelligence

Data Analytics

Failure Modes and Effects Analyses

Morbidity and Mortality

Peer Review

Quality Reporting and Dashboards

Root Cause Analyses

VII.A.4. Patient Safety

TAGS:

Communication

Culture of Safety

Epidemiology of Error

Evidence-Based Practice

Human Factors

Methods and Tools for Evaluating Safety Events
Outcomes Improvement
Prevention of Harm/Complications
Safety Enhancing Systems, Tools, and Processes

VIII. OVERVIEW OF ANESTHESIOLOGY TOPICS

VIII.A. Review of Current Topics in Anesthesiology

IX. CRITICAL CARE MEDICINE

IX.A. Basic Pathophysiology

IX.A.1. Central Nervous System

TAGS:

Altered Mental Status
Brain Death
Central Pontine Myelinolysis
Cerebral Blood Flow
Embolic/Thrombotic
Hemorrhagic
Infection
Intracranial Compliance, Mass Lesion
Ischemic
Neuromuscular Disorders
Seizures and Status Epilepticus
Spinal Cord Injury
Stroke
Vascular Malformations

IX.A.2. Cardiovascular

TAGS:

Aneurysm, Abdominal
Aneurysm, Thoracic
Aortic Insufficiency
Aortic Stenosis
Aortic Valve
Asystole
Cardiac Contusion
Cardiac Transplantation
Cardiogenic
Congenital Heart Disease in Adults
Coronary Artery Disease, Myocardial Ischemia/Infarction
Diastolic Dysfunction
Dissections
Deep Vein Thrombosis
Eisenmenger Syndrome
Endocarditis
Heart Block
Hypertension
Hypertrophic Cardiomyopathy (Hypertrophic Obstructive Cardiomyopathy, Asymmetric Septal Hypertrophy, Idiopathic Hypertrophic Subaortic Stenosis)

- Hypovolemic
- Infection/Inflammation
- Intracardiac Shunts
- Junctional or Nodal Rhythm
- Left Ventricular
- Mitral Regurgitation
- Mitral Stenosis
- Mitral Valve
- Myocardial Function/Dysfunction
- Myocarditis
- Obstructive
- Other Conduction Abnormalities
- Other Myocardial
- Oxygen Supply and Demand
- Pericarditis
- Peripheral Vascular Disease
- Pulmonary Hypertension
- Pulmonary Valve
- Pulmonic Insufficiency
- Pulmonic Stenosis
- Pulseless Electrical Activity (PEA)
- Rhythm Disturbances
- Right Ventricular
- Shock States
- Supraventricular Tachyarrhythmias, Including Atrial Flutter, Fibrillation
- Systemic Hypertension
- Systolic Dysfunction
- Tetralogy of Fallot
- Trauma
- Tricuspid Valve Dysfunction
- Valvular
- Ventricular Tachycardia/Fibrillation

IX.A.3. Pulmonary

TAGS:

- Airway Diseases
- ARDS
- Aspiration
- Bronchopleural Fistula
- Chest Trauma
- Community-Acquired
- Embolic Disorders
- Empyema/Abscess
- Hypercapnic (Acute and Chronic)
- Hypoxic (Acute and Chronic)
- Infection
- Inflammatory and Autoimmune Diseases
- Lung and Chest Wall Tumors

- Lung Transplantation
- Mediastinitis
- Obstructive
- Other Ventilation-Perfusion Abnormalities
- Pleural Effusion
- Pneumonia
- Pneumothorax, Volutrauma
- Pulmonary Mechanics
- Reactive
- Respiratory Failure
- Restrictive
- Sleep Apnea
- Tracheal Disruption
- Tracheobronchitis
- Transfusion-Related Acute Lung Injury
- Ventilator-Associated

IX.A.4. Renal

TAGS:

- AKI
- Infection
- Intrinsic Renal
- Postrenal
- Prerenal
- Renal Tubular Acidosis

IX.A.5. Hematologic/Oncologic

TAGS:

- Anemia
- Bone Marrow/Stem Cell Transplantation
- Carboxyhemoglobin
- Coagulopathies
- Disseminated Intravascular Coagulation
- Fibrinolysis
- Methemoglobin
- Polycythemia
- Platelet Abnormalities
- Thrombocytopenia
- Thrombocytosis
- Tumor Lysis Syndrome
- Vitamin K Dependent Coagulopathy
- White Blood Cell Disorder

IX.A.6. Obstetric

TAGS:

- Coagulopathy, Bleeding Disorders
- Complications of Pregnancy
- Emboli
- Liver Function Abnormalities
- Pre-Eclampsia/Eclampsia

IX.A.7. Endocrine

TAGS:

Adrenal
Adrenal Insufficiency
Cerebral Salt Wasting
Critical Illness Effects on Thyroid Function
Cushing Syndrome
Diabetes Insipidus, Including Central, Nephrogenic
Diabetes Mellitus
Hyperglycemia, Diabetic Ketoacidosis (DKA), Nonketotic Hyperglycemic Coma (NKHG)
Hyperthyroidism, Including Thyroid Storm
Hypoglycemia
Hypothyroidism, Including Myxedema
Pheochromocytoma
Pituitary
SIADH
Thyroid Function Abnormalities

IX.A.8. Gastrointestinal

TAGS:

Abdominal Compartment Syndrome
Bowel Disorders
Diarrhea, Nausea, Vomiting
Gall Bladder Disease (Stones, Cholecystitis)
Gastrointestinal Hemorrhage
Gastrointestinal Motility Dysfunction
Hepatic
Hepatic Dysfunction/Failure (Acute and Chronic)
Hepatic Encephalopathy
Hepatitis
Hepatocellular Carcinoma
Hepatorenal Syndrome
Ileus
Infectious
Malabsorption
Pancreas
Pancreatic Cancer
Pancreatitis
Perforation, Volvulus
Pseudomembranous Colitis
Stomach
Toxic Megacolon
Vascular Diseases

IX.A.9. Dermatologic

TAGS:

Allergic Reactions
Infection

Inflammatory Diseases of the Skin
Necrotizing Fasciitis
Stevens-Johnson Syndrome

IX.A.10. Immunologic/Infectious Disease

TAGS:

Acquired
Autoimmune
Graft vs. Host Disease
HIV/AIDS
Immune Suppression
Mixed Connective Tissue Disease
Sepsis
Systemic Inflammatory Response Syndrome
Therapeutic
Vasculitides

IX.A.11. Acid-base and Electrolyte Abnormalities

TAGS:

Acid-Base Abnormalities
Calcium
Chloride
Electrolyte Abnormalities
Magnesium
Metabolic
Mixed
Phosphorus
Potassium
Respiratory
Sodium

IX.B. Critical Illness Diagnosis and Management

IX.B.1. Central Nervous System

TAGS:

Abscess
Altered Mental Status
Angiography
Anticonvulsants
Antimicrobials
Brain Death
Coma
Critical Illness Polyneuropathy
Degenerative Disease of the Brain
Delirium
Diagnoses
Diagnostic Modalities
EEG, Processed EEG
Embolic/Thrombotic
EMG/NCS
Encephalitis

Guillain-Barré Syndrome
Head Injury, Closed or Open
Hemorrhagic (Subarachnoid, Subdural, Epidural Hematoma)
ICP Measurement
ICP-Controlling Medications
Infectious
Interventional Radiology
Ischemic
Jugular Venous Saturation
Lumbar Puncture
Management Strategies
Meningitis/Ventriculitis
Myasthenia Gravis
Myopathy
Neuromuscular Disorders
Nuclear Medicine Studies
Other Therapies
Pituitary Disorders
Plasmapheresis/Plasma Exchange
Seizures and Status Epilepticus
Spinal Cord Injury
Steroids
Stroke
Subarachnoid, Subdural, Epidural Hematoma
Surgical Interventions
Transcranial Doppler
Vascular Malformations
Vasoactive Drugs

IX.B.2. Cardiovascular

TAGS:

Automatic Implantable Cardioverter Defibrillators
Aneurysm, Thoracic
Anticoagulants and Antithrombotics
Antidysrhythmics
Antifibrinolytics
Antihypertensives
Antimicrobials
Antiplatelet Agents
Arterial Pressure
Asystole
Atrial Flutter/Fibrillation
Biomarkers
Cardiac Contusion
Cardiac Output Monitoring
Cardiac Transplantation, Rejection, Complications
Cardiac Ultrasound (TTE, TEE)
Cardiogenic

Cardiomyopathy
Circulatory Support Systems
Congenital Heart Disease in Adults
Coronary Artery Disease, Myocardial Ischemia/Infarction
CVP
Diagnostic Modalities
Diastolic Dysfunction
ECG
ECMO
Eisenmenger Syndrome
Endocarditis
External Defibrillators
Heart Block
Hemodynamic Monitoring
Heparin
Heparinoids
Hypertension
Hypertrophic Cardiomyopathy (Hypertrophic Obstructive Cardiomyopathy, Asymmetric Septal Hypertrophy, Idiopathic Hypertrophic Subaortic Stenosis)
Hypovolemic
Imaging
Infectious
Inotropes/Chronotropes/Lusitropes
Intra-Aortic Balloon Pump
Junctional or Nodal Rhythm
Left or Right Ventricular Assist Device
Left Ventricular
Low Molecular Weight Heparin
Management Strategies
Myocardial Function/Dysfunction
Myocarditis
Noninfectious Myocarditis
Obstructive
Other Bedside Ultrasound
Pacemakers/Defibrillators
Papillary Muscle Dysfunction
Pericardial Effusion
Pericardiocentesis
Pericarditis
Peripheral Vascular Disease
Pulmonary Hypertension
Pulmonic Valve Disease
Pulseless Electrical Activity (PEA)
Regurgitation
Rhythm Disturbances
Right Ventricular

Shock States
Stenosis
Stress-Induced Cardiomyopathy
Stunned Myocardium
Supraventricular Tachyarrhythmias, Other
Systolic Dysfunction
Tamponade
Tetralogy of Fallot
Thrombin Inhibitors
Thrombolytics
Transthoracic
Transvenous/Epicardial
Traumatic
Tricuspid Valve Disease
Valvular
Vasoconstrictors
Vasodilators
Ventricular Tachycardia/Fibrillation
Warfarin

IX.B.3. Pulmonary

TAGS:

Airway Diseases
Airway Pressure-Release Ventilation
Antimicrobials/Antivirals
ARDS
Arterial Blood Gas
Aspiration
Assist Control
BiPAP
Capnography
Chest Trauma
Chest X-ray
Community-Acquired
CPAP
CT/MRI
Diagnoses
Diagnostic Modalities
Differential Lung Ventilation
Embolitic Disorders
Empyema/Abscess
High-Frequency/Oscillation
Hypercapnic (Acute and Chronic)
Hypoxic (Acute and Chronic)
Imaging
Infection
Inflammatory and Autoimmune Diseases
Invasive Ventilation Modes

- Laryngoscopy and Bronchoscopy
- Lung and Chest Wall Tumors
- Lung Transplantation, Rejection, Complications
- Management of Bronchopleural and Bronchocutaneous Fistulae
- Management Strategies
- Mediastinitis
- Noninvasive
- Nuclear Studies
- Obstructive
- Other Ventilator Strategies
- Pressure Control/Volume Control
- Pleural Effusion
- Pneumonia
- Positioning
- Pressure-Support Ventilation
- Pulmonary Function Studies/Pulmonary Mechanics
- Pulmonary Medications
- Pulse Oximetry
- Respiratory Failure
- Synchronized Intermittent Mandatory Ventilation
- Spontaneous Breathing Trials
- Thoracentesis
- Thromboembolic
- Tracheobronchitis
- Transfusion-Related Acute Lung Injury
- Ultrasound
- Ventilator-Associated
- Ventilatory Support
- Volutrauma/Barotrauma

IX.B.4. Renal

TAGS:

- Angiography
- Antimicrobials/Antifungals
- Biomarkers
- Buffers
- Continuous Renal Replacement Therapies Including Ultrafiltration
- Contrast-Induced Nephropathy
- CT/MRI
- Diagnostic Modalities
- Diagnostic X-ray
- Diuretic Therapy
- Electrolytes, Osmolarity, and Specific Gravity (Serum, Urine)
- Fluid and Electrolyte Management
- Imaging
- Infection
- Intermittent Hemodialysis
- Intrinsic Renal

- Management Strategies
- N-Acetylcysteine
- Pharmacologic Therapies
- Postrenal
- Prerenal
- Renal Failure
- Renal Replacement Therapies
- Renal Transplantation
- Renal Trauma
- Renal Tubular Acidosis
- Ultrasound

IX.B.5. Hematologic/Oncologic

TAGS:

- Anemia
- Anticoagulants
- Antiplatelet Agents
- Carboxyhemoglobin
- Coagulopathies
- Congenital
- Diagnoses
- Diagnostic Modalities
- Disseminated Intravascular Coagulation
- Erythropoietin, G-CSF
- Fibrinolysis
- Hemoglobin Abnormalities
- Heparin
- Heparinoids
- Hypercoagulable State
- Isolated Factor Abnormalities
- IVC Filters, Other Mechanical Devices
- Low-Molecular-Weight Heparin
- Management Strategies
- Methemoglobin
- Other Hemoglobinopathies
- Plasmapheresis/Plasma Exchange
- Platelet Abnormalities
- Polycythemia
- Reversal Agents
- Routine Blood Studies
- Thrombin Inhibitors
- Thrombocytopenia, Including Heparin-Induced
- Thrombocytosis
- Thrombolytics
- Transfusion and Factor Replacement
- Tumor Lysis Syndrome
- Vitamin K Dependent
- Warfarin

IX.B.6. Obstetric

TAGS:

Anticoagulants
Anticonvulsants
Antihypertensive Therapy
Antimicrobials
Coagulopathy, Bleeding Disorders
Delivery
Diagnoses
Diagnostic Modalities
Emboli (Amniotic Fluid, Thromboemboli, Other)
Liver Function Abnormalities
Management Strategies
Peripartum Infection
Preeclampsia/Eclampsia

IX.B.7. Endocrine

TAGS:

Adrenal
Adrenal Insufficiency
Antihypertensives
Cerebral Salt Wasting
Critical Illness Effects on Thyroid Function
Cushing Syndrome
Diabetes Insipidus Including Central, Nephrogenic
Diabetes Mellitus
Diagnoses
Diagnostic Modalities
Desmopressin
Glucose Management
Hyperglycemia, Diabetic Ketoacidosis (DKA), Non-Ketotic Hyperglycemic Coma (NKHG)
Hyperthyroidism, Including Thyroid Storm
Hypoglycemia
Hypothyroidism, Including Myxedema
Insulin
Laboratory Studies (Serum, Urine)
Management Strategies
Oral Hypoglycemic Agents
Other Therapies
Pheochromocytoma
Pituitary
SIADH
Steroids (Glucocorticoid and Mineralocorticoid)
Thyroid Function Abnormalities
Ultrasound

IX.B.8. Gastrointestinal

TAGS:

- Abdominal Compartment Syndrome
- Abdominal Pressure Measurement
- Antimicrobials
- Assessment of Bowel Motility
- Bowel Disorders
- Coagulation Parameters
- Diagnoses
- Diagnostic Modalities
- Diuretics, Renal Replacement Therapies
- Dysfunction/Failure, Acute and Chronic
- Endoscopy, Upper, Lower
- Endoscopy, Upper, Lower with Therapeutic Intervention
- Endoscopy, Upper, Lower; Endoscopic Retrograde Cholangiopancreatography
- Gall Bladder Disease (Stones, Cholecystitis)
- Gastritis
- Gastrointestinal Hemorrhage
- Gastrointestinal Motility Dysfunction, Gastroesophageal Reflux Disease
- Hepatic
- Hepatic Encephalopathy
- Hepatitis
- Hepatocellular Carcinoma
- Hepatorenal Syndrome
- Imaging
- Interventional Radiology (Embolization, Coiling)
- Lactulose, Rifaximin
- Liver Transplantation, Rejection, Complications
- Management of Increased ICP
- Management Strategies
- MRI
- Nuclear Medicine Studies
- Nutritional Assessment (Albumin, Prealbumin)
- Nutritional Support (Enteral, Parenteral)
- Pancreatic Cancer
- Pancreatitis
- Paracentesis
- Pharmacologic Management
- Stool Assessment (Occult Blood, *C. Diff* Toxin)
- Surgical Intervention (Timing, Therapeutic Options)
- Ulcer
- Ultrasound
- Urine Electrolytes (Fractional Excretion of Sodium)
- X-ray

IX.B.9. Dermatologic

TAGS:

- Allergic Reactions
- Antimicrobials, Antihistamines

- Complete Blood Count with Differential
- Diagnoses
- Diagnostic Modalities
- Immunologic Studies
- Infection
- Inflammatory Diseases of the Skin
- Management Strategies
- Necrotizing Fasciitis
- Other Topical Medications
- Pharmacologic
- Steroids, Systemic and Topical
- Stevens-Johnson Syndrome

IX.B.10. Immune/Infectious Disease

TAGS:

- Antimicrobials (Including Prophylaxis)
- Autoimmune
- Biomarkers
- Biopsy, Selective Aspiration
- Congenital
- Cultures
- Diagnoses
- Diagnostic Modalities
- Graft vs. Host Disease
- Highly Active Antiretroviral Therapy
- HIV/AIDS
- Immune Suppression
- Immunologic Studies
- Laboratory Studies
- Management Strategies
- Neutropenia
- Pharmacologic
- Sepsis
- Systemic Inflammatory Response Syndrome
- Systemic Lupus Erythematosus
- Steroids

IX.B.11. Acid-base and Electrolyte Abnormalities

TAGS:

- Acid-Base Abnormalities
- Albumin
- Appropriate Renal and Endocrine Strategies
- Arterial Blood Gas
- Calcium
- Chloride
- Diagnostic Modalities
- Electrolyte Abnormalities
- Electrolyte Replacement as Appropriate
- Electrolytes, Osmolarity, and Specific Gravity (Serum, Urine)

- Magnesium
- Management Strategies
- Metabolic
- Phosphorus
- Potassium
- Respiratory
- Sodium
- Ventilatory Support

IX.C. Specialized Areas

IX.C.1. Biostatistics

TAGS:

- Chi-Squared
- Kaplan-Meier
- Meta-Analysis
- Number Needed to Treat
- Odds Ratio
- Propensity Score
- Regression Analysis
- Relative Risk
- Receiver Operating Characteristic Curve
- Sample Size Estimate
- Sensitivity, Specificity
- Statistical Significance (P-Value)
- Study Design

IX.C.2. Burns

TAGS:

- Airway Management
- Antimicrobials
- Complications
- Electrical Burns
- Fluids and Resuscitation
- Inhalation Injury
- Management

IX.C.3. Disaster Management

TAGS:

- Biologic, Chemical, and Nuclear Exposures
- Epidemic

IX.C.4. Drowning, Fatal, Near-drowning

TAGS:

- Fresh Water

IX.C.5. ICU Ethics

TAGS:

- Brain Death
- End-of-Life, Futility
- Impaired Providers
- Informed Consent
- Living Will/Durable Power of Attorney/Healthcare Surrogate

- Organ Donation
- Palliative Care, Hospice
- Patient Autonomy
- IX.C.6. ICU Management and Organization
 - TAGS:**
 - Clinical Care Bundles
 - Daily Wake-Up Test
 - Handover/Communication
 - Health Insurance Portability and Accountability Act (Privacy and Security)
 - Quality Assurance/Quality Improvement (Patient Safety)
 - Scoring Systems
 - Sedation/Analgesia/Delirium Assessment
 - Triage and Resource Utilization
- IX.C.7. Infection Control
 - TAGS:**
 - Catheter-Associated Infections
 - Environmental Exposures
 - General/Universal Precautions
 - Isolation Techniques
 - Nosocomial Infections
 - Pneumonia (Ventilator-Associated, Hospital-Associated, Etc.)
 - Reverse Isolation
 - Urinary Tract Infection (UTI), Catheter-Associated UTI
- IX.C.8. Life Support and Resuscitation
 - TAGS:**
 - ACLS
 - Other
- IX.C.9. Nutrition Management
 - TAGS:**
 - Enteral and Parenteral Nutrition (Formula, Caloric Intake)
 - Enteral Tubes
 - Refeeding Syndrome
- IX.C.10. Assessment and Management of Pain, Sedation, and Delirium
 - TAGS:**
 - Multimodal Analgesia
 - Opiate Management
 - Regional Analgesia Techniques
 - Sedation/Analgesia/Pain/Delirium Assessment
- IX.C.11. Pharmacology (Indications, Contraindications, and Complications)
 - TAGS:**
 - Anaerobes
 - Antibiotics
 - Antidepressants
 - Antifungal
 - Antimicrobial Resistance
 - Antimicrobials
 - Antiparasitic

- Antipsychotics
- Antiviral
- Genetic Considerations
- Gram-Negative Organisms
- Gram-Positive Organisms
- Lithium
- Neuromuscular Blocking Drugs
- Pharmacokinetics, Pharmacodynamics, and Drug Metabolism
- Prophylactic Antimicrobials
- Sedatives/Hypnotics
- Spirochetal and Rickettsial
- SSRIs
- Tuberculosis
- Tricyclic Antidepressants
- IX.C.12. Poisonings, Toxic Ingestion, Overdoses, and Withdrawal
- IX.C.13. Procedures

TAGS:

- Airway
- Arterial
- Chest Tubes
- Complications
- Intraosseous
- Laryngeal Mask Airways/Others
- Physics of Ultrasound
- Tracheostomy
- Ultrasound
- Vascular Access

IX.C.14. Thermoregulation

TAGS:

- Environmental
- Fever
- Heat Stroke
- Hyperthermia
- Hypothermia
- Malignant Hyperthermia
- Neuroleptic Malignant Syndrome

X. PAIN MEDICINE

X.A. Background Concepts

X.A.1. Anatomy and Physiology: Mechanisms of Nociceptive Transmission

TAGS:

- Autonomic Nervous System
- Central Mechanisms: Spinal and Medullary Dorsal Horns
- Central Mechanisms: Segmental and Brain Stem
- Central Mechanisms: Thalamocortical
- Peripheral Mechanisms: Somatosensory, Somatic, Visceral

X.A.2. Mechanisms of Pain Transmission and Modulation

TAGS:

Central Mechanisms and Implications for Treatment of Pain
Descending Inhibition and Facilitation, Pain Modulation
Mechanisms and Physiology of Somatic and Visceral Pain
Mechanisms of Acute Pain, Inflammatory, and Neuropathic Pain
Neurotransmitters Involved in Pain Modulation
Peripheral and Central Sensitization: Mechanisms and Implications
Peripheral Mechanisms of Pain Transmission and Modulation
Referred Pain
Synaptic Transmission of Pain in the Dorsal Horn

X.A.3. Interpreting Clinical Research Studies about Treatments for Pain

TAGS:

Epidemiology: Measurement of Burden in a Population, Including
Epidemiologic Measures of Occurrence (Prevalence, Incidence)
Epidemiology: Use of Data from Epidemiologic Studies of Pain
Epidemiology: Use of Risk Factors to Guide Treatment
Evaluating Study Results: Basic Concepts, Statistical Analysis, Reliability
and Validity, Sensitivity and Specificity
Evaluating Study Results: Minimal Clinically Important Difference, Meta-
Analysis, Confounding Variables, Grades of Evidence, Influence of Bias
Principles of Clinical Trial Design: Inclusion/Exclusion Criteria, Use of
Study Instruments, Development of Hypothesis
Research Study Design - Cohort Studies: Use to Determine Natural
History and Predictors of Outcome
Research Study Design - Correlational Studies, Case Reports,
Retrospective Studies, Cross-Sectional Surveys
Research Study Design - Observational Studies: Uses and Limitations
(e.g., Measurement of Strength of Association Between Risk Factors
and Pain); Known Major Risk Factors for Development of Chronic Pain
Research Study Design - Randomized Controlled Trials, Prospective,

Experimental

X.A.4. Ethical Standards in Pain Management and Research

TAGS:

Conflicts of Interest and Financial Disclosure
Ethics of Pain Management and Research: Principles of Justice,
Autonomy, Beneficence, Nonmaleficence
Informed Consent
Professionalism

X.A.5. Teamwork and Care Coordination

TAGS:

Importance of Coordination of Care
Participation in Quality Assurance, Identifying System Errors
Transitions of Care, Hand-Off Procedures

X.A.6. Legal and Regulatory Issues

TAGS:

Elements of Medical Malpractice: Duty, Breach of Duty, Causation,
Damages

- Legal Actions and Consequences: National Practitioner Data Bank, Closed Claims
- Patient Privacy, Confidentiality, Health Insurance Portability and Accountability Act
- Requirements for Reporting Impaired Healthcare Professionals
- Understanding Laws Related to Controlled Substances
- Workers Compensation, Disability Evaluations
- X.B. Assessment of Pain**
 - X.B.1. Assessment of Pain**

TAGS:

 - Components of Pain Assessment: Basic Examination, Assessment of Function, Biopsychosocial Assessment
 - Measurement of Pain: Direct Pain Measurement - Self-Report, Indirect Pain Measurement - Observations
 - Pain Sensory Testing: Mechanical Allodynia, Cold and Warm Allodynia
 - Pain Sensory Testing: Pain Threshold, Pain Tolerance
 - Pain Sensory Testing: Quantitative Sensory Testing
 - Terminology: Hyperalgesia, Paresthesia, Spontaneous Pain, Evoked Pain, Allodynia, Anesthesia Dolorosa
 - X.B.2. Placebo and Pain**

TAGS:

 - Ethics of Placebo in Clinical Trials and Clinical Practice
 - Nocebo Effect
 - Placebo as Treatment Modality
 - Placebo Response: Mechanisms and Interpretation
 - Placebo: Definition and Incidence
 - Role of Placebo in Clinical Trials: Response Bias, Regression to Mean, Open-Hidden Paradigm
 - X.B.3. Assessment of Functional Outcomes and Disability**

TAGS:

 - Environmental Factors: Social Attitudes, Workplace
 - Functioning and Disability: Body Functions, Impairment, Limitations and Restrictions
 - Personal Factors: Role of Family, Cultural Background, Social Factors
 - Validated Tools to Assess Functional Status
 - X.B.4. Psychosocial and Cultural Aspects of Pain**

TAGS:

 - Common Emotional Problems and Psychiatric Disorders Associated with Pain
 - Coping Styles: Definition and Effect on Pain Experience and Response to Treatment
 - Cultural, Environmental, and Racial Variations in Experience and Expression of Pain
 - Expectations, Coping, Cultural and Environmental Factors: Effect on Treatment Outcome, Maintenance of Treatment Effects
 - Individual Differences in Affective, Cognitive, and Behavioral Responses to Pain

- Measurement: Screening Questionnaires, Validated Tools for Older or Cognitively Impaired Adults
- Pain as a Biopsychological Experience: Definition and Measurement
- Psychological Assessment: Role of Family, Financial Status, Cultural Beliefs
- Role of Care Givers in Promoting Illness and Well Behavior
- Role of Psychology, Physical and Occupational Therapy, Social Work
- X.B.5. Sex, Gender, and Race Issues in Pain
 - TAGS:**
 - Analgesic Response: Differences Between Sexes and Within the Same Sex
 - Definition of Sex and Gender
 - Sex Differences: Biologic and Psychosocial Contributions to Pain Response
 - Sex Differences: Nociceptive Response and Pain Perception
 - Sex Differences: Role in Epidemiology of Pain in Relation to Age and Reproductive History
 - Sex Differences: Role in Treatment Seeking, Delivery and Effectiveness of Treatment
- X.B.6. Imaging and Electrodiagnostic Evaluation
 - TAGS:**
 - Electrical Nerve Stimulation (EMG/NCV/Evoked Potentials): Uses and Limitations
 - Electroencephalography (EEG, MEG): Uses and Limitations
 - Laser-Evoked Potentials: Uses and Limitations
 - MRI, Functional MRI, and Magnetic Resonance Spectroscopy: Uses and Limitations
 - Nuclear Medicine Bone Scan: Uses and Limitations
 - Positron Emission Tomography (PET) Scan: Uses and Limitations
 - Quantitative Sensory Testing: Uses and Limitations
 - Skin Punch Biopsy: Assessment of Innervation Density
- X.C. Treatment of Pain – Pharmacology: Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, and Indications/Contraindications**
 - X.C.1. Opioids
 - TAGS:**
 - Adverse Effects: Opioid-Induced Hyperalgesia, Opioid Tolerance, Cognitive Effects, Impact on Driving, Effects on Endocrine, Immune, Cardiac, and Respiratory Systems
 - Effectiveness of Opioids: Evidence Base, Effect on Function
 - Federal Regulations Regarding Prescribing of Controlled Substances
 - Mechanism of Action on Pain Transmission and Modulation
 - Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, and Indications/Contraindications: Metabolism and Genetic Variability
 - Rationale for Opioid Rotation, Discontinuation of Opioids
 - Risk Assessment and Management of the Patient Taking Chronic Opioid Therapy

Route of Administration: Oral, Rectal, Transdermal, IV, Epidural, Spinal
Specific Drugs: Buprenorphine, Methadone, Morphine, Synthetic and Semi-Synthetic Opioids

X.C.2. Antipyretic Analgesics: Nonsteroidals, Acetaminophen, and Phenazone Derivatives

TAGS:

Adverse Effects

Drug Interactions and Indications/Contraindications

Mechanism of Action

Pharmacokinetics, Pharmacodynamics, Pharmacogenomics

Specific Drugs

X.C.3. Antidepressants and Anticonvulsants

TAGS:

Anticonvulsants: Mechanism of Action

Anticonvulsants: Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, Indications/Contraindications

Anticonvulsants: Specific Drugs

Antidepressants: Mechanism of Action

Antidepressants: Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, Indications/Contraindications

Antidepressants: Specific Drugs

X.C.4. Other Analgesic Pharmacotherapy: Mechanism of Action, Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, Indications/Contraindications

TAGS:

Alpha-2 Adrenergic Drugs (Clonidine, Tizanidine)

Antihistamines

Benzodiazepines

Botulinum Toxin

Cannabinoids

CNS Stimulants

Corticosteroids

Ketamine and NMDA-Receptor Antagonists

Local Anesthetics and Membrane-Stabilizing Drugs

Miscellaneous Analgesic Agents

Muscle Relaxants and Antispasticity Drugs

Neuroleptic Drugs

Other Vasoactive Drugs (Terazosin, Verapamil)

Sympatholytic Drugs

TRPV1 Agonists, Capsaicin and its Analogs

Ziconotide and Other Calcium Channel Blocking Drugs

X.D. Treatment of Pain: Procedural Treatments

X.D.1. General Considerations

TAGS:

Assessment of Infection Risk, Antibiotic Prophylaxis, Sterile Technique

Drug Selection: Steroids and Contrast Agents

Fluoroscopic Imaging and Radiation Safety

Indications and Appropriateness for Interventional Therapy
Preprocedural Factors and Evaluation of Health Status
Ultrasound Guidance: Basics, Techniques, Risks

X.D.2. Nonsurgical Stimulation-Produced Analgesia

TAGS:

Clinical Applications and Efficacy

Mechanisms

Peripheral Stimulation Techniques: TENS, Acupuncture, Vibration

X.D.3. Interventional Pain Management Including Nerve Blocks and Lesioning

TAGS:

Cranial Nerve Blocks and Ablation

Diagnostic and Treatment Purpose, Clinical Indications, Risks, Anatomy,
Pharmacology, and Use of Drugs

Facet Joint and Zygapophyseal Injectionsa

Intrathecal Blocks and Neurolysis

Musculoskeletal: Tendon, Ligament, and Intra-Articular Injections

Nerve Blocks and Neurolytic Techniques: Risks, Side Effects,
Management of Anticoagulation

Neuraxial Injections: Spinal, Epidural, Nerve Root Injections

Other Procedural Treatments for Pain

Peripheral Nerve Blocks (Including Genicular Nerve Blocks)

Radiofrequency Ablation: Lumbar, Cervical Indications

Radiofrequency Ablation: Lumbar, Cervical Techniques

Regional Tissue Plane Blocks: Transversus Abdominis, Erector Spinae,
Serratus Plane, Pectoralis Blocks, and Others

Sympathetic Ganglion and Plexus Blocks

Vertebral Augmentation: Indications, Risks, Benefits, Complications

X.D.4. Neuromodulation (Implanted Devices): Indications, Risks, Benefits,
Complications

TAGS:

Implanted Stimulation Devices: Spinal Cord Stimulations, Dorsal Root
Ganglion Stimulation, Peripheral Nerve Stimulation

Other Neuromodulation Treatment of Pain

Spinal Drug Delivery Systems: Intrathecal Pumps and Infusions, Epidural
Implants and Infusions

X.D.5. Neuroablative Pain Management: Indications, Risks, Benefits,
Complications

TAGS:

Ablative Procedures: Cordotomy, Dorsal Root Entry Zone Lesioning,
Neurolytic Blocks

Brain, Brain Stem, Spinal Cord, Cervical/Thoracic/Lumbar, and Peripheral
Nerve Procedures

Intrathecal, Visceral, and Peripheral Nerve Neurolysis: Techniques, Drugs

Other Neuroablative Procedures for Pain

X.D.6. Regenerative Medicine: Clinical Uses and Evidence Base

TAGS:

Cellular Products (Lipoaspirate, Bone Marrow Aspirate, Umbilical Stem Cells, Platelet-Rich Plasma)

Environmental Products (Hyaluronic Acid, Tissue Engineering, Prolotherapy, Replacement Discs)

Other Regenerative Pain Medicine

X.E. Treatment of Pain: Psychological, Physical, and Integrative Therapies

X.E.1. Cognitive Behavioral and Behavioral Interventions

TAGS:

Cognitive and Behavioral Strategies: Application to Specific Pain

Syndromes (e.g., Temporomandibular Joint Pain, Neck and Back Pain, Fibromyalgia, Arthritis Pain, Burn Pain, Postoperative Pain)

Common Process Factors: Rapport, Engendering Hope, Therapeutic Alliance

Integration of Approaches: Cognitive Behavioral Treatments, Combined Behavioral and Drug Treatments; Economic Benefits of Integrating Treatment

Other Behavioral Interventions

Stages of Behavioral Change and Effect on Readiness to Adopt Self-Management

Therapies: Solution-Focused, Mindfulness, Family, Hypnosis, Biofeedback

X.E.2. Mental Health Treatment

TAGS:

Anger in Chronic Pain Patients and Relation to Perceived Pain

Coping Styles: Definition and Effect on Pain Experience and Response to Treatment

Differential Diagnosis of Anxiety Disorders that May Augment Pain and Suffering

Pharmacotherapy for Treatment of Comorbid Conditions: Antidepressants, Mood-Stabilizing Agents, Anxiolytics, Antipsychotics

Psychiatric and Psychologic Morbidities of Chronic Pain (e.g., Depressive Disorders, Anxiety Disorders, Substance-Related and Addictive Disorders, Somatic Symptom and Related Disorders, Bipolar and Related Disorders)

Psychotherapy for Depressive Disorders: Cognitive Behavioral, Marital, Family, Interpretive, Group Therapy

Role of Biofeedback, Operant Therapy, Mindfulness, Cognitive Behavioral Therapy, Hypnosis, Relaxation

Role of Cultural and Environmental Factors: Effect on Treatment Outcome, Maintenance of Treatment Effects

Role of Education, Fear Avoidance, Self-Esteem, Self-Efficacy, Self-Control, Sick Role, Illness Behavior, and Individual Differences in Affective, Behavioral Response to Pain

Role of Family and Other Caregivers: Importance of Interviewing and Training Patient and Relatives; Evaluating Information from Relatives

Role of Patient Beliefs and Expectations in Pain and Disability; Coping Strategies

Sleep Disorders in Chronic Pain: Diagnosis and Evaluation

Somatic Complaints in Chronic Pain: Conversion (Functional Neurological Symptom) Disorder, Somatic Symptom Disorder, and Illness Anxiety Disorder

Work History and Education in Evaluation of Chronic Pain

X.E.3. Physical Medicine and Rehabilitation

TAGS:

Exercise Therapy

Orthosis Used for Pain Control: Peripheral Joints and Spine

Other Treatment of Pain (Methods): Physical Medicine and Rehabilitation

Physical Modalities: Manipulation, Mobilization, Massage, Traction

Role of Physiotherapy, Principles of Pacing, Graded Activity, Passive and Active Therapy, Manual Therapy

Temperature Modalities (e.g., Heat, Cold, Ultrasound)

X.E.4. Work Rehabilitation

TAGS:

Components of Successful Comprehensive Rehabilitation Program
(General Exercise, Cognitive Therapy, Vocational Elements)

Functional Capacity Evaluation: Definition, Usefulness, and Limitations

Identification of Obstacles to Recovery (e.g., Fear of Reinjury, Low Expectations of Recovery, Low Mood, Anxiety, Withdrawal from Social Interaction); Reliance on Passive Treatments; Negative Attitude to Physical Activity and Self-Management

Importance of Early Intervention and Early Return to Work in Reducing Absence

Multidisciplinary Approaches for Those Who Do Not Return to Work Within a Few Weeks (Active Exercise, Addressing Distorted Beliefs About Pain, Enhancing Coping Strategies, Promoting Self-Management)

Psychosocial Factors as the Main Determinants of Disability and as Predictors of Prolonged Work Absence, Work Rehabilitation, and Management of Return to Work

X.E.5 Complementary Therapies (CAM)

TAGS:

Acupuncture: Clinical Outcomes and Evidence Base

Acupuncture: Techniques and Indications

Acupuncture: Treatment Principles and Practical Skills

CAM: Alternative Medical Systems (e.g., Traditional Eastern Medicine, Homeopathy, Acupuncture, Acupressure)

CAM: Biologically Based Therapies (e.g., Herbs, Foods, Vitamins), Energy Therapy

CAM: Manipulative Methods (e.g., Osteopathy, Chiropractic)

Evidence-Based CAM

Implications, Costs, and Side Effects (Including Drug Interactions) of CAM

Mind-Body Interventions (e.g., Yoga, Mindfulness, Meditation, Tai Chi)

Prevalence and Patient Reasons for Use of CAM

X.F. Clinical States: Taxonomy

X.F.1. Taxonomy of Pain Systems

TAGS:

Application and Definition of Pain Terms

International Association for the Study of Pain (IASP) Classification of Chronic Pain Syndromes

X.F.2. Chronic Pain as a Symptom or a Disease

TAGS:

Chronic Primary Pain: Definition, Diagnostic Entities, Etiology

Chronic Secondary Pain: Definition, Diagnostic Entities, Etiology

Current Procedural Terminology (CPT): Basis of Reporting Medical Services

Location: Body System, Body Site

Pain Qualifiers: Severity, Interference, Psychological and Social Factors, Disability

X.G. Clinical States: Widespread Pain

X.G.1. Complex Widespread Pain

TAGS:

Central Sensitization Disorder

Chronic Pain Disorder with Somatic and Psychological Features

Illness Anxiety Disorder

Mechanisms: Somatization and Hypervigilance, Caused by Injury, Psychological, Infection, Immune System Disorder, Malingering

Somatic Symptom Disorder

X.G.2. Fibromyalgia

TAGS:

Associated Conditions: Irritable Bowel Syndrome, Headache, Cystitis, Chronic Fatigue

Criteria for Diagnosis: Tender Points, Fatigue, Sleep Problems, Mood Disturbance

Definition of Fibromyalgia, Myofascial Pain

X.H. Clinical States: Acute Pain, Pain due to Trauma, Postoperative Pain

X.H.1. Assessing and Monitoring Efficacy and Safety in the Postoperative Period

TAGS:

Clinical Outcomes to be Evaluated in an Organized Approach to Acute Pain Management

Epidemiology of Inadequate Control of Acute Pain

X.H.2. Central, Perineural, and Infiltrative Techniques

TAGS:

Neuraxial Opioids and Local Anesthetics

Regional Anesthetic Techniques

Use of Adjuvant Agents

X.H.3. Development of Chronic Post-Surgical Pain or Post-Traumatic Pain

TAGS:

After Amputation

After Burn Injury

After Nerve or Spinal Cord Injury

After Spinal Surgery

After Thoracotomy or Other Specified Area (Herniorrhaphy, Breast Surgery, etc.)

- X.H.4. Interventions to Prevent the Development of Chronic Pain after Acute Pain
 - TAGS:**
 - Epidemiology of Transition from Acute to Chronic Pain
 - Role of Regional or Neuraxial Analgesia
 - Role of Perioperative Opioid Management
- X.H.5. Multimodal Analgesia for Optimal Perioperative Pain Management
 - TAGS:**
 - Based on Available Expertise and Technology
 - Based on Patient Preference
 - Based on Physical and Mental Status
 - Formulation Based on Type and Cause of Pain
- X.H.6. Nonpharmacologic Treatment
 - TAGS:**
 - Role of Coping Skills
 - Role of Hot and Cold Packs
 - Role of Patient and Family Education
 - Role of TENS, Stimulation-Based Approaches
- X.H.7. Pharmacologic Properties of Major Classes of Drugs Used for Acute Pain Management
 - TAGS:**
 - Opioids, NSAIDs, Adjuvant Drugs, Local Anesthetics
 - Physiologic and Psychologic Effects: Identification and Control
 - Role of Acute Pain Management in Enhanced Recovery (ERAS)
- Pathways
- X.H.8. Tools for Assessment and Management of Acute Pain
 - TAGS:**
 - Assessment and Management of Older Patients, Delirium
 - Assessment and Management of Pain in Children
 - Assessment and Management of Vulnerable Populations
 - Outcome Measures
- X.H.9. Treatment of Special Populations for Acute Pain
 - TAGS:**
 - Opioid-Tolerant Patients
 - Patients with Chronic Pain
 - Patients with Renal/Hepatic Comorbidities
 - Pregnant or Breastfeeding
 - Spinal Cord Injury
 - Treatment of Nonsurgical Pain: Burns, Sickle Cell Disease
- X.I. Clinical States: Musculoskeletal Pain**
 - X.I.1. Cervical Spinal Pain
 - TAGS:**
 - Anatomy
 - Causes and Differentiation from Neck Pain and Somatic Nerve Pain
 - Central Neuromodulation and Intrathecal Drug Delivery
 - Electrodiagnostic Studies: Reliability and Validity
 - Evidence for Commonly Used Treatments
 - History Taking and Physical Examination: Role and Limitations

Injection Therapy: Indications, Use, and Complications
 Interventions Commonly Used for Acute and Chronic Neck Pain: Evidence for Efficacy
 Mechanisms of Referred Pain: Cervicogenic Headache
 Medical Imaging: Uses, Limitations, Reliability and Validity
 Natural History and Relevance to Management, Including Whiplash Injury
 Nonsurgical Intervention: Evidence for Efficacy of Reassurance, Maintaining Activity, and Exercises – Psychological, Physical and Multidisciplinary Therapy, Complementary Therapies
 Pharmacotherapy: Uses and Limitations
 Public Health Dimensions: Prevalence, Demography, Personal and Societal Costs
 Risk Factors: Transition to Chronic Pain, Predictors of Chronicity
 Surgical Treatment: Indications and Use, Including Indications for Urgent Surgical Referral

X.I.2. Lumbar Spinal Pain

TAGS:

Anatomy

Causes and Differentiation of Low Back Pain and Referred Somatic Pain from Radicular Pain, Radiculopathy, and Sciatica; Relevance to Investigation and Treatment

Central Neuromodulation and Intrathecal Drug Delivery

Electrodiagnostic Studies: Reliability and Validity

Evidence for Commonly Used Treatments

History Taking and Physical Examination: Role and Limitations

Injection Therapy: Indications, Use, and Complications

Interventions Commonly Used for Acute and Chronic Low Back Pain: Evidence for Efficacy

Mechanisms of Referred Pain: Radicular Pain

Medical Imaging: Uses, Limitations, Reliability and Validity

Natural History and Relevance to Management: Etiologic and Prognostic Risk Factors

Nonsurgical Intervention: Evidence for Efficacy of Reassurance, Maintaining Activity, and Exercises – Psychological, Physical and Multidisciplinary Therapy, Complementary Therapies

Pharmacotherapy: Uses and Limitations

Psychosocial and Occupational Factors Related to Low Back Pain and Chronicity

Public Health Dimensions: Prevalence, Demography, Personal and Societal Costs

Risk Factors: Transition to Chronic Pain, Predictors of Chronicity

Surgical Treatment: Indications and Use, Including Indications for Urgent Surgical Referral

X.I.3. Musculoskeletal Pain

TAGS:

Anatomy and Biomechanics of Joints and Muscles

Anatomy and Physiology

Autoimmune and Rheumatic Disorders Including Assessment of Activity and Severity of Rheumatic Disease
Classification and Clinical Characteristics of Musculoskeletal Diseases:
Chronic Musculoskeletal Pain Due to Inflammation, Associated with Structural Changes, Associated with Diseases of the Nervous System
Examination: Multidisciplinary Assessment, Functional Assessment
Mediators of Inflammation, Tissue Destruction, and Repair
Natural History and Relevance to Management: Etiologic and Prognostic Risk Factors
Public Health Dimensions: Prevalence, Demography, Personal and Societal Costs
Risk Factors: Transition to Chronic Pain, Predictors of Chronicity
Treatment and Rehabilitation of Musculoskeletal Pain/Disability: Self-Management, Exercise and Rehabilitation, Pharmacologic and Nonpharmacologic Approaches

X.I.4 Hereditary Connective Tissue Diseases

TAGS:

Anatomy: Connective Disease Structures, Mechanisms of Pain
Clinical Characteristics and Assessment: Dislocation, Trauma, Tissue Fragility
Diagnosis: Ehlers-Danlos Syndrome, Joint Hypermobility Syndrome, Marfan Syndrome
Examination: Gait Analysis, Orthostatic Blood Pressure, Joint/Muscle Exam
Natural History and Relevance to Management: Predictors of Chronicity
Prevalence and Epidemiology of Conditions
Risk Factors: Etiologic and Prognostic
Treatment of Pain: Self-Management, Exercise, Pharmacologic, Nonpharmacologic

X.J. Clinical States: Cancer Pain

X.J.1. Analgesic Approach: Indications, Risks, Pharmacologic Properties, Therapeutic Guidelines

TAGS:

Adjuvant Analgesics: Bisphosphonates, Steroids, Ketamine, Anticonvulsants, Antidepressants, Barbiturates, Cannabinoids
Adverse Effects of Analgesics, Medication Interactions
Route of Administration: Oral, Transdermal, IV, Intrathecal
WHO Ladder: Choice of Analgesics, Limitations

X.J.2. Chronic Cancer Pain: Diagnosis, Etiology, Mechanisms

TAGS:

Bone Cancer Pain
Neuropathic Cancer Pain
Visceral Cancer Pain

X.J.3. Chronic Cancer Pain Due to Treatment

TAGS:

Chemotherapy-Induced Polyneuropathy
Mucositis

- Post-Cancer Surgery Pain
- Radiation-Induced Neuropathy
- X.J.4. Palliative Care: Definition and Scope
 - TAGS:**
 - Advance Care Directives
 - Barriers to Treatment
 - Frequency of Pain and Multiple Sites of Pain
 - Hospice and Multidimensional Treatments
 - Importance of Development of Evidence-Based Practice
- X.J.5. Comprehensive Evaluation of Patients with Cancer Pain: Needs and Approaches
 - TAGS:**
 - Addressing End-of-Life Symptoms: Nausea, Respiratory Distress, Fatigue
 - Social and Cultural Influences
 - Value of Interdisciplinary Teams
- X.J.6. Principles of Treatment
 - TAGS:**
 - Integration of Other Modalities: Physical, Psychological, and Anesthetic
 - Management of Acute Cancer Pain
 - Treatment of Underlying Disease
- X.J.7. Interventional Approaches: Indications, Risks, Practical Implications
 - TAGS:**
 - Injections and Neurolysis
 - Intrathecal Therapy
 - Role of Primary Cancer Therapy
 - Surgical Approaches
- X.J.8. Multidisciplinary Management and Special Situations
 - TAGS:**
 - Needs of Special Populations: Children, Patients with Learning Disabilities, Older Adults
 - Pain Treatment in the Cancer Patient with Coexisting Substance Use Disorder or Other Psychiatric Disorder
 - Physical Therapy: Indications, Utility, and Effectiveness
 - Psychological Approaches: Indications, Utility, and Effectiveness
 - Treatment of Persistent Pain in Cancer Survivors
- X.J.9. Ethical Issues in Cancer Pain Management
 - TAGS:**
 - Benefit to Burden Ratio: Variation According to Stage
 - Prognosticating Life Expectancy
 - Physician-Assisted Suicide, Euthanasia, Double Effect, Intent
- 1. X.K. Visceral Pain
 - X.K.1. Chronic Abdominal Pain
 - TAGS:**
 - Anatomy: Organization of Peripheral and Central Visceral Innervation, Properties of Visceral Nociceptors, and Mechanisms of Visceral Nociceptor Sensitization

Classification of Chronic Visceral Pain Disorders: From Persistent Inflammation, Vascular Mechanisms, and/or Mechanical Factors
Clinical Differentiation of Gastrointestinal, Urologic, Gynecologic, and Musculoskeletal Pain
Diagnostic Evaluation and Treatment
Distinct Clinical Features, e.g., Chronic Pancreatitis, Irritable Bowel Syndrome, Inflammatory Bowel Disease, Functional Abdominal Pain
Epidemiology
Management of Visceral Pain: Pharmacotherapy, Physical Therapy, Psychological Therapies, Interventional Techniques
Peripheral and Central Mechanisms of Visceral Pain Modulation
Psychological Principles in Clinical Assessment, Explanation, and Treatment

X.K.2. Chronic Pelvic Pain

TAGS:

Anatomy
Clinical Differentiation of Gastrointestinal, Urologic, Gynecologic, and Musculoskeletal Pain
Common Causes, Diagnostic Evaluation, and Treatment in Men
Common Causes, Diagnostic Evaluation, and Treatment in Women
Epidemiology
Management of Pelvic Pain: Pharmacotherapy, Physical Therapy, Psychological Therapies, Interventional Techniques
Psychological Principles in Clinical Assessment, Explanation, and Treatment

X.L. Headache and Orofacial Pain

X.L.1. Headache

TAGS:

Anatomy and Physiology
Classification of Headache Disorders: Primary Headache (Migraine, Tension, Cluster, Paroxysmal Hemicrania, Hemicrania Continua)
Classification of Headache Disorders: Secondary Headache (Trauma, Vascular Disorder, Non-Vascular Intracranial Disorder, Due to Substance or its Withdrawal, Infection)
Critical Factors for Life-Threatening Headache
Diagnosis and Management of Post Dural Puncture Headache
Evaluation: Systematic Case History, Use of Headache Diary, Selection of Appropriate Examination Based on History
Indications for Further Investigation of Headache
Internationally Accepted Diagnostic Criteria for Classification of Headache Disorders
Major Hypotheses About Mechanisms
Mechanisms and Pathophysiology
Pharmacologic Treatment and Alternatives
Physical, Psychological, and Social Factors Contributing to Headache; Role of Counseling and Other Nonpharmacologic Treatment (e.g., Botulinum Toxin)
Role of Medication Overuse

Treatment and Management of Headache: Pharmacologic,
Nonpharmacologic, Prophylaxis, Interventional Techniques,
Multidisciplinary Management

X.L.2. Orofacial Pain (e.g., Trigeminal Neuralgia, Post Herpetic Neuralgia,
Atypical Facial Pain)

TAGS:

Anatomic, Physiologic, Psychosocial Aspects

Classification of Orofacial Pain: Primary (Temperomandibular Disorders,
Trigeminal Neuralgia, Atypical Facial Pain, Burning Mouth Syndrome)

Classification of Orofacial Pain: Secondary (Disorders of the Cranium,
Dental Pain, Neuropathic Pain, Secondary Temperomandibular
Disorders)

Evidence-Based Treatment Options

History Taking, Physical Examination, and Diagnostic Studies

Treatment and Management: Pharmacologic, Surgical Options, Ablation
and Stimulation Techniques, Cognitive Behavioral Therapy,
Physiotherapy, Brain Stimulation

X.M. Neuropathic Pain

X.M.1. Peripheral Neuropathic Pain (e.g., Diabetic Peripheral Neuropathy, Post
Herpetic Neuralgia, Peripheral Nerve Injuries)

TAGS:

Clinical Characteristics

Common Neuropathic Pain Syndromes: Differential Diagnosis, Natural
Course

Definition, Anatomy, and Epidemiology

Evaluation: Clinical, Electrodiagnostic, Laboratory, and Radiographic
Findings

Evaluation: Differential Diagnosis, Assessment Tools

Mechanisms and Pathophysiology: Peripheral Nerve Injury, Compression
Neuropathy, Amputation

Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative

X.M.2. Complex Regional Pain Syndrome

TAGS:

Definition, Anatomy, and Epidemiology

Evaluation and Clinical Assessment

Mechanisms and Pathophysiology

Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative

X.M.3. Central Pain Syndromes (e.g., Post Stroke Pain, Phantom Limb Pain,
Pain after Spinal Cord Injury)

TAGS:

Clinical Characteristics

Common Central Pain Syndromes: Differential Diagnosis, Natural Course

Definition, Anatomy, and Epidemiology

Evaluation: Differential Diagnosis, Assessment Tools

Evaluation: Clinical, Electrodiagnostic, and Radiographic Findings

Mechanisms and Pathophysiology: Pathologic Mechanisms in Nervous
System

Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative

X.N. Special Cases

X.N.1. Pain in Infants, Children, and Adolescents

TAGS:

Acute and Chronic Pain in Children and Adolescents: Special Considerations in Management/Palliative Care
Consequences of Pain in Infancy and Childhood
Differences Among Infants, Children, Adolescents, and Adults
Ethics of Treatment of Pain and Research in Children and Adolescents
Factors Affecting Pain Perception in Children and Adolescents (e.g., Development Level, Family Beliefs, Past Pain Experience, Abuse/Trauma)
Pain Assessment Tools in Children and Adolescents: Use and Limitations
Pain Syndromes Commonly Seen in Children and Adolescents (e.g., Functional Abdominal Pain, Sickle Cell Disease, Muscle Skeletal Pain, Headache)
Treatment of Pain in Children and Adolescents: Pharmacologic and Nonpharmacologic (e.g., Counseling, Guided Imagery, Hypnosis, Biofeedback)

X.N.2. Pain in Older Adults

TAGS:

Access to Care
Age-Related Changes: Ischemia, Degeneration, Dementia
Age-Related Changes in Pharmacology (e.g., Drug-Drug Interactions, Clearance, Coexisting Disease)
Common Conditions: Bone Pain, Neuralgic Pain, Visceral Pain
Epidemiology: Prevalence, Onset, Burden, Risk Factors, Prognosis
Ethics of Treatment of Pain in Older Adults
Heterogeneity in Physiologic, Psychological, and Functional Capacity of Persons of the Same Chronologic Age
Issues Related to Age Differences
Pain Assessment: Tools and Limitations, Assessment of Physical Activity, Quality of Life
Procedural Techniques: Evidence Base
Psychosocial Interventions: Cognitive Behavior Therapy in Older Adults

X.N.3. Pain Issues in Individuals with Limited Ability to Communicate Due to Neurocognitive Impairments

TAGS:

Conditions Leading to Limitations in Ability to Communicate
Difficulties in Assessment and Treatment of Pain
Role of Caregivers and Social Context in Assessment and Treatment of Pain

X.N.4. Pain Relief in Persons with Opioid Tolerance, Substance Use, and/or Addictive Disorders

TAGS:

Acute Pain Management of Patients with Substance Use Disorder
Biopharmacologic and Neurophysiologic Basis of Addiction

- Definitions: Tolerance, Dependence, Addiction, Dual Diagnosis, Substance Use Disorder
- Description of Impact of Misuse: Intoxication and Withdrawal
- Interactions Between Addiction, Substance Use Disorder, and Pain
- Interpretation of Drug Toxicology Testing
- Legal, Regulatory, and Reimbursement Issues When Prescribing Controlled Substances to Patients with Pain and Substance Use Disorder
- Needs of Special Populations: Pregnant Women, Neonates, Cancer Patients
- Pharmacologic Treatment of Patients with Substance Use Disorder
- Principles of Comprehensive Approach to Pain Management in Patients with Substance Use Disorder
- Recognition of Aberrant Drug-Related Behavior Including Diversion and Misuse
- Risks and Benefits of Opioid Use in Treatment of Chronic/Cancer Pain in Patients with Substance Use Disorder or Who Take Other Psychoactive Substances
- Risk Assessment for Substance Use Disorder and Addiction in Patients with Pain
- Screening and Referral for Substance Use Disorder in Patients with Pain
- X.N.5. Chronic and Acute Pain in Pregnancy and Lactation
 - TAGS:**
 - Causes of Pain during Pregnancy
 - Factors Influencing Perception of Pain in Pregnancy
 - Management of Opioids During Pregnancy Including Neonatal Abstinence
 - Pharmacologic Management of Pain in Pregnancy and Lactation
 - Principles of Pain Management in Pregnancy
- X.N.6. Pain Relief in Areas of Deprivation and Conflict
 - TAGS:**
 - Access to Analgesic Drugs and Palliative Care Worldwide
 - Causes of Pain Worldwide
 - Education, Training, and Knowledge of Pain Worldwide
 - Ethical and Political Issues in Pain Management Worldwide
 - Spectrum of Providers Caring for Patients with Pain Worldwide
 - Variability of Availability and Access to Pain Treatment Worldwide
- X.N.7. Pain Assessment and Management in Special Populations
 - TAGS:**
 - Patients from Diverse Socioeconomic, Ethnic, Cultural Backgrounds
 - Patients with Hepatic or Renal Function Impairment
 - Patients with Mental Health Diseases
 - Patients with Physical Disabilities
- X.N.8. Diversity, Equity, and Inclusion (DEI) in Health Care
 - TAGS:**
 - Approaches to Improvement: Individual, Community, Policy
 - Barriers: Systematic Discrimination, Bias, Implicit Bias
 - DEI in the Workplace and in Academia

X.N.9. Healthcare Disparities

TAGS:

Child and Adolescent Healthcare Disparities

Maternal Healthcare Disparities

Social Determinants of Health: Race, Language, Education Status, and Others

X.N.10. Ethics and Medicolegal Issues in Clinical Practice

TAGS:

Clinician Wellness and Self-Care: Burnout, Sleep Deprivation, Adaptations for Disability, Substance Use

Healthcare Provider Certification, Maintenance of Certification,

Professional Standing, Clinical Practice Assessment

Patient Autonomy and Decision-Making: Principles of Informed Consent, Advance Directives, Do-Not-Resuscitate Orders, Health Care Proxy, Patient Refusal of Treatment

Professionalism: Disclosure of Errors, Recognizing Limitations, Reporting Unsafe Conditions, Responding to Unprofessional Behavior

Research Ethics: Standards in Research Design, Informed Consent, Financial Disclosure, and Conflicts of Interest

X.N.11. Practice Management

TAGS:

Clinical Informatics: Electronic Medical Record Systems, Artificial Intelligence

Costs of Healthcare: Understanding Funding and Payment, Cost-Conscious Practice

Documentation, Coding, and Billing: Compliance, Accuracy, Coding Integrity

Efficient Practice Staffing and Scheduling

Population Health: Resources to Improve Access

X.N.12. Quality Improvement and Patient Safety

TAGS:

Barriers to Patient Safety and Quality Improvement (QI) Implementation

Change Management Methods: Peer Review, Morbidity and Mortality Conferences, Lean Six Sigma, QI Process, Value Stream Mapping,

Failure Mode, and Root Cause Analysis

Crisis Management and Teamwork: Simulation Training, Handoffs, Checklists

Definitions: Medical Error, Adverse Events, Sentinel Events

Medication Errors: Assessment and Prevention, Reconciliation, Use of Technology

Performance Assessment: Individual Benchmarks, Facility Scorecards, Public Reporting

QI Basics: Design and Implementation, QI Metrics, Patient Satisfaction Measurement, Value-Based Care and Incentives

XI. PEDIATRIC ANESTHESIOLOGY

XI.A. Basic Science

XI.A.1. Anatomy

TAGS:

Airway
Airway Management
Anatomy for Procedures
Atresias, Stenoses and Webs
Body Habitus
Central Neuraxial Blockade
General Development
Peripheral Nerve Blockade
Vascular Cannulation
Water, Volume, and Blood Composition

XI.A.2. Physics and Anesthesia Equipment

TAGS:

Brain, Spinal Cord, and Neuromuscular Function
Breathing Circuits
Cardiac Rhythm and Vascular Pressures
Methods for Monitoring
Oxygenation, Gas Concentration, and Ventilation
Point-of-Care Ultrasound
Respiration
Temperature
Ventilation Devices and Techniques

XI.A.3. Anesthetic Pharmacology: Physiologic States, Pathophysiologic States and Adverse Effects

TAGS:

Agents Affecting Coagulation
Anti-Emetics
Biotransformation and Excretion
Blood-Brain Barrier
Drug Absorption
Drug Distribution
Inhalation Anesthetics
Local Anesthetics
Neuromuscular Blocking and Reversal Agents
Non-Opioid Analgesics
Opioid Analgesics
Pharmacogenetics
Pharmacokinetics and Pharmacodynamics
Sedative and Anxiolytic Agents
Sympathetic and Parasympathetic Agents

XI.B. Organ-Based Basic and Clinical Sciences

XI.B.1. Respiratory System

TAGS:

Acute Respiratory Distress Syndrome (ARDS)
Adaptive-Pressure Control Ventilation (APCV)

- Airway-Pressure Release Ventilation (APRV)
- Anatomy and Physiology
- Anesthesia for Thoracic Procedures
- ARDS: Barotrauma and Volutrauma
- ARDS: Berlin Criteria
- ARDS: Clinical Phases
- ARDS: Etiology, Infectious and Noninfectious
- ARDS: Oxygenation Index
- ARDS: Permissive Oxygenation
- ARDS: Treatment
- Chest Wall Surgery/Reconstruction
- Clinical Sciences
- Congenital Pulmonary Airway Malformation (CPAM)
- CPAP
- Heliox
- High-Flow Nasal Canula
- High-Flow Oscillatory Ventilation (HFOV)
- Lung Physiology
- Mediastinal Masses
- Musculoskeletal
- Nitric Oxide
- Noninvasive Positive-Pressure Ventilation (PPV)
- Obstructive Disease
- One Lung Ventilation
- Oxygen Transport
- Oxygenation Index
- Parenchymal
- Pleural
- Prenatal and Postnatal Development
- Respiratory Mechanics, Ventilation, and Lung Volumes
- Restrictive Disease
- Surfactant and Surface Tension
- Tracheobronchial
- Upper Airway
- Ventilation
- Ventilation/Perfusion Matching
- Video-Assisted Thoracoscopy
- XI.B.2. Cardiovascular System
 - TAGS:**
 - Acyanotic Lesions
 - Anatomy and Physiology
 - Anesthesia for Cardiac Patients
 - Anesthesia for Diagnostic, Interventional and Electrophysical Procedures
 - Anesthesia in Patient with Pacemaker or AICD
 - Anesthetic Effects on the Cardiovascular System
 - Arrhythmic Lesions

- Cardiogenic Shock
- Cardiomyopathies
- Cardiopulmonary Resuscitation and PALS
- Cardiovascular Effects on Anesthetic Uptake and Delivery
- Clinical Science
- Cyanotic Lesions
- Disease States
- Dissociative Shock: Azotemia, Hyperlactatemia, and Metabolic Acidosis
- Distributive Shock
- Fetal, Transitional, and Adult Circulation
- Fluid Resuscitation
- General Considerations
- Heart Transplantation
- Hypertensive Crisis
- Hypovolemic Shock
- Infectious Diseases
- Inotropic Medication
- Intracardiac Masses
- Mechanical Circulatory Support- ECMO
- Obstructive Shock
- Palliative Procedures
- Pericardial Disease
- Postcardiac Arrest Syndrome
- Postcardiac Arrest Syndrome: Metabolic Abnormalities
- Prenatal and Postnatal Development
- Pulmonary Hypertension
- Return of Spontaneous Circulation (ROSC)
- Vasoactive Medications

XI.B.3. Central and Peripheral Nervous Systems

TAGS:

- Anatomy and Physiology
- Anesthesia for Neurosurgical Procedures
- Clinical Science
- Complications: Seizures and Level of Consciousness (LOC)
- Craniofacial Reconstruction/Cranioplasty
- EEG Changes
- General Considerations
- Intracranial Pressure and Blood Flow
- Intracranial Tumors and Vascular Lesions
- Meningomyelocele/Spinal Surgery
- Myelination, Autonomic Nervous Systems, and Pain Pathways
- Neurocognitive and Behavioral Changes after Anesthesia
- Neurologic Imaging
- Pharmacology of Diuretics, Steroids, and Anticonvulsant Medications
- Prenatal and Postnatal Development

Preoperative Anxiety, Postoperative Behavior, and Emergence Delirium
Seizure Surgery
Serotonin Syndrome
SMART Tots Consensus Statement And Animal Studies

XI.B.4. Gastrointestinal System

TAGS:

Abdominal Wall Defects
Atresias, Stenoses and Webs
Clinical Science
Esophageal/Gastrointestinal Foreign Bodies
Esophageal, Stomach and Intestine Disorders
Hernias
Liver, Biliary Tract and Spleen Disorders
Morbid Obesity/Bariatric Surgery
Necrotizing Enterocolitis

XI.B.5. Renal/Urinary

TAGS:

Clinical Science
Prenatal and Postnatal Development
Renal Failure

XI.B.6. Endocrine/Metabolic

TAGS:

Adrenal Disorders
Clinical Science
Diabetes Insipidus
Diabetes Mellitus
DiGeorge Syndrome
Disorders of Sodium Regulation
Pheochromocytoma
Thyroid Disorders

XI.B.7. Hematology/Oncology

TAGS:

Anemias
Anterior Mediastinal Mass
Bone Marrow and Stem Cell Transplants
Chemotherapeutic Agents and Side Effects
Clinical Science
Coagulation Disorders
Hematology
Oncology
Radiation Therapy
Sickle Cell Disease
Tumor Lysis Syndrome

XI.B.8. Genetics

TAGS:

- Clinical Sciences
- Craniofacial Syndromes
- Genetic Abnormalities
- Inborn Errors of Metabolism
- Malignant Hyperthermia
- Mitochondrial Myopathies
- Muscular Dystrophies
- Myopathic Disorders and Myotonias
- Osteochondrodysplasia Symptoms
- Skin and Connective Tissue Disorders
- Trisomy 21

XI.C. Clinical Subspecialties

XI.C.1. Neonatal

TAGS:

- Apnea and Bradycardia
- Clinical Science
- Congenital Cystic Adenomatoid Malformation
- Congenital Diaphragmatic Hernia
- General Considerations
- Medical Disease States
- Neonatal Resuscitation
- Retinopathy of Prematurity
- Surgical Disease States

XI.C.2. Painful Disease States

TAGS:

- Chronic Pain States
- Neonatal Anesthesia for NICU Procedures
- Pain Management in the NICU
- Pathophysiology
- Pharmacologic and Non-Pharmacologic Techniques of Pain Management
- Regional Analgesia
- Treatment

XI.C.3. Otolaryngology

TAGS:

- Airway Procedures
- Bronchoscopic Procedures
- Choanal Atresia Repair
- Cochlear Implant, Tympanoplasty, and Mastoidectomy
- Laser Procedures
- Myringotomy and Tubes
- Obstructive Sleep Apnea (OSA)
- Otologic Procedures
- Tonsillectomy, Adenoidectomy, and Abscess Drainage
- Tracheotomy

XI.C.4. Plastic and Oral-Maxillary Facial Surgery

TAGS:

Cleft Repairs
Clinical Science
Mandibular Repairs
Vascular Malformations

XI.C.5. Ophthalmology

TAGS:

Clinical Science
General Considerations
Pharmacology of Ophthalmologic Medications
Strabismus Repair
Trauma

XI.C.6. Orthopedic Surgery

TAGS:

Anterior, Posterior, and Combined Spine Fusion
Clinical Science

XI.C.7. Trauma and Burns

TAGS:

Anesthetic and Pain Management of the Burn Patient
Burns
Dressing Changes
Fluid Resuscitation and Calculating Burn Surface Area
Hypothermia and Submersion Injury
Incidence, Patterns, Implications of Abuse
Inhalation Injuries/Airway Management
Management of the Polytrauma Victim
Trauma
Types, Mechanisms, Locations and Implications of Injuries

XI.C.8. Nutritional Support in the PICU

TAGS:

Electrolyte Disorders
Enteral Feedings: Gastric and Post-Pyloric
Free Fatty Acid Deficiency
Glycemic Control in the PICU
Hyperglycemia
Line-Associated Infections
Liver Dysfunction
NPO for Children on Enteral Feedings
Risk of Aspiration
Total Parenteral Nutrition (TPN)

XI.C.9. Liver Dysfunction

TAGS:

Biochemical Guidance of Liver Injury
Coagulopathy
Hepatic Encephalopathy

- Hepatorenal Syndrome
- Hyperdynamic Circulatory Failure
- Liver Transplantation
- Pediatric Acute Liver Failure (PALF)
- Rapidly Progressive Multisystem Organ Failure
- Systemic Inflammatory Response Syndrome (SIRS)

XI.C.10. Acute Kidney Injury

TAGS:

- Acute Hyperkalemia
- Acute Tumor Lysis Syndrome
- Biomarkers
- Continuous Renal Replacement Therapy
- Continuous Venovenous Hemofiltration (CVVH)
- Intermittent Hemodialysis
- Peritoneal Dialysis
- Renal Replacement Therapy (RTT)

XI.C.11. Transfusion Practices

TAGS:

- Anemia
- Hemolytic Transfusion Reactions
- Transfusion Related Acute Lung Injury (TRALI)
- Transfusion Triggers
- Transfusion-Associated Circulatory Overload (TACO)
- Transfusion-Associated Risks

XI.D. Clinical Science of Anesthesia

XI.D.1. Evaluation and Preoperative Preparation of the Pediatric Patient (See Specific Disease States)

TAGS:

- Autism Spectrum Disorders
- Concussion
- Evaluation of Coexisting Disease
- Fasting Requirements
- General Considerations
- Informed Consent
- Laboratory Testing
- Normal Developmental Milestones
- Parental Presence and Pharmacologic Preparation for Anesthetic Induction
- Physical Examination
- Psychosocial Preparation of the Patient and Family
- Upper Respiratory Tract infections

XI.D.2. General Considerations of the Perioperative Period

TAGS:

- Fluid, Electrolyte, and Glycemic Management
- Thermoregulation
- Transfusion Therapy and Blood Conservation Techniques

XI.D.3. Regional Anesthesia and Analgesia

TAGS:

Central Neuraxial Blockade: Indications, Contraindications, Techniques, Adjuvants, and Controversies

Peripheral Nerve Blockade: Indications, Contraindications, Techniques, Adjuvants, and Controversies

Pharmacology and Toxicity of Local Anesthetics

XI.D.4. General Anesthesia

TAGS:

Management of the Difficult Airway

XI.D.5. Complications of Anesthesia

TAGS:

Airway Obstruction

Anaphylactic and Anaphylactoid Reactions

Awareness and Recall under Anesthesia

Cardiopulmonary Resuscitation

Dysrhythmias

Iatrogenic Drug Errors

Iatrogenic Trauma/Positioning Injury

Inadequate Vascular Access

XI.D.6. Special Techniques and Situations

TAGS:

Non-Operating Room Anesthesia (NORA)

Transition of Patient Care

XI.D.7. Postoperative Period

TAGS:

Management and Diagnosis of Pain, Anxiety and Emergence Agitation

Post-operative Nausea and Vomiting

XI.D.8. Acute and Chronic Pain Management

TAGS:

Enhanced Recovery after Surgery (ERAS)

Opioid Induced Hyperalgesia

Opioid Tolerance

XI.E. Special Problems or Issues

XI.E.1. Professional Issues

TAGS:

Continuous Quality Improvement

Ethical and Legal Obligations of Pediatric Anesthesia Care and Research

Practice-Based Learning and Improvement

Teaching, Supervision, and the Anesthesia Care Team

XI.E.2. Principles of Biostatistics and Study Design

XII. ADULT CARDIAC ANESTHESIOLOGY

XII.A. Foundations of Adult Cardiac Anesthesiology

XII.A.1. Anatomy and Physiology

TAGS:

Anatomical Landmarks for Regional Anesthesia (e.g., PECS or ESP Blocks)

- Baroreceptor Function
- Blood Pressure
- Blood Volume and Distribution
- Cardiac Conduction
- Cardiac Output Measurements (e.g., PA, TEE, Fick Principle)
- Central: Vasomotor Center/Hypothalamic-Pituitary-Adrenal Axis
- Coronary Circulation
- Myocardial Contractility
- Myocardial Oxygen Utilization and Balance
- Peripheral: Receptors and Reflexes
- Regulation of Circulation and Blood Volume
- Synchronicity of Pressure, Flow, ECG, Valvular Function
- Systemic and Pulmonary Vascular Resistance
- Systolic, Diastolic, Mean and Perfusion Pressures
- Vascular Compliance/Venous Capacitance
- Venous Return
- Ventricular Function

XII.B. Cardiothoracic Diseases (Pathophysiology, Pharmacology, and Clinical Management)

XII.B.1. Cardiac Disease

TAGS:

- Acquired (e.g., Aortic Sclerosis)
- Acute Heart Failure
- Acute vs. Chronic Heart Failure
- Amyloidosis
- Anatomy of the Cardiac Conduction System
- Anesthetic Considerations
- Anesthetic Management and Goals
- Aortic Stenosis/Insufficiency: Risk Factors, Pathophysiology, Pharmacological Management, Interventional Cardiology Management, Surgical Management
- Arrhythmia Classification: Atrioventricular Nodal Reentrant Tachycardia, Focal Atrial Tachycardia; Atrial Fibrillation, Atrial Flutter; Supraventricular Tachycardia; Ventricular Tachycardia; Ventricular Fibrillation
- Arrhythmogenic Right Ventricular Dysplasia
- AV Junction
- Cardiac Masses
- Carcinoid
- Cardiac Catheterization
- Cardiac Enzymes
- Cardiac Imaging: MRI/CT
- Cardiac Resynchronization Therapy/Pacemaker/ICD

- Cardiac Tamponade
- Cardiomyopathy
- Chronic Heart Failure
- Clinical Presentation
- Common Congenital Lesions (e.g., Tetralogy of Fallot, Bicuspid Aortic Valve, ASD, VSD)
- Congenital (e.g., Bicuspid Aortic Valve, Ebstein Anomaly)
- Congenital Heart Disease
- Determinants of Myocardial Oxygen Requirements and Delivery, Silent Ischemia, Postoperative Ischemia
- Diagnosis (e.g., TEE, POCUS, CVP, PAC, CXR, Cardiac MRI, Laboratory Markers)
- Diagnosis of Severity of Myocardial Infarction and Acute Coronary Syndrome
- Diastolic (Heart Failure with Preserved Ejection Fraction)
- Dilated Cardiomyopathy
- Drug Related (e.g., Anthracycline, Serotonin, Ergotamine)
- ECG, Holter, Implantable Loop Recorder
- Echocardiographic Findings in Heart Failure with Preserved/Reduced Ejection Fraction
- Echocardiography
- Electrophysiologic Disturbances and EP Studies
- Fabry Disease
- Fatty Infiltration
- Fontan Physiology
- Glycogen Storage Disease
- Hemochromatosis
- Hypereosinophilic Disease
- Hypertrophic Obstructive Cardiomyopathy
- Implantable Cardioverter-Defibrillators, Pacemakers: Guidelines for Insertion
- Indications for: Revascularization/Valvular Surgery, Mechanical Circulatory Support (e.g., IABP, VAD, etc.), Heart Transplant
- Intraventricular Conduction
- Ischemic Heart Disease
- Ischemic v. Nonischemic
- Left Bundle Branch (Anterior/Posterior Fascicles)
- Mechanical Circulatory Support – Durable and Percutaneous
- Mechanisms of Arrhythmias
- Medical/Interventional Management
- Mitral Stenosis/Insufficiency: Risk Factors, Pathophysiology, Pharmacological Management, Interventional Cardiology Management, Surgical Management
- Neoplastic Diseases

- Normal and Abnormal Embryological Development
- Noncompaction Cardiomyopathy
- Nuclear Techniques
- Others (e.g., Idiopathic, Peripartum)
- Perioperative Management of the Adult with Congenital Heart Disease:
 - Corrected, Uncorrected
- Pharmacological Interventions
- Pulmonary Hypertension
- Pulmonic Stenosis/Insufficiency: Risk Factors, Pathophysiology,
 - Pharmacological Management, Interventional Cardiology
 - Management, Surgical Management
- Radiation
- Rare Cardiac Diseases (e.g., Infiltrative, Storage, Endomyocardial Disease)
 - Restrictive
 - Right Bundle Branch
 - Risk Factors
 - Sarcoidosis
 - Septal Ablation/Myomectomy
 - Sinus Node
 - Stress Tests
 - Surgical Intervention: Pericardiocentesis, Pericardial Window
 - Surgical Interventions
 - Systolic (Heart Failure with Reduced Ejection Fraction)
 - TEE Findings and Assessment of Valvular Heart Disease
 - TEE Findings Associated with Cardiomyopathy
 - Toxicity
 - Transplant
 - Treatment: Pharmacological, Interventional Cardiology Procedures,
 - Surgical Revascularization, Mechanical Circulatory Support (e.g., IABP, VAD), Ablations, Transplant
 - Tricuspid Stenosis/Insufficiency: Risk Factors, Pathophysiology,
 - Pharmacological Management, Interventional Cardiology
 - Management, Surgical Management
 - Valvular Heart Disease
 - Viral

XII.B.2. Thoracic Vascular Disease

TAGS:

- Aneurysmal Disease
- Arterial Insufficiency/Thoracic Outlet Obstruction
- Atherosclerotic Disease
- Cerebrospinal Fluid Drains
- Dissection/Disruption
- Endovascular Procedures

- Lung Isolation
- Open Surgical Procedures
- Others
- Pathophysiology/Classification
- Postoperative Complications
- Recurrent Laryngeal Nerve Injury
- Renal Failure
- Specific Anesthetic Considerations
- Spinal Cord Ischemia
- SSEP Monitoring

XII.B.3 Esophageal Disease

TAGS:

- Impact for Echocardiography

XII.C. Patient Evaluation

XII.C.1. Noninvasive Cardiovascular Evaluation

TAGS:

- Cardiovascular Imaging (e.g., MRI, CT)
- Electrocardiography
- Myocardial Nuclear Scintigraphy
- Stress Testing (e.g., Exercise, Dobutamine)

XII.C.2. Cardiac Catheterization Procedures and Diagnostic Interpretation

TAGS:

- Invasive Cardiac Catheterization Procedures

XII.C.3. Pre-anesthetic Evaluation and Preparation of Adult Cardiothoracic

Patients

TAGS:

- Risk Models (e.g., STS)
- Specific Risk Conditions

XII.D. Perioperative Imaging and Monitoring

XII.D.1. Transesophageal Echocardiography

TAGS:

- 3-Dimensional Imaging
- Artifact Recognition
- Complications and Safety
- Echocardiographic Anatomy: Chambers, Valves, Great Vessels,

Pericardium

- Properties and Physics of Ultrasound and Doppler
- Standard TEE Views and Comprehensive Examination
- Structural Heart Interventions
- TEE Image Acquisition and Optimization
- Vascular Anatomy and Pathology

XII.D.2. Transthoracic Echocardiography and POCUS

XII.D.3. Vascular Pressures

TAGS:

- Arterial
- Central Venous (CVP)
- Invasive/Noninvasive Differences
- Left Atrial (LAP)
- Left Ventricular End-Diastolic (LVEDP)
- Pulmonary Arterial (PAP)
- Pulmonary Artery Occlusion (PAOP)
- Pulse Pressure Variation
- Site Specific Indications/Contraindications and Limitations

XII.D.4. Heart Function

TAGS:

- Cardiac Catheterization, Cardiac MRI
- Cardiac Output
- Cardiac Preload Assessment and Monitoring
- Cardiac Valve Anatomy and Function
- Doppler
- Echocardiography
- Electrocardiogram (ECG)
- Esophageal Doppler
- Ischemic Changes
- PAC
- Regional and Global Myocardial Function
- TEE
- Thoracic Impedance

XII.D.5. Mixed Venous Oxygen Saturation (SvO₂)

XII.D.6. Cerebral Oximetry

XII.D.7. Peripheral Oximetry

XII.D.8 Coagulation

XII.D.9 Temperature

TAGS:

- Cardiopulmonary Bypass Considerations

XII.D.10. Urine Output

XII.D.11. ABG Interpretation

TAGS:

- Anion Gap

- Temperature Effect on Blood Gases: Alpha-Stat vs. pH-Stat

XII.D.12. Cerebrospinal Fluid Pressure

XII.E. Pharmacodynamics and Pharmacokinetics

XII.E.1. Preoperative Medications

XII.E.2. Anesthetic Induction Agents in Patients with Cardiac Disease

XII.E.3. Medications Prescribed for Management of Hemodynamic Instability

TAGS:

- ACE-I/ARBs

- Beta-Blockers

- Calcium Channel Blockers
- Diuretics
- Inhaled (e.g., Nitric Oxide, Prostaglandin)
- Inotropes
- Intravenous (e.g., Nitrates, Phosphodiesterase Inhibitors)
- Vasodilators
- Vasopressors

XII.E.4. Other Perioperative Medications

TAGS:

- GLP-1 Agonists
- SGLT-2 Inhibitors

XII.F. Devices

XII.F.1. Cardiopulmonary Bypass (CPB)

TAGS:

- Cardiothoracic Effects
- Cardioplegia
- Circulatory Arrest
- Coagulation/Anticoagulation Before, During, and After CPB
- CPB on Pharmacokinetics and Pharmacodynamics
- Endocrine Effects
- Hematological Effects
- Metabolic Effects
- Myocardial Preservation
- Neurological Effects
- Renal Effects
- Respiratory Effects
- Thermoregulatory Effects

XII.F.2 Circulatory Assist Devices

TAGS:

- Anesthetic Management
- Anticoagulation Considerations
- Complications
- Contraindications
- Extracorporeal Membrane Oxygenation (ECMO)
- Indications
- Initiation
- Intra-Aortic Balloon Counterpulsation
- Left and Right Ventricular Assist Devices
- Percutaneous Devices
- Perioperative Evaluation (e.g., TEE Exam Findings to Guide Management)
- VA vs. VV ECMO
- Weaning

XII.F.3. Pacemakers

TAGS:

Biventricular Pacing
Implantable Cardioverter Defibrillators (ICD)
Indications and Insertion
Leadless Pacemakers
Modes of Operation
Perioperative Management of ICD and S-ICD
Subcutaneous Implantable Cardioverter Defibrillators (S-ICD)

XII.G. Surgical Procedures

XII.G.1 Cardiac

TAGS:

ASDs/VSDs
Coronary Revascularization
Heart Transplant
Hypertrophic Obstructive Cardiomyopathy
Mechanical Circulatory Support
Minimally Invasive Valve Supply
Neoplastic
Pericardial
Rhythm Disturbances
Valve Repair and Replacement

XII.G.2 Thoracic Aortic

TAGS:

Ascending/Arch Aortic Surgery with Circulatory Arrest
CPB Employing Low Flow and/or Retrograde Cerebral Perfusion
Descending Aortic Surgery
Pharmacologic
Spinal Cord Protection, including CSF Drainage and Management

XII.G.3. Lung Transplant

XII.G.4. Noncardiac Surgery in the Patient with Cardiac Disease – Congenital, Valvular, Coronary

TAGS:

Mitral and Tricuspid Transcatheter Edge-to-Edge Repair
Transcatheter Aortic Valve Replacement
Percutaneous Left Atrial Appendage Closure

XII.H. Postoperative and Perioperative

XII.H.1. Perioperative Ventilator Management

TAGS:

Critical Care Unit Ventilators and Techniques
Intraoperative Anesthetics
Postoperative Sedation Considerations
Weaning and Discontinuation of Mechanical Ventilation

XII.H.2. Perioperative Pain Management

TAGS:

Postoperative Pain Management

Regional Anesthesia for Cardiac Surgical Patients

XII.H.3. Postanesthetic Critical Care of Adult Cardiothoracic Surgical Patients

TAGS:

Diagnosis and Management of Postoperative Complications

Delayed Emergence/Neurologic

Hemorrhagic

Interpretation and Management of Mechanical Support of Circulation

LV, RV, or Biventricular Failure

Tamponade

Vasoplegic

XII.H.4. Point-of-Care Ultrasound (POCUS)

TAGS:

FAST Exam

Gastric

Identifying Shock (Distribution, Cardiogenic, Hypovolemic, Obstructive)

Lung

Monitoring

XII.I. Other Topics

XII.I.1. Research Methodology/Statistical Analysis

TAGS:

Fundamentals of Research Design and Conduct

Interpretation of Data

XII.I.2. Practice Management

TAGS:

Accuracy, Clarity, Specificity of Medical Records

Anesthesia Care Team and Scope of Practice

Artificial Intelligence and Machine Learning

Clinical Informatics

Coding Integrity, Audits, and Insurance Denials

Compliance with Documentation Requirements

Economics of Anesthesia Practice

Costs of Medical/Anesthesia Care

Documentation, Coding, and Billing

Efficient OR Staffing and Scheduling

Electronic Medical Record Systems: Costs and Benefits

Health Care Disparities Between Populations

Population Health: Perioperative Surgical Home and Enhanced Recovery

Population-Based Health Determinants, Resources to Improve Access

Subspecialization Issues: Pediatrics, Cardiac, Regional, Obstetric

Coverage

Payment for Anesthesia Services

XII.I.3. Quality Improvement and Patient Safety

TAGS:

Anesthesia Registries
 Barriers to QI
 Change Management Methods
 Crisis Management and Teamwork
 Crisis Manuals and Other Cognitive Aids
 Data Collection
 Definitions
 Design, Analysis, and Implementation of QI Projects
 Failure Mode and Effects Analysis
 Federal Quality Payment Program
 Group and Facility Scorecards
 Handoff Communication
 Human Factors and Mindfulness
 Individual Benchmarking
 Information Technology to Reduce Medication Errors
 Lean Six Sigma
 Medical Error, Adverse Events, Sentinel Events, Misuse of Medications
 and Technology
 Medication Errors: Assessment and Prevention
 Medication Reconciliation
 Patient Satisfaction Measurement
 Peer Review and Morbidity and Mortality Conferences
 Performance Assessment
 Preoperative and Procedural Checklists
 Public Reporting
 QI and the 5S Process
 QI Metrics
 Quality Improvement (QI) Basics
 Root Cause Analysis
 Simulation Training
 Systems Thinking and Technology Design
 Teamwork Training
 Value Stream Mapping
 Value-Based Care Incentives, Pay-For-Performance
 XII.I.4. Diversity, Equity, and Inclusion (DEI) in Health Care
TAGS:
 Ageism
 Approaches to Improvement; Interventions at Individual, Interpersonal,
 Community, Organizational and Policy Levels; Cultural and Gender
 Competency, Upstander vs. Bystander, Allyship vs. Performative
 Action, Tokenism vs Representation, Assortativity vs. Homophily
 Barriers
 Bias
 Colorism/Shadeism

- DEI in Academia
- DEI in the Workplace
- Discrimination Against Disability
- Discrimination Against Ethnicity
- Discrimination Against Familial Status
- Discrimination Against Gender
- Discrimination Against Gender Identity
- Discrimination Against Immigration/Citizenship Status
- Discrimination Against Language
- Discrimination Against National Origin
- Discrimination Against Religion
- Implicit Bias
- Importance of Language in Reports Discussing Racial Inequities
- Leadership
- Microaggressions
- Representation of Diversity and Race-Related Topics in Research
- Scholarship
- Sexism
- Stereotype Threat
- Surgical Outcomes
- Systematic Racism

XII.I.5. Healthcare Disparities

TAGS:

- ICU Disparities and Outcomes
- Maternal Healthcare Disparities; Maternal Mortality and Morbidity, Pain Management
- Social Determinants of Health Considerations in Assessment and Management of Patients – Race, Language, Education Status, Religion, Housing, Nutrition, Geographic Location, Rural vs. Urban, Access to and Quality of Care, Health Coverage

XII.I.6. Ethics and Medico-Legal Issues

TAGS:

- Adaptations for Clinical Disability
- Advance Directives, Do Not Resuscitate (DNR) Orders, Medical Orders for Life-Sustaining Treatment
- Clinician Wellness and Self-Care
- Conflicts of Interest and Financial Disclosure
- Diagnosis and Treatment of Burnout
- Disclosure of Errors or Adverse Events
- Elements of Medical Malpractice: Duty, Breadth of Duty, Causation, Damages
- Ethical Standards in Research Design: Scientific Validity, Fair Subject Selection, Favorable Risk-Benefit Profile
- Evidence-Based Practice

Health Care Proxy Laws and Limitations
Informed Consent in Research
Legal Actions and Consequences, National Practitioner Data Bank,
Closed Claims Findings, Professional Liability Insurance
Legal and Regulatory Issues
Patient Autonomy and Decision Making
Patient Privacy Issues: Principles of Confidentiality, Access to Records,
Protected Health Information
Patients Refusing Transfusion or Other Treatments
Personal Role in Reporting Unsafe Conditions and Fitness for Work
Primary Certification, Recertification, Maintenance of Certification and
Related Issues (Professional Standing, Lifelong Learning, Cognitive
Knowledge, Clinical Practice Assessment, Systems-Based Practice)
Principles of Informed Consent and Shared Decision Making
Principles of Justice, Autonomy, Beneficence, Nonmaleficence
Professional Behavior: Honesty, Integrity, Compassion, Respect, Altruism,
Conflicts of Interest, Response to Marketing
Professionalism: Definitions and Teaching
Recognizing and Responding to Unprofessional Behavior
Recognizing Limitations In Expertise and Need to Seek Guidance
Research Ethics
Review and Implementation of Trials, The Institutional Review Board
Sleep Deprivation
Substance Use Disorder
The Health Insurance Portability and Accountability Act (HIPAA)
Understanding Laws Related to Controlled Substances, Including Opioids
and Cannabinoids