

MOCA Content Outline

CONTINUING CERTIFICATION IN
ANESTHESIOLOGY PROGRAM

APPROVED JANUARY 2026

CONTENT OUTLINE

Continuing Certification in Anesthesiology

January 2026

TABLE OF CONTENTS

I. FUNDAMENTAL TOPICS IN ANESTHESIOLOGY	1
I.A. Anesthesia Machines and Breathing Systems	1
I.B. Mechanical or Assisted Ventilation	1
I.C. Monitoring	1
I.D. Electrical and Fire Safety	2
II. PHARMACOLOGY	2
II.A. General Concepts	2
II.B. Anesthetic Gases and Vapors	3
II.C. Intravenous Anesthetics: Opioid and Non-Opioid	3
II.D. Local Anesthetics	4
II.E. Neuromuscular Blocking Agents: Depolarizing and Non-Depolarizing	4
III. CLINICAL SCIENCES: ANESTHESIA PROCEDURES, METHODS AND TECHNIQUES	5
III.A. Patient Evaluation and Preoperative Preparation	5
III.B. Perioperative Management of Patients with Chronic Disease States	5
III.C. Regional Anesthesia	7
III.D. General Anesthesia	7
III.E. Monitored Anesthesia Care and Sedation	8
III.F. Asanguineous Intravenous Fluid Therapy during Anesthesia	8
III.G. Perioperative Complications: Types, Prevention, Treatment	8
III.H. Postoperative Period	9
IV. ORGAN-BASED BASIC AND CLINICAL SCIENCES	10
IV.A. Central and Peripheral Nervous Systems	10
IV.B. Respiratory System	10
IV.C. Cardiovascular System	12
IV.D. Gastrointestinal/Hepatic Systems	13
IV.E. Renal and Urinary Systems/Electrolyte Balance	14
IV.F. Hematologic System	15
IV.G. Endocrine and Metabolic Systems	16

IV.H. Neuromuscular System	17
V. CLINICAL SUBSPECIALTIES	17
V.A. Pain Management	17
V.B. Pediatric Anesthesia	18
V.C. Obstetric Anesthesia	20
V.D. Otorhinolaryngology (ENT) Anesthesia	22
V.E. Anesthesia for Plastic Surgery	23
V.F. Anesthesia for Laparoscopic Surgery	23
V.G. Ophthalmologic Anesthesia	24
V.H. Orthopedic Anesthesia	24
V.I. Trauma Anesthesia	25
V.J. Anesthesia for Ambulatory Surgery	26
V.K. Geriatric Anesthesia/Aging	27
V.L. Critical Care Anesthesia	27
V.M. Neuroanesthesia	30
V.N. Thoracic Anesthesia	31
V.O. Cardiac Anesthesia	32
V.P. Vascular Anesthesia	33
V.Q. Regional Anesthesia	33
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	73
XI.A. Basic Science	73
XI.B. Organ-Based Basic and Clinical Sciences.....	74
XI.C. Clinical Subspecialties	77
XI.D. Clinical Science of Anesthesia.....	79
XI.E. Special Problems or Issues.....	82
XII. ADULT CARDIAC ANESTHESIOLOGY	82
XII.A. Foundations of Adult Cardiac Anesthesiology	82
XII.B. Cardiothoracic Diseases (Pathophysiology, Pharmacology, and Clinical Management)	82
XII.C. Patient Evaluation	85
XII.D. Perioperative Imaging and Monitoring.....	85

XII.E. Pharmacodynamics and Pharmacokinetics	86
XII.F. Devices	87
XII.G. Surgical Procedures	88
XII.H. Postoperative and Perioperative	88
XII.I. Other Topics	89

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.A.6. Novel medications

TAGS:

Remimazalam

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 Hypocarbica
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
- Postdural Puncture Headache
- Sickle Cell Disease
- 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 or Fetus
- 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 Abruptio
- 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
- Postdural Puncture Headache
- 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
- Oculocardiac reflex
- 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:

Complications and Side Effects
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

Endovascular (catheter-directed) therapy

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
Embotic/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
Embollic 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

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

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
Respiratory Equipment
Temperature
Ventilation 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
Inotropic Medications
Local Anesthetics
Neuromuscular Blocking and Reversal Agents
Non-Opioid Analgesics
Opioid Analgesics

Pharmacogenetics
Pharmacokinetics and Pharmacodynamics
Sedative and Anxiolytic Agents
Sympathetic and Parasympathetic Agents
Vasodilator Medications

XI.B. Organ-Based Basic and Clinical Sciences

XI.B.1. Respiratory System

TAGS:

Acute Respiratory Distress Syndrome (ARDS)
Airway-Pressure Release Ventilation (APRV)
Anatomy and Physiology
Anesthesia for Thoracic Procedures
ARDS: Barotrauma and Volutrauma
ARDS: Clinical Phases
ARDS: Etiology, Infectious and Noninfectious
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
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
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)

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
- 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
- Esophageal/Gastrointestinal Foreign Bodies
- Esophageal, Stomach and Intestine Disorders
- Hernias
- Liver, Biliary Tract and Spleen Disorders
- Severe 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
- Coagulation Disorders
- Hematology
- Radiation Therapy
- Sickle Cell Disease
- Tumor Lysis Syndrome

XI.B.8. Genetics

TAGS:

- 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
- 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
- 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
- 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
- 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
- Chronic Corticosteroid Use (Stress Dosing)
- Concussion
- Evaluation of Coexisting Disease

- Fasting Requirements
- General Considerations
- GLP-1 Agonists
- Home Medication Administration
- Informed Consent and Assent (Assent for Minors)
- Laboratory Testing
- Normal Developmental Milestones
- Parental Presence and Pharmacologic Preparation for Anesthetic Induction
- Point-of-Care Ultrasonography
- Pregnancy Testing
- Preoperative Anesthesia Clinic
- Preoperative Physical Examination
- Psychosocial Preparation of the Patient and Family
- Role of Child Life Services (Scope of Practice, Utility)
- Subacute Bacterial Endocarditis (SBE) Prophylaxis
- Suitability for Anesthesia at an Outpatient Center
- Upper Respiratory Tract infections

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

TAGS:

- Age and Weight Implications
- Airway Management Devices and Adjuncts
- ASA Difficult Airway Algorithm
- Considerations for Postoperative Admission and Disposition
- Extubation Criteria
- Fluid, Electrolyte, and Glycemic Management
- Induction Technique
- Monitors and Equipment
- Point-of-Care Testing
- Thermoregulation
- TIVA
- 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:

- Bradycardia on Mask Induction
- Intraoperative Airway Fire

Intraoperative Blood Product Transfusion Error
Intraoperative Increased Airway Pressure
Intraosseous Access
LAST
Line Isolation Monitor
Management of Anesthesia Machine Fault
Management of the Difficult Airway
Management of Intraoperative Bronchospasm
Management of Intraoperative Rhabdomyolysis
Management of PEA/Asystole
Management of Supraventricular Tachycardia
Management of Ventricular Fibrillation
Oculocardiac Reflex
Pediatric Massive Transfusion Protocol
Recognition and Management of Cardiac Arrest
Recognition and Management of Malignant Hyperthermia
Recognition and Management of Pseudocholinesterase Deficiency
Wake-up Test for Loss of Neuromonitoring

XI.D.5. Complications of Anesthesia

TAGS:

Airway Obstruction
Anaphylactic and Anaphylactoid Reactions
Awareness and Recall under Anesthesia
Cardiopulmonary Resuscitation
Disposition
Dysrhythmias
Emergence Delirium
Iatrogenic Drug Errors
Iatrogenic Trauma/Positioning Injury
Inadequate Vascular Access
Respiratory Failure/Hypoxia
Surgical Site Infection

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
PONV

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