

MOCA Content Outline

MAINTENANCE OF CERTIFICATION IN ANESTHESIOLOGY PROGRAM

Approved – January 2024



Content Outline

Continuing Certification in Anesthesiology

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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 Nitric Oxide

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
- Stroke Volume Assessment
- TEE
- TTE

I.C.3. Intraoperative Blood Monitoring

TAGS:

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

I.D. Electrical and Fire Safety

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

I.D.2. Fire and Explosion Hazards

TAGS:

- Fuels
- Oxidizers
- Sources of Ignition

I.D.3. Electrical Safety Systems

TAGS:

- Isolated and Grounded Power Systems
- Line Isolation Monitors

I.D.4. Electrical Hazards

TAGS:

- Electrosurgery and Safety (Macro- and Microshock)

II. PHARMACOLOGY

II.A. General Concepts

II.A.1. Pharmacogenetics

TAGS:

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

II.A.2. Drug Interactions

TAGS:

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

II.A.3. Drug Reactions

TAGS:

Anaphylactoid

Anaphylaxis

Idiosyncratic

II.A.4. Substance Use Disorder

TAGS:

Anesthetic Implications

Pharmacologic Mechanisms

Physiologic Effects

II.A.5. Agonists and Antagonists

II.B. Anesthetic Gases and Vapors

II.B.1. Indications and Contraindications

II.B.2. Pharmacokinetics

TAGS:

Delivery Systems: Vaporizers

Metabolism and Excretion

Uptake and Distribution

II.B.3. Pharmacodynamics

TAGS:

Effects on Central Nervous System

Effects on Circulation

Effects on Other Organs

Effects on Ventilation

II.B.4. Drug Interactions

II.B.5. Side Effects and Toxicity

TAGS:

Atmospheric Waste

II.C. Intravenous Anesthetics: Opioid and Non-Opioid

II.C.1. Indications and Contraindications

II.C.2. Pharmacokinetics

TAGS:

Distribution and Redistribution

Metabolism and Excretion

II.C.3. Pharmacodynamics

TAGS:

Effects on Circulation

Effects on Other Organs

Effects on the Central Nervous System

Effects on Ventilation

II.C.4. Drug Interactions

II.C.5. Side Effects and Toxicity

TAGS:

Shivering

II.D. Local Anesthetics

II.D.1. Indications and Contraindications

II.D.2. Pharmacokinetics

TAGS:

Metabolism and Excretion

Uptake and Distribution

II.D.3. Pharmacodynamics

TAGS:

Effects on Circulation

Effects on Other Organs

Effects on the Central Nervous System

Effects on Ventilation

II.D.4. Drug Interactions

II.D.5. Side Effects and Toxicity

TAGS:

Local Anesthetic Systemic Toxicity

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

II.E.1. Indications and Contraindications

II.E.2. Pharmacokinetics

TAGS:

Distribution and Redistribution

Metabolism and Excretion

Prolongation of Action

II.E.3. Pharmacodynamics

TAGS:

Differential Effects on Muscle Groups

Effects on Neuromuscular Transmission

II.E.4. Drug Interactions

II.E.5. Side Effects and Toxicity

TAGS:

Anaphylaxis

Critical Illness Myopathy

II.E.6. Reversal of Blockade

TAGS:

Antagonism

Chelation

III. CLINICAL SCIENCES: ANESTHESIA PROCEDURES, METHODS AND TECHNIQUES

III.A. Patient Evaluation and Preoperative Preparation

III.A.1. History and Physical Examination

III.A.2. Airway Evaluation

TAGS:

Predictors of Difficult Laryngoscopy and Intubation

Predictors of Difficult Mask Ventilation

III.A.3. Standards and Guidelines

TAGS:

ACC/AHA Guidelines on Perioperative Cardiovascular Evaluation

ASA Physical Status Classification

- Indications for Preoperative Testing
- Preoperative Fasting Guidelines
- III.A.4. Preoperative Management of Chronic Medications
 - TAGS:**
 - Anticoagulants and Antiplatelet Medications
 - Antihyperglycemics
 - Cannabinoids
 - Cardiovascular Medications
 - Central Nervous System Medications
- III.A.5. Premedication
 - TAGS:**
 - Antibiotics
 - Anxiolysis
 - Aspiration Prophylaxis
 - PONV Prophylaxis
- III.A.6. Patients with Specific Disease States
 - TAGS:**
 - Cardiovascular Disease
 - Morbid Obesity
 - Pulmonary Disease
- III.B. Perioperative Management of Patients with Chronic Disease States
 - III.B.1. Central and Peripheral Nervous System
 - TAGS:**
 - Chronic Pain States
 - Dementia
 - Multiple Sclerosis
 - Parkinson
 - Spinal Cord Injury
 - III.B.2. Respiratory System
 - TAGS:**
 - Asthma
 - COPD
 - Sleep Apnea
 - Smoking
 - III.B.3. Cardiovascular System
 - TAGS:**
 - Coronary Artery Disease/Stents
 - Heart Failure
 - Pacemakers/Defibrillators
 - Valvular Disease
 - III.B.4. Gastrointestinal/Hepatic Systems
 - TAGS:**
 - Eating Disorders
 - GERD
 - Liver Failure

III.B.5. Renal and Urinary Systems

TAGS:

End-Stage Renal Disease and Dialysis

III.B.6. Hematologic System

TAGS:

Anemia

Coagulopathies

Sickle Cell

III.B.7. Endocrine and Metabolic Systems

TAGS:

Diabetes

Morbid Obesity

Pheochromocytoma

Thyroid Disease

III.B.8. Neuromuscular Diseases

TAGS:

Muscular Dystrophies

Myasthenic Syndromes

Myopathies

III.B.9. Special Problems

TAGS:

Allergic Reactions

Chemotherapy

Chronic Alcohol Use

Chronic Cannabinoid Use

Chronic Immunosuppression

Malignancy

Previous Organ Transplant

Substance Use Disorder

III.C. Regional Anesthesia

III.C.1. General Topics

TAGS:

Guidelines and Standards

Indications and Contraindications

Local Anesthetic Systemic Toxicity

Nerve Stimulator Guidance

Ultrasound Guidance

III.C.2. Neuraxial

TAGS:

Complications

Factors Influencing Onset and Duration

Indications and Contraindications

Medications: Local Anesthetics, Opioids, Adjuncts

Types: Caudal, Epidural, Spinal, Combined Spinal-Epidural

III.C.3. Regional Blocks

TAGS:

Anatomy

Catheters

Complications

Factors Influencing Onset and Duration

Indications and Contraindications

Intraneural Injections

Medications: Local Anesthetics, Opioids, Adjuncts

Specific Blocks: Head and Neck, Upper and Lower Extremity, Truncal

III.C.4. IV Regional

TAGS:

Complications

Factors Influencing Onset and Duration

Indications and Contraindications

Medications: Local Anesthetics, Opioids, Adjuncts

III.D. General Anesthesia

III.D.1. Techniques

TAGS:

Combined General/Regional

Inhalational

Total Intravenous

III.D.2. Airway Management

TAGS:

Airway Management Devices and Adjuncts

ASA Difficult Airway Algorithm

Complications

Emergency Surgical Airway

Endotracheal Tube Types

Flexible Fiberoptic Bronchoscopy

High-Frequency Jet Ventilation

Postoperative Considerations

Regional Airway Blocks

III.E. Monitored Anesthesia Care and Sedation

III.E.1. Guidelines and Standards

III.E.2. Levels of Sedation

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

III.F. Asanguineous Intravenous Fluid Therapy during Anesthesia

III.F.1. Indications and Contraindications

TAGS:

Colloids

Crystalloids

Hypertonic Saline

III.F.2. Complications

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

III.G.1. Types

TAGS:

Air Embolism
Anaphylaxis
Arterial Thrombosis
Aspiration of Gastric Contents
Bronchospasm
Burns
Cerebrovascular Accident
Corneal Abrasions
Esophageal Injury
Hypothermia and Hyperthermia
Laryngospasm
Myocardial Ischemia/Infarction
Positioning Complications
Postobstructive Pulmonary Edema
Postoperative Visual Loss
Shivering
Tourniquet, Adverse Effects of
Unintended Intraoperative Awareness
Vascular Trauma
Venous Thromboembolism

III.G.2. Prevention and Treatment

TAGS:

Aspiration of Gastric Contents
Fire Prevention and Management
Management of Intraoperative Patient Temperature
Perioperative Anticoagulation

III.H. Postoperative Period

III.H.1. Emergence and Recovery of Airway Reflexes

III.H.2. Acute Pain Management

TAGS:

Field Block
Multimodal Analgesia Strategies
Opioids
Patient-Controlled Analgesia (PCA)
Regional Anesthesia/Nerve Blocks
Systemic Local Anesthetics

III.H.3. Respiratory Complications in the PACU

III.H.4. Cardiovascular Complications in the PACU

TAGS:

Arrhythmias
Hypertension
Hypotension
Myocardial Ischemia

III.H.5. Nausea and Vomiting

TAGS:

Prophylactic Medications

Risk Factors

III.H.6. Residual Neuromuscular Blockade

III.H.7. Neurologic Consequences of Surgery and Anesthesia

TAGS:

Cognitive Dysfunction

Delirium

Failure to Emerge from Anesthesia

Stroke

IV. ORGAN-BASED BASIC AND CLINICAL SCIENCES

IV.A. Central and Peripheral Nervous Systems

IV.A.1. Anatomy

TAGS:

Autonomic Nervous System

Central Nervous System

Peripheral Nervous System

IV.A.2. Physiology

TAGS:

Autoregulation

Drug Effects

Intracranial Pressure (ICP)

Metabolism

Spinal Reflexes

Vagal Reflex

IV.A.3. Pharmacology

TAGS:

Anticonvulsants

Drug Effects on CNS Blood Flow

Drug Effects on CNS Metabolism

Osmotic Agents

IV.A.4. Clinical Science

TAGS:

Abscess

Air Embolism

Airway Management in the Patient with Cervical Spine Disease

Autonomic Dysfunction

Autonomic Hyperreflexia

Cerebrovascular Accident (CVA)

Coma

Drug Intoxication

Fluid Management

Hydrocephalus

Pituitary Adenomas

Postural Orthostatic Hypotension Syndrome (POTS)

Prone and Sitting Positioning: Implications

Seizures

Spinal Shock

Subdural and Epidural Hematomas

Trans-Sphenoidal Hypophysectomy

Ventriculostomy

IV.B. Respiratory System

IV.B.1. Anatomy

TAGS:

Alveoli/ Lung Parenchyma

Innervation

Larynx

Musculoskeletal

Tracheobronchial Tree

Vascular Supply

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

TAGS:

Alveolar-Arterial O₂ Gradient (A-aDO₂)

Anion Gap

Apneic Oxygenation

Arterial-Alveolar CO₂ Gradient (A-aDCO₂)

Central and Peripheral Chemoreceptors

CO₂ and O₂ Response Curves

Dead Space

Diffusion Hypoxia

Hypercarbia and Hypocarbia

Hypoxia and Hyperoxia

Hypoxic Pulmonary Vasoconstriction

Lung Mechanics

Nonrespiratory Functions of Lungs: Immune and Metabolic

Pleural Pressure Gradient

V/Q Mismatch

IV.B.3. Pharmacology

TAGS:

Anti-inflammatory Medications

Bronchodilators

IV.B.4. Clinical Science

TAGS:

Abdominal Compartment Syndrome

Acute Respiratory Distress Syndrome (ARDS)

Arterial Blood Gas Interpretation

Asthma

Atelectasis

Barotrauma

Bronchiectasis

- Bronchitis
- Bronchopleural Fistula
- Bronchopulmonary Dysplasia
- Bronchospasm: Management
- Cancer
- Chest Trauma
- Chest X-Ray: Indications and Interpretation
- Complications and Side Effects of Mechanical Ventilation
- COPD
- Cystic Fibrosis
- Empyema
- Foreign Body
- Hemothorax
- Lung Abscess
- Mediastinal Masses
- Nonventilatory Respiratory Management
- Obstructive Sleep Apnea (OSA)
- Oxygen Therapy and Toxicity
- Pleural Effusion
- Pneumonia
- Pneumothorax
- Postoperative Extubation Criteria
- Postoperative Mechanical Ventilation
- Pulmonary Fibrosis
- Respiratory Distress Syndrome (ARDS)
- Respiratory Failure Management

IV.C. Cardiovascular System

IV.C.1. Anatomy

TAGS:

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

IV.C.2. Physiology

TAGS:

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

Systolic Dysfunction

Valvular Dysfunction

IV.C.3. Pharmacology

TAGS:

Angiotensin Converting Enzyme Inhibitors

Angiotensin Receptor Blockers

Antianginal Drugs

Antiarrhythmics

Beta-Blockers

Calcium Channel Blockers

Chronotropic Agents

Digitalis

Inotropes

Statins

Vasodilators

Vasopressors

IV.C.4. Clinical Management of Disease States

TAGS:

Cardiac Ischemia

Cardiac Tamponade and Constrictive Pericarditis

Cardiogenic Shock

Cardiomyopathy

Carotid Artery Disease

Dysrhythmia

Hypertrophic Cardiomyopathy

Intracardiac Defects

Myocardial Infarction and Acute Coronary Syndrome

Myocarditis

Peripheral Vascular Disease

Pulmonary Embolism

Pulmonary Hypertension

Right or Left Ventricular Dysfunction

Valvular Abnormalities

IV.C.5. Special Considerations in Cardiovascular Anesthesia

TAGS:

Cardiac Catheterization

Cardiac Implantable Electrical Device Management: AICD and Pacemakers

Electrophysiologic Studies and Procedures

Left Atrial Appendage Occlusion

Left Ventricular Assist Devices

Percutaneous Valvuloplasty and Valve Replacement

Perfusion Studies

IV.D. Gastrointestinal/Hepatic Systems

IV.D.1. Anatomy

TAGS:

Arterial Blood Supply (Celiac, Superior and Inferior Mesenteric Arteries)

Esophageal Sphincters

Innervation: Sympathetic, Parasympathetic, and Enteric

Liver Blood Supply

IV.D.2. Physiology

TAGS:

Cytochrome P450 Function and Variants

Excretory Functions

Factors Affecting Splanchnic Blood Volume

Metabolic and Synthetic Functions

Portal Hypertension

IV.D.3. Pharmacology

TAGS:

Effects of Liver Dysfunction on Drug Metabolism/Elimination

Hepatotoxicity

IV.D.4. Clinical Science

TAGS:

Acute Hepatitis

Anesthetic Management: Full Stomach

Anesthetic Management: Intestinal Obstruction

Cricoid Pressure

Esophageal Disease

Fluid Management for Hepatic Resection

Hepatic Failure

Implication of Ascites

Liver Transplantation

Morbid Obesity/Anesthesia for Bariatric Surgery

Nitrous Oxide and GI 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

Renal Cancer with IVC Tumor Invasion

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
- 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

Motor Neurons

IV.H.2. Physiology

TAGS:

Factors Impacting Muscle Strength

Neuromuscular Transmission

IV.H.3. Pharmacology

TAGS:

Antagonists: Anticholinesterases

Antagonists: Selective Relaxant Binding Agents

Neuromuscular Blocking Agents: Depolarizing

Neuromuscular Blocking Agents: Nondepolarizing

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

TAGS:

Diseases of the Neuromuscular Junction

Inflammatory Myopathies

Metabolic Diseases of the Muscle

Motor Neuron Diseases

Peripheral Nerve Diseases

V. CLINICAL SUBSPECIALTIES

V.A. Pain Management

V.A.1. Pathophysiology

TAGS:

Acute Pain

Cancer-Related Pain

Chronic Pain States

Complex Regional Pain Syndrome (CRPS): Types I and II

Diabetic Neuropathy

Neuropathic Pain States

Peripheral Neuropathies

Phantom Limb

Postherpetic Neuralgia

Post-Stroke Pain

Somatic Pain Conditions

Substance Use Disorder

V.A.2. Diagnostic Strategies

TAGS:

Diagnostic Blocks
Electromyography (EMG)
Imaging Modalities

V.A.3. Treatment of Painful Disease States

TAGS:

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

V.B. Pediatric Anesthesia

V.B.1. Clinical Science

TAGS:

Airway Selection
Behavioral Development
Infants: Fluid and Glucose Management
Infants: Respiratory Physiology
Infants: Thermoregulation
Malignant Hyperthermia: Susceptibility and Management
Neonatal Advanced Life Support (NALS)
Neonates: Transitional Circulation
Organ Function Changes During Development
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

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
Intubation and Extubation Complications
Jet Ventilation
Laryngoscopy Techniques
Laryngospasm
Laser
Pediatric Regional Anesthetic Techniques
Pediatric Sedation
PONV
Postoperative Pain Management: Codeine
Premedication Techniques

Propofol Infusion Syndrome
Strabismus
Stridor
Tonsillectomy and Adenoidectomy
Upper Respiratory Infection
Urologic Procedures

V.C. Obstetric Anesthesia

V.C.1. Clinical Science

TAGS:

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

V.C.2. Pharmacology

TAGS:

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

V.C.3. Clinical Management of Disease States

TAGS:

Amniocentesis
Amniotic Fluid Embolism
Antepartum Fetal Therapy
Antepartum Hemorrhage
Anticoagulant Therapy
Cardiovascular Disease
Ectopic Pregnancy
Endocrine Disease
Ex-utero Intrapartum Treatment (EXIT)
Fetal Malposition
Fetal Malpresentation
Fever and Infection
Gestational Trophoblastic Surgery Disease

Hematologic Disease
Maternal Cardiopulmonary Resuscitation
Multiple Gestation
Neurologic Disease
Obesity
Placenta Abruption
Placenta Accreta Spectrum
Placenta Previa
Postpartum Hemorrhage
Preeclampsia and Eclampsia
Preterm Labor
Renal Disease
Respiratory Disease
Resuscitation of Newborn
Retained Placenta
Rh and ABO Incompatibility
Spontaneous Abortion
Trial of Labor after Cesarean (TOLAC)
Umbilical Cord Blood Gas Measurements
Umbilical Cord Prolapse
Uterine Atony
Uterine Rupture

V.C.4. Special Considerations in Obstetric Anesthesia

TAGS:

Antepartum Fetal Assessment
Aorto-Caval Compression
Cesarean Delivery: Elective Anesthesia
Cesarean Delivery: Emergency Anesthesia
Difficult Airway
Gastroesophageal Sphincter Function
Influence of Anesthetic Technique on Labor
Neonatal Assessment: Apgar Score
Nonobstetric Anesthesia in Pregnancy
Operative Vaginal Delivery
Pulmonary Aspiration
Regulation of Uterine Blood Flow
Thermoregulation

V.C.5. Maternal Physiology

TAGS:

Acid-Base Changes
Airway Changes
Anatomic Position
Barrier Function
Cardiovascular Changes
Coagulation Changes

- Gastrointestinal Changes
- Hematologic Changes
- Nervous System Changes
- Renal Changes
- Respiratory Changes
- V.C.6. Maternal-Fetal Considerations
 - TAGS:**
 - Intrapartum Fetal Monitoring
 - Intrauterine Fetal Resuscitation
- V.C.7. Pathophysiology of Complicated Pregnancy
- V.D. Otorhinolaryngology (ENT) Anesthesia
 - V.D.1. Surgical Procedures
 - TAGS:**
 - Airway Endoscopy
 - Microlaryngeal Surgery
 - Radical Neck Dissection
 - Sinus Endoscopy
 - Tonsillectomy
 - Transoral Robotic Surgery
 - Uvulopalatopharyngoplasty
 - V.D.2. Laser Surgery
 - TAGS:**
 - Airway Fires
 - Lasers: Safety Implications
 - Laser-Safe Endotracheal Tubes
 - V.D.3. Anesthetic Management
 - TAGS:**
 - Airway Management
 - Anesthesia for Vascular Flaps
 - Effects of Radiation Therapy
 - Ventilation Strategies, Including Jet Ventilation
- V.E. Anesthesia for Plastic Surgery
 - V.E.1. Liposuction
 - V.E.2. Tumescent: Volume Overload, LAST
 - V.E.3. Fire Risk
 - V.E.4. Local Anesthetic Systemic Toxicity
- 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
Ventilation

V.F.3. Risks

TAGS:

CO₂ Embolism
Hemorrhage
Hypercapnea
Hypotension
Subcutaneous Emphysema
Vascular or Organ Perforation

V.G. Ophthalmologic Anesthesia

V.G.1. Clinical Science

TAGS:

Retrobulbar and Peribulbar Blocks

V.G.2. Pharmacology

V.G.3. Clinical Management of Disease States

TAGS:

Open Eye Injuries

V.G.4. Special Considerations in Ophthalmologic Anesthesia

TAGS:

ASA Preoperative Testing Guidelines
Preoperative Selection

V.H. Orthopedic Anesthesia

V.H.1. Tourniquet Management

TAGS:

Ischemia
Nerve Injury
Reperfusion

V.H.2. Spine Surgery

TAGS:

Anesthetic Technique
Antifibrinolytics
Cervical Spine Disease
Neurophysiologic Monitoring
Postoperative Visual Loss

V.H.3. Complications

TAGS:

Blood Loss
Fat Embolism
Methyl Methacrylate
Positioning Injury
Venous Air Embolism

V.H.4. Anesthetic Techniques

TAGS:

Regional vs. General Anesthesia

V.H.5. Special Considerations in Orthopedic Surgery

TAGS:

Ankylosing Spondylitis

Compartment Syndrome

Postoperative Analgesia

Rheumatoid Arthritis

Scoliosis

Thromboprophylaxis

V.I. Trauma Anesthesia

V.I.1. Primary Survey and Resuscitation

TAGS:

Emergency Airway

Hemorrhagic Shock

Initial Evaluation

Mass Casualty Response

Penetrating vs. Blunt Trauma

Prehospital and EMS

Team Function in Trauma

Triage

V.I.2. Secondary Survey and Stabilization

TAGS:

Fluid Management

Hemostatic Resuscitation

Hypothermia

Massive Transfusion

Monitoring

Nuclear, Biological, and Chemical Injury

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
 - 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
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
- 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 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
 - Interventional Radiology
 - Intraoperative MRI
 - Neurophysiologic Monitoring
 - Patient Positioning
 - Seizures
 - Spinal Drains
 - Venous Air Embolism
- V.N. Thoracic Anesthesia
 - V.N.1. Clinical Science
 - TAGS:**
 - Anesthetic Techniques for Thoracotomy and Thoracoscopy
 - Complications: Cardiac Herniation
 - Hypoxic Pulmonary Vasoconstriction
 - Lung Separation Techniques: Double-Lumen Tubes and Endobronchial Blockers
 - One-Lung Ventilation
 - Preoperative Assessment and Optimization
 - Pulmonary Function Tests (PFTs)
 - V.N.2. Pharmacology
 - TAGS:**
 - Bronchodilators
 - Fluid Management
 - Pulmonary Vasodilators
 - V.N.3. Clinical Management of Disease States
 - TAGS:**
 - Bronchopulmonary Fistula
 - Bullae/Recurrent Pneumothorax
 - Chronic Obstructive Pulmonary Disease
 - Empyema
 - Endocrine-Secreting Tumors
 - Mediastinal Masses
 - Myasthenia Gravis/Myasthenic Syndromes
 - Pleural Disease
 - Reactive Airways Disease
 - Restrictive Pulmonary Disease
 - V.N.4. Special Considerations in Thoracic Anesthesia
 - TAGS:**
 - Esophageal Resection
 - Jet Ventilation
 - Lung Resection

- Mediastinoscopy
- Pain Management
- Pneumonectomy
- Postoperative Complications
- Rigid Bronchoscopy
- Thymectomy
- Tracheal Resection

V.O. Cardiac Anesthesia

V.O.1. Clinical Science

TAGS:

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

V.O.2. Pharmacology

TAGS:

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

V.O.3. Clinical Management of Disease States

TAGS:

- Aortic Aneurysm: Thoracic
- Aortic Dissection
- Aortic Insufficiency
- Aortic Stenosis
- Arrhythmias
- Atrial Septal Defects
- Carcinoid Heart Disease
- Congenital Heart Disease
- Congestive Heart Failure
- Diastolic Dysfunction/Heart Failure
- Endocarditis
- Hypertrophic Cardiomyopathy
- Ischemic Cardiomyopathy
- Ischemic Heart Disease
- Mitral Regurgitation
- Mitral Stenosis
- Nonischemic Cardiomyopathy
- Pericardial Effusion/Tamponade

Post-Cardiac Arrest Care/Normothermia/Hypothermia
Pulmonary Valve Disease
Tricuspid Regurgitation
Tricuspid Stenosis
Ventricular Septal Defects

V.O.4. Special Considerations in Cardiac Anesthesia

TAGS:

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

V.P. Vascular Anesthesia

V.P.1. Clinical Science

TAGS:

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

V.P.2. Pharmacology

TAGS:

Heparin
Protamine
Statins

V.P.3. Clinical Management of Disease States

TAGS:

Aortic Aneurysm
Carotid Endarterectomy, Stent Procedures
Peripheral Vascular Disease

V.P.4. Special Considerations in Vascular Anesthesia

TAGS:

Anticoagulation and Reversal
Aortic Clamping
Carotid Clamping
Endovascular Surgery
Renal Protection

V.Q. Regional Anesthesia

V.Q.1. General Topics

TAGS:

Anticoagulation in Regional Anesthesia
Guidelines and Standards
Indications and Contraindications

- Nerve Localization: Nerve Stimulator, Landmarks, Ultrasound
- Nerve Structural Anatomy
- Sedation and Monitoring
- V.Q.2. Pharmacology
 - TAGS:**
 - Liposomal Bupivacaine
 - Local Anesthetics and Adjuncts
- V.Q.3. Neuraxial Anesthesia
 - TAGS:**
 - Anatomy and Sonoanatomy
 - Caudal Anesthesia
 - Combined Spinal-Epidural Anesthesia
 - Complications
 - Epidural Anesthesia
 - Epidural Blood Patch
 - Factors Influencing Onset and Duration
 - Indications and Contraindications
 - Medications: Local Anesthetics, Opioids, Adjuncts
 - Patient-Controlled Epidural Analgesia
 - Spinal Anesthesia
- V.Q.4. Upper Extremity Regional Anesthesia
 - TAGS:**
 - Brachial Plexus Anatomy and Sonoanatomy
 - Brachial Plexus Blocks: Interscalene, Supraclavicular, Infraclavicular, Axillary
 - Cervical Plexus Blocks: Superficial, Deep
 - Other: Musculocutaneous, Wrist Blocks
 - Suprascapular/Shoulder Blocks
- V.Q.5. Lower Extremity Regional Anesthesia
 - TAGS:**
 - Ankle Block and Anatomy
 - Inguinal Region Nerve Blocks: Femoral, LFCN, Obturator, Fascia Iliaca, 3-in-1
 - Lumbar Plexus, Femoral, and Saphenous Anatomy and Sonoanatomy
 - Saphenous, Adductor Canal Blocks
 - Sciatic Nerve and Sacral Plexus Anatomy and Sonoanatomy
 - Sciatic Nerve Blocks: Popliteal, Transgluteal, Infragluteal
- V.Q.6. Truncal Regional Anesthesia
 - TAGS:**
 - Abdominal Wall Blocks: TAP, Ilioinguinal, Iliohypogastric, Rectus Sheath
 - Anterior and Lateral Chest Blocks: PECS, Serratus
 - Paravertebral Anatomy and Sonoanatomy
 - Paravertebral Blocks
 - Posterior Truncal Blocks: Quadratus Lumborum, Erector Spinae, Retrolaminar
 - Truncal Block Anatomy and Sonoanatomy
- V.Q.7. Complications and Side Effects
 - TAGS:**

- Falls
- Hematoma
- Horner Syndrome
- Infection/ Abscess
- Intraneural Injections
- Local Anesthetic Systemic Toxicity
- Neuropraxia, Nerve injury
- Opioid
- Phrenic Nerve Block
- Postdural Puncture Headache
- Rebound Pain
- V.Q.8. Ultrasound-Guided Regional Anesthesia
 - TAGS:**
 - Image Generation and Display
 - Needle and Probe Alignment
 - Ultrasound Artifacts
 - Ultrasound Physics
- V.Q.9. Continuous Regional Anesthesia
 - TAGS:**
 - Indications and Contraindications
 - Perineural Infusions: Medications, Pumps, Dosing Parameters
- V.Q.10. IV Regional
 - TAGS:**
 - Complications
 - Factors Influencing Onset and Duration
 - Indications and Contraindications
 - Medications: Local Anesthetics, Opioids, Adjuncts
- V.R. Acute Pain Management
 - V.R.1. Analgesic Pharmacology
 - TAGS:**
 - Acetaminophen
 - Alpha-2 Agonists
 - Anticonvulsants
 - Antidepressants
 - Gabapentinoids
 - Intravenous Local Anesthetic Infusions
 - Intravenous Medications
 - Multimodal Analgesia
 - Muscle Relaxants
 - NMDA Antagonists
 - NSAIDs/COX-2 Inhibitors
 - Opioid Agonists, Antagonists
 - Opioids
 - Oral/Transdermal Opioids
 - Parenteral Medications

Patient-Controlled Analgesia

Transdermal Medications

V.R.2. Alternative Analgesic Modalities

TAGS:

Acupuncture

Complementary Therapies

Hypnosis

TENS Therapy

V.R.3. Acute Pain Evaluation and Treatment

TAGS:

Acute on Chronic Pain

Cancer Pain

Discharge Planning

Escalation of Therapy

Inflammatory Pain

Neuropathic Pain

Nociceptive Pain

Opioid Conversion

Opioid Tolerance

Opioid-Induced Hyperalgesia

Oral Therapy

Parenteral Therapy

Patient-Controlled Analgesia

Physical Therapy

Psychiatric Comorbidities

Substance Use Disorder

Transdermal Therapy

Transition to Chronic Pain

V.R.4. Monitoring and Safety

TAGS:

Cardiopulmonary Monitoring

Complications and Side Effects

Controlled Substance Prescribing

Drug Testing

Legal Issues

Level of Care

VI. SPECIAL PROBLEMS OR ISSUES IN ANESTHESIOLOGY

VI.A. Electroconvulsive Therapy

VI.A.1. Physiology

TAGS:

Central Nervous System Effects

Hemodynamic Effects

VI.A.2. Pharmacology

TAGS:

Anticholinergics

- Beta-Blockers
- Sedative-Hypnotics
- Vasodilators

VI.B. Organ Donors

- VI.B.1. Pathophysiology

- VI.B.2. Clinical Management

 - TAGS:**

 - Criteria for Brain Death

 - Donation after Cardiac Death

 - Donation after Brain Death

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

- VI.C.1. MRI

 - TAGS:**

 - Anesthetic Management

 - Monitoring

 - Risks/Contraindications

- VI.C.2. Electrophysiology

 - TAGS:**

 - Ablation Procedures/Cardioversion

 - Cardiac Implantable Devices

- VI.C.3. Interventional Radiology

 - TAGS:**

 - Angiography/Thrombolysis

 - CT-Guided Procedures

 - Intravenous Contrast

 - Transhepatic Intrajugular Portosystemic Shunt

- VI.C.4. Gastrointestinal Endoscopy

 - TAGS:**

 - Colonoscopy/Upper Endoscopy

 - Endoscopic Retrograde Cholangiopancreatography

 - 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

VII. 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 (NKHCC)
- Hyperthyroidism, Including Thyroid Storm
- Hypoglycemia
- Hypothyroidism, Including Myxedema
- Pheochromocytoma
- Pituitary
- SIADH
- Thyroid Function Abnormalities

IX.A.8. Gastrointestinal

TAGS:

- Abdominal Compartment Syndrome
- Bowel Disorders
- Diarrhea, Nausea, Vomiting
- Gall Bladder Disease (Stones, Cholecystitis)
- Gastrointestinal Hemorrhage
- Gastrointestinal Motility Dysfunction
- Hepatic
- Hepatic Dysfunction/Failure (Acute and Chronic)
- Hepatic Encephalopathy
- Hepatitis
- Hepatocellular Carcinoma
- Hepatorenal Syndrome

- Ileus
- Infectious
- Malabsorption
- Pancreas
- Pancreatic Cancer
- Pancreatitis
- Perforation, Volvulus
- Pseudomembranous Colitis
- Stomach
- Toxic Megacolon
- Vascular Diseases

IX.A.9. Dermatologic

TAGS:

- Allergic Reactions
- Infection
- Inflammatory Diseases of the Skin
- Necrotizing Fasciitis
- Stevens-Johnson Syndrome

IX.A.10. Immunologic/Infectious Disease

TAGS:

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

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

TAGS:

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

IX.B. Critical Illness Diagnosis and Management

IX.B.1. Central Nervous System

TAGS:

- Abscess
- Altered Mental Status
- Angiography
- Anticonvulsants
- Antimicrobials
- Brain Death

Coma
 Critical Illness Polyneuropathy
 Degenerative Disease of the Brain
 Delirium
 Diagnoses
 Diagnostic Modalities
 EEG, Processed EEG
 Embolic/Thrombotic
 EMG/NCS
 Encephalitis
 Guillain-Barré Syndrome
 Head Injury, Closed or Open
 Hemorrhagic (Subarachnoid, Subdural, Epidural Hematoma)
 ICP Measurement
 ICP-Controlling Medications
 Infectious
 Interventional Radiology
 Ischemic
 Jugular Venous Saturation
 Lumbar Puncture
 Management Strategies
 Meningitis/Ventriculitis
 Myasthenia Gravis
 Myopathy
 Neuromuscular Disorders
 Nuclear Medicine Studies
 Other Therapies
 Pituitary Disorders
 Plasmapheresis/Plasma Exchange
 Seizures and Status Epilepticus
 Spinal Cord Injury
 Steroids
 Stroke
 Subarachnoid, Subdural, Epidural Hematoma
 Surgical Interventions
 Transcranial Doppler
 Vascular Malformations
 Vasoactive Drugs
 IX.B.2. Cardiovascular
TAGS:
 Automatic Implantable Cardioverter Defibrillators
 Aneurysm, Thoracic
 Anticoagulants and Antithrombotics
 Antidysrhythmics
 Antifibrinolytics
 Antihypertensives
 Antimicrobials
 Antiplatelet Agents
 Arterial Pressure
 Asystole
 Atrial Flutter/Fibrillation
 Biomarkers

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

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

IX.B.3. Pulmonary

TAGS:

Airway Diseases
Airway Pressure-Release Ventilation
Antimicrobials/Antivirals
ARDS
Arterial Blood Gas
Aspiration
Assist Control
BiPAP
Capnography
Chest Trauma
Chest X-ray
Community-Acquired
CPAP
CT/MRI
Diagnoses
Diagnostic Modalities
Differential Lung Ventilation
Embolic 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 (NKH)
Hypertension, 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 Injections

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.1.3. 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.1.4 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

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

XI. PEDIATRIC ANESTHESIOLOGY

XI.A. Basic Science

XI.A.1. Anatomy

TAGS:

Airway

- Airway Management
- Anatomy for Procedures
- Atresias, Stenoses and Webs
- Body Habitus
- Central Neuraxial Blockade
- General Development
- Peripheral Nerve Blockade
- Vascular Cannulation
- Water, Volume, and Blood Composition
- XI.A.2. Physics and Anesthesia Equipment
 - TAGS:**
 - Brain, Spinal Cord, and Neuromuscular Function
 - Breathing Circuits
 - Cardiac Rhythm and Vascular Pressures
 - Methods for Monitoring
 - Oxygenation, Gas Concentration, and Ventilation
 - Point-of-Care Ultrasound
 - Respiration
 - Temperature
 - Ventilation Devices and Techniques
- XI.A.3. Anesthetic Pharmacology: Physiologic States, Pathophysiologic States and Adverse Effects
 - TAGS:**
 - Agents Affecting Coagulation
 - Anti-Emetics
 - Biotransformation and Excretion
 - Blood-Brain Barrier
 - Drug Absorption
 - Drug Distribution
 - Inhalation Anesthetics
 - Local Anesthetics
 - Neuromuscular Blocking and Reversal Agents
 - Non-Opioid Analgesics
 - Opioid Analgesics
 - Pharmacogenetics
 - Pharmacokinetics and Pharmacodynamics
 - Sedative and Anxiolytic Agents
 - Sympathetic and Parasympathetic Agents
- XI.B. Organ-Based Basic and Clinical Sciences
 - XI.B.1. Respiratory System
 - TAGS:**
 - Acute Respiratory Distress Syndrome (ARDS)
 - Adaptive-Pressure Control Ventilation (APCV)
 - Airway-Pressure Release Ventilation (APRV)
 - Anatomy and Physiology

Anesthesia for Thoracic Procedures
ARDS: Barotrauma and Volutrauma
ARDS: Berlin Criteria
ARDS: Clinical Phases
ARDS: Etiology, Infectious and Noninfectious
ARDS: Oxygenation Index
ARDS: Permissive Oxygenation
ARDS: Treatment
Chest Wall Surgery/Reconstruction
Clinical Sciences
Congenital Pulmonary Airway Malformation (CPAM)
CPAP
Heliox
High-Flow Nasal Canula
High-Flow Oscillatory Ventilation (HFOV)
Lung Physiology
Mediastinal Masses
Musculoskeletal
Nitric Oxide
Noninvasive Positive-Pressure Ventilation (PPV)
Obstructive Disease
One Lung Ventilation
Oxygen Transport
Oxygenation Index
Parenchymal
Pleural
Prenatal and Postnatal Development
Respiratory Mechanics, Ventilation, and Lung Volumes
Restrictive Disease
Surfactant and Surface Tension
Tracheobronchial
Upper Airway
Ventilation
Ventilation/Perfusion Matching
Video-Assisted Thoracoscopy

XI.B.2. Cardiovascular System

TAGS:

Acyanotic Lesions
Anatomy and Physiology
Anesthesia for Cardiac Patients
Anesthesia for Diagnostic, Interventional and Electrophysical Procedures
Anesthesia in Patient with Pacemaker or AICD
Anesthetic Effects on the Cardiovascular System
Arrhythmic Lesions
Cardiogenic Shock

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

XI.B.3. Central and Peripheral Nervous Systems

TAGS:

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

Seizure Surgery
Serotonin Syndrome
SMART Tots Consensus Statement And Animal Studies

XI.B.4. Gastrointestinal System

TAGS:

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

XI.B.5. Renal/Urinary

TAGS:

Clinical Science
Prenatal and Postnatal Development
Renal Failure

XI.B.6. Endocrine/Metabolic

TAGS:

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

XI.B.7. Hematology/Oncology

TAGS:

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

XI.B.8. Genetics

TAGS:

Clinical Sciences

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

XI.C. Clinical Subspecialties

XI.C.1. Neonatal

TAGS:

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

XI.C.2. Painful Disease States

TAGS:

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

XI.C.3. Otolaryngology

TAGS:

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

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

TAGS:

- Cleft Repairs
- Clinical Science
- Mandibular Repairs
- Vascular Malformations
- XI.C.5. Ophthalmology
 - TAGS:**
 - Clinical Science
 - General Considerations
 - Pharmacology of Ophthalmologic Medications
 - Strabismus Repair
 - Trauma
- XI.C.6. Orthopedic Surgery
 - TAGS:**
 - Anterior, Posterior, and Combined Spine Fusion
 - Clinical Science
- XI.C.7. Trauma and Burns
 - TAGS:**
 - Anesthetic and Pain Management of the Burn Patient
 - Burns
 - Dressing Changes
 - Fluid Resuscitation and Calculating Burn Surface Area
 - Hypothermia and Submersion Injury
 - Incidence, Patterns, Implications of Abuse
 - Inhalation Injuries/Airway Management
 - Management of the Polytrauma Victim
 - Trauma
 - Types, Mechanisms, Locations and Implications of Injuries
- XI.C.8. Nutritional Support in the PICU
 - TAGS:**
 - Electrolyte Disorders
 - Enteral Feedings: Gastric and Post-Pyloric
 - Free Fatty Acid Deficiency
 - Glycemic Control in the PICU
 - Hyperglycemia
 - Line-Associated Infections
 - Liver Dysfunction
 - NPO for Children on Enteral Feedings
 - Risk of Aspiration
 - Total Parenteral Nutrition (TPN)
- XI.C.9. Liver Dysfunction
 - TAGS:**
 - Biochemical Guidance of Liver Injury
 - Coagulopathy
 - Hepatic Encephalopathy
 - Hepatorenal Syndrome

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

XI.C.10. Acute Kidney Injury

TAGS:

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

XI.C.11. Transfusion Practices

TAGS:

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

XI.D. Clinical Science of Anesthesia

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

TAGS:

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

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

TAGS:

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

XI.D.3. Regional Anesthesia and Analgesia

TAGS:

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

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

Pharmacology and Toxicity of Local Anesthetics

XI.D.4. General Anesthesia

TAGS:

Management of the Difficult Airway

XI.D.5. Complications of Anesthesia

TAGS:

Airway Obstruction

Anaphylactic and Anaphylactoid Reactions

Awareness and Recall under Anesthesia

Cardiopulmonary Resuscitation

Dysrhythmias

Iatrogenic Drug Errors

Iatrogenic Trauma/Positioning Injury

Inadequate Vascular Access

XI.D.6. Special Techniques and Situations

TAGS:

Non-Operating Room Anesthesia (NORA)

Transition of Patient Care

XI.D.7. Postoperative Period

TAGS:

Management and Diagnosis of Pain, Anxiety and Emergence Agitation

Post-operative Nausea and Vomiting

XI.D.8. Acute and Chronic Pain Management

TAGS:

Enhanced Recovery after Surgery (ERAS)

Opioid Induced Hyperalgesia

Opioid Tolerance

XI.E. Special Problems or Issues

XI.E.1. Professional Issues

TAGS:

Continuous Quality Improvement

Ethical and Legal Obligations of Pediatric Anesthesia Care and Research

Practice-Based Learning and Improvement

Teaching, Supervision, and the Anesthesia Care Team

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

XII. ADULT CARDIAC ANESTHESIOLOGY

XII.A. Foundations of Adult Cardiac Anesthesiology

XII.A.1. Anatomy and Physiology

TAGS:

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

Baroreceptor Function

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

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

XII.B.1. Cardiac Disease

TAGS:

Acquired (e.g., Aortic Sclerosis)
Acute Heart Failure
Acute vs. Chronic Heart Failure
Amyloidosis
Anatomy of the Cardiac Conduction System
Anesthetic Considerations
Anesthetic Management and Goals
Aortic Stenosis/Insufficiency: Risk Factors, Pathophysiology, Pharmacological Management, Interventional Cardiology Management, Surgical Management
Arrhythmia Classification: Atrioventricular Nodal Reentrant Tachycardia, Focal Atrial Tachycardia; Atrial Fibrillation, Atrial Flutter; Supraventricular Tachycardia; Ventricular Tachycardia; Ventricular Fibrillation
Arrhythmogenic Right Ventricular Dysplasia
AV Junction
Benign vs. Malignant 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
 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
 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
 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
 Nuclear Techniques
 Others (e.g., Idiopathic, Peripartum)
 Perioperative Management of the Adult with Congenital Heart Disease: Corrected,
 Uncorrected
 Pharmacological Interventions
 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

XII.C.2

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

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

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
- 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)

Nitrates

Vasodilators

Vasopressors

XII.F. Devices

XII.F.1. Cardiopulmonary Bypass (CPB)

TAGS:

Cardiothoracic Effects

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:

- Coronary Revascularization
- Heart Transplant
- Mechanical Circulatory Support
- Neoplastic
- Pericardial
- Rhythm Disturbances
- Valve Repair and Replacement

XII.G.2 Thoracic Aortic

TAGS:

- Ascending/Arch Aortic Surgery with Circulatory Arrest
- Cerebrospinal Fluid Drainage
- CPB Employing Low Flow and/or Retrograde Cerebral Perfusion
- Descending Aortic Surgery
- Lumbar Drain Indications and Management
- Pharmacologic
- Spinal Cord Protection

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.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
Cost-Conscious 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-Based Health Determinants, Resources to Improve Access
Population Health: Perioperative Surgical Home and Enhanced Recovery
Subspecialization Issues: Pediatrics, Cardiac, Regional, Obstetric Coverage
Understanding Principles of Healthcare Funding and Payment

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