Content Outline

Continuing Certification in Anesthesiology

January 2023
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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
II.A.4. Substance Use Disorder

TAGS:
- Anaphylactoid
- Anaphylaxis
- Idiosyncratic

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

III.A.4. Preoperative Management of Chronic Medications

TAGS:
- Anticoagulants and Antiplatelet Medications
- Antihyperglycemics
- 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:
- Morbid Obesity
- Cardiovascular Disease
- 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

II.B.7. Endocrine and Metabolic Systems
TAGS:
Diabetes
Morbid Obesity
Pheochromocytoma
Thyroid Disease

III.B.8. Neuromuscular Diseases
TAGS:
Muscular Dystrophies
Myasthenia
Myopathies

III.B.9. Special Problems
TAGS:
Allergic Reactions
Chemotherapy
Chronic Alcohol Use
Chronic Immunosuppression
Malignancy
Previous Organ Transplant
Substance Abuse

III.C. Regional Anesthesia

III.C.1. General Topics
TAGS:
Indications and Contraindications
Guidelines and Standards
Local Anesthetic Systemic Toxicity
Nerve Stimulator Guidance
Ultrasound Guidance

III.C.2. Neuraxial
TAGS:
Complications
Epidural Test Dose
Factors Influencing Onset and Duration
Indications and Contraindications
Medications: Local Anesthetics, Opioids, Adjuncts
Types: Caudal, Epidural, Spinal, CSE

III.C.3. Regional Blocks
TAGS:
Anatomy
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
Cuff Pressure Management
Emergency Surgical Airway
Endotracheal Tube Types
Flexible Fiberoptic Bronchoscopy
Indications for Endobronchial Intubation
Indications for Neuromuscular Blockade
Postoperative Considerations
Regional Airway Blocks
Translaryngeal Jet Ventilation

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
Hypertonic Saline
Lactated Ringer’s
Normal Saline
Plasma-Lyte®
III.F.2. Complications
III.F.3. Goal-Directed

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

III.G.1. Types

TAGS:
- Airway Burns
- 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
- Vascular Air Embolism
- Venous Thromboembolism

III.G.2. Prevention and Treatment

TAGS:
- Airway and Nonairway Fire Prevention and Management
- Management of Intraoperative Patient Temperature
- Perioperative Anticoagulation
- Strategies to Minimize Patient Harm

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

TAGS:
- Consequences of Anesthesia
Consequences of Surgery

III.H.4. Cardiovascular Complications in the PACU
TAGS:
Arrhythmias
Hypertension
Hypotension
Myocardial Ischemia

III.H.5. Nausea and Vomiting
TAGS:
Etiology
Multimodal Drug Therapy

III.H.6. Residual Neuromuscular Blockade
TAGS:
Etiology
Prevention
Recognition
Treatment

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
Blood-Brain Barrier
Brain
Cranial Nerves
Peripheral Nerves
Spinal Cord
Vascular Anatomy
Venous Sinuses and Drainage

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
- Head Stabilization in Pins
- Hydrocephalus
- Pituitary Adenomas
- Postural Orthostatic Hypotension Syndrome (POTS)
- Prone and Sitting Positioning: Implications
- Seizures
- Spinal Shock
- Subdural and Epidural Hematomas
- Trans-Sphenoidal Hypophysectomy
- Tumors
- Ventriculostomy

IV.B. Respiratory System

IV.B.1. Anatomy

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

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

**TAGS:**
- Alveolar-Arterial O$_2$ Gradient (A-aDO$_2$)
- Anion Gap
- Apneic Oxygenation
- Arterial-Alveolar CO$_2$ Gradient (A-aDCO$_2$)
- Central and Peripheral Chemoreceptors
- CO$_2$ and O$_2$ Response Curves
- CO$_2$ Production
- Control of Ventilation
Dead Space to Tidal Volume Ratio (Vd/Vt)
Diffusion Hypoxia
Hypoxic Pulmonary Vasoconstriction
Lung Mechanics
Nonrespiratory Functions of Lungs: Immune and Metabolic
Normal Acid-Base Regulation: Buffer Systems
Pleural Pressure Gradient
Surfactant
Systemic Effects of Hypercarbia and Hypocarbia
Systemic Effects of Hypoxia and Hyperoxia
V/Q Mismatch
Work of Breathing

IV.B.3. Pharmacology
TAGS:
Anti-inflammatory Medications
Bronchodilators

IV.B.4. Clinical Science
TAGS:
Acute Respiratory Distress Syndrome (ARDS)
Arterial Blood Gas Interpretation
Abdominal Compartment Syndrome
Asthma
Atelectasis
Barotrauma
Bronchiectasis
Bronchitis
Bronchopleural Fistula
Bronchopulmonary Dysplasia
Bronchospasm: Management
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
Neoplasm
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
    Coronary Circulation
    Innervation
    Major Blood Vessels
    Normal Cardiac Anatomy
    Radiographic Chest Anatomy
    Transesophageal Echocardiography (TEE) Views

IV.C.2. Physiology

    TAGS:
    Baroreceptor Function
    Cardiac Output: Regulation
    Control of Heart Rate
    Coronary Blood Flow Regulation
    Determination of Myocardial Oxygen Demand
    Diastolic Dysfunction
    Normal Intracardiac Pressures
    Mixed Venous Oxygen Tension and Saturation
    Myocardial Contractility
    Myocardial Oxygen Utilization
    Preload and Afterload
    Systemic and Pulmonary Vascular Resistance
    Valve Function
    Vascular Compliance/Venous Capacitance
    Venous Return

IV.C.3. Pharmacology

    TAGS:
    Angiotensin Receptor Blockers
    Angiotensin Converting Enzyme Inhibitors
    Antianginal Drugs
    Antiarrhythmics
    Betablockers
    Calcium Channel Blockers
    Chronotropes
    Digitalis
    Inotropes
    Statins
IV.C.4. Clinical Management of Disease States

**TAGS:**
- Cardiac Ischemia
- Cardiac Tamponade and Constrictive Pericarditis
- Cardiac Valvular Abnormalities
- Cardiogenic Shock
- Carotid Artery Disease
- Heart Failure and Cardiomyopathy
- Hypertrophic Cardiomyopathy
- Intracardiac Defects
- Myocardial Infarction and Acute Coronary Syndrome
- Myocarditis
- Peripheral Vascular Disease
- Pulmonary Embolism
- Pulmonary Hypertension
- Rhythm Disturbances
- Right or Left Ventricular Dysfunction

IV.C.5. Special Considerations in Cardiovascular Anesthesia

**TAGS:**
- Cardiac Ablations
- Cardiac Catheterization
- Cardiac Implantable Electrical Device Management: AICD and Pacemakers
- Left Ventricular Assist Devices
- Perfusion Studies

IV.D. Gastrointestinal/Hepatic Systems

IV.D.1. Anatomy

**TAGS:**
- Arterial Blood Supply (Celiac, Superior and Inferior Mesenteric Arteries)
- Esophageal Diverticuli
- Esophageal Sphincters
- Hepatic Artery Anatomy
- Innervation: Sympathetic, Parasympathetic, and Enteric
- Portal Venous Anatomy
- Segmental Hepatic Anatomy
- Splanchnic Venous Bed

IV.D.2. Physiology

**TAGS:**
- Cytochrome P450 Function and Variants
- Dual Hepatic Blood Supply
- Excretory Functions
- Factors Affecting Splanchnic Blood Volume
- Metabolic and Synthetic Functions
- Portal Hypertension
IV.D.3. Pharmacology

TAGS:
Drug Hepatotoxicity
Neuromuscular Blocking Drugs
Sedative-Hypnotic Drugs

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 Encephalopathy
Hepatic Failure
Hepatorenal Syndrome
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 in Chronic Renal Insufficiency and Renal Failure
Anesthetic Management for Renal Transplantation
Anesthetic Management for Patients on Renal Replacement Therapy
Arteriovenous (AV) Shunts
Perioperative Oliguria and Anuria
Protection of Renal Function in Vascular Surgery and with Radiocontrast Exposure
Risk Factors for Acute Renal Failure

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

TAGS:
Renal Cancer with IVC Tumor Invasion
Transurethral Resection of Prostate (TURP): Complications
Urologic Surgery: Lithotripsy

IV.F. Hematologic System

IV.F.1. Anatomy

IV.F.2. Physiology

TAGS:
Compensatory Mechanisms
Normal Hemostatic Mechanisms

IV.F.3. Pharmacology

TAGS:
Anticoagulants and Antagonists
Antiplatelet Drugs
Blood Substitutes
Coagulation Factor Replacement Therapy
Erythropoietin
Immunosuppressive and Antirejection Drugs
Iron Therapy

IV.F.4. Clinical Science

TAGS:
Alternatives to Transfusion
Anemias
Autologous Blood Donation
Blood Products
Citrate Intoxication
Congenital and Acquired Factor Deficiencies
Disseminated Intravascular Coagulation (DIC)
Fibrinolysis
Hemoglobinopathies
Heparin-Induced Thrombocytopenia (HIT)
Hypothermia: Effects
IgA Deficiency
Infections: Cytomegalovirus (CMV), HIV, Hepatitis
Massive Transfusion: Acquired Coagulopathy
Massive Transfusion Protocol
Porphyrias
Thrombocytopenia and Thrombocytopathy
Transfusion Complications including TACO and TRALI
Transfusion Indications
Transfusion: Infection Risks
Viscoelastic Testing

IV.G. Endocrine and Metabolic Systems

IV.G.1. Anatomy
TAGS:
Endocrine Tumors

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 Disease
Cushing Syndrome
Diabetes Insipidus
Diabetic Ketoacidosis
Diabetes Mellitus
Hyperosmolar Coma
Inappropriate ADH Secretion
Large Thyroid Goiter: Management
Parathyroid Disease: Hyper and Hypoparathyroidism
Pancreas Transplantation
Panhypopituitarism: Substitution Therapy
Pheochromocytoma
Pituitary Disease: Hyper and Hypopituitarism
Primary Aldosteronism
Recurrent Laryngeal Nerve Injury
Thyroid Disease: Hyper and Hypothyroidism
Thyroid Storm Management

IV.G.5. Biochemistry of Normal Body Metabolism
TAGS:
Antidiuretic Hormone
Control of Blood Glucose
Glucagon
Glucocorticoids
Human Growth Hormone
Insulin
Lipoproteins and Triglycerides
Liver Metabolism
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:
Demyelinating Diseases
Myasthenic Syndromes
Primary Muscle 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

V.A.2. Diagnostic Strategies
V.A.3. Treatment of Painful Disease States

TAGS:
- Acupuncture
- Electrical Stimulation
- Methemoglobinemia
- Neuraxial Opioids
- Neurolytic and Non-Neurolytic Blocks
- Other Techniques: TENS
- Patient-Controlled Analgesia
- Peripheral Nerve Blockade and Catheters
- Pharmacologic Therapy
- Spinal and Epidural Analgesia
- Substance Use Disorder
- Sympathetic Nerve Blocks

V.B. Pediatric Anesthesia

V.B.1. Clinical Science

TAGS:
- Artificial Airway Selection
- Behavioral Development
- Infants: Fluid and Glucose Management
- Infants: Respiratory Physiology
- Infants: Thermoregulation
- Malignant Hyperthermia: Susceptibility and Management
- 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
Laryngotraceobronchitis
Myelomeningocele
Obesity
Obstructive Sleep Apnea
Omphalocele and Gastroschisis
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
Cleft Lip and Palate
Congenital Hip Dysplasia
Craniofacial Abnormalities
Difficult Airway Management
Difficulty with IV Access
Jet Ventilation
Laryngoscopy Techniques
Laryngospasm
Laser Implications
Pediatric Regional Anesthetic Techniques
Pediatric Sedation
PONV
Postoperative Pain Management: Codeine
Premedication Techniques
Problems with Intubation and Extubation
Propofol Infusion Syndrome
Strabismus
Stridor
Tonsillectomy and Adenoidectomy
Ureteral Reimplantation

V.C. Obstetric Anesthesia
V.C.1. Clinical Science

TAGS:
Anesthetic Complications
Anesthetic Risks
Coagulation Changes
Combined Spinal/Epidural Technique
Neuraxial Anesthetic Techniques: Epidural, Spinal, 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 Hemorrhage
Antepartum Fetal Therapy
Anticoagulant Therapy
Cardiovascular Disease
Dystocia
Ectopic Pregnancy
Endocrine Disease
Ex-utero Intrapartum Treatment (EXIT)
Fever and Infection
Fetal Malposition
Fetal Malpresentation
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:
Abnormal Placentation
Antepartum Fetal Assessment
Aorto-Caval Compression
Cesarean Delivery: Elective Anesthesia
Cesarean Delivery: Emergency Anesthesia
Cesarean Delivery: Indications
Difficult Airway
Gastroesophageal Sphincter Function
Influence of Anesthetic Technique on Labor
Intrapartum Fetal Monitoring
Intrauterine Fetal Resuscitation
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:
  Fetal Heart Rate Tracing
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
  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
  Choice of Anesthetic
  Effects of Radiation Therapy
  Jet Ventilation
  Ventilation Strategies
V.E. Anesthesia for Plastic Surgery
  V.E.1. Liposuction
  V.E.2. Tumescent: Volume Overload
  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
- Ventilation

V.F.3. Risks

**TAGS:**
- 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:**
- Ambulatory Anesthesia: Preoperative Selection
- Ambulatory Surgery
- ASA Preoperative Testing Guidelines

V.H. Orthopedic Anesthesia

V.H.1. Tourniquet Management

**TAGS:**
- Ischemia
- Nerve Injury
- Reperfusion

V.H.2. Spine Surgery

**TAGS:**
- 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
Pediatric Trauma

V.J. Anesthesia for Ambulatory Surgery

V.J.1. Patient Selection and Preoperative Management

TAGS:
Malignant Hyperthermia
Obesity
Preoperative Selection
Risk Factors for Admission

V.J.2. Anesthetic Management

TAGS:
Ambulatory Regional Anesthesia
Saphenous, Adductor Canal Blocks

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

TAGS:
Discharge Criteria
Continuous Nerve Blocks

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
   Monitored Anesthesia Care
   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
   Metabolic Encephalopathy
   Neuromuscular Pathology
   Spinal Cord Compromise
   Stroke: Ischemic or Hemorrhagic
   Subarachnoid, Epidural Bleed

V.L.2. Cardiac Dysfunction/Failure
   TAGS:
   Cardiac Interventions: Lysis, Catheter, PCI, Pacer
   Cardiogenic Shock
   Congestive Heart Failure
   Device Management
   Dysrhythmias
   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
ECMO
Noninvasive Ventilatory Support
Mechanical Ventilation
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
Canalicular Chronic Hepatic Failure
Hepatocellular
Infectious

V.L.6. Renal Dysfunction/Failure
TAGS:
Acute Kidney Injury
Chronic Kidney Disease
Dialytic Support: CRRT, IHD
End-Stage Renal Disease

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
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:
- Factors Impacting Cerebral Blood Flow
- Factors Impacting Intracranial Pressure
- Factors Impacting Neuronal Function

V.M.2. Pharmacology

TAGS:
- Anesthetics
- Anticonvulsants
- Anti-Parkinsonian Medications
- Diuretics
- Fluid Management
- Steroids
- Vasodilators and Constrictors

V.M.3. Clinical Management of Disease States

TAGS:
- Arteriovenous Malformations
- Brainstem
- Cerebellar Resection: Implications
- Cervical Spine Disease
- Coma
- Hydrocephalus
- Intracranial Aneurysms
- Intracranial Masses
- Intracranial Vascular Lesions
- Moyamoya Disease
- Pituitary Adenomas
- Skull Base Tumors
- Traumatic Brain Injury
V.M.4. Special Considerations in Neuroanesthesia

TAGS:
- Cerebral Blood Flow
- Cerebral Herniation
- Cerebral Ischemia
- Cerebral Vasospasm
- Interventional Radiology
- Intraoperative MRI
- Neurophysiologic Monitoring
- Patient Positioning
- Seizures
- Spinal Drains
- Venous Air Embolism
- Ventriculostomy

V.N. Thoracic Anesthesia

V.N.1. Clinical Science

TAGS:
- Anesthetic Techniques for Thoracic and Pulmonary Surgery
- Anesthetic Techniques for Thoracoscopic Surgery
- Hypoxic Pulmonary Vasoconstriction
- Preoperative Assessment: Lung Resection
- Pulmonary Function Tests (PFTs)
- Risk Stratification and Preoperative Optimization
- Ventilation-Perfusion Matching

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
- Myasthenia Gravis/Myasthenic Syndromes
- Reactive Airways Disease
- Restrictive Pulmonary Disease

V.N.4. Special Considerations in Thoracic Anesthesia

TAGS:
- Esophageal Resection
- Hypoxemia
- Isolated Lung Ventilation
- Jet Ventilation
Lung Resection
Mediastinal Masses
Mediastinoscopy
Pain Management
Pleural Disease
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:
Antiarrythmics
Antiplatelet Agents
Beta-Adrenergic Blockers
Chronotropes
Heparin
Inotropes
Protamine
Statins
Vasodilators and Constrictors

V.O.3. Clinical Management of Disease States

TAGS:
ACLS/BLS
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 Coronary 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
Electrophysiologic Procedures
Extracorporeal Circulation
Heparin-Induced Thrombocytopenia
Pacemaker Function and Application
Thoracoabdominal Aortic Aneurysm
Unintended Intraoperative Awareness
ECMO (VA, VV)

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
Atherosclerosis
Carotid Stenosis
Peripheral Vascular Disease

V.P.4. Special Considerations in Vascular Anesthesia

TAGS:
Anticoagulation and Reversal
Aortic Clamping
Carotid Clamping
Endovascular Surgery
Renal Protection
Thoracoabdominal Aortic Aneurysm
V.Q.1. General Topics

TAGS:
Anticoagulation in Regional Anesthesia
Block Performance Assessment: Competency
Guidelines and Standards
Indications and Contraindications
Informed Consent
Nerve Localization: Nerve Stimulator
Nerve Localization: Paresthesia, Landmark Approaches
Nerve Structural Anatomy
Sedation and Monitoring

V.Q.2. Pharmacology

TAGS:
Epidural Local Anesthetics
Epidural Opioids
Intralipid Therapy
Intrathecal Local Anesthetics
Intrathecal Opioids
Liposomal Bupivacaine
Local Anesthetic Pharmacology
Local Anesthetic Selection
Markers of Vascular Injection
Minimal Local Anesthetic Volume and Concentration
Perineural Adjuncts

V.Q.3. Neuraxial Anesthesia

TAGS:
Caudal Anesthesia
Combined Spinal Epidural Anesthesia
Complications
Enhanced Recovery After Surgery (ERAS)
Epidural Anesthesia
Epidural Blood Patch
Epidural Space and Spine Anatomy and Sonoanatomy
Factors Influencing Onset and Duration
Indications and Contraindications
Infusion Settings
Medications: Local Anesthetics, Opioids, Adjuncts
Patient-Controlled Epidural Analgesia
Subarachnoid Block

V.Q.4. Upper Extremity Regional Anesthesia

TAGS:
Brachial Plexus Anatomy and Sonoanatomy
Cervical Plexus Blocks: Superficial, Deep
Major Brachial Plexus Blocks: Interscalene, Supraclavicular, Infraclavicular, Axillary
Minor Brachial Plexus Blocks: Suprascapular, Axillary Nerve, Median, Radial, Ulnar

V.Q.5. Lower Extremity Regional Anesthesia
TAGS:
Ankle Block
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:
Epidural Hematoma
Falls
Infection: Epidural 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:
Factors Influencing Onset and Duration
Image Generation and Display
Medications: Local Anesthetics, Opioids, Adjuncts
Needle and Probe Alignment
Ultrasound Artifacts
Ultrasound Physics

V.Q.9. Continuous Anesthesia
TAGS:
Ambulatory Regional Anesthesia
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
Complimentary 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-Induced Hyperalgesia
Opioid Tolerance
Oral Therapy
Parenteral Therapy
Patient-Controlled Analgesia
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

VI.C. Radiologic Procedures
   VI.C.1. CT Scan
      TAGS:
      Intravenous Contrast
   VI.C.2. MRI: Anesthetic Implications/Management
      TAGS:
      Magnet Safety
      Monitoring
   VI.C.3. Anesthesia in Locations Outside the Operating Room
      TAGS:
      Airway Management
      Anesthetic Management
      Monitoring Requirements
      Radiation Therapy
VI.D. Physician Impairment or Disability
  VI.D.1. Substance Abuse
  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.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
  VI.E.3. Informed Consent
    TAGS:
    Components
    Principles
  VI.E.4. Malpractice
    TAGS:
    Anesthetic Accidents
    Closed Claims Findings
    Definition
    Expert Testimony
    Legal Actions and Consequences
    National Practitioner Database
    Professional Liability Insurance
  VI.E.5. Practice Management
    TAGS:
    Health Insurance Portability and Accountability Act (HIPAA)
    Medicare/Medicaid Requirements
    Patient Privacy Issues
  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:
    Approaches to Reducing Disparities (Race and Ethnicity, Gender, Sexual Identity and Orientation, Disability Status, Geographic Location)
    Cultural Competency
Determinants of Disparities, Including Systemic Racism
Effects of Disparities on Access to and Quality of Care
Effects of Disparities on 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
Gender Equity in the Workplace
Rationale for DEI in Healthcare
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 Technology
Systems Thinking and the Effect of the System on Patient Safety

VIII. OVERVIEW OF ANESTHESIOLOGY TOPICS

VIII.A. Review of Current Topics in Anesthesiology

IX. CRITICAL CARE MEDICINE

IX.A. Basic Pathophysiology

IX.A.1. Central Nervous System

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

IX.A.2. Cardiovascular

TAGS:
Aneurysm, Abdominal
Aneurysms, 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
Distributive
DVT
Eisenmenger Syndrome
Endocarditis
Heart Block
Hypertension
Hypertrophic Cardiomyopathy (HOCM, ASH, IHSS)
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
Pericardial
Pericarditis
Peripheral Vascular Disease
Pulmonary Hypertension
Pulmonary Valve
Pulmonic Insufficiency
Pulmonic Stenosis
Pulseless Electrical Activity (PEA)
Rhythm Disturbances
Right Ventricular
Shock States
Structural
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
Airway Disruption
ARDS
Aspiration
Bronchopleural Fistula
Central
Chest Trauma
Community-acquired
Embolic Disorders
Empyema/Abscess
Healthcare Associated
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
TRALI
Ventilator-associated

IX.A.4. Renal
TAGS:
Acute Kidney Injury
Infection
Intrinsic Renal
Post-Renal
Pre-Renal
Renal Tubular Acidosis

IX.A.5. Hematologic/Oncologic
TAGS:
Acquired
Anemia
Bone Marrow/Stem Cell Transplantation
Carboxyhemoglobin
Coagulopathies
Congenital
DIC
Fibrinolysis
Hemoglobin Abnormalities
Isolated Factor Abnormalities
Leukemia, Lymphoma
Methemoglobin
Other Hemoglobinopathies
Polycythemia
Platelet Abnormalities
Thrombocytopenia
Thrombocytosis
Tumor Lysis Syndrome
Vitamin K Dependent Coagulopathy
White Blood Cell Disorder

IX.A.6. Obstetric
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 (NKHC)
- 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)
- GI Hemorrhage
- GI Motility Dysfunction
- Hepatic
- Hepatic Dysfunction/Failure (Acute and Chronic)
- Hepatic Encephalopathy
- Hepatitis
- Hepatocellular Carcinoma
- Hepatorenal Syndrome
- Ileus
- Infectious
- Lower
- Malabsorption
Pancreas
Pancreatic Cancer
Pancreatitis
Perforation, Volvulus
Pseudomembranous Colitis
Stomach
Toxic Megacolon
Upper
Vascular Diseases

IX.A.9. Dermatologic

**TAGS:**
- Allergic Reactions
- Cellulitis
- Disruption of the Skin Barrier
- Infection
- Inflammatory Diseases of the Skin
- Necrotizing Fasciitis
- Stevens Johnson Syndrome

IX.A.10. Immunologic/Infectious Disease

**TAGS:**
- Acquired
- Autoimmune
- Congenital
- Graft vs. Host Disease
- HIV/AIDS
- Immune Suppression
- Mixed Connective Tissue Disease
- RA
- Sepsis
- SIRS
- SLE
- 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
Demyelinating
Diagnoses
Diagnostic Modalities
EEG, Processed EEG
Embolic/Thrombotic
Encephalitis
Evoked Potential
Guillain-Barré Syndrome
Hallucinations
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
Nerve Conduction Studies/EMG
Neuromuscular Disorders
Neuroprotectants
Nuclear Medicine Studies
Other Imaging
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:
- Acquired ASD, VSD
- AICDs
- Aneurysm, Abdominal
- Aneurysms, Thoracic
- Anticoagulants and Antithrombotics
- Antidysrhythmics
- Antifibrinolytics
- Antihypertensives
- Antimicrobials
- Antiplatelet Agents
- Aortic
- 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
- CT, MRI
- CVP
- Diagnoses
- Diagnostic Modalities
- Diastolic Dysfunction
- Dissections
- Distributive
- ECG
- ECMO
- Eisenmenger Syndrome
- Endocarditis
External Defibrillators
Heart Block
Hemodynamic Monitoring
Heparin
Heparinoids
Hypertension
Hypertrophic Cardiomyopathy (HOCM, ASH, IHSS)
Hypovolemic
Imaging
Infectious
Inotropes/Chronotropes/Lusitropes
Insufficiency
Interventional Imaging
Intraaortic Balloon Pump
Junctional or Nodal Rhythm
Left or Right Ventricular Assist Device
Left Ventricular
LMWH
Management Strategies
Mitral
Myocardial Function/Dysfunction
Myocarditis
Non-infectious Myocarditis
Nuclear Imaging
Obstructive
Other Bedside Ultrasound
Other Conduction Abnormalities
Other Myocardial
Pacemakers/Defibrillators
Papillary Muscle Dysfunction
Pericardial
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
Structural
Stunned Myocardium
Supraventricular Tachyarrhythmias, Other
Systemic Hypertension
Systemic Oxygen Supply and Demand
Systolic Dysfunction
Tamponade
Tetralogy of Fallot
Thrombin Inhibitors
Thrombolytics
Transthoracic
Transvenous/Epicardial
Traumatic
Tricuspid Valve Disease
Unfractionated
Valvular
Vasoactive or Modulating Drugs
Vasoconstrictors
Vasodilators
Ventricular Tachycardia/Fibrillation
Warfarin

IX.B.3. Pulmonary

**TAGS:**
Air
Airway Diseases
Airway Disruption
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
Fat
Healthcare Associated
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
PC/Volume Control
Pleural Drainage and Evacuation
Pleural Effusion
Pneumonia
Positioning
Pressure-Support Ventilation
Pulmonary Function Studies/Pulmonary Mechanics
Pulmonary Medications
Pulse Oximetry
Reactive
Respiratory Failure
Restrictive
SIMV
Sleep Studies
Spontaneous Breathing Trials
Thoracentesis
Thromboembolic
Tracheobronchitis
TRALI
Ultrasound
Vaccination (Pneumovax)
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
Diagnoses
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
Peritoneal Dialysis
Pharmacologic Therapies
Post-Renal
Pre-Renal
Renal Biopsy
Renal Failure
Renal Replacement Therapies
Renal Transplantation
Renal Trauma
Renal Tubular Acidosis
Ultrasound

IX.B.5. Hematologic/Oncologic

**TAGS:**
Acquired
Anemia
Anticoagulants
Antiplatelet Agents
Bone Marrow Biopsy, Culture
Bone Marrow/Stem Cell Transplantation, Rejection, Complications
Carboxyhemoglobin
Coagulation Studies
Coagulopathies
Congenital
Diagnoses
Diagnostic Modalities
DIC
Erythropoietin, GCSF
Fibrinolysis
Hemoglobin Abnormalities
Heparin
Heparinoids
Hypercoagulable State
Isolated Factor Abnormalities
IVC Filters, Other Mechanical Devices
Leukemia, Lymphoma
LMWH
Management Strategies
Methemoglobin
Other Hemoglobinopathies
Plasmapheresis/Plasma Exchange
Platelet Abnormalities
Polycythemia
Reversal Agents
Routine Blood Studies
Thrombin Inhibitors
Thrombocytopenia (Including HIT)
Thrombocytosis
Thrombolytics
Transfusion and Factor Replacement
Tumor Lysis Syndrome
Unfractionated
Vitamin K Dependent
Warfarin
White Blood Cell Disorder

IX.B.6. Obstetric

TAGS:
Anticoagulants
Anticonvulsants
Antihypertensive therapy
Antimicrobials
Cardiotocography
Coagulopathy, Bleeding Disorders
Delivery
Diagnoses
Diagnostic Modalities
Emboli (Amniotic Fluid, Thromboemboli, Other)
Laboratory Studies (Serum, Urine)
Liver Function Abnormalities
Management Strategies
Peripartum Infection
Pre-Eclampsia/Eclampsia
Ultrasound

IX.B.7. Endocrine
IX.B.8. Gastrointestinal

TAGS:
Abdominal Compartment Syndrome
Abdominal Pressure Measurement
Additional Relevant Studies
Antimicrobials
Assessment of Bowel Motility
Blood Product Selection and Administration
Bowel Disorders
Coagulation Parameters
CT
Diagnoses
Diagnostic Modalities
Diuretics, Renal Replacement Therapies
IX.B.9. Dermatologic

TAGS:
- Allergic Reactions
- Antimicrobials, Antihistamines
- Biopsy (with Culture and Appropriate Stains)
- CBC with Differential
- Cellulitis
- Diagnoses
- Diagnostic Modalities
- Disruption of the Skin Barrier
- Immunologic Studies
- Infection
- Inflammatory Diseases of the Skin
- Laboratory Studies
- Management Strategies
- Medication Review
- Necrotizing Fasciitis
- Other Immunotherapies
- Other Topical Medications
- Pharmacologic
- Sedimentation Rate
- Steroids, Systemic and Topical
- Stevens Johnson Syndrome
- Wound Care (Surgical and Other)

IX.B.10. Immune/Infectious Disease

TAGS:
- Acquired
- Antimicrobials (Including Prophylaxis)
- Autoimmune
- Biomarkers
- Biopsy, Selective Aspiration
- Congenital
- Cultures
- Diagnoses
- Diagnostic Modalities
- Graft vs. Host Disease
- HAART
- HIV/AIDS
- Immune Suppression
- Immunologic Studies
- Laboratory Studies
- Management Strategies
- Mixed Connective Tissue Disease
Neutropenia
Pharmacologic
RA
Routine (CBC, etc.)
Sepsis
Serologies
SIRS
SLE
Steroids
Vasculitides

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

TAGS:
- Acid-base Abnormalities
- Albumin
- Appropriate Renal and Endocrine Strategies
- Arterial Blood Gas
- Calcium
- Chloride
- Diagnoses
- Diagnostic Modalities
- Electrolyte Abnormalities
- Electrolyte Replacement as Appropriate
- Electrolytes, Osmolarity, and Specific Gravity (Serum, Urine)
- Laboratory Studies
- Magnesium
- Management Strategies
- Metabolic
- Mixed
- Phosphorus
- Potassium
- Respiratory
- Selective Imaging
- 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
ROC
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
Other Therapies (Hyperbaric, Pharmacologic, Surgical)

IX.C.3. Disaster Management
TAGS:
Biologic, Chemical, and Nuclear Exposures
Epidemic

IX.C.4. Drowning, Fatal, Near-drowning
TAGS:
Fresh Water
Salt Water

IX.C.5. ICU Ethics
TAGS:
Brain Death
End-of-Life, Futility
Impaired Providers
Informed Consent
Living Will/DPOA/Healthcare Surrogate
Organ Donation
Palliative Care, Hospice
Patient Autonomy

IX.C.6. ICU Management and Organization
TAGS:
Clinical Care Bundles
Compliance
Daily Wake-Up Test
Handover/Communication
HIPAA (Privacy and Security)
ICU Transport
Outcome and Performance Measures (HCAPS)
QA/QI (Patient Safety)
Regulatory Requirements
Scoring Systems
Sedation/Analgesia/Delirium Assessment
Triage and Resource Utilization

IX.C.7. Infection Control
TAGS:
- Blood and Body Fluid Exposure
- Catheter Associated Infections
- Environmental Exposures
- General/Universal Precautions
- Isolation Techniques
- Nosocomial Infections
- Pneumonia (Ventilator Associated, Hospital Associated, Etc.)
- Preparation Techniques
- Reverse Isolation
- Specific Isolation Procedures
- 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
- Re-feeding 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 and Pharmacodynamics and Drug Metabolism
Prophylactic Antimicrobials
Sedatives/Hypnotics
Spirochetal and Rickettsial
SSRIs
TB
Tricyclic Antidepressants

IX.C.12. Poisonings, Toxic Ingestion, Overdoses, and Withdrawal

IX.C.13. Procedures

TAGS:
Airway
Arterial
Chest Tubes
Complications
Indications, Application
Interpretation
Intraosseous
LMA/Others
Monitoring Techniques and Troubleshooting
Physics of Ultrasound
Tracheostomy
Ultrasound
Vascular Access
Venous

IX.C.14. Thermoregulation

TAGS:
Environmental
Fever
Heat Stroke
Hyperthermia
Hypothermia
Malignant Hyperthermia
Neuroleptic Malignant Syndrome
Therapeutic

X. PAIN MEDICINE

X.A. General

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

TAGS:
Peripheral Mechanisms
Central Mechanisms: Spinal and Medullary Dorsal Horns
Central Mechanisms: Segmental and Brain Stem
Central Mechanisms: Thalamocortical

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

TAGS:
Central and Peripheral Sensitization: Mechanisms and Implications for Treatment of Pain
Neurotransmitters Involved in Pain Modulation
Peripheral Mechanisms of Pain Transmission and Modulation
Synaptic Transmission of Pain in the Dorsal Horn

X.A.3. Designing, Reporting, and Interpreting Clinical Research Studies about Treatments for Pain: Evidence-Based Medicine

TAGS:
Cohort Studies: Use to Determine Natural History and Predictors of Outcome
Components of Clinical Trials
Critical Analysis of Literature and Evidence-Based Medicine: Basic Concepts
Effects of Analysis on the Clinical Applicability of Study Results
Ethical Standards of Research Design, Review and Implementation, Informed Consent
Principles of Valid Clinical Research
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
Special Features of Study of Pain
Use of Data from Epidemiologic Studies of Pain
Use of Risk Factors to Guide Treatment

X.A.4. Ethical Standards in Pain Management

TAGS:
Boundary Issues (e.g., Inappropriate Prescribing, Overfamiliarity with Patients)
Documentation Including Appropriate Coding and Billing
Ethics of Pain Management
Informed Consent
Professionalism
Quality Assurance
Managing Difficult and Disruptive Patients, Including Safety in the Workplace

X.A.5. Factors Complicating the Treatment Chronic Pain

TAGS:
Obesity
Sleep Disorders
Tobacco Use and Abuse

X.B. Assessment and Psychology of Pain

X.B.1. Assessment and Psychology of Pain

TAGS:
Direct Pain Measurement: Self-Report
Indirect Pain Measurement: Observations
Introspection and Measurement of Subjective Experience: Basic Concepts
Outcome Measures in Clinical Studies: Basic Issues
Outcomes Measures in Studies of the Impact of Pain: Requirements
Pain as a Subjective, Multidimensional Experience

X.B.2. Placebo and Pain
X.B.3. Clinical Nerve Function Studies and Imaging

TAGS:
- EEG, MEG: Uses
- Electrical Nerve Stimulation EMG/NCV/Evoked Potentials): Uses and Limitations
- MRI, FMRI, and MR Spectroscopy: Uses
- PET Scans: Uses
- Quantitative Sensory Testing: Uses and Limitations
- Skin Punch Biopsy: Assessment of Innervation Density

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 Disability, Treatment Outcome, Maintenance of Treatment Effects
- Individual Differences in Affective, Cognitive, and Behavioral Responses to Pain
- Pain as a Biopsychological Experience: Definition and Measurement
- Role of Care Givers in Promoting Illness and Well Behavior

X.B.5. Sex, Gender and Race Issues in Pain

TAGS:
- Analgesic Response: Differences Between Sexes and Within the Same Sex (e.g., Child Bearing)
- Definition of Sex and Gender
- Sex Differences: Biologic and Psychosocial Contributions to Pain Response
- 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.C. Treatment of Pain: Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, and Indications/Contraindications

X.C.1. Opioids

TAGS:
- Differential Response, Opioid-Induced Hyperalgesia
- Federal Regulations Regarding Prescribing of Controlled Substances
- Opioid Metabolism, Genetic Variability
- Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, and Indications/Contraindications
- Pharmacology of Buprenorphine and Methadone
- Pharmacology of Pain Transmission and Modulation
- Risk Assessment and Management of the Patient on Chronic Opioid Therapy

TAGS:
Adverse Effects
Drug Interactions
Indications/Contraindications
Pharmacodynamics
Pharmacokinetics

X.C.3. Antidepressants and Anticonvulsants

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


TAGS:
Analeptic Drugs
Antihistamines
Benzodiazepines
Cannabinoids
Corticosteroids
Local Anesthetics and Membrane-Stabilizing Drugs
Muscle Relaxants and Antispasticity Drugs
Neuroleptic Drugs
NMDA Antagonists
Sympatholytic Drugs

X.D. Treatment of Pain: Other Methods

X.D.1. Psychological Treatments (Cognitive-Behavioral and Behavioral Interventions)

TAGS:
Cognitive and Behavioral Strategies: Application to Specific Pain Syndromes (e.g., TMJ Pain, Neck and Back Pain, Fibromyalgia, Arthritis Pain, Burn Pain, Postoperative Pain)
Integration of Approaches: Cognitive Behavioral Treatments, Combined Behavioral and Drug Treatments; Economic Benefits of Integrating Treatment

X.D.2. Psychiatric Treatment

TAGS:
Anger in Chronic Pain Patients and Relation to Perceived Pain
Differential Diagnosis of Anxiety Disorders That May Augment Pain and Suffering
Opioids in Chronic Noncancer Pain: Use in Persons with Substance Use Disorders; Addiction Vs Pharmacological Tolerance; Withdrawal Symptoms; Role of Buprenorphine
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)
Psychiatric and Psychological Factors That Impact Treatment Adherence and the Therapeutic Alliance with Treatment Providers (e.g., Psychological Factors Affecting Other Medical Conditions)

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.D.3. Stimulation-Produced Analgesia**

**TAGS:**
Clinical Applications and Efficacy
Indications, Risks, Associated Complications
Postulated Mechanisms
Stimulation Techniques (TENS, Vibration, Peripheral Nerve Stimulation, Spinal Cord Stimulation)

**X.D.4. Interventional Pain Management Including Nerve Blocks and Lesioning**

**TAGS:**
Anatomy
Image Guided Injection Techniques (e.g., Ultrasound, Fluoroscopy, CT)
Intrathecal Drug Delivery: Indications, Risks, Associated Complications
Joint, Bursa, Soft Tissue Injections: Clinical Indications, Risks, Associated Complications
Neural Block: Indications, Risks, Associated Complications
Neurolytic Blocks: Indications, Risks, Associated Complications
Peripheral Nerve Blocks: Clinical Indications, Risks, Associated Complications
Pharmacology and Use of Drugs
Radiofrequency Treatment: Indications, Risks, Associated Complications
Sympathetic Nerve Blocks: Clinical Indications, Risks, Associated Complications

**X.D.5. Physical Medicine and Rehabilitation**

**TAGS:**
Casting and Splinting
Exercise Therapy
Manipulation, Mobilization, Massage, Traction
Other-Treatment of Pain (Methods): Physical Medicine and Rehabilitation
Temperature Modalities (e.g., Heat, Cold, Ultrasound)

**X.D.6. 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
Psychosocial Factors as the Main Determinants of Disability and as Predictors of Prolonged Work Absence

Work Rehabilitation

X.D.7. Complementary Therapies (CAM)

TAGS:
Alternative Medical Systems (e.g., Traditional Eastern Medicine, Homeopathy, Acupuncture, Acupressure)
Biologically Based Therapies (e.g., Herbs, Foods, Vitamins)
Energy Therapy
Evidence Base
Implications, Costs and Side Effects (Including Drug Interactions)
Manipulative Methods (e.g., Osteopathy, Chiropractic)
Mind-Body Interventions (e.g., Yoga, Mindfulness, Meditation, Tai Chi)
Prevalence and Patient Reasons for Use

X.E. Tissue Pain

X.E.1. Acute Pain

TAGS:
Clinical Outcomes to Be Evaluated in an Organized Approach to Acute Pain Management
Employing Multimodal Analgesia for Optimal Perioperative Pain Management: Formulation Based On Type and Cause of Pain, Patient Preference, Physical and Mental Status, and Available Expertise and Technology
Epidemiology of Inadequate Control of Acute Pain
Nonpharmacologic Treatment
Perioperative Management of the Patient with Chronic Pain
Pharmacologic Properties of Major Classes of Drugs Used for Acute Pain Management
Physiologic and Psychologic Effects: Identification and Control
Treatment of Acute Pain in the Opioid Tolerant Patient
Treatment of Nonsurgical Pain (e.g., Burns, Sickle Cell Disease)

X.E.2. Cancer Pain

TAGS:
Analgesic Approach; Indications, Pharmacologic Properties, Therapeutic Guidelines, Adverse Effects of Opioids and Other-Analgesics, Including Drugs for Neuropathic Pain
Anesthetic Approaches: Indications, Risks, Practical Implications
Comprehensive Evaluation of Patients with Cancer Pain: Needs and Approach
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
Palliative Care: Definition and Scope; Frequency of Pain and Multiple Sites of Pain, Barriers to Treatment, Importance of Development of Evidence-Based Practice in the Management of Cancer Pain

Physical Therapy: Usefulness

Principles of Treatment, Including Treatment of Underlying Disease, Analgesic Pharmacotherapy; Integration of Other-Modalities (e.g., Physical, Psychological, and Anesthetic)

Psychological Approaches: Usefulness

Surgical and Interventional Approaches: Indications, Risks, Practical Implications

Treatment of Persistent Pain in Cancer Survivors

X.E.3. Cervical Spinal Pain

TAGS:

Anatomy

Causes and Differentiation from Neck Pain and Somatic Nerve Pain

Electrodiagnostic Studies: Reliability and Validity

Evidence for Commonly Used Treatments

History Taking and Neurologic Examination: Role and Limitations

Injection Therapy: Indications, Use, and Complications

Medical Imaging: Reliability and Validity

Natural History and Relevance to Management, Including Whiplash Injury

Nonsurgical Intervention: Evidence for Efficacy of Reassurance, Maintaining Activity, and Exercises

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

X.E.4. Lumbar Spinal Pain

TAGS:

Anatomy

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

Electrodiagnostic Studies: Reliability and Validity

Etiologic and Prognostic Risk Factors: Differences, Clinical Significance, and Use

History Taking: Significance and Use

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

Invasive Tests (e.g., Diagnostic Joint Blocks, Diskography): Use

Medical Imaging: Reliability and Validity

Multidisciplinary Therapy: Use and Limitations

Natural History

Nonsurgical Intervention: Evidence for Efficacy of Reassurance, Maintaining Activity, and Exercises

Physical Examination

Psychosocial and Occupational Factors Related to Low Back Pain and Chronicity

Surgical Treatment, Including Indications for Urgent Surgical Referral

X.E.5. 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
Diagnostic Labels for Muscle Pain: Myalgia, Nonskeletal Musculoskeletal Pain, Chronic Regional Pain, Regional Soft-Tissue Pain, Myofascial Pain, Fibromyalgia, Spasticity, and Myopathies
Epidemiology
Mediators of Inflammation, Tissue Destruction, and Repair
Treatment and Rehabilitation of Musculoskeletal Pain/Disability

X.F. Visceral Pain

X.F.1. Chronic Abdominal Pain

TAGS:
Anatomy: Organization of Peripheral and Central Visceral Innervation, Properties of Visceral Nociceptors, and Mechanisms of Visceral Nociceptor Sensitization
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
Psychological Principles in Clinical Assessment, Explanation, and Treatment

X.F.2. Chronic Pelvic Pain

TAGS:
Anatomy
Epidemiology
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
Psychological Principles in Clinical Assessment, Explanation, and Treatment

X.G. Headache and Facial Pain

X.G.1. Headache

TAGS:
Anatomy and Physiology
Diagnosis and Management of Post Dural Puncture Headache
Headache: Indications for Further Investigation of Headache
Internationally Accepted Diagnostic Criteria for Classification of Headache Disorders
Major Hypotheses about Mechanisms
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
Systematic Case History, Use of Headache Diary, Selection of Appropriate Examination Based on History

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

TAGS:
- Anatomic, Physiologic, Psychosocial Aspects
- Evidence-Based Treatment Options
- History Taking, Physical Examination, and Diagnostic Studies

X.H. Neuropathic Pain

X.H.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
- Pathologic Mechanisms in Nervous System Diagnostic Studies: Clinical, Electrodiagnostic, Laboratory, and Radiographic Findings
- Definition
- Epidemiology
- Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative

X.H.2. 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
- Diagnostic Studies: Clinical, Electrodiagnostic, and Radiographic Findings
- Epidemiology
- Pathologic Mechanisms in Nervous System
- Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative

X.H.3. Complex Regional Pain Syndromes

TAGS:
- Definition
- Diagnostic Studies
- Epidemiology
- Pathophysiologic Mechanisms
- Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative

X.I. Special Cases

X.I.1. Pain in Children and Adolescents

TAGS:
- Acute and Chronic Pain in Children and Adolescents: Special Considerations in Management/Palliative Care
- Ethics of Treatment of Pain 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.I.2. Pain in Older Adults

TAGS:
Access to Care
Age-Related Changes in Pharmacology (e.g. Drug-Drug Interactions, Clearance, Coexisting Disease)
Epidemiology
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: Limitations

X.I.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.I.4. Pain Relief in Persons with Substance Use Disorders

TAGS:
Acute Pain Management of Patients with Substance Use Disorder
Biopharmacologic and Neurophysiologic Basis of Addiction
Interactions between Substance Use Disorder and Pain
Interpretation of Drug Toxicology Testing
Legal and Regulatory Issues When Prescribing Controlled Substances to Patients with Pain and Substance Use Disorder
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
Screening and Referral for Substance Use Disorder in Patients with Pain

X.I.5. Chronic Pain in Pregnancy and Lactation

TAGS:
Causes of Pain during Pregnancy
Management of Opioids during Pregnancy Including Neonatal Abstinence
Pharmacologic Management of Pain in Pregnancy and Lactation
Principles of Pain Management in Pregnancy

XI. PEDIATRIC ANESTHESIOLOGY

XI.A. Basic Science

XI.A.1. Anatomy
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
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

TAGS:
- Cleft Repairs
- Clinical Science
- Mandibular Repairs
- Vascular Malformations

XI.C.5. Ophthalmology

TAGS:
- Clinical Science
- General Considerations
- Pharmacology of Ophthalmologic Medications
- Strabismus Repair
- Trauma

XI.C.6. Orthopedic Surgery

TAGS:
- Anterior, Posterior, and Combined Spine Fusion
- Clinical Science

XI.C.7. Trauma and Burns

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

XI.C.8. Nutritional Support in the PICU

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

XI.C.9. Liver Dysfunction

TAGS:
- Biochemical Guidance of Liver Injury
- Coagulopathy
Hepatic Encephalopathy
Hepatorenal Syndrome
Hyperdynamic Circulatory Failure
Liver Transplantation
Pediatric Acute Liver Failure (PALF)
Rapidly Progressive Multisystem Organ Failure
Systemic Inflammatory Response Syndrome (SIRS)

XI.C.10. Acute Kidney Injury

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

XI.C.11. Transfusion Practices

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

XI.D. Clinical Science of Anesthesia

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

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

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

**TAGS:**
- Fluid, Electrolyte, and Glycemic Management
- Thermoregulation
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
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
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
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, Nonmalfeasance
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 Abuse
The Health Insurance Portability and Accountability Act (HIPAA)
Understanding Laws Related to Controlled Substances, Including Opioids and Cannabinoids