Content Outline

Continuing Certification in Anesthesiology

January 2024
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I. FUNDAMENTAL TOPICS IN ANESTHESIOLOGY

I.A. Anesthesia Machines and Breathing Systems
   I.A.1. Components
       TAGS:
       Circuit Types
       CO$_2$ 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
       FiO$_2$
       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
Neuropysihologic Monitors
Point-of-Care Ultrasound
Stroke Volume Assessment
TEE
TTE
I.C.3. Intraoperative Blood Monitoring
    TAGS:
    Arterial Blood Gas
    Coagulation
    Glucose
    Point-of-Care Laboratory Testing
I.D. Electrical and Fire Safety
    I.D.1. National Fire Protection Association (NFPA) Standards
    I.D.2. Fire and Explosion Hazards
        TAGS:
        Fuels
        Oxidizers
        Sources of Ignition
    I.D.3. Electrical Safety Systems
        TAGS:
        Isolated and Grounded Power Systems
        Line Isolation Monitors
    I.D.4. Electrical Hazards
        TAGS:
        Electrosurgery and Safety (Macro- and Microshock)

II. PHARMACOLOGY
    II.A. General Concepts
        II.A.1. Pharmacogenetics
            TAGS:
            Butyrylcholinesterase (Pseudocholinesterase) Deficiency
            Genetic Factors in Drug Dose-Response Relationships
            Malignant Hyperthermia (MH)
            Polymorphisms of Drug Metabolism
        II.A.2. Drug Interactions
            TAGS:
            Drug-Drug Binding
            Enzyme Induction
            Enzyme Inhibition
            Perioperative Implications of Alternative and Herbal Medicines
            Synergistic Drug Interactions
        II.A.3. Drug Reactions
TAGS:
Anaphylactoid
Anaphylaxis
Idiosyncratic

II.A.4. Substance Use Disorder
TAGS:
Anesthetic Implications
Pharmacologic Mechanisms
Physiologic Effects

II.A.5. Agonists and Antagonists

II.B. Anesthetic Gases and Vapors
   II.B.1. Indications and Contraindications
   II.B.2. Pharmacokinetics
       TAGS:
           Delivery Systems: Vaporizers
           Metabolism and Excretion
           Uptake and Distribution
   II.B.3. Pharmacodynamics
       TAGS:
           Effects on Central Nervous System
           Effects on Circulation
           Effects on Other Organs
           Effects on Ventilation
   II.B.4. Drug Interactions
   II.B.5. Side Effects and Toxicity
       TAGS:
           Atmospheric Waste

II.C. Intravenous Anesthetics: Opioid and Non-Opioid
   II.C.1. Indications and Contraindications
   II.C.2. Pharmacokinetics
       TAGS:
           Distribution and Redistribution
           Metabolism and Excretion
   II.C.3. Pharmacodynamics
       TAGS:
           Effects on Circulation
           Effects on Other Organs
           Effects on the Central Nervous System
           Effects on Ventilation
   II.C.4. Drug Interactions
   II.C.5. Side Effects and Toxicity
       TAGS:
           Shivering

II.D. Local Anesthetics
   II.D.1. Indications and Contraindications
II.D.2. Pharmacokinetics
    TAGS:
    Metabolism and Excretion
    Uptake and Distribution
II.D.3. Pharmacodynamics
    TAGS:
    Effects on Circulation
    Effects on Other Organs
    Effects on the Central Nervous System
    Effects on Ventilation
II.D.4. Drug Interactions
II.D.5. Side Effects and Toxicity
    TAGS:
    Local Anesthetic Systemic Toxicity
II.E. Neuromuscular Blocking Agents: Depolarizing and Non-Depolarizing
    II.E.1. Indications and Contraindications
    II.E.2. Pharmacokinetics
        TAGS:
        Distribution and Redistribution
        Metabolism and Excretion
        Prolongation of Action
    II.E.3. Pharmacodynamics
        TAGS:
        Differential Effects on Muscle Groups
        Effects on Neuromuscular Transmission
    II.E.4. Drug Interactions
    II.E.5. Side Effects and Toxicity
        TAGS:
        Anaphylaxis
        Critical Illness Myopathy
    II.E.6. Reversal of Blockade
        TAGS:
        Antagonism
        Chelation

III. CLINICAL SCIENCES: ANESTHESIA PROCEDURES, METHODS AND TECHNIQUES
    III.A. Patient Evaluation and Preoperative Preparation
        III.A.1. History and Physical Examination
        III.A.2. Airway Evaluation
            TAGS:
            Predictors of Difficult Laryngoscopy and Intubation
            Predictors of Difficult Mask Ventilation
    III.A.3. Standards and Guidelines
        TAGS:
        ACC/AHA Guidelines on Perioperative Cardiovascular Evaluation
        ASA Physical Status Classification
Indications for Preoperative Testing
Preoperative Fasting Guidelines

III.A.4. Preoperative Management of Chronic Medications
TAGS:
- Anticoagulants and Antiplatelet Medications
- Antihyperglycemics
- Cannabinoids
- Cardiovascular Medications
- Central Nervous System Medications

III.A.5. Premedication
TAGS:
- Antibiotics
- Anxiolysis
- Aspiration Prophylaxis
- PONV Prophylaxis

III.A.6. Patients with Specific Disease States
TAGS:
- Cardiovascular Disease
- Morbid Obesity
- Pulmonary Disease

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

III.B.1. Central and Peripheral Nervous System
TAGS:
- Chronic Pain States
- Dementia
- Multiple Sclerosis
- Parkinson
- Spinal Cord Injury

III.B.2. Respiratory System
TAGS:
- Asthma
- COPD
- Sleep Apnea
- Smoking

III.B.3. Cardiovascular System
TAGS:
- Coronary Artery Disease/Stents
- Heart Failure
- Pacemakers/Defibrillators
- Valvular Disease

III.B.4. Gastrointestinal/Hepatic Systems
TAGS:
- Eating Disorders
- GERD
- Liver Failure
III.B.5. Renal and Urinary Systems
  TAGS:
  End-Stage Renal Disease and Dialysis

III.B.6. Hematologic System
  TAGS:
  Anemia
  Coagulopathies
  Sickle Cell

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

III.B.8. Neuromuscular Diseases
  TAGS:
  Muscular Dystrophies
  Myasthenic Syndromes
  Myopathies

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

III.C. Regional Anesthesia

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

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

III.C.3. Regional Blocks
TAGS:
Anatomy
Catheters
Complications
Factors Influencing Onset and Duration
Indications and Contraindications
Intraneural Injections
Medications: Local Anesthetics, Opioids, Adjuncts
Specific Blocks: Head and Neck, Upper and Lower Extremity, Truncal

III.C.4. IV Regional
TAGS:
Complications
Factors Influencing Onset and Duration
Indications and Contraindications
Medications: Local Anesthetics, Opioids, Adjuncts

III.D. General Anesthesia
III.D.1. Techniques
TAGS:
Combined General/Regional
Inhalational
Total Intravenous

III.D.2. Airway Management
TAGS:
Airway Management Devices and Adjuncts
ASA Difficult Airway Algorithm
Complications
Emergency Surgical Airway
Endotracheal Tube Types
Flexible Fiberoptic Bronchoscopy
High-Frequency Jet Ventilation
Postoperative Considerations
Regional Airway Blocks

III.E. Monitored Anesthesia Care and Sedation
III.E.1. Guidelines and Standards
III.E.2. Levels of Sedation
III.E.3. Sedation Guidelines for Non-Anesthesiologists

III.F. Asanguineous Intravenous Fluid Therapy during Anesthesia
III.F.1. Indications and Contraindications
TAGS:
Colloids
Crystalloids
Hypertonic Saline

III.F.2. Complications

III.G. Perioperative Complications: Types, Prevention, Treatment
III.G.1. Types
TAGS:
Air Embolism
Anaphylaxis
Arterial Thrombosis
Aspiration of Gastric Contents
Bronchospasm
Burns
Cerebrovascular Accident
Corneal Abrasions
Esophageal Injury
Hypothermia and Hyperthermia
Laryngospasm
Myocardial Ischemia/Infarction
Positioning Complications
Postobstructive Pulmonary Edema
Postoperative Visual Loss
Shivering
Tourniquet, Adverse Effects of
Unintended Intraoperative Awareness
Vascular Trauma
Venous Thromboembolism

III.G.2. Prevention and Treatment
TAGS:
Aspiration of Gastric Contents
Fire Prevention and Management
Management of Intraoperative Patient Temperature
Perioperative Anticoagulation

III.H. Postoperative Period
III.H.1. Emergence and Recovery of Airway Reflexes
III.H.2. Acute Pain Management
TAGS:
Field Block
Multimodal Analgesia Strategies
Opioids
Patient-Controlled Analgesia (PCA)
Regional Anesthesia/Nerve Blocks
Systemic Local Anesthetics

III.H.3. Respiratory Complications in the PACU
III.H.4. Cardiovascular Complications in the PACU
TAGS:
Arrhythmias
Hypertension
Hypotension
Myocardial Ischemia

III.H.5. Nausea and Vomiting
TAGS:
Prophylactic Medications
Risk Factors
III.H.6. Residual Neuromuscular Blockade
III.H.7. Neurologic Consequences of Surgery and Anesthesia
TAGS:
Cognitive Dysfunction
Delirium
Failure to Emerge from Anesthesia
Stroke

IV. ORGAN-BASED BASIC AND CLINICAL SCIENCES
IVA. Central and Peripheral Nervous Systems
IVA.1. Anatomy
TAGS:
Autonomic Nervous System
Central Nervous System
Peripheral Nervous System
IVA.2. Physiology
TAGS:
Autoregulation
Drug Effects
Intracranial Pressure (ICP)
Metabolism
Spinal Reflexes
Vagal Reflex
IVA.3. Pharmacology
TAGS:
Anticonvulsants
Drug Effects on CNS Blood Flow
Drug Effects on CNS Metabolism
Osmotic Agents
IVA.4. Clinical Science
TAGS:
Abscess
Air Embolism
Airway Management in the Patient with Cervical Spine Disease
Autonomic Dysfunction
Autonomic Hyperreflexia
Cerebrovascular Accident (CVA)
Coma
Drug Intoxication
Fluid Management
Hydrocephalus
Pituitary Adenomas
Postural Orthostatic Hypotension Syndrome (POTS)
Prone and Sitting Positioning: Implications
Seizures
Spinal Shock
Subdural and Epidural Hematomas
Trans-Sphenoidal Hypophysectomy
Ventriculostomy

IV.B. Respiratory System

IV.B.1. Anatomy

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

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

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

IV.B.3. Pharmacology

TAGS:
- Anti-inflammatory Medications
- Bronchodilators

IV.B.4. Clinical Science

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

IV.C. Cardiovascular System
IV.C.1. Anatomy
TAGS:
Conduction System
Congenital Heart Disease
Coronary Circulation
Innervation
Transesophageal Echocardiography (TEE) Views

IV.C.2. Physiology
TAGS:
Baroreceptor Function
Cardiac Output
Coronary Blood Flow Regulation
Determination of Myocardial Oxygen Demand
Diastolic Dysfunction
Intracardiac Pressures
Mixed Venous Oxygen Tension and Saturation
Rhythm
Systemic and Pulmonary Vascular Resistance

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Systolic Dysfunction
Valvular Dysfunction

IV.C.3. Pharmacology
TAGS:
Angiotensin Converting Enzyme Inhibitors
Angiotensin Receptor Blockers
Antianginal Drugs
Antiarrhythmics
Beta-Blockers
Calcium Channel Blockers
Chronotropic Agents
Digitalis
Inotropes
Statins
Vasodilators
Vasopressors

IV.C.4. Clinical Management of Disease States
TAGS:
Cardiac Ischemia
Cardiac Tamponade and Constrictive Pericarditis
Cardiogenic Shock
Cardiomyopathy
Carotid Artery Disease
Dysrhythmia
Hypertrophic Cardiomyopathy
Intracardiac Defects
Myocardial Infarction and Acute Coronary Syndrome
Myocarditis
Peripheral Vascular Disease
Pulmonary Embolism
Pulmonary Hypertension
Right or Left Ventricular Dysfunction
Valvular Abnormalities

IV.C.5. Special Considerations in Cardiovascular Anesthesia
TAGS:
Cardiac Catheterization
Cardiac Implantable Electrical Device Management: AICD and Pacemakers
Electrophysiologic Studies and Procedures
Left Atrial Appendage Occlusion
Left Ventricular Assist Devices
Percutaneous Valvuloplasty and Valve Replacement
Perfusion Studies

IV.D. Gastrointestinal/Hepatic Systems
IV.D.1. Anatomy
TAGS:
Arterial Blood Supply (Celiac, Superior and Inferior Mesenteric Arteries)
Esophageal Sphincters
Innervation: Sympathetic, Parasympathetic, and Enteric
Liver Blood Supply

IV.D.2. Physiology
TAGS:
Cytochrome P450 Function and Variants
Excretory Functions
Factors Affecting Splanchnic Blood Volume
Metabolic and Synthetic Functions
Portal Hypertension

IV.D.3. Pharmacology
TAGS:
Effects of Liver Dysfunction on Drug Metabolism/Elimination
Hepatotoxicity

IV.D.4. Clinical Science
TAGS:
Acute Hepatitis
Anesthetic Management: Full Stomach
Anesthetic Management: Intestinal Obstruction
Cricoid Pressure
Esophageal Disease
Fluid Management for Hepatic Resection
Hepatic Failure
Implication of Ascites
Liver Transplantation
Morbid Obesity/Anesthesia for Bariatric Surgery
Nitrous Oxide and GI Surgery
Postoperative Hepatic Dysfunction
Postoperative Ileus

IV.E. Renal and Urinary Systems/Electrolyte Balance
IV.E.1. Clinical Science
TAGS:
Factors Affecting Glomerular Filtration
Factors Impacting Renal Blood Flow
Hormonal Regulation of Extracellular Fluid
Hormonal Regulation of Osmolality
Pathophysiology of Renal Disease
Regulation of Acid-Base Balance
Regulation of Blood Volume
Renal Drug Excretion
Renal Function Tests
Tubular Reabsorption and Secretion
Water and Electrolytes: Distribution and Balance

IV.E.2. Pharmacology
TAGS:
Diuretics
Drug Effects on Electrolytes and Acid-Base Balance
Pharmacologic Protection and Treatment of Renal Failure

IV.E.3. Clinical Management of Disease States
TAGS:
Anesthetic Management for Patients on Renal Replacement Therapy
Arteriovenous (AV) Shunts
Chronic Renal Insufficiency and Renal Failure
Perioperative Oliguria and Anuria
Preservation of Renal Function
Renal Cancer with IVC Tumor Invasion
Renal Transplantation
Risk Factors for Acute Renal Failure

IV.E.4. Special Considerations with the Renal System
TAGS:
Transurethral Resection of Prostate (TURP): Complications
Urologic Surgery: Lithotripsy

IV.F. Hematologic System
IV.F.1. Anatomy
IV.F.2. Physiology
TAGS:
Hemostasis

IV.F.3. Pharmacology
TAGS:
Anticoagulants and Antagonists
Antifibrinolytics
Antiplatelet Drugs
Blood Substitutes
Coagulation Factor Concentrates
Erythropoietin
Immunosuppressive and Antirejection Drugs
Iron Therapy

IV.F.4. Clinical Science
TAGS:
Alternatives to Transfusion
Anemias
Autologous Blood Donation
Blood Products
Carboxyhemoglobinemia
Citrate Toxicity
Congenital and Acquired Factor Deficiencies
Disseminated Intravascular Coagulation (DIC)
Fibrinolysis
Hemoglobinopathies
Heparin-Induced Thrombocytopenia (HIT)
IgA Deficiency
Massive Transfusion
Methemoglobinemia
Porphyrias
Thrombocytopenia and Thrombocytopeny
Transfusion Complications: TACO/TRALI
Transfusion Indications
Transfusion: Infection Risks (Cytomegalovirus, HIV, Hepatitis)
Viscoelastic Testing

IV.G. Endocrine and Metabolic Systems

IV.G.1. Anatomy

IV.G.2. Physiology

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

IV.G.3. Pharmacology

TAGS:
Antihyperglycemic Drugs
Glucocorticoid Supplementation
Mineralocorticoid Supplementation
Somatostatin/Octreotide

IV.G.4. Clinical Science

TAGS:
Acromegaly
Addison Disease
Carcinoid Syndrome
Cushing Syndrome
Diabetes Insipidus
Diabetes Mellitus
Diabetic Ketoacidosis
Endocrine Tumors
Goiter
Hyperosmolar Coma
Pancreas Transplantation
Parathyroid Disease: Hyper- and Hypoparathyroidism
Pheochromocytoma
Pituitary Disease: Hyper and Hypopituitarism
Primary Aldosteronism
Recurrent Laryngeal Nerve Injury
Syndrome of Inappropriate ADH Secretion
Thyroid Disease: Hyper and Hypothyroidism
Thyroid Storm Management

IV.G.5. Biochemistry of Normal Body Metabolism
TAGS:
Fluid Homeostasis
Glucose Homeostasis
Surgical Stress Response

IV.H. Neuromuscular System

IV.H.1. Anatomy
TAGS:
Acetylcholine Receptor
Motor Neurons

IV.H.2. Physiology
TAGS:
Factors Impacting Muscle Strength
Neuromuscular Transmission

IV.H.3. Pharmacology
TAGS:
Antagonists: Anticholinesterases
Antagonists: Selective Relaxant Binding Agents
Neuromuscular Blocking Agents: Depolarizing
Neuromuscular Blocking Agents: Nondepolarizing

IV.H.4. Diseases and Disorders: Clinical Science
TAGS:
Diseases of the Neuromuscular Junction
Inflammatory Myopathies
Metabolic Diseases of the Muscle
Motor Neuron Diseases
Peripheral Nerve Diseases

V. CLINICAL SUBSPECIALTIES

V.A. Pain Management

V.A.1. Pathophysiology
TAGS:
Acute Pain
Cancer-Related Pain
Chronic Pain States
Complex Regional Pain Syndrome (CRPS): Types I and II
Diabetic Neuropathy
Neuropathic Pain States
Peripheral Neuropathies
Phantom Limb
Postherpetic Neuralgia
Post-Stroke Pain
Somatic Pain Conditions
Substance Use Disorder
V.A.2. Diagnostic Strategies

TAGS:
Diagnostic Blocks
Electromyography (EMG)
Imaging Modalities

V.A.3. Treatment of Painful Disease States

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

V.B. Pediatric Anesthesia

V.B.1. Clinical Science

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

V.B.2. Pharmacology

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

V.B.3. Clinical Management of Disease States

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

V.B.4. Special Considerations in Pediatric Anesthesia

TAGS:
Airway Foreign Bodies
Apnea of Prematurity
Bladder and Urethral Malformations
Bronchoscopy: Flexible and Rigid
Bronchospasm
Cleft Lip and Palate
Congenital Hip Dysplasia
Craniofacial Abnormalities
Difficult Airway Management
Difficult IV Access
Intubation and Extubation Complications
Jet Ventilation
Laryngoscopy Techniques
Laryngospasm
Laser
Pediatric Regional Anesthetic Techniques
Pediatric Sedation
PONV
Postoperative Pain Management: Codeine
Premedication Techniques
Propofol Infusion Syndrome
Strabismus
Stridor
Tonsillectomy and Adenoidectomy
Upper Respiratory Infection
Urologic Procedures

V.C. Obstetric Anesthesia

V.C.1. Clinical Science
TAGS:
Anesthetic Complications
Anesthetic Risks
Coagulation Changes
Neuraxial Anesthetic Techniques: Epidural, Spinal, Combined Spinal-Epidural, and Caudal
Neuraxial Labor Analgesia
Paracervical Block
Physiology of Labor
Pudendal Block
Systemic Labor Analgesia

V.C.2. Pharmacology
TAGS:
Anesthetic Drugs and Adjuvants
Drug Effects on Newborn
Drug Metabolism
FetalDisposition of Drugs
Magnesium Sulfate
Mechanisms of Placental Transfer
Oxytocic Drugs
Protein Binding of Drugs
Tocolytic Drugs

V.C.3. Clinical Management of Disease States
TAGS:
Amniocentesis
Amniotic Fluid Embolism
Antepartum Fetal Therapy
Antepartum Hemorrhage
Anticoagulant Therapy
Cardiovascular Disease
Ectopic Pregnancy
Endocrine Disease
Ex-utero Intrapartum Treatment (EXIT)
Fetal Malposition
Fetal Malpresentation
Fever and Infection
Gestational Trophoblastic Surgery Disease
Hematologic Disease
Maternal Cardiopulmonary Resuscitation
Multiple Gestation
Neurologic Disease
Obesity
Placenta Abruption
Placenta Accreta Spectrum
Placenta Previa
Postpartum Hemorrhage
Preeclampsia and Eclampsia
Preterm Labor
Renal Disease
Respiratory Disease
Resuscitation of Newborn
Retained Placenta
Rh and ABO Incompatibility
Spontaneous Abortion
Trial of Labor after Cesarean (TOLAC)
Umbilical Cord Blood Gas Measurements
Umbilical Cord Prolapse
Uterine Atony
Uterine Rupture

V.C.4. Special Considerations in Obstetric Anesthesia
TAGS:
Antepartum Fetal Assessment
Aorto-Caval Compression
Cesarean Delivery: Elective Anesthesia
Cesarean Delivery: Emergency Anesthesia
Difficult Airway
Gastroesophageal Sphincter Function
Influence of Anesthetic Technique on Labor
Neonatal Assessment: Apgar Score
Nonobstetric Anesthesia in Pregnancy
Operative Vaginal Delivery
Pulmonary Aspiration
Regulation of Uterine Blood Flow
Thermoregulation

V.C.5. Maternal Physiology
TAGS:
Acid-Base Changes
Airway Changes
Anatomic Position
Barrier Function
Cardiovascular Changes
Coagulation Changes
Gastrointestinal Changes
Hematologic Changes
Nervous System Changes
Renal Changes
Respiratory Changes
V.C.6. Maternal-Fetal Considerations
TAGS:
Intrapartum Fetal Monitoring
Intrauterine Fetal Resuscitation
V.C.7. Pathophysiology of Complicated Pregnancy
V.D. Otorhinolaryngology (ENT) Anesthesia
V.D.1. Surgical Procedures
TAGS:
Airway Endoscopy
Microlaryngeal Surgery
Radical Neck Dissection
Sinus Endoscopy
Tonsillectomy
Transoral Robotic Surgery
Uvulopalatopharyngoplasty
V.D.2. Laser Surgery
TAGS:
Airway Fires
Lasers: Safety Implications
Laser-Safe Endotracheal Tubes
V.D.3. Anesthetic Management
TAGS:
Airway Management
Anesthesia for Vascular Flaps
Effects of Radiation Therapy
Ventilation Strategies, Including Jet Ventilation
V.E. Anesthesia for Plastic Surgery
V.E.1. Liposuction
V.E.2. Tumescent: Volume Overload, LAST
V.E.3. Fire Risk
V.E.4. Local Anesthetic Systemic Toxicity
V.F. Anesthesia for Laparoscopic Surgery
V.F.1. Surgical Procedures
TAGS:
Appendectomy
Bariatric Surgery
Cholecystectomy
Gynecologic Procedures
Hiatus Hernia Repair
V.F.2. Anesthetic Management
TAGS:
Monitoring
Patient Positioning
Physiology
Ventilation

V.F.3. Risks
TAGS:
CO₂ Embolism
Hemorrhage
Hypercapnea
Hypotension
Subcutaneous Emphysema
Vascular or Organ Perforation

V.G. Ophthalmologic Anesthesia
V.G.1. Clinical Science
TAGS:
Retrobulbar and Peribulbar Blocks

V.G.2. Pharmacology

V.G.3. Clinical Management of Disease States
TAGS:
Open Eye Injuries

V.G.4. Special Considerations in Ophthalmologic Anesthesia
TAGS:
ASA Preoperative Testing Guidelines
Preoperative Selection

V.H. Orthopedic Anesthesia
V.H.1. Tourniquet Management
TAGS:
Ischemia
Nerve Injury
Reperfusion

V.H.2. Spine Surgery
TAGS:
Anesthetic Technique
Antifibrinolytics
Cervical Spine Disease
Neurophysiologic Monitoring
Postoperative Visual Loss

V.H.3. Complications
TAGS:
Blood Loss
Fat Embolism
Methyl Methacrylate
Positioning Injury
Venous Air Embolism
V.I.4. Anesthetic Techniques
TAGS:
Regional vs. General Anesthesia

V.I.5. Special Considerations in Orthopedic Surgery
TAGS:
Ankylosing Spondylitis
Compartment Syndrome
Postoperative Analgesia
Rheumatoid Arthritis
Scoliosis
Thromboprophylaxis

V.I. Trauma Anesthesia
V.I.1. Primary Survey and Resuscitation
TAGS:
Emergency Airway
Hemorrhagic Shock
Initial Evaluation
Mass Casualty Response
Penetrating vs. Blunt Trauma
Prehospital and EMS
Team Function in Trauma
Triage

V.I.2. Secondary Survey and Stabilization
TAGS:
Fluid Management
Hemostatic Resuscitation
Hypothermia
Massive Transfusion
Monitoring
Nuclear, Biological, and Chemical Injury
Protection of Cervical Spine

V.I.3. Organ System Trauma
TAGS:
Abdominal Trauma
Aortic and Vascular Trauma
Orthopedic and Soft Tissue Trauma
Spinal Cord
Thoracic Trauma
Traumatic Brain Injury
Traumatic Coagulopathy

V.I.4. Thermal and Electrical Injury
TAGS:
Airway Management
Carbon Monoxide/Carboxyhemoglobin
Fluids and Electrolytes
Inhalation Injury
Nondepolarizing Muscle Relaxants
Succinylcholine Use
Vasoconstrictor Effects and Complications

V.I.5. Special Considerations in Trauma Anesthesia

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

V.J. Anesthesia for Ambulatory Surgery

V.J.1. Patient Selection and Preoperative Management

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

V.J.2. Anesthetic Management

TAGS:
- Ambulatory Regional Anesthesia
- Continuous Nerve Blocks

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

TAGS:
- Discharge Criteria

V.J.4. Office-Based Anesthesia

TAGS:
- Equipment
- Organization
- Patient Management
- Safety

V.K. Geriatric Anesthesia/Aging

V.K.1. Preoperative Evaluation

TAGS:
- Coexisting/Chronic Disease Processes
- Medication Management
- Risk Reduction and Stratification

V.K.2. Organ Function Changes with Aging

TAGS:
- Cardiovascular System
- Central Nervous System
- Endocrine System
- Hematologic System
- Hepatic System
- Renal System
- Respiratory System

V.K.3. Pharmacology
TAGS:
Adverse Response to Medications
Beers Criteria
Changes in PK/PD with Aging
V.K.4. Anesthetics
TAGS:
General
Local
Sedation
Regional
V.K.5. Fluid Management
V.K.6. Pain Management
V.K.7. Thermoregulation
V.K.8. Ethics and Informed Consent
V.K.9. Postoperative Care and Transitions of Care
TAGS:
Delirium
Postoperative Cognitive Dysfunction
V.K.10. Patient Safety
V.L. Critical Care Anesthesia
V.L.1. Central Nervous System Dysfunction
TAGS:
Altered Mental Status
Brain Death
Brain Trauma
Delirium
Metabolic Encephalopathy
Neuromuscular Pathology
Spinal Cord Compromise
Stroke: Ischemic or Hemorrhagic
Subarachnoid, Epidural Bleed
V.L.2. Cardiovascular Dysfunction/Failure
TAGS:
Cardiac Interventions: Lysis, Catheter, PCI, Pacer
Cardiogenic Shock
Congestive Heart Failure
Device Management
Dysrhythmias
ECMO
Myocardial Ischemia/Infarction
Vascular Disease: Aneurysm, Dissection, Thrombosis
V.L.3. Respiratory Dysfunction/Failure
TAGS:
Acute Lung Injury/Acute Respiratory Distress Syndrome
Acute or Chronic Respiratory Insufficiency or Failure
Aspiration
ECMO
Mechanical Ventilation
Noninvasive Ventilatory Support
Thromboembolic Disease: DVT/PE

V.L.4. Immune Dysfunction/Infection
TAGS:
Antimicrobial Resistance
Antimicrobials: Antibiotics, Antivirals, Antifungals, Antiparasitics
Autoimmune Disease
General and Universal Precautions
Hand Washing
Hospital-Acquired Infection
Immunosuppression
Infection Control
Needle Stick Injury
Sepsis
Septic Shock

V.L.5. Hepatic Dysfunction/Failure
TAGS:
Acute Hepatic Failure
Chronic Hepatic Failure
End-Stage Liver Disease

V.L.6. Renal Dysfunction/Failure
TAGS:
Acute Kidney Injury
Chronic Kidney Disease
End-Stage Renal Disease
Renal Replacement Therapy

V.L.7. Hematologic Dysfunction
TAGS:
Anemia, Neutropenia, Thrombocytopenia, Pancytopenia
Anticoagulation/Antiplatelet/Antifibrinolytic Therapy
Bone Marrow Transplant
Coagulopathy: DIC, Consumptive, Dilutional
Transfusion Therapy

V.L.8. Gastrointestinal Dysfunction
TAGS:
Hemorrhage
Ileus
Inflammatory/Infectious

V.L.9. Endocrine Dysfunction
TAGS:
Adrenal
Pancreatic
Pituitary
Thyroid

V.L.10. Dermatologic Dysfunction
TAGS:
Pressure Injury

V.L.11. Additional Critical Care Topics
TAGS:
Drug Overdose
Epidemic Management
ICU Management/Organization
ICU Monitoring
ICU Procedures
Multi-Organ Failure
Nutritional Support
Targeted Temperature Management
Toxicology
Transplantation Management

V.M. Neuroanesthesia

V.M.1. Clinical Science
TAGS:
Cerebral Ischemia
Cerebral Vasospasm
Factors Impacting Cerebral Blood Flow
Factors Impacting Intracranial Pressure

V.M.2. Pharmacology
TAGS:
Anesthetics
Anticonvulsants
Anti-Parkinsonian Medications
Diuretics
Fluid Management
Steroids
Vasodilators and Vasoconstrictors

V.M.3. Clinical Management of Disease States
TAGS:
Arteriovenous Malformations
Cerebral Herniation
Cervical Spine Disease
Coma
Hydrocephalus, VP Shunts, Ventriculostomy
Intracranial Aneurysm
Intracranial Masses
Intracranial Vascular Lesions
Moyamoya Disease
Pituitary Adenomas
V.M.4. Special Considerations in Neuroanesthesia

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

V.N. Thoracic Anesthesia

V.N.1. Clinical Science

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

V.N.2. Pharmacology

TAGS:
Bronchodilators
Fluid Management
Pulmonary Vasodilators

V.N.3. Clinical Management of Disease States

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

V.N.4. Special Considerations in Thoracic Anesthesia

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

V.O. Cardiac Anesthesia
V.O.1. Clinical Science

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

V.O.2. Pharmacology

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

V.O.3. Clinical Management of Disease States

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

V.O.4. Special Considerations in Cardiac Anesthesia
TAGS:
Anticoagulation and Reversal
Blood Conservation
Circulatory Assist Devices
ECMO (VA, VV)
Extracorporeal Circulation
Heparin-Induced Thrombocytopenia
Pacemaker Management
Thoracoabdominal Aortic Aneurysm
Transesophageal Echocardiography
Unintended Intraoperative Awareness

V.P. Vascular Anesthesia
V.P.1. Clinical Science
TAGS:
Cardiac Risk Assessment and Preoperative Optimization
Factors Affecting Organ/Peripheral Perfusion

V.P.2. Pharmacology
TAGS:
Heparin
Protamine
Statins

V.P.3. Clinical Management of Disease States
TAGS:
Aortic Aneurysm
Carotid Endarterectomy, Stent Procedures
Peripheral Vascular Disease

V.P.4. Special Considerations in Vascular Anesthesia
TAGS:
Anticoagulation and Reversal
Aortic Clamping
Carotid Clamping
Endovascular Surgery
Renal Protection

V.Q. Regional Anesthesia
V.Q.1. General Topics
TAGS:
Anticoagulation in Regional Anesthesia
Guidelines and Standards
Indications and Contraindications
Nerve Localization: Nerve Stimulator, Landmarks, Ultrasound
Nerve Structural Anatomy
Sedation and Monitoring

V.Q.2. Pharmacology
TAGS:
Liposomal Bupivacaine
Local Anesthetics and Adjuncts

V.Q.3. Neuraxial Anesthesia
TAGS:
Anatomy and Sonoanatomy
Caudal Anesthesia
Combined Spinal-Epidural Anesthesia
Complications
Epidural Anesthesia
Epidural Blood Patch
Factors Influencing Onset and Duration
Indications and Contraindications
Medications: Local Anesthetics, Opioids, Adjuncts
Patient-Controlled Epidural Analgesia
Spinal Anesthesia

V.Q.4. Upper Extremity Regional Anesthesia
TAGS:
Brachial Plexus Anatomy and Sonoanatomy
Brachial Plexus Blocks: Interscalene, Supraclavicular, Infraclavicular, Axillary
Cervical Plexus Blocks: Superficial, Deep
Other: Musculocutaneous, Wrist Blocks
Suprascapular/Shoulder Blocks

V.Q.5. Lower Extremity Regional Anesthesia
TAGS:
Ankle Block and Anatomy
Inguinal Region Nerve Blocks: Femoral, LFCN, Obturator, Fascia Iliaca, 3-in-1
Lumbar Plexus, Femoral, and Saphenous Anatomy and Sonoanatomy
Saphenous, Adductor Canal Blocks
Sciatic Nerve and Sacral Plexus Anatomy and Sonoanatomy
Sciatic Nerve Blocks: Popliteal, Transgluteal, Infragluteal

V.Q.6. Truncal Regional Anesthesia
TAGS:
Abdominal Wall Blocks: TAP, Ilioinguinal, Iliohipogastric, Rectus Sheath
Anterior and Lateral Chest Blocks: PECS, Serratus
Paravertebral Anatomy and Sonoanatomy
Paravertebral Blocks
Posterior Truncal Blocks: Quadratus Lumborum, Erector Spinae, Retrolaminar
Truncal Block Anatomy and Sonoanatomy

V.Q.7. Complications and Side Effects
TAGS:
Falls
Hematoma
Horner Syndrome
Infection/Abscess
Intraneural Injections
Local Anesthetic Systemic Toxicity
Neuropraxia, Nerve injury
Opioid
Phrenic Nerve Block
Postdural Puncture Headache
Rebound Pain
V.Q.8. Ultrasound-Guided Regional Anesthesia
TAGS:
Image Generation and Display
Needle and Probe Alignment
Ultrasound Artifacts
Ultrasound Physics
V.Q.9. Continuous Regional Anesthesia
TAGS:
Indications and Contraindications
Perineural Infusions: Medications, Pumps, Dosing Parameters
V.Q.10. IV Regional
TAGS:
Complications
Factors Influencing Onset and Duration
Indications and Contraindications
Medications: Local Anesthetics, Opioids, Adjuncts
V.R. Acute Pain Management
V.R.1. Analgesic Pharmacology
TAGS:
Acetaminophen
Alpha-2 Agonists
Anticonvulsants
Antidepressants
Gabapentinoids
Intravenous Local Anesthetic Infusions
Intravenous Medications
Multimodal Analgesia
Muscle Relaxants
NMDA Antagonists
NSAIDs/COX-2 Inhibitors
Opioid Agonists, Antagonists
Opioids
Oral/Transdermal Opioids
Parenteral Medications
Patient-Controlled Analgesia
Transdermal Medications

V.R.2. Alternative Analgesic Modalities
TAGS:
Acupuncture
Complementary Therapies
Hypnosis
TENS Therapy

V.R.3. Acute Pain Evaluation and Treatment
TAGS:
Acute on Chronic Pain
Cancer Pain
Discharge Planning
Escalation of Therapy
Inflammatory Pain
Neuropathic Pain
Nociceptive Pain
Opioid Conversion
Opioid Tolerance
Opioid-Induced Hyperalgesia
Oral Therapy
Parenteral Therapy
Patient-Controlled Analgesia
Physical Therapy
Psychiatric Comorbidities
Substance Use Disorder
Transdermal Therapy
Transition to Chronic Pain

V.R.4. Monitoring and Safety
TAGS:
Cardiopulmonary Monitoring
Complications and Side Effects
Controlled Substance Prescribing
Drug Testing
Legal Issues
Level of Care

VI. SPECIAL PROBLEMS OR ISSUES IN ANESTHESIOLOGY
VI.A. Electroconvulsive Therapy
VI.A.1. Physiology
TAGS:
Central Nervous System Effects
Hemodynamic Effects

VI.A.2. Pharmacology
TAGS:
Anticholinergics
Beta-Blockers
Sedative-Hypnotics
Vasodilators

VI.B. Organ Donors
VI.B.1. Pathophysiology
VI.B.2. Clinical Management
  TAGS:
  Criteria for Brain Death
  Donation after Cardiac Death
  Donation after Brain Death

VI.C. Non-Operating Room Anesthesia (NORA)
VI.C.1. MRI
  TAGS:
  Anesthetic Management
  Monitoring
  Risks/Contraindications

VI.C.2. Electrophysiology
  TAGS:
  Ablation Procedures/Cardioversion
  Cardiac Implantable Devices

VI.C.3. Interventional Radiology
  TAGS:
  Angiography/Thrombolysis
  CT-Guided Procedures
  Intravenous Contrast
  Transhepatic Intrajugular Portosystemic Shunt

VI.C.4. Gastrointestinal Endoscopy
  TAGS:
  Colonoscopy/Upper Endoscopy
  Endoscopic Retrograde Cholangiopancreatography
  Monitored Anesthesia Care (MAC) vs. General Anesthesia

VI.C.5. Neurointerventional Procedures
  TAGS:
  Acute Stroke/Cerebral Revascularization
  Cerebral Vasospasm
  Intracranial Aneurysms

VI.C.6 Bronchoscopy Procedures
  TAGS:
  Endobronchial Ultrasound (EBUS)
  Pulmonary Hemorrhage

VI.C.7. Cardiac Catheterization Procedures
  TAGS:
  Left Atrial Appendage Occlusion Procedures
  Mitral Valve Repairs
  Transfemoral Aortic Valve Replacement (TAVR)
VI.C.8. Transesophageal Echocardiography
VI.C.9. Radiation Therapy

VI.D. Physician Impairment or Disability
VI.D.1. Substance Use Disorder
VI.D.2. Fatigue
VI.D.3. Aging
VI.D.4. Visual and Auditory Impairment
VI.D.5. Americans with Disabilities Act (ADA)
VI.D.6. Abusive or Disruptive Physicians
VI.D.7. Sexual Harassment
VI.D.8. Physician Burnout and Wellness

VI.E. Ethics, Practice Management and Medicolegal Issues
VI.E.1. Professionalism and Licensure
VI.E.2. Ethics
   TAGS:
   Do-Not-Resuscitate (DNR) Orders and Advance Directives
   End-of-Life Issues (Withholding/Withdrawal)
   Jehovah’s Witness Patient Care
   Mandatory Reporting

VI.E.3. Informed Consent
   TAGS:
   Components of Informed Consent
   Principles

VI.E.4. Malpractice
   TAGS:
   Closed Claims Findings
   Legal Actions and Consequences
   National Practitioner Data Bank
   Professional Liability Insurance

VI.E.5. Practice Management
   TAGS:
   Health Insurance Portability and Accountability Act (HIPAA)
   Medicare/Medicaid Requirements
   Patient Privacy

VI.E.6. Costs of Medical/Anesthesia Care
   TAGS:
   Operating Room Management

VI.E.7. Patient Safety
   TAGS:
   Disclosure of Errors to Patients
   Medication Errors: Assessment and Prevention

VI.E.8. Healthcare Disparities
   TAGS:
   Reducing Disparities
   Cultural Competency
Effects of Disparities on Access to and Quality of Care, Outcomes, and Health Status
Social Determinants of Health

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

TAGS:
Approaches to Improving DEI in Healthcare
Equity in the Workplace
Threats to DEI, Including Unconscious Bias, Microaggressions, and Stereotype Threat

VII. QUALITY IMPROVEMENT

VII.A. Quality Assurance and Performance Improvement

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

TAGS:
Tools for Process Improvement
QI Methods

VII.A.2. Communication and Reporting

TAGS:
Outcomes Registries
Public Reporting

VII.A.3. Analysis/Assessment of Information

TAGS:
Artificial Intelligence
Data Analytics
Failure Modes and Effects Analyses
Morbidity and Mortality
Peer Review
Quality Reporting and Dashboards
Root Cause Analyses

VII.A.4. Patient Safety

TAGS:
Communication
Culture of Safety
Epidemiology of Error
Evidence-Based Practice
Human Factors
Methods and Tools for Evaluating Safety Events
Outcomes Improvement
Prevention of Harm/Complications
Safety Enhancing Systems, Tools, and Processes

VII. OVERVIEW OF ANESTHESIOLOGY TOPICS

VIII.A. Review of Current Topics in Anesthesiology

IX. CRITICAL CARE MEDICINE

IX.A. Basic Pathophysiology

IX.A.1. Central Nervous System

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

IX.A.2. Cardiovascular

TAGS:
Aneurysm, Abdominal
Aneurysm, Thoracic
Aortic Insufficiency
Aortic Stenosis
Aortic Valve
Asystole
Cardiac Contusion
Cardiac Transplantation
Cardiogenic
Congenital Heart Disease in Adults
Coronary Artery Disease, Myocardial Ischemia/Infarction
Diastolic Dysfunction
Dissections
Deep Vein Thrombosis
Eisenmenger Syndrome
Endocarditis
Heart Block
Hypertension
Hypertrophic Cardiomyopathy (Hypertrophic Obstructive Cardiomyopathy, Asymmetric Septal Hypertrophy, Idiopathic Hypertrophic Subaortic Stenosis)
Hypovolemic
Infection/Inflammation
Intracardiac Shunts
Junctional or Nodal Rhythm
Left Ventricular
Mitral Regurgitation
Mitral Stenosis
Mitral Valve
Myocardial Function/Dysfunction
Myocarditis
Obstructive
Other Conduction Abnormalities
Other Myocardial
Oxygen Supply and Demand
Pericarditis
Peripheral Vascular Disease
Pulmonary Hypertension
Pulmonary Valve
Pulmonic Insufficiency
Pulmonic Stenosis
Pulseless Electrical Activity (PEA)
Rhythm Disturbances
Right Ventricular
Shock States
Supraventricular Tachyarrhythmias, Including Atrial Flutter, Fibrillation
Systemic Hypertension
Systolic Dysfunction
Tetralogy of Fallot
Trauma
Tricuspid Valve Dysfunction
Valvular
Ventricular Tachycardia/Fibrillation

IX.A.3. Pulmonary
TAGS:
Airway Diseases
ARDS
Aspiration
Bronchopleural Fistula
Chest Trauma
Community-Acquired
Emolic Disorders
Empyema/Abscess
Hypercapnic (Acute and Chronic)
Hypoxic (Acute and Chronic)
Infection
Inflammatory and Autoimmune Diseases
Lung and Chest Wall Tumors
Lung Transplantation
Mediastinitis
Obstructive
Other Ventilation-Perfusion Abnormalities
Pleural Effusion
Pneumonia
Pneumothorax, Volutrauma
Pulmonary Mechanics
Reactive
Respiratory Failure
Restrictive
Sleep Apnea
Tracheal Disruption
Tracheobronchitis
Transfusion-Related Acute Lung Injury
Ventilator-Associated

IX.A.4. Renal
TAGS:
AKI
Infection
Intrinsic Renal
Postrenal
Prerenal
Renal Tubular Acidosis

IX.A.5. Hematologic/Oncologic
TAGS:
Anemia
Bone Marrow/Stem Cell Transplantation
Carboxyhemoglobin
Coagulopathies
Disseminated Intravascular Coagulation
Fibrinolysis
Methemoglobin
Polycythemia
Platelet Abnormalities
Thrombocytopenia
Thrombocytosis
Tumor Lysis Syndrome
Vitamin K Dependent Coagulopathy
White Blood Cell Disorder

IX.A.6. Obstetric
TAGS:
Coagulopathy, Bleeding Disorders
Complications of Pregnancy
Emboli
Liver Function Abnormalities
Pre-Eclampsia/Eclampsia

IX.A.7. Endocrine
TAGS:
Adrenal
Adrenal Insufficiency
Cerebral Salt Wasting
Critical Illness Effects on Thyroid Function
Cushing Syndrome
Diabetes Insipidus, Including Central, Nephrogenic
Diabetes Mellitus
Hyperglycemia, Diabetic Ketoacidosis (DKA), Nonketotic Hyperglycemic Coma (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)
Gastrointestinal Hemorrhage
Gastrointestinal Motility Dysfunction
Hepatic
Hepatic Dysfunction/Failure (Acute and Chronic)
Hepatic Encephalopathy
Hepatitis
Hepatocellular Carcinoma
Hepatorenal Syndrome
Ileus
Infectious
Malabsorption
Pancreas
Pancreatic Cancer
Pancreatitis
Perforation, Volvulus
Pseudomembranous Colitis
Stomach
Toxic Megacolon
Vascular Diseases

IX.A.9. Dermatologic
TAGS:
Allergic Reactions
Infection
Inflammatory Diseases of the Skin
Necrotizing Fasciitis
Stevens-Johnson Syndrome

IX.A.10. Immunologic/Infectious Disease
TAGS:
Acquired
Autoimmune
Graft vs. Host Disease
HIV/AIDS
Immune Suppression
Mixed Connective Tissue Disease
Sepsis
Systemic Inflammatory Response Syndrome
Therapeutic
Vasculitides

IX.A.11. Acid-base and Electrolyte Abnormalities
TAGS:
Acid-Base Abnormalities
Calcium
Chloride
Electrolyte Abnormalities
Magnesium
Metabolic
Mixed
Phosphorus
Potassium
Respiratory
Sodium

IX.B. Critical Illness Diagnosis and Management
IX.B.1. Central Nervous System
TAGS:
Abscess
Altered Mental Status
Angiography
Anticonvulsants
Antimicrobials
Brain Death
Coma
Critical Illness Polyneuropathy
Degenerative Disease of the Brain
Delirium
Diagnoses
Diagnostic Modalities
EEG, Processed EEG
Embolic/Thrombotic
EMG/NCS
Encephalitis
Guillain-Barré Syndrome
Head Injury, Closed or Open
Hemorrhagic (Subarachnoid, Subdural, Epidural Hematoma)
ICP Measurement
ICP-Controlling Medications
Infectious
Interventional Radiology
Ischemic
Jugular Venous Saturation
Lumbar Puncture
Management Strategies
Meningitis/Ventriculitis
Myasthenia Gravis
Myopathy
Neuromuscular Disorders
Nuclear Medicine Studies
Other Therapies
Pituitary Disorders
Plasmapheresis/Plasma Exchange
Seizures and Status Epilepticus
Spinal Cord Injury
Steroids
Stroke
Subarachnoid, Subdural, Epidural Hematoma
Surgical Interventions
Transcranial Doppler
Vascular Malformations
Vasoactive Drugs

IX.B.2. Cardiovascular

TAGS:
Automatic Implantable Cardioverter Defibrillators
Aneurysm, Thoracic
Anticoagulants and Antithrombotics
Antidysrhythmics
Antifibrinolytics
Antihypertensives
Antimicrobials
Antiplatelet Agents
Arterial Pressure
Asystole
Atrial Flutter/Fibrillation
Biomarkers
Cardiac Contusion
Cardiac Output Monitoring
Cardiac Transplantation, Rejection, Complications
Cardiac Ultrasound (TTE, TEE)
Cardiogenic
Cardiomyopathy
Circulatory Support Systems
Congenital Heart Disease in Adults
Coronary Artery Disease, Myocardial Ischemia/Infarction
CVP
Diagnostic Modalities
Diastolic Dysfunction
ECG
ECMO
Eisenmenger Syndrome
Endocarditis
External Defibrillators
Heart Block
Hemodynamic Monitoring
Heparin
Heparinoids
Hypertension
Hypertrophic Cardiomyopathy (Hypertrophic Obstructive Cardiomyopathy, Asymmetric Septal Hypertrophy, Idiopathic Hypertrophic Subaortic Stenosis)
Hypovolemic
Imaging
Infectious
Inotropes/Chronotropes/Lusitropes
Intra-Aortic Balloon Pump
Junctional or Nodal Rhythm
Left or Right Ventricular Assist Device
Left Ventricular
Low Molecular Weight Heparin
Management Strategies
Myocardial Function/Dysfunction
Myocarditis
Noninfectious Myocarditis
Obstructive
Other Bedside Ultrasound
Pacemakers/Defibrillators
Papillary Muscle Dysfunction
Pericardial Effusion
Pericardiocentesis
Pericarditis
Peripheral Vascular Disease
Pulmonary Hypertension
Pulmonic Valve Disease
Pulseless Electrical Activity (PEA)
Regurgitation
Rhythm Disturbances
Right Ventricular
Shock States
Stenosis
Stress-Induced Cardiomyopathy
Stunned Myocardium
Supraventricular Tachyarrhythmias, Other
Systolic Dysfunction
Tamponade
Tetralogy of Fallot
Thrombin Inhibitors
Thrombolytics
Transsthoracic
Transvenous/Epicardial
Traumatic
Tricuspid Valve Disease
Valvular
Vasoconstrictors
Vasodilators
Ventricular Tachycardia/Fibrillation
Warfarin

IX.B.3. Pulmonary
TAGS:
Airway Diseases
Airway Pressure-Release Ventilation
Antimicrobials/Antivirals
ARDS
Arterial Blood Gas
Aspiration
Assist Control
BiPAP
Capnography
Chest Trauma
Chest X-ray
Community-Acquired
CPAP
CT/MRI
Diagnoses
Diagnostic Modalities
Differential Lung Ventilation
Embolic Disorders
Empyema/Abscess
High-Frequency/Oscillation
Hypercapnic (Acute and Chronic)
Hypoxic (Acute and Chronic)
Imaging
Infection
Inflammatory and Autoimmune Diseases
Invasive Ventilation Modes
Laryngoscopy and Bronchoscopy
Lung and Chest Wall Tumors
Lung Transplantation, Rejection, Complications
Management of Bronchopleural and Bronchocutaneous Fistulae
Management Strategies
Mediastinitis
Noninvasive
Nuclear Studies
Obstructive
Other Ventilator Strategies
Pressure Control/Volume Control
Pleural Effusion
Pneumonia
Positioning
Pressure-Support Ventilation
Pulmonary Function Studies/Pulmonary Mechanics
Pulmonary Medications
Pulse Oximetry
Respiratory Failure
Synchronized Intermittent Mandatory Ventilation
Spontaneous Breathing Trials
Thoracentesis
Thromboembolic
Tracheobronchitis
Transfusion-Related Acute Lung Injury
Ultrasound
Ventilator-Associated
Ventilatory Support
Volutrauma/Barotrauma

IX.B.4. Renal
TAGS:
Angiography
Antimicrobials/Antifungals
Biomarkers
Buffers
Continuous Renal Replacement Therapies Including Ultrafiltration
Contrast-Induced Nephropathy
CT/MRI
Diagnostic Modalities
Diagnostic X-ray
Diuretic Therapy
Electrolytes, Osmolarity, and Specific Gravity (Serum, Urine)
Fluid and Electrolyte Management
Imaging
Infection
Intermittent Hemodialysis
Intrinsic Renal
Management Strategies
N-Acetylcysteine
Pharmacologic Therapies
Postrenal
Prerenal
Renal Failure
Renal Replacement Therapies
Renal Transplantation
Renal Trauma
Renal Tubular Acidosis
Ultrasound
IX.B.5. Hematologic/Oncologic
TAGS:
Anemia
Anticoagulants
Antiplatelet Agents
Carboxyhemoglobin
Coagulopathies
Congenital
Diagnoses
Diagnostic Modalities
Disseminated Intravascular Coagulation
Erythropoietin, G-CSF
Fibrinolysis
Hemoglobin Abnormalities
Heparin
Heparinoids
Hypercoagulable State
Isolated Factor Abnormalities
IVC Filters, Other Mechanical Devices
Low-Molecular-Weight Heparin
Management Strategies
Methemoglobin
Other Hemoglobinopathies
Plasmapheresis/Plasma Exchange
Platelet Abnormalities
Polycythemia
Reversal Agents
Routine Blood Studies
Thrombin Inhibitors
Thrombocytopenia, Including Heparin-Induced
Thrombocytosis
Thrombolytics
Transfusion and Factor Replacement
Tumor Lysis Syndrome
Vitamin K Dependent
Warfarin
IX.B.6. Obstetric
TAGS:
Anticoagulants
Anticonvulsants
Antihypertensive Therapy
Antimicrobials
Coagulopathy, Bleeding Disorders
Delivery
Diagnoses
Diagnostic Modalities
Emboli (Amniotic Fluid, Thromboemboli, Other)
Liver Function Abnormalities
Management Strategies
Peripartum Infection
Preeclampsia/Eclampsia
IX.B.7. Endocrine
TAGS:
Adrenal
Adrenal Insufficiency
Antihypertensives
Cerebral Salt Wasting
Critical Illness Effects on Thyroid Function
Cushing Syndrome
Diabetes Insipidus Including Central, Nephrogenic
Diabetes Mellitus
Diagnoses
Diagnostic Modalities
Desmopressin
Glucose Management
Hyperglycemia, Diabetic Ketoacidosis (DKA), Non-Ketotic Hyperglycemic Coma (NKHC)
Hyperthyroidism, Including Thyroid Storm
Hypoglycemia
Hypothyroidism, Including Myxedema
Insulin
Laboratory Studies (Serum, Urine)
Management Strategies
Oral Hypoglycemic Agents
Other Therapies
Pheochromocytoma
Pituitary
SIADH
Steroids (Glucocorticoid and Mineralocorticoid)
Thyroid Function Abnormalities
Ultrasound

IX.B.8. Gastrointestinal

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

IX.B.9. Dermatologic

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

IX.B.10. Immune/Infectious Disease

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

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

TAGS:
Acid-Base Abnormalities
Albumin
Appropriate Renal and Endocrine Strategies
Arterial Blood Gas
Calcium
Chloride
Diagnostic Modalities
Electrolyte Abnormalities
Electrolyte Replacement as Appropriate
Electrolytes, Osmolarity, and Specific Gravity (Serum, Urine)
Magnesium
Management Strategies
Metabolic
Phosphorus
Potassium
Respiratory
Sodium
Ventilatory Support

IX.C. Specialized Areas

IX.C.1. Biostatistics

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

IX.C.2. Burns

TAGS:
Airway Management
Antimicrobials
Complications
Electrical Burns
Fluids and Resuscitation
Inhalation Injury
IX.C.3. Disaster Management
TAGS:
- Biologic, Chemical, and Nuclear Exposures
- Epidemic

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

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

IX.C.6. ICU Management and Organization
TAGS:
- Clinical Care Bundles
- Daily Wake-Up Test
- Handover/Communication
- Health Insurance Portability and Accountability Act (Privacy and Security)
- Quality Assurance/Quality Improvement (Patient Safety)
- Scoring Systems
- Sedation/Analgesia/Delirium Assessment
- Triage and Resource Utilization

IX.C.7. Infection Control
TAGS:
- Catheter-Associated Infections
- Environmental Exposures
- General/Universal Precautions
- Isolation Techniques
- Nosocomial Infections
- Pneumonia (Ventilator-Associated, Hospital-Associated, Etc.)
- Reverse Isolation
- Urinary Tract Infection (UTI), Catheter-Associated UTI

IX.C.8. Life Support and Resuscitation
TAGS:
- ACLS
- Other

IX.C.9. Nutrition Management
TAGS:
- Enteral and Parenteral Nutrition (Formula, Caloric Intake)
- Enteral Tubes
- Refeeding Syndrome

IX.C.10. Assessment and Management of Pain, Sedation, and Delirium
TAGS:
- Multimodal Analgesia
- Opiate Management
- Regional Analgesia Techniques
IX.C.11. Pharmacology (Indications, Contraindications, and Complications)
TAGS:
- Anaerobes
- Antibiotics
- Antidepressants
- Antifungal
- Antimicrobial Resistance
- Antimicrobials
- Antiparasitic
- Antipsychotics
- Antiviral
- Genetic Considerations
- Gram-Negative Organisms
- Gram-Positive Organisms
- Lithium
- Neuromuscular Blocking Drugs
- Pharmacokinetics, Pharmacodynamics, and Drug Metabolism
- Prophylactic Antimicrobials
- Sedatives/Hypnotics
- Spirochetal and Rickettsial
- SSRIs
- Tuberculosis
- Tricyclic Antidepressants
IX.C.12. Poisonings, Toxic Ingestion, Overdoses, and Withdrawal
IX.C.13. Procedures
TAGS:
- Airway
- Arterial
- Chest Tubes
- Complications
- Intraosseous
- Laryngeal Mask Airways/Others
- Physics of Ultrasound
- Tracheostomy
- Ultrasound
- Vascular Access
IX.C.14. Thermoregulation
TAGS:
- Environmental
- Fever
- Heat Stroke
- Hyperthermia
- Hypothermia
- Malignant Hyperthermia
- Neuroleptic Malignant Syndrome

X. PAIN MEDICINE
X.A. Background Concepts
X.A.1. Anatomy and Physiology: Mechanisms of Nociceptive Transmission
TAGS:
- Autonomic Nervous System
Central Mechanisms: Spinal and Medullary Dorsal Horns
Central Mechanisms: Segmental and Brain Stem
Central Mechanisms: Thalamocortical
Peripheral Mechanisms: Somatosensory, Somatic, Visceral

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

X.A.3. Interpreting Clinical Research Studies about Treatments for Pain
TAGS:
Epidemiology: Measurement of Burden in a Population, Including Epidemiologic
  Measures of Occurrence (Prevalence, Incidence)
Epidemiology: Use of Data from Epidemiologic Studies of Pain
Epidemiology: Use of Risk Factors to Guide Treatment
Evaluating Study Results: Basic Concepts, Statistical Analysis, Reliability and Validity,
  Sensitivity and Specificity
Evaluating Study Results: Minimal Clinically Important Difference, Meta-Analysis,
  Confounding Variables, Grades of Evidence, Influence of Bias
Principles of Clinical Trial Design: Inclusion/Exclusion Criteria, Use of Study Instruments,
  Development of Hypothesis
Research Study Design - Cohort Studies: Use to Determine Natural History and
  Predictors of Outcome
Research Study Design - Correlational Studies, Case Reports, Retrospective Studies,
  Cross-Sectional Surveys
Research Study Design - Observational Studies: Uses and Limitations (e.g.,
  Measurement of Strength of Association Between Risk Factors and Pain); Known
  Major Risk Factors for Development of Chronic Pain
Research Study Design - Randomized Controlled Trials, Prospective, Experimental

X.A.4. Ethical Standards in Pain Management and Research
TAGS:
Conflicts of Interest and Financial Disclosure
Ethics of Pain Management and Research: Principles of Justice, Autonomy,
  Beneficence, Nonmaleficence
Informed Consent
Professionalism

X.A.5. Teamwork and Care Coordination
TAGS:
Importance of Coordination of Care

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

X.A.6. Legal and Regulatory Issues
TAGS:
Elements of Medical Malpractice: Duty, Breach of Duty, Causation, Damages
Legal Actions and Consequences: National Practitioner Data Bank, Closed Claims
Patient Privacy, Confidentiality, Health Insurance Portability and Accountability Act
Requirements for Reporting Impaired Healthcare Professionals
Understanding Laws Related to Controlled Substances
Workers Compensation, Disability Evaluations

X.B. Assessment of Pain

X.B.1. Assessment of Pain
TAGS:
Components of Pain Assessment: Basic Examination, Assessment of Function, Biopsychosocial Assessment
Pain Sensory Testing: Mechanical Allodynia, Cold and Warm Alloodynia
Pain Sensory Testing: Pain Threshold, Pain Tolerance
Pain Sensory Testing: Quantitative Sensory Testing
Terminology: Hyperalgesia, Paresthesia, Spontaneous Pain, Evoked Pain, Allodynia, Anesthesia Dolorosa

X.B.2. Placebo and Pain
TAGS:
Ethics of Placebo in Clinical Trials and Clinical Practice
Nocebo Effect
Placebo as Treatment Modality
Placebo Response: Mechanisms and Interpretation
Placebo: Definition and Incidence
Role of Placebo in Clinical Trials: Response Bias, Regression to Mean, Open-Hidden Paradigm

X.B.3. Assessment of Functional Outcomes and Disability
TAGS:
Environmental Factors: Social Attitudes, Workplace
Functioning and Disability: Body Functions, Impairment, Limitations and Restrictions
Personal Factors: Role of Family, Cultural Background, Social Factors
Validated Tools to Assess Functional Status

X.B.4. Psychosocial and Cultural Aspects of Pain
TAGS:
Common Emotional Problems and Psychiatric Disorders Associated with Pain
Coping Styles: Definition and Effect on Pain Experience and Response to Treatment
Cultural, Environmental, and Racial Variations in Experience and Expression of Pain Expectations, Coping, Cultural and Environmental Factors: Effect on Treatment Outcome, Maintenance of Treatment Effects
Individual Differences in Affective, Cognitive, and Behavioral Responses to Pain
Measurement: Screening Questionnaires, Validated Tools for Older or Cognitively Impaired Adults
Pain as a Biopsychological Experience: Definition and Measurement
Psychological Assessment: Role of Family, Financial Status, Cultural Beliefs
Role of Care Givers in Promoting Illness and Well Behavior
Role of Psychology, Physical and Occupational Therapy, Social Work
X.B.5. Sex, Gender, and Race Issues in Pain
TAGS:
Analgesic Response: Differences Between Sexes and Within the Same Sex
Definition of Sex and Gender
Sex Differences: Biologic and Psychosocial Contributions to Pain Response
Sex Differences: Nociceptive Response and Pain Perception
Sex Differences: Role in Epidemiology of Pain in Relation to Age and Reproductive History
Sex Differences: Role in Treatment Seeking, Delivery and Effectiveness of Treatment
X.B.6. Imaging and Electrodiagnostic Evaluation
TAGS:
Electrical Nerve Stimulation (EMG/NCV/Evoked Potentials): Uses and Limitations
Electroencephalography (EEG, MEG): Uses and Limitations
Laser-Evoked Potentials: Uses and Limitations
MRI, Functional MRI, and Magnetic Resonance Spectroscopy: Uses and Limitations
Nuclear Medicine Bone Scan: Uses and Limitations
Positron Emission Tomography (PET) Scan: Uses and Limitations
Quantitative Sensory Testing: Uses and Limitations
Skin Punch Biopsy: Assessment of Innervation Density
X.C. Treatment of Pain – Pharmacology: Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, and Indications/Contraindications
X.C.1. Opioids
TAGS:
Adverse Effects: Opioid-Induced Hyperalgesia, Opioid Tolerance, Cognitive Effects, Impact on Driving, Effects on Endocrine, Immune, Cardiac, and Respiratory Systems
Effectiveness of Opioids: Evidence Base, Effect on Function
Federal Regulations Regarding Prescribing of Controlled Substances
Mechanism of Action on Pain Transmission and Modulation
Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, and
Indications/Contraindications: Metabolism and Genetic Variability
Rationale for Opioid Rotation, Discontinuation of Opioids
Risk Assessment and Management of the Patient Taking Chronic Opioid Therapy
Route of Administration: Oral, Rectal, Transdermal, IV, Epidural, Spinal
Specific Drugs: Buprenorphine, Methadone, Morphine, Synthetic and Semi-Synthetic Opioids
TAGS:
Adverse Effects
Drug Interactions and Indications/Contraindications
Mechanism of Action
Pharmacokinetics, Pharmacodynamics, Pharmacogenomics
Specific Drugs

X.C.3. Antidepressants and Anticonvulsants
TAGS:
Anticonvulsants: Mechanism of Action
Anticonvulsants: Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, Indications/Contraindications
Anticonvulsants: Specific Drugs
Antidepressants: Mechanism of Action
Antidepressants: Pharmacokinetics, Pharmacodynamics, Adverse Effects, Drug Interactions, Indications/Contraindications
Antidepressants: Specific Drugs

TAGS:
Alpha-2 Adrenergic Drugs (Clonidine, Tizanidine)
Antihistamines
Benzodiazepines
Botulinum Toxin
Cannabinoids
CNS Stimulants
Corticosteroids
Ketamine and NMDA-Receptor Antagonists
Local Anesthetics and Membrane-Stabilizing Drugs
Miscellaneous Analgesic Agents
Muscle Relaxants and Antispasticity Drugs
Neuroleptic Drugs
Other Vasoactive Drugs (Terazosin, Verapamil)
Sympatholytic Drugs
TRPV1 Agonists, Capsaicin and its Analogs
Ziconotide and Other Calcium Channel Blocking Drugs

X.D. Treatment of Pain: Procedural Treatments

X.D.1. General Considerations
TAGS:
Assessment of Infection Risk, Antibiotic Prophylaxis, Sterile Technique
Drug Selection: Steroids and Contrast Agents
Fluoroscopic Imaging and Radiation Safety
Indications and Appropriateness for Interventional Therapy
Preprocedural Factors and Evaluation of Health Status
Ultrasound Guidance: Basics, Techniques, Risks

X.D.2. Nonsurgical Stimulation-Produced Analgesia
TAGS:
Clinical Applications and Efficacy
Mechanisms
Peripheral Stimulation Techniques: TENS, Acupuncture, Vibration
X.D.3. Interventional Pain Management Including Nerve Blocks and Lesioning

**TAGS:**
- Cranial Nerve Blocks and Ablation
- Diagnostic and Treatment Purpose, Clinical Indications, Risks, Anatomy, Pharmacology, and Use of Drugs
- Facet Joint and Zygapophyseal Injections
- Intrathecal Blocks and Neurolysis
- Musculoskeletal: Tendon, Ligament, and Intra-Articular Injections
- Nerve Blocks and Neurolytic Techniques: Risks, Side Effects, Management of Anticoagulation
- Neuraxial Injections: Spinal, Epidural, Nerve Root Injections
- Other Procedural Treatments for Pain
- Peripheral Nerve Blocks (Including Genicular Nerve Blocks)
- Radiofrequency Ablation: Lumbar, Cervical Indications
- Radiofrequency Ablation: Lumbar, Cervical Techniques
- Regional Tissue Plane Blocks: Transversus Abdominis, Erector Spinae, Serratus Plane, Pectoralis Blocks, and Others
- Sympathetic Ganglion and Plexus Blocks
- Vertebral Augmentation: Indications, Risks, Benefits, Complications


**TAGS:**
- Implanted Stimulation Devices: Spinal Cord Stimulations, Dorsal Root Ganglion Stimulation, Peripheral Nerve Stimulation
- Other Neuromodulation Treatment of Pain
- Spinal Drug Delivery Systems: Intrathecal Pumps and Infusions, Epidural Implants and Infusions

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

**TAGS:**
- Ablative Procedures: Cordotomy, Dorsal Root Entry Zone Lesioning, Neurolytic Blocks
- Brain, Brain Stem, Spinal Cord, Cervical/Thoracic/Lumbar, and Peripheral Nerve Procedures
- Intrathecal, Visceral, and Peripheral Nerve Neurolysis: Techniques, Drugs
- Other Neuroablative Procedures for Pain

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

**TAGS:**
- Cellular Products (Lipoaspirate, Bone Marrow Aspirate, Umbilical Stem Cells, Platelet-Rich Plasma)
- Environmental Products (Hyaluronic Acid, Tissue Engineering, Prolotherapy, Replacement Discs)
- Other Regenerative Pain Medicine

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

X.E.1. Cognitive Behavioral and Behavioral Interventions

**TAGS:**
Cognitive and Behavioral Strategies: Application to Specific Pain Syndromes (e.g., Temporomandibular Joint Pain, Neck and Back Pain, Fibromyalgia, Arthritis Pain, Burn Pain, Postoperative Pain)
Common Process Factors: Rapport, Engendering Hope, Therapeutic Alliance
Integration of Approaches: Cognitive Behavioral Treatments, Combined Behavioral and Drug Treatments; Economic Benefits of Integrating Treatment
Other Behavioral Interventions
Stages of Behavioral Change and Effect on Readiness to Adopt Self-Management Therapies: Solution-Focused, Mindfulness, Family, Hypnosis, Biofeedback

X.E.2. Mental Health Treatment
TAGS:
Anger in Chronic Pain Patients and Relation to Perceived Pain
Coping Styles: Definition and Effect on Pain Experience and Response to Treatment
Differential Diagnosis of Anxiety Disorders that May Augment Pain and Suffering
Pharmacotherapy for Treatment of Comorbid Conditions: Antidepressants, Mood-Stabilizing Agents, Anxiolytics, Antipsychotics
Psychiatric and Psychologic Morbidities of Chronic Pain (e.g., Depressive Disorders, Anxiety Disorders, Substance-Related and Addictive Disorders, Somatic Symptom and Related Disorders, Bipolar and Related Disorders)
Psychotherapy for Depressive Disorders: Cognitive Behavioral, Marital, Family, Interpretive, Group Therapy
Role of Biofeedback, Operant Therapy, Mindfulness, Cognitive Behavioral Therapy, Hypnosis, Relaxation
Role of Cultural and Environmental Factors: Effect on Treatment Outcome, Maintenance of Treatment Effects
Role of Education, Fear Avoidance, Self-Esteem, Self-Efficacy, Self-Control, Sick Role, Illness Behavior, and Individual Differences in Affective, Behavioral Response to Pain
Role of Family and Other Caregivers: Importance of Interviewing and Training Patient and Relatives; Evaluating Information from Relatives
Role of Patient Beliefs and Expectations in Pain and Disability; Coping Strategies
Sleep Disorders in Chronic Pain: Diagnosis and Evaluation
Somatic Complaints in Chronic Pain: Conversion (Functional Neurological Symptom) Disorder, Somatic Symptom Disorder, and Illness Anxiety Disorder
Work History and Education in Evaluation of Chronic Pain

X.E.3. Physical Medicine and Rehabilitation
TAGS:
Exercise Therapy
Orthosis Used for Pain Control: Peripheral Joints and Spine
Other Treatment of Pain (Methods): Physical Medicine and Rehabilitation
Physical Modalities: Manipulation, Mobilization, Massage, Traction
Role of Physiotherapy, Principles of Pacing, Graded Activity, Passive and Active Therapy, Manual Therapy
Temperature Modalities (e.g., Heat, Cold, Ultrasound)

X.E.4. Work Rehabilitation
TAGS:
Components of Successful Comprehensive Rehabilitation Program (General Exercise, Cognitive Therapy, Vocational Elements)

Functional Capacity Evaluation: Definition, Usefulness, and Limitations
Identification of Obstacles to Recovery (e.g., Fear of Re-injury, Low Expectations of Recovery, Low Mood, Anxiety, Withdrawal from Social Interaction); Reliance on Passive Treatments; Negative Attitude to Physical Activity and Self-Management
Importance of Early Intervention and Early Return to Work in Reducing Absence
Multidisciplinary Approaches for Those Who Do Not Return to Work Within a Few Weeks (Active Exercise, Addressing Distorted Beliefs About Pain, Enhancing Coping Strategies, Promoting Self-Management)

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

X.E.5 Complementary Therapies (CAM)

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

X.F. Clinical States: Taxonomy

X.F.1. Taxonomy of Pain Systems

TAGS:
Application and Definition of Pain Terms
International Association for the Study of Pain (IASP) Classification of Chronic Pain Syndromes

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

TAGS:
Chronic Primary Pain: Definition, Diagnostic Entities, Etiology
Chronic Secondary Pain: Definition, Diagnostic Entities, Etiology
Location: Body System, Body Site
Pain Qualifiers: Severity, Interference, Psychological and Social Factors, Disability

X.G. Clinical States: Widespread Pain

X.G.1. Complex Widespread Pain

TAGS:
Central Sensitization Disorder
Chronic Pain Disorder with Somatic and Psychological Features
Illness Anxiety Disorder
Mechanisms: Somatization and Hypervigilance, Caused by Injury, Psychological, Infection, Immune System Disorder, Malingering
Somatic Symptom Disorder

X.G.2. Fibromyalgia
TAGS:
Associated Conditions: Irritable Bowel Syndrome, Headache, Cystitis, Chronic Fatigue
Criteria for Diagnosis: Tender Points, Fatigue, Sleep Problems, Mood Disturbance
Definition of Fibromyalgia, Myofascial Pain

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

X.H.1. Assessing and Monitoring Efficacy and Safety in the Postoperative Period
TAGS:
Clinical Outcomes to be Evaluated in an Organized Approach to Acute Pain Management
Epidemiology of Inadequate Control of Acute Pain

X.H.2. Central, Perineural, and Infiltrative Techniques
TAGS:
Neuraxial Opioids and Local Anesthetics
Regional Anesthetic Techniques
Use of Adjuvant Agents

X.H.3. Development of Chronic Post-Surgical Pain or Post-Traumatic Pain
TAGS:
After Amputation
After Burn Injury
After Nerve or Spinal Cord Injury
After Spinal Surgery
After Thoracotomy or Other Specified Area (Herniorrhaphy, Breast Surgery, etc.)

X.H.4. Interventions to Prevent the Development of Chronic Pain after Acute Pain
TAGS:
Epidemiology of Transition from Acute to Chronic Pain
Role of Regional or Neuraxial Analgesia
Role of Perioperative Opioid Management

X.H.5. Multimodal Analgesia for Optimal Perioperative Pain Management
TAGS:
Based on Available Expertise and Technology
Based on Patient Preference
Based on Physical and Mental Status
Formulation Based on Type and Cause of Pain

X.H.6. Nonpharmacologic Treatment
TAGS:
Role of Coping Skills
Role of Hot and Cold Packs
Role of Patient and Family Education
Role of TENS, Stimulation-Based Approaches

X.H.7. Pharmacologic Properties of Major Classes of Drugs Used for Acute Pain Management
TAGS:
Opioids, NSAIDs, Adjuvant Drugs, Local Anesthetics
Physiologic and Psychologic Effects: Identification and Control
Role of Acute Pain Management in Enhanced Recovery (ERAS) Pathways

X.H.8. Tools for Assessment and Management of Acute Pain
TAGS:
Assessment and Management of Older Patients, Delirium
Assessment and Management of Pain in Children
Assessment and Management of Vulnerable Populations
Outcome Measures

X.H.9. Treatment of Special Populations for Acute Pain
TAGS:
Opioid-Tolerant Patients
Patients with Chronic Pain
Patients with Renal/Hepatic Comorbidities
Pregnant or Breastfeeding
Spinal Cord Injury
Treatment of Nonsurgical Pain: Burns, Sickle Cell Disease

X.I. Clinical States: Musculoskeletal Pain

X.I.1. Cervical Spinal Pain
TAGS:
Anatomy
Causes and Differentiation from Neck Pain and Somatic Nerve Pain
Central Neuromodulation and Intrathecal Drug Delivery
Electrodiagnostic Studies: Reliability and Validity
Evidence for Commonly Used Treatments
History Taking and Physical Examination: Role and Limitations
Injection Therapy: Indications, Use, and Complications
Interventions Commonly Used for Acute and Chronic Neck Pain: Evidence for Efficacy
Mechanisms of Referred Pain: Cervicogenic Headache
Medical Imaging: Uses, Limitations, Reliability and Validity
Natural History and Relevance to Management, Including Whiplash Injury
Nonsurgical Intervention: Evidence for Efficacy of Reassurance, Maintaining Activity, and Exercises – Psychological, Physical and Multidisciplinary Therapy,
Complementary Therapies
Pharmacotherapy: Uses and Limitations
Public Health Dimensions: Prevalence, Demography, Personal and Societal Costs
Risk Factors: Transition to Chronic Pain, Predictors of Chronicity
Surgical Treatment: Indications and Use, Including Indications for Urgent Surgical Referral

X.I.2. Lumbar Spinal Pain
TAGS:
Anatomy
Causes and Differentiation of Low Back Pain and Referred Somatic Pain from Radicular Pain, Radiculopathy, and Sciatica; Relevance to Investigation and Treatment
Central Neuromodulation and Intrathecal Drug Delivery
Electrodiagnostic Studies: Reliability and Validity
Evidence for Commonly Used Treatments
History Taking and Physical Examination: Role and Limitations
Injection Therapy: Indications, Use, and Complications
Interventions Commonly Used for Acute and Chronic Low Back Pain: Evidence for Efficacy
Mechanisms of Referred Pain: Radicular Pain
Medical Imaging: Uses, Limitations, Reliability and Validity
Natural History and Relevance to Management: Etiologic and Prognostic Risk Factors
Nonsurgical Intervention: Evidence for Efficacy of Reassurance, Maintaining Activity, and Exercises – Psychological, Physical and Multidisciplinary Therapy, Complementary Therapies
Pharmacotherapy: Uses and Limitations
Psychosocial and Occupational Factors Related to Low Back Pain and Chronicity
Public Health Dimensions: Prevalence, Demography, Personal and Societal Costs
Risk Factors: Transition to Chronic Pain, Predictors of Chronicity
Surgical Treatment: Indications and Use, Including Indications for Urgent Surgical Referral

X.I.3. Musculoskeletal Pain

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

X.I.4 Hereditary Connective Tissue Diseases

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

X.J. Clinical States: Cancer Pain
   TAGS:
   Adjuvant Analgesics: Bisphosphonates, Steroids, Ketamine, Anticonvulsants, Antidepressants, Barbiturates, Cannabinoids
   Adverse Effects of Analgesics, Medication Interactions
   Route of Administration: Oral, Transdermal, IV, Intrathecal
   WHO Ladder: Choice of Analgesics, Limitations
X.J.2. Chronic Cancer Pain: Diagnosis, Etiology, Mechanisms
   TAGS:
   Bone Cancer Pain
   Neuropathic Cancer Pain
   Visceral Cancer Pain
X.J.3. Chronic Cancer Pain Due to Treatment
   TAGS:
   Chemotherapy-Induced Polyneuropathy
   Mucositis
   Post-Cancer Surgery Pain
   Radiation-Induced Neuropathy
X.J.4. Palliative Care: Definition and Scope
   TAGS:
   Advance Care Directives
   Barriers to Treatment
   Frequency of Pain and Multiple Sites of Pain
   Hospice and Multidimensional Treatments
   Importance of Development of Evidence-Based Practice
X.J.5. Comprehensive Evaluation of Patients with Cancer Pain: Needs and Approaches
   TAGS:
   Addressing End-of-Life Symptoms: Nausea, Respiratory Distress, Fatigue
   Social and Cultural Influences
   Value of Interdisciplinary Teams
X.J.6. Principles of Treatment
   TAGS:
   Integration of Other Modalities: Physical, Psychological, and Anesthetic
   Management of Acute Cancer Pain
   Treatment of Underlying Disease
X.J.7. Interventional Approaches: Indications, Risks, Practical Implications
   TAGS:
   Injections and Neurolysis
   Intrathecal Therapy
   Role of Primary Cancer Therapy
   Surgical Approaches
X.J.8. Multidisciplinary Management and Special Situations
   TAGS:
   Needs of Special Populations: Children, Patients with Learning Disabilities, Older Adults
Pain Treatment in the Cancer Patient with Coexisting Substance Use Disorder or Other Psychiatric Disorder
Physical Therapy: Indications, Utility, and Effectiveness
Psychological Approaches: Indications, Utility, and Effectiveness
Treatment of Persistent Pain in Cancer Survivors

TAGS:
Benefit to Burden Ratio: Variation According to Stage
Prognosticating Life Expectancy
Physician-Assisted Suicide, Euthanasia, Double Effect, Intent

X.K. Visceral Pain

X.K.1. Chronic Abdominal Pain
TAGS:
Anatomy: Organization of Peripheral and Central Visceral Innervation, Properties of Visceral Nociceptors, and Mechanisms of Visceral Nociceptor Sensitization
Classification of Chronic Visceral Pain Disorders: From Persistent Inflammation, Vascular Mechanisms, and/or Mechanical Factors
Clinical Differentiation of Gastrointestinal, Urologic, Gynecologic, and Musculoskeletal Pain
Diagnostic Evaluation and Treatment
Distinct Clinical Features, e.g., Chronic Pancreatitis, Irritable Bowel Syndrome, Inflammatory Bowel Disease, Functional Abdominal Pain
Epidemiology
Management of Visceral Pain: Pharmacotherapy, Physical Therapy, Psychological Therapies, Interventional Techniques
Peripheral and Central Mechanisms of Visceral Pain Modulation
Psychological Principles in Clinical Assessment, Explanation, and Treatment

X.K.2. Chronic Pelvic Pain
TAGS:
Anatomy
Clinical Differentiation of Gastrointestinal, Urologic, Gynecologic, and Musculoskeletal Pain
Common Causes, Diagnostic Evaluation, and Treatment in Men
Common Causes, Diagnostic Evaluation, and Treatment in Women
Epidemiology
Management of Pelvic Pain: Pharmacotherapy, Physical Therapy, Psychological Therapies, Interventional Techniques
Psychological Principles in Clinical Assessment, Explanation, and Treatment

X.L. Headache and Orofacial Pain

X.L.1. Headache
TAGS:
Anatomy and Physiology
Classification of Headache Disorders: Primary Headache (Migraine, Tension, Cluster, Paroxysmal Hemicrania, Hemicrania Continua)
Classification of Headache Disorders: Secondary Headache (Trauma, Vascular Disorder, Non-Vascular Intracranial Disorder, Due to Substance or its Withdrawal, Infection)
Critical Factors for Life-Threatening Headache
Diagnosis and Management of Post Dural Puncture Headache
Evaluation: Systematic Case History, Use of Headache Diary, Selection of Appropriate Examination Based on History
Indications for Further Investigation of Headache
Internationally Accepted Diagnostic Criteria for Classification of Headache Disorders
Major Hypotheses About Mechanisms
Mechanisms and Pathophysiology
Pharmacologic Treatment and Alternatives
Physical, Psychological, and Social Factors Contributing to Headache; Role of Counseling and Other Nonpharmacologic Treatment (e.g., Botulinum Toxin)
Role of Medication Overuse
Treatment and Management of Headache: Pharmacologic, Nonpharmacologic, Prophylaxis, Interventional Techniques, Multidisciplinary Management
X.L.2. Orofacial Pain (e.g., Trigeminal Neuralgia, Post Herpetic Neuralgia, Atypical Facial Pain)
TAGS:
Anatomic, Physiologic, Psychosocial Aspects
Classification of Orofacial Pain: Primary (Temperomandibular Disorders, Trigeminal Neuralgia, Atypical Facial Pain, Burning Mouth Syndrome)
Classification of Orofacial Pain: Secondary (Disorders of the Cranium, Dental Pain, Neuropathic Pain, Secondary Temperomandibular Disorders)
Evidence-Based Treatment Options
History Taking, Physical Examination, and Diagnostic Studies
Treatment and Management: Pharmacologic, Surgical Options, Ablation and Stimulation Techniques, Cognitive Behavioral Therapy, Physiotherapy, Brain Stimulation
X.M. Neuropathic Pain
X.M.1. Peripheral Neuropathic Pain (e.g., Diabetic Peripheral Neuropathy, Post Herpetic Neuralgia, Peripheral Nerve Injuries)
TAGS:
Clinical Characteristics
Common Neuropathic Pain Syndromes: Differential Diagnosis, Natural Course Definition, Anatomy, and Epidemiology
Evaluation: Clinical, Electrodiagnostic, Laboratory, and Radiographic Findings
Evaluation: Differential Diagnosis, Assessment Tools
Mechanisms and Pathophysiology: Peripheral Nerve Injury, Compression Neuropathy, Amputation
Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative
X.M.2. Complex Regional Pain Syndrome
TAGS:
Definition, Anatomy, and Epidemiology
Evaluation and Clinical Assessment
Mechanisms and Pathophysiology
Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative

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

TAGS:
Clinical Characteristics
Common Central Pain Syndromes: Differential Diagnosis, Natural Course
Definition, Anatomy, and Epidemiology
Evaluation: Differential Diagnosis, Assessment Tools
Evaluation: Clinical, Electrodiagnostic, and Radiographic Findings
Mechanisms and Pathophysiology: Pathologic Mechanisms in Nervous System
Therapeutic Modalities: Pharmacologic, Interventional, Rehabilitative

X.N. Special Cases

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

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

X.N.2. Pain in Older Adults

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

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

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

X.N.4. Pain Relief in Persons with Opioid Tolerance, Substance Use, and/or Addictive Disorders
TAGS:
Acute Pain Management of Patients with Substance Use Disorder
Biopharmacologic and Neurophysiologic Basis of Addiction
Definitions: Tolerance, Dependence, Addiction, Dual Diagnosis, Substance Use Disorder
Description of Impact of Misuse: Intoxication and Withdrawal
Interactions Between Addiction, Substance Use Disorder, and Pain
Interpretation of Drug Toxicology Testing
Legal, Regulatory, and Reimbursement Issues When Prescribing Controlled Substances to Patients with Pain and Substance Use Disorder
Needs of Special Populations: Pregnant Women, Neonates, Cancer Patients
Pharmacologic Treatment of Patients with Substance Use Disorder
Principles of Comprehensive Approach to Pain Management in Patients with Substance Use Disorder
Recognition of Aberrant Drug-Related Behavior Including Diversion and Misuse
Risks and Benefits of Opioid Use in Treatment of Chronic/Cancer Pain in Patients with Substance Use Disorder or Who Take Other Psychoactive Substances
Risk Assessment for Substance Use Disorder and Addiction in Patients with Pain Screening and Referral for Substance Use Disorder in Patients with Pain

X.N.5. Chronic and Acute Pain in Pregnancy and Lactation
TAGS:
Causes of Pain during Pregnancy
Factors Influencing Perception of Pain in Pregnancy
Management of Opioids During Pregnancy Including Neonatal Abstinence
Pharmacologic Management of Pain in Pregnancy and Lactation
Principles of Pain Management in Pregnancy

X.N.6. Pain Relief in Areas of Deprivation and Conflict
TAGS:
Access to Analgesic Drugs and Palliative Care Worldwide
Causes of Pain Worldwide
Education, Training, and Knowledge of Pain Worldwide
Ethical and Political Issues in Pain Management Worldwide
Spectrum of Providers Caring for Patients with Pain Worldwide
Variability of Availability and Access to Pain Treatment Worldwide

X.N.7. Pain Assessment and Management in Special Populations
TAGS:
Patients from Diverse Socioeconomic, Ethnic, Cultural Backgrounds
Patients with Hepatic or Renal Function Impairment
Patients with Mental Health Diseases
Patients with Physical Disabilities

X.N.8. Diversity, Equity, and Inclusion (DEI) in Health Care
TAGS:
Approaches to Improvement: Individual, Community, Policy
Barriers: Systematic Discrimination, Bias, Implicit Bias
DEI in the Workplace and in Academia

X.N.9. Healthcare Disparities
TAGS:
Child and Adolescent Healthcare Disparities
Maternal Healthcare Disparities
Social Determinants of Health: Race, Language, Education Status, and Others

X.N.10. Ethics and Medicolegal Issues in Clinical Practice
TAGS:
Clinician Wellness and Self-Care: Burnout, Sleep Deprivation, Adaptations for Disability, Substance Use
Healthcare Provider Certification, Maintenance of Certification, Professional Standing, Clinical Practice Assessment
Professionalism: Disclosure of Errors, Recognizing Limitations, Reporting Unsafe Conditions, Responding to Unprofessional Behavior

X.N.11. Practice Management
TAGS:
Clinical Informatics: Electronic Medical Record Systems, Artificial Intelligence
Costs of Healthcare: Understanding Funding and Payment, Cost-Conscious Practice
Documentation, Coding, and Billing: Compliance, Accuracy, Coding Integrity
Efficient Practice Staffing and Scheduling
Population Health: Resources to Improve Access

X.N.12. Quality Improvement and Patient Safety
TAGS:
Barriers to Patient Safety and Quality Improvement (QI) Implementation
Change Management Methods: Peer Review, Morbidity and Mortality Conferences, Lean Six Sigma, QI Process, Value Stream Mapping, Failure Mode, and Root Cause Analysis
Crisis Management and Teamwork: Simulation Training, Handoffs, Checklists
Definitions: Medical Error, Adverse Events, Sentinel Events
Medication Errors: Assessment and Prevention, Reconciliation, Use of Technology
Performance Assessment: Individual Benchmarks, Facility Scorecards, Public Reporting
QI Basics: Design and Implementation, QI Metrics, Patient Satisfaction Measurement, Value-Based Care and Incentives

XI. PEDIATRIC ANESTHESIOLOGY
XI.A. Basic Science
XI.A.1. Anatomy
TAGS:
Airway
Airway Management
Anatomy for Procedures
Atresias, Stenoses and Webs
Body Habitus
Central Neuraxial Blockade
General Development
Peripheral Nerve Blockade
Vascular Cannulation
Water, Volume, and Blood Composition

XI.A.2. Physics and Anesthesia Equipment
TAGS:
Brain, Spinal Cord, and Neuromuscular Function
Breathing Circuits
Cardiac Rhythm and Vascular Pressures
Methods for Monitoring
Oxygenation, Gas Concentration, and Ventilation
Point-of-Care Ultrasound
Respiration
Temperature
Ventilation Devices and Techniques

XI.A.3. Anesthetic Pharmacology: Physiologic States, Pathophysiologic States and Adverse Effects
TAGS:
Agents Affecting Coagulation
Anti-Emetics
Biotransformation and Excretion
Blood-Brain Barrier
Drug Absorption
Drug Distribution
Inhalation Anesthetics
Local Anesthetics
Neuromuscular Blocking and Reversal Agents
Non-Opioid Analgesics
Opioid Analgesics
Pharmacogenetics
Pharmacokinetics and Pharmacodynamics
Sedative and Anxiolytic Agents
Sympathetic and Parasympathetic Agents

XI.B. Organ-Based Basic and Clinical Sciences
XI.B.1. Respiratory System
TAGS:
Acute Respiratory Distress Syndrome (ARDS)
Adaptive-Pressure Control Ventilation (APCV)
Airway-Pressure Release Ventilation (APRV)
Anatomy and Physiology
Anesthesia for Thoracic Procedures
ARDS: Barotrauma and Volutrauma
ARDS: Berlin Criteria
ARDS: Clinical Phases
ARDS: Etiology, Infectious and Noninfectious
ARDS: Oxygenation Index
ARDS: Permissive Oxygenation
ARDS: Treatment
Chest Wall Surgery/Reconstruction
Clinical Sciences
Congenital Pulmonary Airway Malformation (CPAM)
CPAP
Heliox
High-Flow Nasal Canula
High-Flow Oscillatory Ventilation (HFOV)
Lung Physiology
Mediastinal Masses
Musculoskeletal
Nitric Oxide
Noninvasive Positive-Pressure Ventilation (PPV)
Obstructive Disease
One Lung Ventilation
Oxygen Transport
Oxygenation Index
Parenchymal
Pleural
Prenatal and Postnatal Development
Respiratory Mechanics, Ventilation, and Lung Volumes
Restrictive Disease
Surfactant and Surface Tension
Tracheobronchial
Upper Airway
Ventilation
Ventilation/Perfusion Matching
Video-Assisted Thoracoscopy

XI.B.2. Cardiovascular System

TAGS:
Acyanotic Lesions
Anatomy and Physiology
Anesthesia for Cardiac Patients
Anesthesia for Diagnostic, Interventional and Electrophysical Procedures
Anesthesia in Patient with Pacemaker or AICD
Anesthetic Effects on the Cardiovascular System
Arrhythmic Lesions
Cardiogenic Shock
Cardiomyopathies
Cardiopulmonary Resuscitation and PALS
Cardiovascular Effects on Anesthetic Uptake and Delivery
Clinical Science
Cyanotic Lesions
Disease States
Dissociative Shock: Azotemia, Hyperlactatemia, and Metabolic Acidosis
Distributive Shock
Fetal, Transitional, and Adult Circulation
Fluid Resuscitation
General Considerations
Heart Transplantation
Hypertensive Crisis
Hypovolemic Shock
Infectious Diseases
Inotropic Medication
Intracardiac Masses
Mechanical Circulatory Support- ECMO
Obstructive Shock
Palliative Procedures
Pericardial Disease
Postcardiac Arrest Syndrome
Postcardiac Arrest Syndrome: Metabolic Abnormalities
Prenatal and Postnatal Development
Pulmonary Hypertension
Return of Spontaneous Circulation (ROSC)
Vasoactive Medications

XI.B.3. Central and Peripheral Nervous Systems

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

XI.B.4. Gastrointestinal System
TAGS:
Abdominal Wall Defects
Atresias, Stenoses and Webs
Clinical Science
Esophageal/Gastrointestinal Foreign Bodies
Esophageal, Stomach and Intestine Disorders
Hernias
Liver, Biliary Tract and Spleen Disorders
Morbid Obesity/Bariatric Surgery
Necrotizing Enterocolitis

XI.B.5. Renal/Urinary
TAGS:
Clinical Science
Prenatal and Postnatal Development
Renal Failure

XI.B.6. Endocrine/Metabolic
TAGS:
Adrenal Disorders
Clinical Science
Diabetes Insipidus
Diabetes Mellitus
DiGeorge Syndrome
Disorders of Sodium Regulation
Pheochromocytoma
Thyroid Disorders

XI.B.7. Hematology/Oncology
TAGS:
Anemias
Anterior Mediastinal Mass
Bone Marrow and Stem Cell Transplants
Chemotherapeutic Agents and Side Effects
Clinical Science
Coagulation Disorders
Hematology
Oncology
Radiation Therapy
Sickle Cell Disease
Tumor Lysis Syndrome

XI.B.8. Genetics
TAGS:
Clinical Sciences
Craniofacial Syndromes
Genetic Abnormalities
Inborn Errors of Metabolism
Malignant Hyperthermia
Mitochondrial Myopathies
Muscular Dystrophies
Myopathic Disorders and Myotonias
Osteochondrodysplasia Symptoms
Skin and Connective Tissue Disorders
Trisomy 21

XI.C. Clinical Subspecialties

XI.C.1. Neonatal

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

XI.C.2. Painful Disease States

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

XI.C.3. Otolaryngology

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


TAGS:
Cleft Repairs
Clinical Science
Mandibular Repairs
Vascular Malformations

XI.C.5. Ophthalmology
TAGS:
Clinical Science
General Considerations
Pharmacology of Ophthalmologic Medications
Strabismus Repair
Trauma

XI.C.6. Orthopedic Surgery
TAGS:
Anterior, Posterior, and Combined Spine Fusion
Clinical Science

XI.C.7. Trauma and Burns
TAGS:
Anesthetic and Pain Management of the Burn Patient
Burns
Dressing Changes
Fluid Resuscitation and Calculating Burn Surface Area
Hypothermia and Submersion Injury
Incidence, Patterns, Implications of Abuse
Inhalation Injuries/Airway Management
Management of the Polytrauma Victim
Trauma
Types, Mechanisms, Locations and Implications of Injuries

XI.C.8. Nutritional Support in the PICU
TAGS:
Electrolyte Disorders
Enteral Feedings: Gastric and Post-Pyloric
Free Fatty Acid Deficiency
Glycemic Control in the PICU
Hyperglycemia
Line-Associated Infections
Liver Dysfunction
NPO for Children on Enteral Feedings
Risk of Aspiration
Total Parenteral Nutrition (TPN)

XI.C.9. Liver Dysfunction
TAGS:
Biochemical Guidance of Liver Injury
Coagulopathy
Hepatic Encephalopathy
Hepatorenal Syndrome
Hyperdynamic Circulatory Failure
Liver Transplantation
Pediatric Acute Liver Failure (PALF)
Rapidly Progressive Multisystem Organ Failure
Systemic Inflammatory Response Syndrome (SIRS)

XI.C.10. Acute Kidney Injury
TAGS:
Acute Hyperkalemia
Acute Tumor Lysis Syndrome
Biomarkers
Continuous Renal Replacement Therapy
Continuous Venovenous Hemofiltration (CVVH)
Intermittent Hemodialysis
Peritoneal Dialysis
Renal Replacement Therapy (RTT)

XI.C.11. Transfusion Practices
TAGS:
Anemia
Hemolytic Transfusion Reactions
Transfusion Related Acute Lung Injury (TRALI)
Transfusion Triggers
Transfusion-Associated Circulatory Overload (TACO)
Transfusion-Associated Risks

XI.D. Clinical Science of Anesthesia
XI.D.1. Evaluation and Preoperative Preparation of the Pediatric Patient (See Specific Disease States)
TAGS:
Autism Spectrum Disorders
Concussion
Evaluation of Coexisting Disease
Fasting Requirements
General Considerations
Informed Consent
Laboratory Testing
Normal Developmental Milestones
Parental Presence and Pharmacologic Preparation for Anesthetic Induction
Physical Examination
Psychosocial Preparation of the Patient and Family
Upper Respiratory Tract infections

XI.D.2. General Considerations of the Perioperative Period
TAGS:
Fluid, Electrolyte, and Glycemic Management
Thermoregulation
Transfusion Therapy and Blood Conservation Techniques

XI.D.3. Regional Anesthesia and Analgesia
XI.E.2

TAGS:
Central Neuraxial Blockade: Indications, Contraindications, Techniques, Adjuvants, and Controversies
Peripheral Nerve Blockade: Indications, Contraindications, Techniques, Adjuvants, and Controversies
Pharmacology and Toxicity of Local Anesthetics
XI.D.4. General Anesthesia
(TAGS:
Management of the Difficult Airway
XI.D.5. Complications of Anesthesia
(TAGS:
Airway Obstruction
Anaphylactic and Anaphylactoid Reactions
Awareness and Recall under Anesthesia
Cardiopulmonary Resuscitation
Dysrhythmias
Iatrogenic Drug Errors
Iatrogenic Trauma/Positioning Injury
Inadequate Vascular Access
XI.D.6. Special Techniques and Situations
(TAGS:
Non-Operating Room Anesthesia (NORA)
Transition of Patient Care
XI.D.7. Postoperative Period
(TAGS:
Management and Diagnosis of Pain, Anxiety and Emergence Agitation
Post-operative Nausea and Vomiting
XI.D.8. Acute and Chronic Pain Management
(TAGS:
Enhanced Recovery after Surgery (ERAS)
Opioid Induced Hyperalgesia
Opioid Tolerance
XI.E. Special Problems or Issues
XI.E.1. Professional Issues
(TAGS:
Continuous Quality Improvement
Ethical and Legal Obligations of Pediatric Anesthesia Care and Research
Practice-Based Learning and Improvement
Teaching, Supervision, and the Anesthesia Care Team
XI.E.2. Principles of Biostatistics and Study Design

XII. ADULT CARDIAC ANESTHESIOLOGY
XII.A. Foundations of Adult Cardiac Anesthesiology
XII.A.1. Anatomy and Physiology
(TAGS:
Anatomical Landmarks for Regional Anesthesia (e.g., PECS or ESP Blocks)
Baroreceptor Function
XIIB.1

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

XIIB. Cardiothoracic Diseases (Pathophysiology, Pharmacology, and Clinical Management)

XIIB.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
XI.B.1

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
TAGS:
3-Dimensional Imaging
Artifact Recognition
Complications and Safety
Echocardiographic Anatomy: Chambers, Valves, Great Vessels, Pericardium
Properties and Physics of Ultrasound and Doppler
Standard TEE Views and Comprehensive Examination
TEE Image Acquisition and Optimization
Vascular Anatomy and Pathology

XII.D.2. Transthoracic Echocardiography and POCUS
XII.D.3. Vascular Pressures

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

XII.D.4. Heart Function

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

XII.D.5. Mixed Venous Oxygen Saturation (SvO₂)
XII.D.6. Cerebral Oximetry
XII.D.7. Peripheral Oximetry
XII.D.8 Coagulation
XII.D.9 Temperature

**TAGS:**
Cardiopulmonary Bypass Considerations

XII.D.10. Urine Output

XII.D.11. ABG Interpretation

**TAGS:**
Anion Gap
Temperature Effect on Blood Gases: Alpha-Stat vs. pH-Stat

XII.D.12. Cerebrospinal Fluid Pressure
XII.F.2

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:
    Cardiopulmonary 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. WV 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.1.2. 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.1.3. 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.1.4. 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.1.5. 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.1.6. 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, Nonmalefeasance
Professional Behavior: Honesty, Integrity, Compassion, Respect, Altruism, Conflicts of Interest, Response to Marketing
Professionalism: Definitions and Teaching
Recognizing and Responding to Unprofessional Behavior
Recognizing Limitations In Expertise and Need to Seek Guidance
Research Ethics
Review and Implementation of Trials, The Institutional Review Board
Sleep Deprivation
Substance Use Disorder
The Health Insurance Portability and Accountability Act (HIPAA)
Understanding Laws Related to Controlled Substances, Including Opioids and Cannabinoids