

# PAIN MEDICINE EXAMINATION

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## Content Outline

November 2024

The Content Outline for Pain Medicine is based on the International Association for the Study of Pain (IASP) Core Curriculum for Professional Education in Pain (Third Edition, 2005). It is divided into four major sections including General, Assessment and Psychology of Pain, Treatment of Pain (Pharmacology and Other Methods) and Clinical States (including Taxonomy, Tissue Pain, Visceral Pain, Headache and Facial Pain, Nerve Damage and Special Cases). The examination includes items from all topics within the curriculum. Questions are routinely reviewed and either revised or replaced as necessary based upon ongoing changes in the science and practice of Pain Medicine.



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# A. General

## 1. Background Concepts

- a. Anatomy, Physiology, and Pharmacology of Nociception
  - i. Anatomy and physiology of nociception
    - 1. Somatosensory system
    - 2. Autonomic nervous system
    - 3. Somatic and visceral peripheral nerves
    - 4. Spinal system
    - 5. Brain: midbrain, thalamic nuclei, cerebral cortex, limbic system
  - ii. Mechanisms of nociceptive transmission and modulation
    - 1. Peripheral mechanisms: afferent fibers, peripheral sensitization
    - 2. Central mechanisms: Spinal transmission in the dorsal horn, spinal processing, spinal reflexes, medullary dorsal horn mechanisms
    - 3. Central mechanisms: Changes in the brain with chronic pain
    - 4. Mechanisms of acute pain, inflammatory, and neuropathic pain
    - 5. Mechanisms and physiology of somatic and visceral pain
    - 6. Referred pain
  - iii. Peripheral and central sensitization
    - 1. Mechanisms and implications for treatment in pain
    - 2. Plasticity, NMDA receptors, long term potentiation, neuroimmune signaling
    - 3. Psychosocial factors contributing to central sensitization
    - 4. Descending inhibition and facilitation, pain modulation
    - 5. Neurotransmitters involved in pain modulation
    - 6. Pharmacology of pain modulation in the brain
    - 7. Other anatomy, physiology, and pharmacology of nociception
- b. Development of Pain Systems
  - i. Anatomical development of pain system in fetus
  - ii. Pain behavior in the fetus and newborn
  - iii. Physiologic and behavioral pain assessment measures in infants: use and limitations
  - iv. Long-term consequences of neonatal pain
  - v. Role of pediatric traumatic experiences on pain system development
  - vi. Other development of pain systems
- c. Research Methodology of Pain
  - i. Epidemiology
    - 1. Use of data from epidemiologic studies of pain
    - 2. Measurement of burden in a population, including epidemiologic measures of occurrence (prevalence, incidence)
    - 3. Use of risk factors to guide treatment
  - ii. Principles of clinical trial design
    - 1. Inclusion and exclusion criteria, use of data from medical history and exam
    - 2. Use of study instruments (questionnaires), lab tests, imaging
    - 3. Development of a hypothesis
  - iii. Research study design
    - 1. Observational studies: uses and limitations (e.g., measurement of strength of association between risk factors and pain); know major risk factors for development of chronic pain
    - 2. Cohort studies: use to determine natural history and predictors of outcome
    - 3. Correlational studies, case reports, retrospective studies, cross-sectional survey
    - 4. Controlled trials: randomized, prospective, experimental
  - iv. Data analysis
    - 1. Different types of data (parametric, continuous, ratio, categorical, dichotomous)

2. Normal and non-normal data distribution, statistical testing, logarithms
3. Descriptive statistics: calculation of confidence intervals, means and proportions
4. Probability testing, sample distributions, sampling techniques
- v. Statistical analysis
  1. Power and power calculations
  2. Importance of effect size, evaluating levels of evidence
  3. Concepts of significance and power, type 1 and type 2 errors, relationship to sample size
  4. Influence of sample size on derived indices such as a proportion or a mean
- vi. Evaluating study results
  1. Concept of minimal clinically important difference
  2. Regression analysis, dependent variable, explanatory variables, confounding variables
  3. Use of tests between continuous data: correlation coefficients
  4. Application of tests to evaluate studies: t-test, ANOVA, linear regression, chi-squared test, odds ratios, logistic regression, effect size, statistical power, number needed to treat, number needed to harm
  5. Precision of tests with regards to clinical relevance: repeatability, minimal clinically important difference (MCID)
  6. Meta-analysis: summary statistics, effect size, standardized mean differences, and odds ratios
- vii. Understanding basic research concepts
  1. Reliability and validity
  2. Sensitivity and specificity
  3. Randomization to minimize bias, use of controls
- viii. Methods of assessing scientific evidence
  1. Grades of evidence, difficulties of combining evidence in reviews and meta-analysis and systematic reviews
  2. Cochrane database of systematic reviews
  3. Influence of bias, chance, confounding variables, methods to reduce them
  4. Publication bias
- ix. Ethical standards in pain management and research
  1. Ethics of pain management and research: principles of justice, autonomy, beneficence, nonmaleficence
  2. Professionalism and quality assurance in research
  3. Ethical standards of research design
    - a. Scientific validity, fair subject selection, favorable risk-benefit ratio
    - b. Respect for enrolled subjects, review of history of medical ethics
    - c. Review and implementation of trials (independent review, IRB)
  4. Informed consent in research
  5. Conflicts of interest and financial disclosure
- x. Other research methodology
- d. Teamwork and Care Coordination
  - i. Importance of coordination of care with colleagues and health systems relevant to patient care
  - ii. Mentorship and personal well-being: personal development, balance between professional requirements and personal life
  - iii. Participation in quality assurance, identifying system errors
  - iv. Optimizing communication, transitions of care, and hand-off procedures
  - v. Other teamwork and care coordination
- e. Legal and Regulatory Issues
  - i. Elements of medical malpractice: duty, breach of duty, causation, damages

- ii. Legal actions and consequences: National Practitioner Data Bank, Closed Claims findings, professional liability insurance
- iii. Understanding laws related to controlled substances, including opioids and cannabinoids
- iv. Patient privacy issues: principles of confidentiality, access to records, protected health information
- v. The Health Insurance Portability and Accountability Act (HIPAA)
- vi. Workers' compensation and requests for disability evaluations
- vii. Requirements for reporting of the impaired healthcare professional
- viii. Other legal and regulatory issues

## 2. Assessment of Pain

### a. Clinical Pain Evaluation

- i. Pain as a subjective, multidimensional experience: biopsychosocial model
  - 1. IASP definition of pain
  - 2. Distinction between nociception and pain
  - 3. Differences between acute and chronic pain
- ii. Terminology in pain
  - 1. Analgesia, hyperalgesia, hypoalgesia, anesthesia, hyperesthesia, hypoesthesia, paresthesia, dysesthesia
  - 2. Spontaneous pain and evoked pain
  - 3. Hyperpathia, allodynia, anesthesia dolorosa
  - 4. Radicular pain, radiculopathy
- iii. Measurement of pain
  - 1. Measurement of subjective experience: basic concepts
  - 2. Measurement of pain in populations: challenges and limitations
  - 3. Direct pain measurement: self-report
  - 4. Indirect pain measurement: observations
- iv. Pain sensory testing
  - 1. Sensory threshold, pain threshold, pain tolerance
  - 2. Mechanical allodynia (punctate, dynamic, static)
  - 3. Cold and warm allodynia
  - 4. Quantitative sensory testing: definition, methods, mechanisms
- v. Components of pain assessment
  - 1. Basic medical examination: history taking, physical examination, mental status examination
  - 2. Body functions, body structures, assessment of motor function, assessment of sensory function, assessment of autonomic function
  - 3. Biomedical assessment: response to treatments to date, prior and ongoing pharmacological management, nutritional status, sleep status, sexual function, general health
- vi. Other assessment of pain

### b. Placebo and Pain

- i. Placebo: definition and incidence
- ii. Historic aspects of placebo response
- iii. Placebo response: mechanisms and interpretation
- iv. Role of placebo in clinical trials
- v. Role of placebo in clinical trials: response bias
- vi. Ethics of placebo in clinical trials and clinical practice
- vii. Concept of regression to the mean
- viii. Placebo as treatment modality
- ix. Nocebo effect
- x. Other placebo and pain

- c. Assessment of Functional Outcomes and Disability
  - i. Functioning and disability
    - 1. Body functions and structures: anatomic, physiological and psychological function, impairment (sleep, attention, temperament, emotional, cognitive)
    - 2. Activities and participation: execution of task, involvement in life situation, limitations and restrictions (exercise tolerance, sexual function, mobility)
    - 3. Developing a pain rehabilitation program: assess static and dynamic flexibility, strength, coordination, agility for joint, spinal, and soft tissue pain conditions
    - 4. Validated tools to assess functional status
  - ii. Contextual factors: facilitators or barriers for functioning
    - 1. Environmental factors: physical, social, and attitudinal (role of health and social services, workplace policies, attitudes of health professionals)
    - 2. Personal factors: role of partners and family, role of workplace, cultural background, religious or spiritual principles, position in society, recreational and leisure activities
- d. Assessment of Psychosocial and Cultural Aspects of Pain
  - i. Assessment of pain as a biopsychosocial experience
    - 1. Definition and measurement: validated tools for older adults, cognitively impaired, those with behavioral issues, patients from diverse socioeconomic backgrounds
    - 2. Social, cultural, psychological, physical, genetic, age, health literacy, religion, role of family
    - 3. Role of psychology, physical and occupational therapy, nursing, social work: multimodal approach from one practitioner, multidisciplinary approach from a team, referrals to other specialists
    - 4. Assessment of nutritional status, sleep function, sexual function, general health, past treatments, and pharmacological management
    - 5. Assessment of special populations: pregnant women, older adults, mental health disorders (dementia, intellectual disabilities), active or past substance abuse, opioid tolerant patients)
  - ii. Psychological assessment
    - 1. Focused assessment of home situation, family role, employment, financial status, recreational activities, cultural beliefs
    - 2. Understand impact of history of physical, emotional, sexual abuse
    - 3. Role of past and current psychological history, stresses, coping strategies
    - 4. Understand beliefs about pain, expected prognosis, life interference, changes to lifestyle and identity
    - 5. Screening questionnaires for psychological status
- e. Sex and Gender Issues in Pain
  - i. Definition of sex and gender
  - ii. Sex differences: role in epidemiology of pain in relation to age and reproductive history
  - iii. Sex differences in nociceptive responses and pain perception
  - iv. Analgesic response: differences between sexes and within the same sex
  - v. Sex differences: biologic and psychosocial contributions to pain response
  - vi. Sex differences: role in treatment seeking, delivery and effectiveness of treatment
  - vii. Other sex and gender issues in pain
- f. Imaging and Electrodiagnostic Evaluation
  - i. Magnetic resonance imaging: MRI, fMRI, and MR spectroscopy uses and limitations
  - ii. Electrodiagnostic evaluation (EMG/NCV/evoked potentials): uses and limitations
  - iii. Quantitative sensory testing: uses and limitations
  - iv. Skin punch biopsy: assessment of innervation density
  - v. Laser-evoked potentials: uses and limitations
  - vi. Positron emission tomography (PET) scan: uses
  - vii. Nuclear medicine bone scan: uses and limitations

- viii. Electroencephalography (EEG): uses
- ix. Other imaging and clinical nerve function studies

### 3. Treatment of Pain: Pharmacotherapy

- a. Opioids
  - i. Mechanism of action on pain transmission and modulation
  - ii. Pharmacokinetics, pharmacodynamics, pharmacogenomics: dose equivalence, renal and hepatic impairment
  - iii. Drug interactions and indications/contraindications
  - iv. Specific drugs: buprenorphine, methadone, codeine, fentanyl, hydromorphone, morphine, oxycodone, oxymorphone, tapentadol, tramadol
  - v. Route of administration: oral, sublingual, buccal, rectal, transdermal, topical, subcutaneous, intramuscular, intravenous, intra-articular, epidural, spinal
  - vi. Compare opioid use in acute, chronic non-cancer, and cancer pain
  - vii. Effectiveness of opioids: evidence base, loss of efficacy with time, length of treatment, effect on general function
  - viii. Opioids in chronic non-cancer pain: use in persons with substance use disorders, addiction vs. pharmacological tolerance, withdrawal symptoms
  - ix. Rationale for opioid rotation, discontinuation of opioid
  - x. Adverse effects: opioid induced hyperalgesia, opioid tolerance, effects on immune system, endocrine system, cardiovascular system, role in tumor growth, and cognitive effects, impact on driving
  - xi. Other opioids
- b. Antipyretic Analgesics: Nonsteroidals, Acetaminophen, and Phenazone Derivatives
  - i. Mechanism of action
  - ii. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  - iii. Drug interactions and indications/contraindications
  - iv. Specific drugs
  - v. Adverse effects
  - vi. Other antipyretic analgesics
- c. Antidepressants and Anticonvulsants
  - i. Antidepressants
    - 1. Mechanism of action
    - 2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
    - 3. Drug interactions and indications/contraindications
    - 4. Specific drugs
    - 5. Adverse effects
  - ii. Anticonvulsants
    - 1. Mechanism of action
    - 2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
    - 3. Drug interactions and indications/contraindications
    - 4. Specific drugs
    - 5. Adverse effects
  - iii. Other antidepressants and anticonvulsants
- d. Other Analgesic Pharmacotherapy
  - i. Neuroleptic drugs
    - 1. Mechanism of action
    - 2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
    - 3. Drug interactions and indications/contraindications
    - 4. Adverse effects
  - ii. Antihistamines

1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- iii. Central nervous system stimulants
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- iv. Corticosteroids
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- v. Muscle relaxants and antispasticity drugs
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- vi. Ketamine and NMDA-receptor antagonists
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- vii. Local anesthetics and membrane-stabilizing drugs
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- viii. Sympatholytic drugs
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- ix. Benzodiazepines
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- x. Botulinum toxin
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- xi. TRPV-1 agonists, capsaicin and its analogs
1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- xii. Alpha-2 adrenergic drugs (clonidine, tizanidine)
1. Mechanism of action



2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
3. Drug interactions and indications/contraindications
4. Adverse effects
- xiii. Other vasoactive drugs (terazosin, verapamil)
  1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- xiv. Cannabinoids
  1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- xv. Ziconotide and other calcium channel blocking drugs
  1. Mechanism of action
  2. Pharmacokinetics, pharmacodynamics, pharmacogenomics
  3. Drug interactions and indications/contraindications
  4. Adverse effects
- xvi. Miscellaneous analgesic agents

#### 4. Treatment of Pain: Procedural

- a. General Considerations
  - i. Preprocedural factors and evaluation of health status
  - ii. Indications and appropriateness for interventional procedures
  - iii. Fluoroscopic imaging and radiation safety
  - iv. Ultrasound guidance: basics, techniques, risks
  - v. Drug selection, including steroids and radiographic contrast agents
  - vi. Assessment of infection risk, antibiotic prophylaxis, maintaining sterile technique
  - vii. Other general considerations in procedural treatments of pain
- b. Nonsurgical Stimulation-Produced Analgesia
  - i. Peripheral stimulation techniques (TENS, acupressure, acupuncture, electroacupuncture, vibration)
  - ii. Postulated mechanisms
  - iii. Clinical applications and efficacy
  - iv. Other nonsurgical stimulation-produced analgesia in procedural treatment of pain
- c. Injections, Nerve Blocks, and Lesioning
  - i. Nerve blocks and neurolytic techniques: diagnostic and treatment purposes; clinical indications, risks, anatomy, pharmacology, and use of drugs
    1. Cranial nerve blocks and ablation
    2. Peripheral nerve blocks (including genicular nerve blocks)
    3. Regional tissue plane blocks: transversus abdominis, erector spinae, serratus plane, pectoralis blocks, and others
    4. Musculoskeletal (tendon, ligament) and intra-articular injections
    5. Neuraxial injections, intrathecal blocks, and neurolysis: spinal, epidural (interlaminar, transforaminal, caudal, nerve root injections)
    6. Facet joint and zygapophyseal injections
    7. Radiofrequency ablation: joints, cervical, thoracic, lumbar, and sacral indications and techniques
    8. Sympathetic ganglion and plexus blocks
  - ii. Nerve blocks and neurolytic techniques
    1. Side effects: recognition and treatment
    2. Risks, associated complications

- 3. Management of anti-coagulation
  - iii. Vertebral augmentation procedures (kyphoplasty, vertebroplasty): indications, benefits, risks, associated complications
  - iv. Other procedural treatments of pain: injections, nerve blocks, lesioning
- d. Neuromodulation (Implanted Devices): Indications, Benefits, Risks, Associated Complications
  - i. Implanted stimulation devices
    - 1. Spinal cord stimulation
    - 2. Dorsal root ganglion (DRG) stimulation
    - 3. Peripheral nerve stimulation
  - ii. Spinal drug delivery systems
    - 1. Intrathecal pumps and infusions
    - 2. Epidural implants and infusions
  - iii. Other neuromodulation treatment of pain
- e. Neuroablative Pain Management
  - i. Ablative procedures (cordotomy, DREZ, neurolytic blocks for cancer): indications, benefits, risks, associated complications
    - 1. Brain, brain stem, spinal cord, peripheral nerve procedures
    - 2. Cervical, thoracic, lumbar spine procedures
  - ii. Intrathecal, visceral, and peripheral nerve neurolysis
    - 1. Techniques of neuroablation
    - 2. Drugs used for neuroablation
  - iii. Other neuroablative pain management
- f. Regenerative Pain Medicine
  - i. Environmental products (hyaluronic acid, amniotic fluid, platelet-rich-plasma): Risks, benefits, associated complications
  - ii. Cellular products (lipoaspirate, bone marrow aspirate, umbilical cord blood, stem cells): Risks, benefits, associated complications
  - iii. Clinical uses and evidence base
  - iv. Other regenerative pain medicine

## 5. Treatment of Pain: Psychological, Physical, and Integrative Therapies

- a. Cognitive-Behavioral and Behavioral Interventions
  - i. Cognitive and behavioral strategies: application to specific pain syndromes (e.g., TMJ pain, neck and back pain, fibromyalgia, arthritis pain, burn pain, postoperative pain)
  - ii. Integration of approaches: cognitive-behavioral treatments, combined behavioral and drug treatments; economic benefits of integrating treatment
  - iii. Stages of behavioral change and their effect on readiness to adopt self-management strategies for chronic pain
  - iv. Cognitive-behavioral and self-management interventions: common process factors (e.g., rapport, engendering hope and positive expectations, developing a therapeutic alliance, communication strategies, support, suggestion)
  - v. Solution-focused brief therapy, mindfulness-based therapy, family therapy, hypnosis and guided imagery, biofeedback, progressive muscle relaxation
  - vi. Other behavioral interventions
- b. Mental Health Treatment
  - i. Role of biofeedback, operant therapy, mindfulness, CBT, hypnosis, relaxation, motivational enhancement therapy
  - ii. Psychiatric and psychological factors that impact treatment adherence and the therapeutic alliance with treatment providers (e.g., psychological factors affecting other medical conditions)

- iii. Pharmacotherapy for treatment of comorbid conditions: antidepressants, mood-stabilizing agents, anxiolytics, antipsychotics
- iv. Psychotherapy for depressive disorders: cognitive-behavioral, marital, family, interpretive, group therapy
- v. Differential diagnosis of anxiety disorders that may augment pain and suffering
- vi. Anger in chronic pain patients and relation to perceived pain
- vii. Somatic complaints in chronic pain: conversion (functional neurological symptom) disorder, somatic symptom disorder, and illness anxiety disorder
- viii. Role of education, fear avoidance, self-esteem, self-efficacy, self-control, sick role, illness behavior, and individual differences in affective, cognitive, and behavioral responses to pain
- ix. Coping styles: definition and effect on pain experience and response to treatment outcome, maintenance of treatment effects, catastrophizing
- x. Role of cultural and environmental factors: effect on treatment outcome, maintenance of treatment effects
- xi. Role of family: importance of interviewing and training patient and relatives; evaluating information from relatives
- xii. Role of patient beliefs and expectations in pain and disability; coping strategies
- xiii. Sleep disorders in chronic pain: diagnosis and evaluation
- xiv. Work history and education in evaluation of chronic pain
- xv. Other mental health assessment and treatments
- c. Physical Medicine and Rehabilitation Modalities and Treatment
  - i. Role of physiotherapy, principles of pacing, graded activity, passive and active therapy, manual therapy, exercise prescription
  - ii. Temperature modalities (e.g., heat, cold, ultrasound)
  - iii. Physical modalities: manipulation, mobilization, massage, traction
  - iv. Casting and splinting
  - v. Exercise therapy
  - vi. Other physical medicine and rehabilitation modalities and treatment
- d. Work Rehabilitation and Management of Return to Work
  - i. Importance of early intervention and early return to work in reducing absence
  - ii. Psychosocial factors as the main determinants of disability and as predictors of prolonged work absence
  - iii. Identification of obstacles to recovery (e.g., fear of reinjury, low expectations of recovery, low mood, anxiety, withdrawal from social interaction); reliance on passive treatments; negative attitude to physical activity and self-management
  - iv. Components of successful, comprehensive rehabilitation program (general exercise, cognitive therapy, vocational elements)
  - v. 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)
  - vi. Functional capacity evaluation: definition, usefulness, and limitations
  - vii. Other work rehabilitation and management of return to work
- e. Complementary and Integrative Therapies (CAM)
  - i. Range of available CAM
    - 1. Alternative medical systems (e.g., traditional Chinese medicine, homeopathy, mind-body interventions, energy therapy)
    - 2. Biologically based therapies (e.g., herbs, foods, vitamins)
    - 3. Manipulative methods (e.g., osteopathy)
  - ii. Acupuncture, acupressure, and dry needling techniques
    - 1. Treatment principles and practical skills
    - 2. Techniques and indications
    - 3. Clinical outcomes and evidence base

- iii. Prevalence and patient reasons for use of CAM
- iv. Evidence-based CAM
- v. Implications, costs, and side effects (including drug interactions) of CAM
- vi. Other complementary and integrative therapies

## B. Clinical States

### 1. Taxonomy: Classification of Pain Syndromes

- a. Taxonomy of Pain Systems
  - i. IASP classification of chronic pain syndromes: basis and application
  - ii. Application and definition of pain terms
- b. Chronic Pain as a Symptom or a Disease: ICD coding basis and application
  - i. Chronic primary pain: definition, diagnostic entities, etiology
  - ii. Chronic secondary pain: definition, diagnostic entities, etiology
  - iii. Pain qualifiers: severity, interference, psychological factors, social factors, impairment and disability
  - iv. Location: body system, body site
  - v. CPT (Current Procedural Terminology): basis of reporting medical services
- c. Other Taxonomy of Pain Systems

### 2. Chronic Widespread Pain Syndromes

- a. Chronic Widespread Pain: Definition, Characteristics, Comorbidities
  - i. Complex widespread pain
    - 1. Mechanisms: somatization and hypervigilance, caused by injury, psychological, infection, growth hormone or immune system disorder, malingering
    - 2. Somatic symptom disorder
    - 3. Illness anxiety disorder
    - 4. Chronic pain disorder with somatic and psychological factors
    - 5. Central sensitization disorder
    - 6. Small fiber neuropathy disorder
  - ii. Fibromyalgia
    - 1. Definition fibromyalgia, myofascial pain (American College of Rheumatology definition)
    - 2. Criteria for diagnosis: tender points, fatigue, sleep problems, mood disturbance, cognitive effects
    - 3. Associated conditions: irritable bowel syndrome, headache, cystitis, chronic fatigue syndrome
    - 4. Management: self-management, exercise, medications, cognitive-behavioral therapy
- b. Other Chronic Widespread Pain Syndromes

### 3. Acute Pain, Pain due to Trauma, and Postoperative Pain

- a. Epidemiology of Inadequate Control of Acute Pain
- b. Physiologic and Psychologic Effects: Identification and Control
- c. Utilization and Effectiveness of Major Classes of Drugs Used for Acute Pain Management
  - i. Opioids (systemic, epidural, intrathecal)
  - ii. NSAIDs (COX-1 and COX-2 inhibitors)
  - iii. Adjuvant drugs (NMDA-receptor antagonists, anticonvulsants, antidepressants, alpha-2 adrenergic agonists, corticosteroids, intravenous lidocaine)
  - iv. Local anesthetics (regional, epidural, or intrathecal)
- d. Central, Perineural, and Infiltrative techniques (Joints, Nerves, Tissue Planes)

- i. Use and effects of neuraxial opioids or local anesthetics
  - ii. Regional anesthetic techniques for the treatment of acute pain
  - iii. Use of adjuvant agents for neuraxial or regional anesthesia blocks
- e. Assessing and Monitoring Efficacy and Safety in the Postoperative Period
- f. Multimodal Analgesia for Optimal Perioperative Pain Management: Formulation Based on Type and Cause of Pain, Patient Preference, Physical and Mental Status, and Available Expertise and Technology
- g. Nonpharmacologic Assessment and Treatment for Acute and Postoperative Pain
  - i. Role of psychological coping skills, social, and culturally related factors
  - ii. Hot and cold packs, TENS, other nonpharmacological methods
  - iii. Stimulation-based approaches to managing acute pain
- h. Role of Acute Pain Management in Enhanced Recovery (ERAS) Pathways
- i. Tools for Assessment and Measurement of Acute and Postoperative Pain
  - i. Assessment of vulnerable populations: nonverbal, cultural, socioeconomic factors
  - ii. Assessment of the older patient, including those with impaired verbal ability
  - iii. Assessment of delirium and role in has in treating acute pain
  - iv. Assessment of pain in children and adolescents
  - v. Assessment tools (pain intensity, other outcome measures)
- j. Role of Patient and Family Education in Improving Acute and Postoperative Pain Management
- k. Treatment of Special Populations for Acute Pain and in the Postoperative Setting
  - i. Spinal cord injury, burn injury, crush injury, compartment syndrome
  - ii. Pregnant or breastfeeding patients
  - iii. Patients with comorbidities: renal impairment, hepatic disease
  - iv. Opioid tolerant patients, opioid use disorder, buprenorphine treatment
- l. Development of Chronic Postsurgical or Posttraumatic Pain after Acute Pain
  - i. Chronic pain after amputation: limb, organ, stump, phantom limb
  - ii. Chronic pain after spinal surgery: Persistent spinal pain syndromes
  - iii. Chronic pain after thoracotomy, breast surgery, herniorrhaphy, hysterectomy, arthroplasty, or other specified chronic post-surgical pain
  - iv. Chronic pain after burn injury, whiplash, musculoskeletal injury
  - v. Chronic pain after nerve injury, spinal cord injury, or brain injury
  - vi. Interventions to prevent the development of chronic pain
- m. Other Acute Pain

#### 4. Musculoskeletal Pain

- a. Neck Pain and Cervical Radicular Pain
  - i. Public health dimensions: prevalence, demography, personal and societal costs (quality of life, ability to work, social function, disability)
  - ii. Anatomy: structures associated with pain
  - iii. Risk factors: etiologic and prognostic (transition from acute to chronic pain)
  - iv. Natural history and relevance to management: predictors of chronicity, including whiplash injury
  - v. Causes and differentiation of neck pain and somatic nerve pain: evaluation and treatment of pain from the cervical spine or the shoulder
    - 1. Rational and use of assessment tools for neck pain: assessment of mood, function, anxiety, catastrophizing, overall quality of life
    - 2. Differential diagnosis for neck pain: infection, trauma, neoplasm, metabolic disease, inflammatory disease
  - vi. History taking and physical examination: reliability, validity, limitations, and “red flag” pathologies
  - vii. Mechanisms of referred pain: cervicogenic headache
  - viii. Medical imaging: use, limitations, reliability and validity

- ix. Electrodiagnostic studies: reliability and validity
- x. Pharmacotherapy: limitations and uses (NSAIDs, opioids, adjunctive medications)
- xi. Injection therapy: indications and use, evidence base
  - 1. Cervical epidural steroid injections
  - 2. Cervical diagnostic joint blocks
  - 3. Cervical medial branch neurotomy
  - 4. Botulinum toxin injections
- xii. Neck pain: central neuromodulation and intrathecal drug delivery
  - 1. Spinal cord stimulation and dorsal root ganglion stimulation
  - 2. Peripheral nerve stimulation
  - 3. Intrathecal drug infusion
- xiii. Surgical treatment: indications and efficacy (discectomy, laminectomy, fusion)
- xiv. Nonsurgical intervention: evidence for efficacy of reassurance, maintaining activity, and exercises
  - 1. Psychosocial and occupational factors related to low back pain and disability
  - 2. Psychological therapy: cognitive-behavioral, biofeedback, mindfulness, relaxation, hypnosis
  - 3. Physical therapy: exercises, hydrotherapy, manual therapy, massage, acupuncture, electrical stimulation (TENS), traction
  - 4. Multidisciplinary therapy: use and limitations, combined physical and psychological approaches
  - 5. Complementary and integrative medicine techniques: acupuncture, chiropractic care
- xv. Other neck pain
- b. Back Pain and Lumbar Radicular Pain
  - i. Public health dimensions: prevalence, demography, personal and societal costs (quality of life, ability to work, social function, disability)
  - ii. Anatomy: structures associated with pain
  - iii. Risk factors: etiologic and prognostic (transition from acute to chronic pain)
  - iv. Natural history and relevance to management: predictors of chronicity
  - v. Causes and differentiation of back pain and somatic referred pain: evaluation and treatment including thoracic and lumbar pain
    - 1. Rational and use of assessment tools for back pain: assessment of mood, function, anxiety, catastrophizing, overall quality of life
    - 2. Differential diagnosis for back pain: infection, trauma, neoplasm, metabolic disease, inflammatory disease
  - vi. History and physical examination: reliability, validity, limitations, and “red flag” pathologies
  - vii. Mechanisms of referred pain: sciatica, thoracic radicular pain
  - viii. Medical imaging: use, limitations, reliability and validity
  - ix. Electrodiagnostic studies: reliability and validity
  - x. Pharmacotherapy: limitations and uses (NSAIDs, opioids, adjunctive medications)
  - xi. Injection therapy: indications and use, evidence base
    - 1. Lumbar interlaminar, transforaminal, and caudal epidural steroid injections
    - 2. Lumbar diagnostic joint blocks
    - 3. Lumbar medial branch neurotomy
    - 4. Thoracic epidural injections, regional anesthetic, and nerve blocks
    - 5. Sacroiliac joint injections and other interventions
  - xii. Back pain: Central neuromodulation and intrathecal drug delivery
    - 1. Spinal cord stimulation and dorsal root ganglion stimulation
    - 2. Peripheral nerve stimulation
    - 3. Intrathecal drug infusion
  - xiii. Surgical treatment: indications and efficacy (discectomy, laminectomy, fusion)



- xiv. Nonsurgical intervention: evidence for efficacy of reassurance, maintaining activity, and exercises
  - 1. Psychosocial and occupational factors related to low back pain and disability
  - 2. Psychological therapy: cognitive-behavioral, biofeedback, mindfulness, relaxation, hypnosis
  - 3. Physical therapy: exercises, hydrotherapy, manual therapy, massage, acupuncture, electrical stimulation (TENS), traction
  - 4. Multidisciplinary therapy: use and limitations, combined physical and psychological approaches
  - 5. Complementary and alternative medicine (CAM) techniques: acupuncture, chiropractic
- xv. Other low back pain and lumbar radicular pain
- c. Musculoskeletal Pain
  - i. Public health dimensions: prevalence, demography, personal and societal costs (quality of life, ability to work, social function, disability)
  - ii. Anatomy and physiology: biomechanics of joints and muscles, muscle nociceptors, ergoreceptors: mediators of inflammation, tissue destruction, and repair
  - iii. Risk factors: etiologic and prognostic
  - iv. Natural history and relevance to management: predictors of chronicity
  - v. Clinical characteristics and assessment: joint pain, bone pain, myofascial pain
    - 1. Role and influence of movement, repetitive injuries, and work
    - 2. Relationship between symptoms and imaging findings
  - vi. Examination: multidisciplinary assessment
    - 1. Level of emotional distress: anxiety, anger, depression
    - 2. Assessment of function: interference in activities, reduced social participation
    - 3. Assessment of myofascial pain, spasticity, and myopathies
    - 4. Assessment of joint pain: major (knee, hip, SI, shoulder) and minor joints
  - vii. Diagnosis: based on classification of musculoskeletal pain disorders
    - 1. Chronic musculoskeletal pain from persistent inflammation
      - a. Due to infection: virus, bacteria, fungi, parasites
      - b. Due to crystal deposition: calcium, hydroxyapatite, uric acid
      - c. Due to autoimmune disorders (rheumatic disease): rheumatoid arthritis, systemic lupus erythematosus, Sjögren syndrome
      - d. Due to auto-inflammatory disorders: spondyloarthritis, psoriatic arthritis
      - e. Due to endocrine and metabolic abnormalities: hypothyroid, vitamin D, menopause, role of estrogen and testosterone
      - f. Due to adverse drug reactions: antibiotics, statins, steroids, bisphosphonates, oncologic drugs, NGF-inhibitors, and others
    - 2. Chronic musculoskeletal pain associate with structural changes including myofascial pain
      - a. Associated with osteoarthritis of the joints: symptoms, examination findings
      - b. Associated with spondylosis: vertebral end plates, intervertebral discs, zygapophyseal joints
      - c. Chronic pain after musculoskeletal injury
    - 3. Chronic musculoskeletal pain associated with disease of the nervous system
      - a. Associated with Parkinson disease: assessment and pain scale
      - b. Associated with multiple sclerosis
      - c. Associated with peripheral neurologic disease: Charcot joint disease
    - 4. Other chronic secondary musculoskeletal pain
  - viii. Treatment of musculoskeletal pain/disability: evidence base
    - 1. Self-management
    - 2. Exercise and rehabilitation

- 3. Pharmacologic treatments
    - 4. Nonpharmacological approaches
  - ix. Other musculoskeletal pain
- d. Hereditary Connective Tissue Disorders
  - i. Prevalence, epidemiology of conditions: Ehlers-Danlos syndrome, joint hypermobility syndrome, Marfan syndrome, osteogenesis imperfecta
  - ii. Anatomy: connective tissue structures, function, mechanisms of pain
  - iii. Risk factors: etiologic and prognostic
  - iv. Natural history and relevance to management: predictors of chronicity
  - v. Clinical characteristics and assessment: dislocation, trauma, skin and tissue fragility
  - vi. Examination: gait analysis, orthostatic blood pressure test, joint/muscle exam
  - vii. Diagnosis: based on classification of hereditary connective tissue disorders
    - 1. Ehlers-Danlos syndrome
    - 2. Joint hypermobility syndrome
    - 3. Marfan syndrome
    - 4. Osteogenesis imperfecta
  - viii. Treatment of pain due to hereditary connective tissue disorders
    - 1. Self-management
    - 2. Exercise and rehabilitation
    - 3. Pharmacologic treatments
    - 4. Nonpharmacological approaches
  - ix. Other hereditary connective tissue disorders

## 5. Cancer Pain and Cancer-related Pain

- a. Chronic Cancer Pain: Continuous (Background) or Intermittent (Episodic)
  - i. Chronic visceral cancer pain: diagnosis, etiology, mechanisms
  - ii. Chronic bone cancer pain: diagnosis, etiology, mechanisms
  - iii. Chronic neuropathic cancer pain: diagnosis, etiology, mechanisms
  - iv. Other chronic cancer pain: diagnosis, etiology, mechanisms
- b. Chronic Post-Cancer Treatment Pain
  - i. Chronic post-cancer medicine pain
    - 1. Chronic painful chemotherapy-induced polyneuropathy
    - 2. Mucositis: diagnosis and treatment
    - 3. Other post- cancer medicine pain
    - 4. Post-cancer medicine pain, unspecified
  - ii. Chronic post-radiotherapy pain
    - 1. Chronic painful radiation-induced neuropathy
  - iii. Chronic post-cancer surgery pain
  - iv. Other chronic post-cancer treatment pain
- c. Palliative Care: Definition and Scope
  - i. Barriers to treatment; disparities in care
  - ii. Evidence-based practice in management of cancer pain
  - iii. Differences in goals and approach: cancer pain and non-cancer pain
  - iv. Hospice and multidimensional treatments that comprise palliative care
  - v. Advanced care directives in palliative and end-of-life contexts
- d. Comprehensive Evaluation of Patients with Cancer Pain: Needs and Approach
  - i. Social and cultural influences on cancer-related pain
  - ii. Addressing end-of-life symptoms: nausea, respiratory distress, fatigue
  - iii. Value of interdisciplinary teams: oncologist, palliative care, surgeon
- e. Principles of Treatment
  - i. Treatment of underlying disease
  - ii. Management of acute cancer pain



- iii. Analgesic pharmacotherapy for cancer pain
  - iv. Integration of other modalities (e.g., physical, psychological)
- f. Analgesic Approach: Indications, Pharmacologic Properties, Therapeutic Guidelines
  - i. Adverse effects of analgesics, medication interactions
  - ii. Routes of administration: oral, transdermal, intravenous, neuraxial
  - iii. WHO ladder: choice of analgesics, limitations
  - iv. Adjuvant analgesics: bisphosphonates, steroids, ketamine, anticonvulsants, antidepressants, barbiturates, cannabinoids
  - v. Other analgesic approaches (including medications for neuropathic pain)
- g. Interventional Approaches
  - i. Injections and neurolysis (e.g., celiac block: indications, risks, outcomes)
  - ii. Surgery (e.g., cordotomy: indications, risks, outcomes)
  - iii. Intrathecal therapy (e.g., ziconotide: indications, risks, outcomes)
  - iv. Role of primary cancer therapy: chemotherapy, radiotherapy, hormone therapy, immunotherapy, surgery
- h. Physical Therapy: Indications, Utility, and Effectiveness
- i. Psychological Approaches: Indications, Utility, and Effectiveness
- j. Needs of Special Populations: Children, Patients with Learning Disabilities, Elderly, Those with Substance Use Disorders
- k. Cancer Pain Emergencies: Acute Spinal Cord Compression, GI Obstruction and Perforation, Hypercalcemia, Bone Fractures, Increased Intracranial Pressure
- l. Ethical Issues
  - i. Benefit to burden ratio: variation according to stage
  - ii. Prognosticating life expectancy
  - iii. Physician-assisted suicide, euthanasia, double effect, intent
- m. Other Cancer-related Pain

## 6. Visceral Pain

- a. Distinct Clinical Features, Taxonomy, Epidemiology, Impact
  - i. Evaluating a clinical and psychosocial history: interpreting tests, imaging, and assessing for critical features to suggest active disease
  - ii. Physical examination: identifying visceral from non-visceral causes of pain, abdominal wall pain
- b. Anatomy: Neuroanatomy and Neurophysiology
  - i. Central and peripheral pathways: stellate, splanchnic, celiac, hypogastric, ganglion impar
  - ii. Properties of visceral nociceptors: viscerosomatic, viscerovisceral
  - iii. Mechanisms of visceral nociceptor sensitization and visceral hypersensitivity
  - iv. Neurophysiological basis of referred visceral pain
- c. Peripheral and Central Mechanisms of Visceral Pain Modulation: Inflammation, Vascular Mechanisms, and Mechanical Factors
- d. Classification of Chronic Visceral Pain Disorders
  - i. Visceral pain from persistent inflammation: infectious, noninfectious, autoimmune, and trauma
    - 1. Head and neck region: Behcet disease, Granulomatosis with polyangiitis (PGA), Crohn disease, chronic pharyngitis, chronic tonsillitis
    - 2. Thoracic region: pericarditis, pleurisy, esophagitis, GERD
    - 3. Abdominal region: gastritis, ulcerative colitis, Crohn disease, pancreatitis, diverticulitis, enteropathies (SLE), irritable bowel syndrome
    - 4. Pelvic region: Crohn disease; ulcerative colitis; painful bladder syndrome; female urogenital pain including endometriosis, cystitis, pelvic inflammatory disease, vaginitis; male urogenital pain including prostatitis

- ii. Visceral pain from vascular mechanisms: ischemia, hypercoagulability, vasospasm, thrombosis
  - 1. Head and neck region: carotid artery aneurysms
  - 2. Thoracic region: ischemic heart disease, aortic dissection, aneurysms
  - 3. Abdominal region: mesenteric ischemia, superior mesenteric artery entrapment, median arcuate ligament syndrome
  - 4. Pelvic region: ischemic colitis, iliac artery aneurysm
- iii. Visceral pain from mechanical factors: obstruction, traction, compression
  - 1. Head and neck region: stenosis, compression pharynx, larynx, thyroid
  - 2. Thoracic region: stenosis esophagus, trachea, bronchi
  - 3. Abdominal region: biliary or renal stones, obstruction of GI tract
  - 4. Pelvic region: urinary colic, anorectal pain, traction of ovarian ligament
- e. Management of Visceral Pain: Assess Clinical Outcomes
  - i. Pharmacotherapy: indications, evidence, effectiveness, adverse effects
  - ii. Physical therapy and acupuncture
  - iii. Interventional techniques: injections, intrathecal therapy, stimulation, neurolysis
  - iv. Psychological therapies: treatment of functional visceral pain syndromes
- f. Other Visceral Pain

## 7. Headache and Orofacial Pain

- a. Headache
  - i. Anatomy and physiology: cranial, cervical nerves, innervation of head, neck
  - ii. Mechanisms and pathophysiology: headache, orofacial pain, dental pain
  - iii. Evaluation: systematic case history, use of headache diary, selection of appropriate examination based on history
  - iv. Classification of headache disorders
    - 1. Chronic primary headache: diagnosis, duration, chronicity
      - a. Migraine with or without aura
      - b. Tension-type headache
      - c. Autonomic cephalalgias: cluster headache, paroxysmal hemicrania, SUNCT, hemicrania continua
    - 2. Chronic secondary headache
      - a. Trauma or injury to the head or neck: post-craniotomy, pathology in eyes or ears, head injury, neck injury (whiplash)
      - b. Cranial or cervical vascular disorder: stroke, hemorrhage, temporal arteritis, carotid/vertebral artery dissection, venous thrombosis, genetic vasculopathy
      - c. Non-vascular intracranial disorder: high or low CSF pressure, neoplasm, intrathecal injection, seizure
      - d. Due to a substance or its withdrawal: medication overuse headache, medication-induced, withdrawal headache
      - e. Infection: meningitis, encephalitis
      - f. Disorders of homeostasis: hypoxia, hypercapnia, altitude, hypertension
      - g. Disorders of cranium: ears, eyes, sinuses, oral mucosa, salivary glands; or cervical spine: cervicogenic headache
      - h. Postdural puncture headache: assessment and treatment
  - v. Critical factors for life-threatening headache: indications for further investigation of headache
  - vi. Psychological, and social factors contributing to headache
  - vii. Treatment and management of headache
    - 1. Nonpharmacologic treatment: education, cognitive-behavioral therapy, biofeedback, physical therapy, acupuncture, manual therapy, support groups
    - 2. Pharmacologic treatment of acute migraine: acetaminophen, NSAIDs, antiemetics, triptans, opioids

3. Pharmacologic prophylaxis of migraine: beta-blockers, calcium channel blockers, sodium valproate, tricyclic agents, topiramate, others (SNRIs and gabapentin)
  4. Interventions: Role and use of botulinum toxin, treatment of cluster headache
  5. Multidisciplinary management: role in treatment of headache
- viii. Other headache
- b. Orofacial Pain
- i. Anatomic, physiologic, psychosocial aspects
  - ii. History taking, physical examination, and diagnostic studies
  - iii. Classification of orofacial pain
    1. Chronic primary orofacial pain
      - a. Temporomandibular disorders: orofacial muscle pain, temporomandibular joint pain
      - b. Trigeminal neuralgia
      - c. Other primary neuralgias: glossopharyngeal, post-herpetic
      - d. Burning mouth syndrome
      - e. Atypical facial pain
    2. Chronic secondary orofacial pain
      - a. Disorders of the cranium: sinus pathology, vision problems
      - b. Chronic dental pain: pulpitis, apical periodontitis
      - c. Chronic neuropathic orofacial pain
      - d. Secondary TMD pain: myofascial, arthralgia
      - e. Atypical facial pain in cancer survivors
    3. Treatment and management
      - a. Pharmacological treatment of trigeminal neuralgia
      - b. Surgical options for trigeminal neuralgia: decompression, ablation, irradiation, rhizotomy, radiosurgery
      - c. Trigeminal ganglion ablation and stimulation techniques
      - d. Treatment of temporomandibular disorders: education, cognitive behavioral therapy, exercises, occlusive devices, physiotherapy, acupuncture, surgery
      - e. Brain stimulation techniques for facial pain: transcranial magnetic stimulation, cortical electrostimulation, motor cortex stimulation
    4. Other orofacial pain

## 8. Neuropathic Pain

- a. Peripheral Neuropathic Pain
  - i. Definition, anatomy and epidemiology: nociceptive, neuropathic, mixed
  - ii. Mechanisms and pathophysiology: pathologic mechanisms in the peripheral nerve fibers, peripheral nerve injury, compression neuropathy, amputation
  - iii. Evaluation: allodynia, hyperalgesia, hyperpathia
    1. Differential diagnosis, natural course
    2. Clinical laboratory and radiographic findings, use and limitations
    3. Assessment tools: pain questionnaire, laboratory testing, nerve function testing
    4. Diagnostic studies: use and limitations
  - iv. Common neuropathic pain syndromes: nociceptive, neuropathic, mixed
    1. Trigeminal neuralgia
    2. Chronic neuropathic pain after peripheral nerve injury
    3. Painful polyneuropathy: metabolic, autoimmune, familial, infectious, toxic, HIV, chemotherapy-induced
    4. Postherpetic neuralgia: acute herpes zoster
    5. Painful radiculopathy: cervical, thoracic, lumbar, sacral, radiation therapy-induced
    6. Other specified and unspecified chronic peripheral neuropathic pain including thoracic outlet syndrome

- v. Treatment and management: evidence base
  1. Antidepressants and anticonvulsants
  2. Opioids for neuropathic pain
  3. Topical lidocaine and capsaicin (other topical treatments)
  4. Other drugs: NMDA-receptor antagonists, adjuvants
  5. Neuromodulation and injection techniques
  6. Physical therapy and rehabilitative techniques (mirror therapy, etc.)
  7. Treating associated comorbidities: sleeping disorder, depression, anxiety
  8. Other treatments
- vi. Other neuropathic pain
- b. Complex Regional Pain Syndrome
  - i. Definition, anatomy, and epidemiology
  - ii. Mechanisms and pathophysiology
  - iii. Evaluation and clinical assessment
    1. Differential diagnosis, natural course
    2. Clinical laboratory and radiographic findings, use and limitations
    3. Assessment tools: pain questionnaire, laboratory testing, nerve function testing
    4. Diagnostic studies: use and limitations
  - iv. Treatment and management: evidence base
    1. Psychological: coping, relaxation, management of anxiety/depression
    2. Physical: graded motor imagery, mirror therapy, occupational therapy, paced exercise, desensitization techniques
    3. Pharmacotherapy: neuropathic pain medications, bisphosphonates, steroids
    4. Procedural treatment
  - v. Other complex regional pain syndromes
- c. Central Neuropathic Pain
  - i. Definition, anatomy and epidemiology
  - ii. Mechanisms and pathophysiology: pathologic mechanisms in the central nervous system
  - iii. Evaluation of chronic central neuropathic pain
    1. Differential diagnosis, natural course
    2. Clinical laboratory and radiographic findings, use and limitations
    3. Assessment tools: pain questionnaire, laboratory testing, nerve function testing
    4. Diagnostic studies: use and limitations
- d. Common Central Pain Syndromes
  - i. Spinal cord injury
  - ii. Brain injury
  - iii. Post-stroke pain
  - iv. Multiple sclerosis
  - v. Parkinson disease
  - vi. Phantom pain
  - vii. Guillain-Barré syndrome
  - viii. Other specified and unspecified chronic central pain syndromes
- e. Central Pain Syndromes Treatment and Management: Evidence Base
  - i. Antidepressants and anticonvulsants
  - ii. Opioids for central pain
  - iii. Topical lidocaine and capsaicin (other topical treatments)
  - iv. Other drugs for central pain, i.e., NMDA-receptor antagonists, adjuvants
  - v. Neuromodulation and injection techniques
  - vi. Physical therapy and rehabilitative techniques
  - vii. Treating associated comorbidities: sleeping disorder, depression, anxiety

## 9. Special Cases

- a. Pain in Infants, Children, and Adolescents
  - i. Differences among infants, children, adolescents, and adults
    - 1. Developmental, behavioral differences
    - 2. Pharmacokinetic/pharmacodynamic differences
  - ii. Factors affecting pain perception in children (e.g., developmental level, family beliefs, past pain experiences)
  - iii. Pain assessment tools in children: use and limitations
    - 1. Validated pain measurement tools
    - 2. Assessment based on age, level of cognitive function, and cultural background
  - iv. Treatment of pain in children: pharmacologic
    - 1. Toxicity, side effects of analgesics
    - 2. Use of analgesic adjuvant drugs in pediatrics
  - v. Treatment of pain in children: nonpharmacologic
    - 1. Role of counseling, guided imagery, hypnosis, biofeedback
    - 2. Role of family, society, cultural background
    - 3. Strategies for staying in school or returning to school
    - 4. Physical medicine: hot/cold packs, TENS, pacing, exercise
    - 5. Psychological therapies: distractions, breathing techniques, CBT, mindfulness
  - vi. Acute and chronic pain in children: special considerations in management
    - 1. Procedural, postoperative, and acute pain: role of nerve blocks
    - 2. Complex pain conditions: headache, abdominal pain, CRPS, widespread pain, neuropathic pain, visceral pain, musculoskeletal pain
    - 3. Cancer pain and palliative care
  - vii. Consequences of pain in infancy and childhood
    - 1. Neurophysiology of pain during development
    - 2. Relationship of early adverse life events on pain (neonatal ICU, child abuse)
  - viii. Ethics
    - 1. Evaluating a child for analgesic research
    - 2. Obtaining consent for treatment of pain in children
  - ix. Other pain in infants, children, and adolescents
- b. Chronic and Acute Pain During Pregnancy and Peripartum
  - i. Factors influencing the perception of pain in pregnancy compared with the non-pregnant state
  - ii. Causes of acute and chronic pain during pregnancy
  - iii. Principles of pain management during pregnancy
  - iv. Pain assessment and management of patients who are breastfeeding
  - v. Other chronic and acute pain during pregnancy
- c. Pain in Older Adults
  - i. Epidemiology: prevalence, onset, burden, risk factors, prognosis
  - ii. Assessment: intensity of pain
    - 1. Understand tools to assess pain in older adults: Brief Pain Inventory, numeric or verbal pain scales, geriatric pain scales
    - 2. Understand limitations of assessment tools
    - 3. Impact on quality of life: depression, anxiety
    - 4. Assess physical activity and establish goals for exercise plan
  - iii. Issues related to age differences: anatomy, physical comorbidities, pain threshold
  - iv. Pain assessment: limitations
  - v. Age-related changes relevant to pain management: ischemia, degeneration, dementia
  - vi. Heterogeneity in physiologic, psychological, and functional capacity of persons of the same chronologic age: emotional components, functional ability, attitudes and beliefs

- vii. Common conditions: bone pain (osteoporotic fractures), neuralgic pain (nerve compression), visceral pain (bladder or GI pain)
- viii. Pharmacotherapy: alterations in metabolic response, changes in gastrointestinal, hepatic, and renal system
  - 1. Pharmacokinetics: absorption, distribution, excretion, metabolism
  - 2. Pharmacodynamics: receptor properties, homeostatic mechanisms
  - 3. Indications, risks, outcomes: NSAIDs, opioids, antidepressants, anticonvulsants
- ix. Psychosocial interventions: evidence base (cognitive-behavioral therapy in older adults)
- x. Procedural techniques: evidence base
- xi. Other pain in older adults
- d. Pain in Individuals with Limited Ability to Communicate
  - i. Conditions leading to limitations in ability to communicate: patient with mental health disorders, cognitive, neurodevelopmental impairment
  - ii. Difficulties in assessment and treatment of pain
  - iii. Role of caregivers and social context in assessment and treatment of pain
  - iv. Other pain issues in individuals with limited ability to communicate
- e. Pain Relief in Persons with Opioid Tolerance, Substance Use, and/or Addictive Disorders
  - i. Biopharmacologic and neurophysiologic basis of addiction
  - ii. Definitions of dependence and addictive disorder
    - 1. Tolerance, physical dependence, psychological dependence
    - 2. Dual diagnosis, medication-assisted treatment
    - 3. Substance use disorder
  - iii. Interactions between addiction and pain: use of analgesics in persons with substance use disorder and misuse
  - iv. Description of impact of misuse
    - 1. Opioids, caffeine, nicotine, alcohol, cannabis, benzodiazepines, stimulants
    - 2. Describe intoxication/withdrawal from: opioids, alcohol, benzodiazepines, amphetamines, cannabis
  - v. Risk assessment for substance use disorder or addiction in patients with pain
    - 1. Validated screening tools for risk stratification (ORT, SOAPP)
    - 2. Urine toxicology testing: uses and limitations
  - vi. Principles of comprehensive approach to pain management in patients with addiction, either active or in recovery
    - 1. Strategies to reduce opioid overconsumption and diversion
    - 2. Pharmacologic treatment of patients with addiction
    - 3. Acute pain management in patients with active addiction or in recovery
    - 4. Analgesic response to opioids in patients with addiction
    - 5. Programs to withdraw from opioids, benzodiazepines, alcohol
    - 6. Medication-assisted treatment: methadone, buprenorphine (pharmacology, dosing, and appropriate use)
  - vii. Risks and benefits of opioid use in treatment of chronic/cancer pain
    - 1. In patients with substance use disorder or addiction
    - 2. In patients who take other psychoactive substances (benzodiazepines)
  - viii. Needs of special populations or treatment groups of patients with addiction
    - 1. Pregnant patients
    - 2. Neonatal abstinence syndrome
    - 3. Cancer patients and survivors
  - ix. Regulation and monitoring of controlled substances
    - 1. Prescription monitoring programs
    - 2. Federal controls on opioids and other drugs
    - 3. Board of medicine regulatory controls

- x. Legal, regulatory, reimbursement issues affecting access to care for patients with pain and addiction
  - xi. Other pain relief in persons with substance use disorder
- f. Pain Relief in Areas of Deprivation and Conflict
  - i. Variability of availability and access to pain treatment worldwide
  - ii. Causes of pain worldwide (e.g., infectious diseases, torture-related pain and suffering, war-related injuries)
  - iii. Spectrum of providers caring for patients with pain worldwide
  - iv. Education, training, and knowledge of pain and its treatment; variability of beliefs and communication about pain
  - v. Research: importance in extending pain care worldwide; ethical and political issues
  - vi. Access to drugs and palliative care worldwide
  - vii. Other pain relief in areas of deprivation and conflict
- g. Pain Assessment and Management in Special Populations
  - i. Patients with hepatic or renal function impairment
  - ii. Patients with physical disabilities
  - iii. Patients from diverse socioeconomic, ethnic, cultural backgrounds
  - iv. Patients with mental health disease
  - v. Other pain management in special populations
- h. Diversity, Equity, and Inclusion (DEI) in health care
  - i. Barriers
    - 1. Systematic racism, colorism/shadeism, sexism, discrimination against sexual orientation, gender identity, language, national origin, ethnicity, religion, immigration/citizenship status, age, familial status, and disability
    - 2. Bias; Implicit bias, microaggression, stereotype threat
  - ii. Approaches to improvement; interventions at individual, inter-personal, community, organizational and policy levels; cultural and gender competency, upstander vs. bystander, allyship vs. performative action, tokenism vs representation, assortativity vs homophily
  - iii. DEI in the workplace
  - iv. DEI in academia
    - 1. Leadership
    - 2. Scholarship; Representation of diversity and race related topics in research, Importance of language in reports discussing racial inequities
- i. Healthcare Disparities
  - i. 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
  - ii. Maternal healthcare disparities; Maternal mortality and morbidity, Pain management
  - iii. Child and adolescent healthcare disparities
- j. Ethics and Medico-Legal Issues
  - i. Professionalism: definitions and teaching
    - 1. Disclosure of errors or adverse events
    - 2. Professional behavior: honesty, integrity, compassion, respect, altruism, conflicts of interest, response to marketing
    - 3. Recognizing limitations in expertise and need to seek guidance
    - 4. Personal role in reporting unsafe conditions and fitness for work
    - 5. Recognizing and responding to unprofessional behavior



- 6. Evidence-based practice
- ii. Patient autonomy and decision making
  - 1. Principles of informed consent and shared decision making
  - 2. Advance Directives, Do Not Resuscitate (DNR) Orders, medical orders for life-sustaining treatment
  - 2. Health care proxy laws and limitations
  - 3. Patients Refusing Transfusion or Other Treatments
- iii. Primary Certification, Recertification, Maintenance of Certification and Related Issues (Professional Standing, Lifelong Learning, Cognitive Knowledge, Clinical Practice Assessment, Systems-Based Practice)
- iv. Research ethics
  - 1. Principles of justice, autonomy, beneficence, nonmaleficence
  - 2. Ethical standards in research design: scientific validity, fair subject selection, favorable risk-benefit profile
  - 3. Review and implementation of trials, the institutional review board
  - 4. Informed consent in research
  - 5. Conflicts of interest and financial disclosure
- v. Clinician wellness and self-care
  - 1. Diagnosis and treatment of burnout
  - 2. Sleep deprivation
  - 3. Adaptations for clinical disability
  - 4. Substance abuse
- k. Practice Management
  - i. Costs of medical/anesthesia care
    - 1. Understanding principles of healthcare funding and payment
    - 2. Cost-conscious practice
  - ii. Efficient practice staffing and scheduling
    - 1. Subspecialization issues: procedural, operative, and non-procedural care
    - 2. Pain Medicine team and scope of practice
  - iii. Population health: perioperative surgical home and enhanced recovery
    - 1. Population based health determinants, resources to improve access
    - 2. Health care disparities between populations
  - iv. Clinical informatics
    - 1. Electronic medical record systems: costs and benefits
    - 2. Artificial intelligence and machine learning
  - v. Documentation, coding, and billing
    - 1. Compliance with documentation requirements
    - 2. Accuracy, clarity, specificity of medical records
    - 3. Coding integrity, audits, and insurance denials
- l. Quality Improvement and Patient Safety
  - i. Definitions



1. Medical error, adverse events, sentinel events, misuse of medications and technology
  2. Human factors and mindfulness
  3. Systems thinking and technology design
- ii. Medication errors: assessment and prevention
1. Medication reconciliation
  2. Information technology to reduce medication errors
- iii. Crisis Management and Teamwork
1. Simulation training
  2. Crisis manuals and other cognitive aids
  3. Teamwork training
  4. Handoff communication
  5. Preoperative and procedural checklists
- iv. Quality Improvement (QI) Basics
1. Design, Analysis, and implementation of QI projects
  2. Data collection
  3. QI metrics
  4. Patient satisfaction measurement
  5. Value-based care incentives, pay-for-performance
- v. Performance Assessment
1. Individual benchmarking
  2. Group and facility scorecards
  3. Public reporting
    - a. Federal Quality Payment Program
    - b. Anesthesia registries
- vi. Change Management Methods
1. Peer review and morbidity and mortality Conferences
  2. Lean Six Sigma
  3. QI and the 5S process
  4. Value stream mapping
  5. Failure mode and effects analysis
  6. Root cause analysis
- vii. Barriers to QI