Definition of Pain

- **Pain**: “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”
  - (Merskey and Bogduk. Classification of Chronic Pain. 1994. IASP)

- Physical Examination: Allodynia & Hyperalgesia

- **Allodynia**: painful response to a non-painful stimulus
- **Hyperalgesia**: heightened response to painful stimulus
Pain Assessment Scales

Verbal Pain Intensity Scale

No pain  |  Mild pain  |  Moderate pain  |  Severe pain  |  Very severe pain  |  Worst possible pain

0-10 Numeric Pain Intensity Scale

0  |  1  |  2  |  3  |  4  |  5  |  6  |  7  |  8  |  9  |  10
No pain | Moderate pain | Severe pain | Very severe pain | Pain | Possible pain

“Faces” Scale May Apply to Both Pediatrics and Geriatrics


Cultural and Linguistic Competency in Pain Management: Implication in Clinical Practice (California AB 1195)

- All history and physical examination regarding pain and treatment should incorporate patients’ **culture diversity and linguistic competency**

- The response to evaluation and treatment on pain may also be affected, and need to be adjusted according to **culture diversity and linguistic competency**

- California Assembly Bill 1195 (Effective July, 2006)
A Multifaceted Initiative to Improve Clinician Awareness of Pain Management Disparities (I)

- Patients belonging to some racial, ethnic, and socioeconomic groups may be at risk of receiving suboptimal pain management.
- This study identifies health care provider attitudes, knowledge, and practices regarding the treatment of chronic pain in vulnerable patient populations.
- It assesses whether a certified continuing medical education (CME) intervention can improve knowledge in this area.
- Survey responses revealed a lack of knowledge that undertreatment of pain is more common in minority patients than others.


A Multifaceted Initiative to Improve Clinician Awareness of Pain Management Disparities (II)

- Language barriers, miscommunication, fear of medication diversion, and financial barriers as major obstacles to optimal pain management for minority.

- Understanding clinician factors that underlie suboptimal pain management is necessary to develop effective strategies to overcome disparities and improve quality of care for patients with chronic pain.

**Clinical Course of Back Pain**

- **Acute**
  - < 6 weeks
  - Pain resolves with healing of the underlying incident or injury
  - Serves a protective function

- **Subacute**: 6-12 weeks
  - Majority of patients return to function within 3 months

- **Chronic**
  - Pain > 12 weeks beyond onset or expected period of healing
  - Ceases to serve a protective function
  - Degrades health and functional capability

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**Chronic Pain, Sleep Disturbances, Depression and Anxiety**

Principle & Practice of Pain Management

• Assess pain **systemically** and identify **comorbidities**

• Measure improvement in **pain** and **function capacity**

• **Universal precaution** in prescribing pain management

• Reinforce **patient** participation and **family** involvement

• Update any progress and modify pain management plan

• **Comprehensive** and **multidisciplinary** treatment plan

Common Acute and Chronic Pain Syndromes

**Nociceptive Pain**

- Visceral
  - Abdominal
  - Obstetrical

- Musculoskeletal
  - Osteoarthritis
  - Rheumatoid Arthritis
  - Low Back Pain

**Mixed Type**

- (eg, Trauma, postoperative pain, cancer pain, chronic back pain & sciatica)

- Mixed Type
  - Postoperative Cancer Pain

**Neuropathic Pain**

- Postherpetic Neuralgia
- Trigeminal Neuralgia
- Central Poststroke Pain
- Distal Polyneuropathy (eg, diabetic, HIV)

CRPS = Complex Regional Pain Syndrome
Comprehensive Approach to Pain Management

- **Pharmacologic therapy**
  1. Discuss risk and benefits of non-opioid, adjuvant, and opioids analgesics
  2. Consider age-associated changes in pharmacokinetics & pharmacodynamics

- **Non-Pharmacologic therapy**
  1. **Physiotherapy and Rehabilitation**
     1. Exercise program, stretch and strengthening in musculoskeletal system
     2. Massage, manipulation, electrical stimulation, topical application of heat and cold.
  2. **Interventional Pain Procedure**: epidural steroid injection, nerve block
  3. **Psychological Management**
     1. Cognitive-behavioral therapy
     2. Relaxation and biofeedback training, and hypnosis
  4. **Complementary & Alternative Medicine (CAM)**

**WHO Three Step Analgesic Ladder**
Cancer Pain Management Guideline

- 1. Non-opioid analgesics & adjuvant meds
- 2. Weak opioid analgesics plus 1st step
- 3. Strong opioid analgesics plus 1st & 2nd

- Addition Step 3: transdermal delivery, subcutaneous, IV PCA
- Neuraxial drug delivery system, Neuromodulation, Nerve block, Neurolysis (chemical or radiofrequency ablation)
Pharmacotherapy in Pain Management

- **Non-opioids adjuvants**
  - 1. NSAIDs, COX-2 inhibitors
  - 2. Muscle relaxants
  - 3. Antidepressants
  - 4. Anti-epileptics

- **Opioids**
  - 1. Short-acting opioids
  - 2. Long-acting opioids
  - 3. Rapid onset fentanyl products for cancer breakthrough pain only

Classification of NSAIDs
Chemical/Pharmacokinetic Subclasses

- **Low potency/fast elimination**
  - Salicylates: aspirin, salicylic acid
  - Propionic acid: ibuprofen
  - Anthranilic acid: diflunisal

- **High potency/fast elimination**
  - Propionic acid: ketoprofen
  - Pyrrolizine carboxylate: ketorolac
  - Phenylacetic acid: diclofenac
  - Indoleacetic acid: indomethacin

- **Intermediate potency/elimination**
  - Salicylates: diflunisal
  - Propionic acids: naproxen
  - Naphthylalkanone: nabumetone

- **High potency/slow elimination**
  - Oxicams: meloxicam, piroxicam
Adverse Reactions of NSAIDs

- **GI**: dyspepsia, gastritis, ulcer, bleeding, obstruction of small bowel
- **Hepatic**: hepatotoxicity, altered liver function test, jaundice
- **Renal**: acute papillary necrosis; chronic interstitial disease, glomerulopathy; water retention & electrolyte balance
- **CV**: CHF, reversal of effects of antihypertensive drugs e.g. more effect on ACE inhibitors than beta blockers & diuretics
- **Hematological**: inhibits platelet cyclooxygenase, increased bleeding time, bone marrow suppression
- **CNS**: headache, hallucination, seizure, tinnitus, aseptic meningitis
- **Hypersensitivity reactions**: asthma, urticaria, vasomotor rhinitis

NSAIDs & COX-2 Inhibitor in Pain Management

Key Clinical Pearls

- Clinical data have shown **COX-2 selective inhibitors offer the similar pain relief as Non-specific NSAIDs**
  - COX-2 inhibitors have a better GI safety profile vs Non-specific NSAIDs up to 6 months
  - Overall safety is similar among all NSAIDs
  - Avoid COX-2 inhibitors & NSAIDs in patients with CV risk & those requiring aspirin
  - Use lowest dose and shortest duration

- All NSAIDs including COX-2 inhibitors possess potential risk for Cardiovascular or cerebrovascular thromboembolic events
Pharmacologic Treatment: PHN & DPN
FDA Approved Label Use for Neuropathic Pain

- Agents with consistent efficacy demonstrated in multiple, randomized, controlled trials for **PHN (Postherpetic Neuralgia):**
  - **Topical agent: Lidocaine 5% patch and Capsaicin 8% patch**
  - **Gabapentin, Pregabalin**
- Consider safety and tolerability when initiating treatment with off label agents e.g. Tricyclic antidepressants, other anti-epileptics, and opioids

- Agents with consistent efficacy demonstrated in **Painful DPN (Diabetic Polyneuropathy):**
  - **Duloxetine, Pregabalin**
  - **Tapentadol ER**

Common Adverse Events

- Commonly reported AEs (generally anticholinergic):
  - Blurred vision
  - Cognitive changes
  - Constipation
  - Dry mouth
  - Orthostatic hypotension
  - Sedation
  - Sexual dysfunction
  - Tachycardia
  - Urinary retention
- Fewest AEs: Desipramine, Nortriptyline, Imipramine, Doxepin, Amitriptyline
SNRI in Chronic Pain Management

- **Duloxetine** Delayed-Release Capsules
- **Diabetic Peripheral Neuropathic Pain & Fibromyalgia**
  - Recommended dose is 60 mg once daily
  - There is no evidence that doses > 60 mg confer additional significant benefit and the higher dose is clearly less well tolerated
  - Start with a lower dose and titrate
  - Since diabetes is frequently complicated by renal disease, a lower starting dose and gradual increase in dose should be considered for patients with renal impairment
- **Milnacipran** is indicated for the management of **fibromyalgia**
  - Recommended dose is 100 mg/day
  - May be increased to 200 mg/day based on individual patient response
  - Dose should be adjusted in patients with severe renal impairment

From Opium to Opiate and Opioid in Pain Medicine

A Diagram Illustrating Anti-nociceptive Mechanisms of Morphine

*Figure 17.1: Diagram illustrating proposed antinociceptive mechanisms of morphine in the central nervous system. (Reproduced with permission from Miller RD [ed]. Anesthesia, Vol 1, 5th ed. New York: Churchill Livingstone, 2000. Copyright © 2000 Churchill Livingstone, Inc.)*
**Structure & Classification of Opioids**

- **Alkaloid**
  - Derived from the poppy
  - 1. morphine
  - 2. codeine

- **Semisynthetic**
  - Modification of morphine functional groups
  - 1. diacetylmorphine
  - 2. hydrocodone
  - 3. hydromorphone
  - 4. oxycodone
  - 5. oxymorphone

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**Structure & Classification of Opioids & Nonopioid Analgesics**

- **Synthetic opioids**: progressive reduction in the numbers of fused rings in phenanthrene moiety of morphine
  - 1. **Morphinan**: levorphanol, butorphanol
  - 2. **Phenylpiperidine**: meperidine, fentanyl, sufentanil, alfentanil
  - 3. **Propioanilide**: methadone
  - 4. **Benzomorphinan**: pentazocine

- **Tramadol** is a synthetic codeine analog; nonscheduled with IR & ER
  - Mechanism: Mu-opioid receptor agonist and inhibition on re-uptake of norepinephrine & serotonin

- **Tapentadol** has a dual central mechanism (mu-opioid agonist activity and inhibition of norepinephrine reuptake) in analgesia based on animal model
  - **Tapentadol IR** for **acute moderate to severe pain**
  - **Tapentadol ER** for **chronic moderate to severe pain, PHN**
Short-Acting Analgesics in Pain Management

- Tramadol
- Tapentadol
- Hydrocodone
- Acetaminophen with Codeine #3, #4
- Oxycodone
- Oxymorphone
- Hydromorphone
- Morphine

In opioid tolerant cancer patients for breakthrough pain only
- Fentanyl transmucosal lozenge, buccal tablet, sublingual tablet or spray, and nasal spray

Long Acting Analgesics in Pain Management

- Long half-life Opioids
  - Methadone

- Time-release Opioids
  - Morphine Sulfate Controlled Release q 12 h
  - Morphine Sulfate Extended Release Capsule q 12-24 h
  - Oxycodone Controlled Release q 12 h
  - Oxymorphone Extended Release q 12 h
  - Hydromorphone Extended Release q 24 h

- Transdermal System
  - Fentanyl q 3 days,
  - Buprenorphine q 7 days
Pain Medication Treatment Agreement
Recommend Universal Precaution

- Medication is responsibility of the patient
- No illicit substances are allowed
- Only one healthcare provider prescribes pain medications
- Unannounced drug screens can be enforced in follow up

- Periodically assess the 4A’s:
  - Analgesia
  - Activities of daily living
  - Adverse effects
  - Aberrant drug-related behavior

Diagnosis & Treatment of Low Back Pain (LBP)

- A Joint Clinical Guideline from American College of Physicians & American Pain Society provide evidence-based information on LBP

- First-line medication for LBP: Acetaminophen, NSAIDs

- **Nonpharmacological therapy** with proven benefits for LBP
  - 1. Acute LBP: spinal manipulation
  - 2. Sub-Acute LBP or Chronic LBP
    - Intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy (CBT), relaxation and biofeedback

National Institutes of Health (NIH) Consensus Statement on Acupuncture in 1997

- NIH organized a conference of panel of experts to evaluate the available literature on acupuncture in 1997
- While designing studies to evaluate efficacy remain a challenge, Acupuncture was widely practiced in the USA for treatment on
  - Postoperative, & chemotherapy nausea and vomiting; and postoperative dental pain
- Other promising results of Acupuncture have been seen in
  - headache, low back pain, asthma, menstrual cramps, fibromyalgia, and myofascial pain


Outcome Evaluation of the Veterans Affairs Salt Lake City Integrative Health Clinic for Chronic Nonmalignant Pain (I)

- OBJECTIVES: The purpose of this longitudinal outcome study was to investigate the effectiveness of Integrative Health Clinic and Program.
- This is an innovative outpatient clinical service that provides Non-pharmacological, bio-psychosocial interventions using research based mind-body skills and complementary and alternative therapies.
- The study assessed improvement in chronic nonmalignant pain and related depression, anxiety, and health-related quality of life.

Outcome Evaluation of the Veterans Affairs Salt Lake City Integrative Health Clinic for Chronic Nonmalignant Pain (II)

- METHODS: It was a retrospective post-hoc quasi-experimental design with a group analysis comparing:
  - (1) chronic non-spinal related pain (CNSP) (e.g., joint pain, headache, and fibromyalgia) (n=53)
  - (2) chronic spinal-related pain (CSP) (e.g., back pain and neck pain) (n=88)

- Data were collected at intake and up to 4 follow-up visits.
- Hierarchical Linear Modeling was used for statistical analysis.
- Outcome measures included: Quality of Life (Short Form-36), the Beck Depression Inventory, and Beck Anxiety Inventory.


Outcome Evaluation of the Veterans Affairs Salt Lake City Integrative Health Clinic for Chronic Nonmalignant Pain (III)

- RESULTS: There were statistically significant differences within and between the CNSP and CSP groups across all follow-up visits.

- For the chronic non-spinal related pain (CNSP) group, depression, anxiety, and bodily pain significantly improved with moderate-to-large effect sizes at 6 months and these benefits persisted across all follow-up visits.

- The chronic spinal-related pain (CSP) group showed an improvement trend in bodily pain.

- DISCUSSION: The greatest improvement after participation in Integrative Health Clinic and Program were seen in the chronic non-spinal related pain (CNSP) group with benefits persisting to 24 months in mood and in some health-related quality of life subcategories.

Integrative Approach to Cancer-Related Neuropathic Pain

• Integrative oncology is the synthesis of mainstream cancer care and evidence-based complementary therapies.

• Complementary strategies include massage therapies, acupuncture, fitness, and mind-body techniques, physical and psychosocial wellbeing, therefore requiring an integrative management approach.

• Neuropathic pain is part of a complex process involving the whole body. This article illustrated the promise of integrative approaches for the treatment of cancer-related neuropathic pain and clinical pain syndrome.


Interventions for Pain Management

Diagnostic & Therapeutic Approach

• Myofascial Trigger Point Injection
• Joint and Bursa Injection
• Diagnostic and Therapeutic Nerve Block

• Spinal Intervention
• Epidural Steroid Injection
• Facet Joint Medial Branch Radiofrequency Ablation
• Sympathetic Block

• Neuromodulation and Infusion Therapy
• Spinal Cord Stimulation
• Spinal Infusion Pump Therapy
Comprehensive Pain Management: Summary

- Gender & cultural differences
- Address co morbid conditions
- Improve daily activity & function
- Universal precaution for analgesics
- Consider interventional approach
- Complementary & Alternative Treatment

Better Quality of Life