

Improving Our Practice: using science to elevate our patient's comfort

November, 2011

Why 'Pain Management'?

- Scope of the Problem:
 - Est. 200 million people have ongoing pain issues
 - Acute
 - 29 million people have surgical procedures / year
 - Chronic
 - Over 90 million adults suffer from chronic pain / day
 - Costs exceed over 240 billion dollars / year

EOL / Palliative Care

- Cancer
 - Est. 1.3 million new case of cancer / year
 - 1/3 of patients actively receiving treatment
 - 75% of patients with advanced disease suffer pain
 - 60- 90% suffer significant pain
 - 54% in the last 4 weeks of life
 - 34% in the last 1 week of life
 - 13,000 CA patients in NH / 30% report unrelieved pain
- Cardiac / COPD / ESRD report similar pain levels
- HIV- 56% report significant pain
 - Lower CD4 counts associated with neuropathies

Breakthrough pain:

Computerized Survey of 1000 community-based CA patients

- N= 160 with significant breakthrough pain
- Increased ER and outpatient doctor visits
- Pain related hospitalizations costs = \$1.7M vs \$192,000
- Pain medication yearly costs = \$12,000 vs \$2,400

Fortner BV, Oken TA, Portney RK, J Pain 2002; 3:38-44.

Breakthrough Pain: OTFC use

- N= 39
- Pain Score before use 9.0 / after use 3.0
- OTFC averted ER visits, parenteral opioids, hospital admissions

Burton AW, Driver LC, Mendoza TR, Syed G. *Clin J Pain* 2004; 20:195-197.

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Pain

- Definition: - an unpleasant sensory input involving tissue damage, or described in terms of such damage.
- 2 Major Components:
 - Emotional
 - Physical

(International Assoc. for the Study of Pain)

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Pain: What are the effects if it is left unrelieved

Simple Right?!! "NO Pain, NO Gain" **Wrong !! PAIN KILLS**

- **Cardiovascular** ↑ Heart rate, ↑ cardiac output, ↑ peripheral vascular resistance, ↑ systemic vascular resistance, hypertension, ↑ coronary vascular resistance, ↑ myocardial oxygen consumption, hypercoagulation, deep vein thrombosis
- **Respiratory** ↓ Flows and volumes, atelectasis, shunting, hypoxemia, ↓ cough, sputum retention, infection
- **Genitourinary** ↓ Urinary output, urinary retention, fluid overload, hypokalemia
- **Gastrointestinal** ↓ Gastric and bowel motility

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Unrelieved Pain (cont.)

- **Endocrine** ↑ Adrenocorticotrophic hormone (ACTH), ↑ cortisol, ↑ antidiuretic hormone (ADH), ↑ epinephrine, ↑ norepinephrine, ↑ growth hormone (GH), ↑ catecholamines, ↑ renin, ↑ angiotensin II, ↑ aldosterone, ↑ glucagon, ↑ interleukin-1, ↓ insulin, ↓ testosterone
- **Musculoskeletal** Muscle spasm, impaired muscle function, fatigue, immobility
- **Immune** Depression of immune response
- **Metabolic** Gluconeogenesis, hepatic glycogenolysis, hyperglycemia, glucose intolerance, insulin resistance, muscle protein catabolism, ↑ lipolysis

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Unrelieved Pain:(cont.)

- **Cognitive** Reduction in cognitive function, mental confusion
- **Developmental** ↑ Behavioral and physiologic responses to pain, altered temperaments, higher somatization, infant distress behavior, possible altered development of the pain system, ↑ vulnerability to stress disorders, addictive behavior and anxiety states
- **Future pain** Debilitating chronic pain syndromes: postmastectomy pain, postthoracotomy pain, phantom pain, postherpetic neuralgia
- **Quality of life** Sleeplessness, anxiety, fear, hopelessness, ↑ thoughts of suicide

(McCaffery M, Pasero C: Pain: Clinical Manual, p.24. Copyright © 1999, Mosby, Inc.)

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Types of Pain

- **Nociceptive ***
 - Somatic
 - Visceral
 - Bone
- **Neuropathic / Deafferentation**
 - Opioid sensitivity is strongly questioned

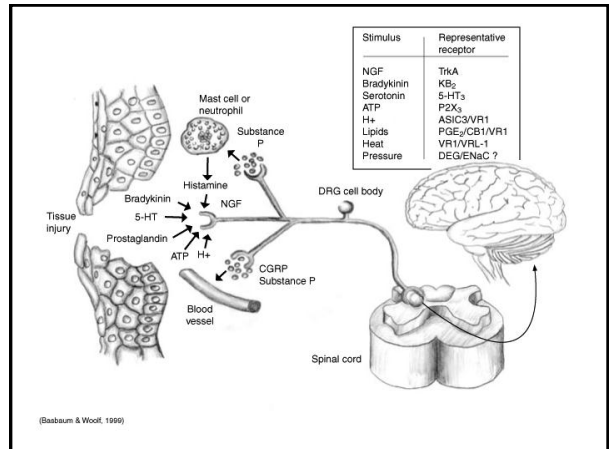
*Vary in opioid sensitivity

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Nociceptive

- **Somatic:**
 - musculoskeletal, any inflammatory or infiltrative process- ie: arthralgias, decubiti, cutaneous
- **Visceral:**
 - Chemical irritation felt with stretching or contraction of hollow visceral organs- ie: G.I., G.U., pleural cavity
- **Bone:**
 - fractures, osteoporosis, metastatic bone disease, amputations

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Neuropathic / Deafferentation

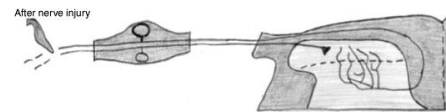
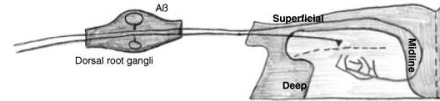
- Excitatory nerve state
- Causes:
 - nerve compression secondary to: tumor pressure, fluid retention-swelling, bone compression
 - chronic irritation
 - neurovascular depletion (Sickle Cell)
 - nerve severing
 - nerve regeneration
- opioid sensitive?



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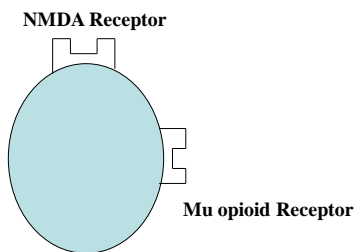
Nerve Injury leads to Central Reorganization in the Spinal Dorsal Horn

Normal terminations of primary afferents in the dorsal horn

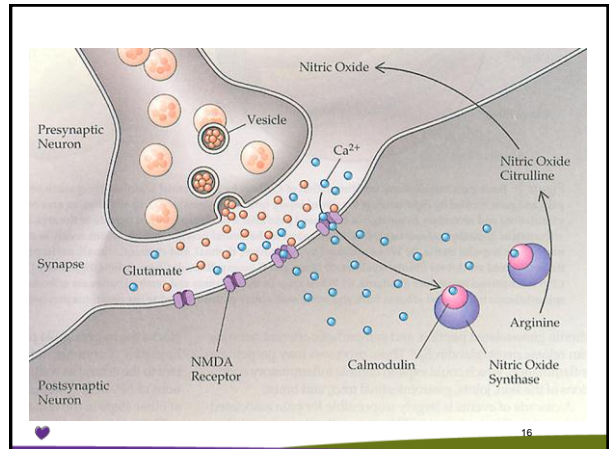


(Woolf & Mannion, 1999)

'Tolerance' or Undertreatment

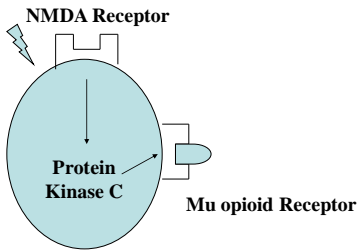


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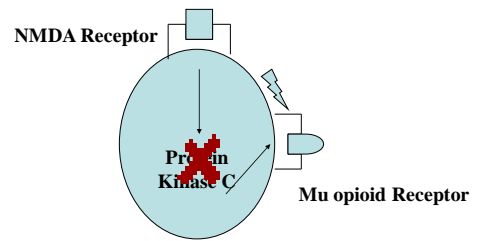
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NMDA Stimulation



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NMDA Antagonist Drugs



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How Do We Treat?



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Nonopioid Analgesics

<u>Drug</u>	<u>Dose range(mg)</u>
Acetaminophen	325-650 q4h
ASA	325-650 q4h
Ibuprofen	200-400 q6h
Nonacetylated Salicylates	500-1500 q12h
COX-2 inhibitors	

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Acetaminophen

- Maximum dose:
 - 4 gm/day < 10 days
 - 3.2 gm/day - chronic use
 - 2.4 gm/day in debilitated, alcoholic, renal failure, and malnourished patients

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Opioids Commonly Prescribed for Moderate-to-Severe Pain

Step 2 opioids (combination*)

- Codeine
- Dihydrocodeine
- Hydrocodone
- Oxycodone
- Propoxyphene

* Usually combined with aspirin or acetaminophen.

Step 3 opioids (single agent)

- Morphine
- Fentanyl
- Oxycodone
- Hydromorphone

Not recommended for use:

- Meperidine
- Buprenorphine
- Pentazocine
- Butorphanol
- Dezocine
- Nalbuphine
- Propoxyphene

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Methadone

- Acute pain: methadone \approx morphine (1:1)
- Chronic pain: ratio depends upon previous opioid dose (methadone:morphine)
 - <90 mg (1:5)
 - 91-299 mg (1:10)
 - >300 mg (1:12)
 - >1000 mg (1:20)

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Weaning Protocols:

- Literature based
- 5 & 10 day weaning to promote appropriate conversion to non-invasive modalities with less rebound pain and rehospitalizations
 - 5 day = 20% wean per day
 - 10 day = 10% wean per day for those that are opioid tolerant

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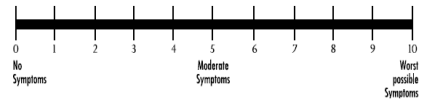
Adjuvant Drugs

- Steroids
- NSAIDs
- Antidepressants
- Anticonvulsants
- Benzodiazepines / Anxiolytics
- Muscle Relaxants

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Most Common Symptoms:

Diarrhea	Nausea	Sleeplessness
Drowsiness	Vomiting	Shortness of breath
Fatigue	Itching	Constipation
Depression	Weight loss	Pain
Appetite	Feeling of well being	



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Symptom Management

- N= 348 (55% female / 55% Cancer)
- MSAS
 - Lack of Energy (83%)
 - Pain (76%)
 - Lack of Appetite (63%)
 - Drowsiness (61%)
 - Difficulty Concentrating (60%)
 - Sadness (51%)

Kutner JS, Kassner CT, Nowels DE. J Pain Symptom Manage. 2001 Jun; 21(6): 473-80.

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Barriers to Effective Symptom Management

- 32 symptoms reviewed:
- "Most Difficult to Manage"
 - Agitation (45%)
 - Pain (40%)
 - Dyspnea (34%)
- Reasons:
 - 38% - Family Care Providers would not implement or maintain recommended treatments
 - 38% - Family Care Providers not wanting recommended treatments
 - 37% - Competing demands from other distressing symptoms

Johnson DC, Kassner CT, Houser J, Kutner JS. J Pain Symptom Manage. 2005 Jan; 29(1): 69-79.

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Nausea

- Gastritis: irritation
 - H2 Blockers, Antacids
- Gastric stasis / motility: constipation, gastroparesis
 - Reglan (metoclopramide) 10mg QID
- Central: chemically induced, smells, learned
 - Haldol (haloperidol) 0.5mg q4-6hr / 2mg BID PO
 - Ativan (Lorazepam) 0.5-2mg q4-12hr
 - Zofran, Kytril, Anzemet
- Vestibular: movement
 - Benadryl (Diphenhydramine) 25-50mg q4hr
 - Scopalamine: gel or patch

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Constipation from opioids . . .

- Occurs with all opioids
- Pharmacologic tolerance developed slowly, or not at all
- Dietary interventions alone usually not sufficient
- Avoid bulk-forming agents in debilitated patients
- Combination stimulant / softeners are useful first-line medications
 - casanthranol + docusate sodium
 - senna + docusate sodium
- Prokinetic agents

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Heart Failure- Symptom Management

- Most patient's suffer from an average of 7 symptoms
- Dyspnea: loop diuretics, vasodilators, O2, Nitrates, Exercise, Opioids
- Fatigue (50%): Sleep disorder (CPAP), O2, Exercises, Psychostimulants
- Anxiety: Sleep disorder, Benzodiazepines, Opioids
- Depression: 1/3 of patients- anti-depressants (SSRI's cause hyponatremia)
- Pain (50%): Avoid NSAIDs, non-acetylated salicylates maybe OK, Opioids

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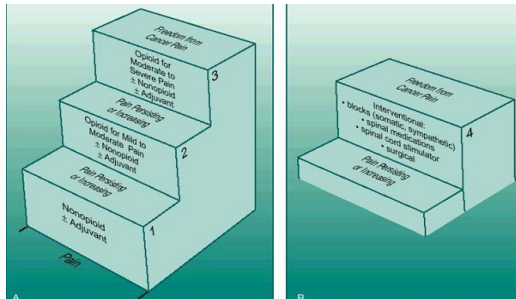
Opioids

- Dilatation of capacitance vessels (large vessels in the legs)- thus decreasing preload
- Decreases dyspnea- midbrain effect
 - Blunts chemoreceptors to sensitivity to CO2
 - Decreases O2 consumption
- Lowers sympathetic tone

- Morphine may stabilize end stage CHF

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Extending the "ladder"



Medscape ©

<http://www.medscape.com>

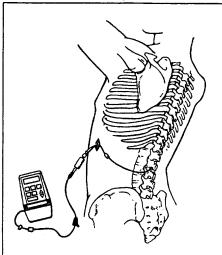
Guide to Intraspinal

- Failure of WHO 3 Step Ladder
 - Drug trials of long acting opioids +/- adjuvants
- Overwhelming systemic side effects
- No contraindications to intraspinal method
- Pain syndrome amenable to intraspinal treatment
(Krames, ES. 1999)

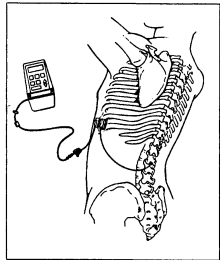
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Delivery Modalities

External catheter and ambulatory infusion pump



Implantable port and an ambulatory infusion pump



(McCaffery M, Pasero C: Pain: Clinical Manual, p.219. Copyright © 1999, Mosby, Inc.)

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Infection Rates

- Exteriorized epidural system
 - 1 per 1,702 days of catheter use
- Exteriorized subarachnoid system
 - 1 per 7,242 days of catheter use
- Portal systems theorized to be < than exteriorized catheter systems
(Nitescu P, Sjoberg M, Appelgren L, et al, 1995)

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Local Anesthetics

- Lidocaine:
 - Mode of Action: Sodium Channel Blocking Agent. Blocks neuronal action in an active or depolarized neuron without interfering with motor or sensory function
 - Candidates for therapy: Neuropathic pain. Also found significant in patients with visceral and central input.
 - Patients with heart failure or liver disease should be carefully assessed prior to use, secondary to increased toxicity risks

Lidocaine Infusion

- SC or IV at .5-2mg/ kg / hr
- Toxicity rare
- S&S of early toxicity: lightheadedness, periorbital numbness and tingling.
- Treatment: Slow or stop infusion
- Opioid needs most likely will decline. Quick weaning within 24 hours has not shown opioid withdrawal symptoms

(Ferrini & Paice, 2004)

Ketamine

- Dosage Suggestions:
- Starting Dosage:
 - approximately 50 mg/24 hours-
 - approximately .5mg / kg /24 hours-
 - (0.1-1.5mg/kg/h) (Portenoy, 2001)
 - ~2mg/ hour infusion to begin with.
- Titrate up by 50 mg/24hrs q 48 hours as tolerated based on pain relief
- Pain control typically achieved at 100- 400mg / 24 hours
- Subanesthetic dosing (2-30mg / hr)

Ketamine

- **Opioid decrease:** Ketamine is adjuvant to opioid dosing and actually will decrease opioid needs. Opioid decrease may be as significant as 50% within the first 24 hours and continued titration down over administration as tolerated. Establish pain benefit first and then begin titration down by 25% as tolerated.

Ketamine: Side Effects

Side Effects

- Most common side effects involve the central nervous system. Notify physician as directed and use prophylactic or preemptive medication as prescribed.

Light-headedness, Drowsiness, Reporting dream-like state, Confusion, Nausea and Vomiting, Hallucinations, Dry Mouth.

Side Effect Medications:

- Diazepam 1 mg prn (typically given BID as preemptive / prophylactic)
- Lorazepam 1mg BID
- Haloperidol 0.5-1mg BID- TID
- Clonazepam 0.25-0.5mg qhs-BID



We must all die.... But that I can save him from days of torture- that is what I feel as my great and ever new privilege. Pain is a more terrible lord of mankind than even death itself.

Dr Albert Schweitzer (1875-1965)



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