

Project: Ghana Emergency Medicine Collaborative

Document Title: Pain Management

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Critical outcome

- The emergency nurse assesses, identifies and manages acute and chronic pain within the emergency setting.

Specific Outcomes

- Define the types of pain and complications of pain management.
- Delineate pain physiology and mechanisms of addressing pain with medications.
- Define the general assessment of the patient in pain.
- Delineate the nursing process and role in the management of the patient with acute and chronic pain.

Specific Outcomes

- Apply the nursing process when analyzing a case scenario/patient simulation
- Predict differential diagnosis when presented with specific information regarding the history of a patient
- List and know the common drugs used in the emergency department to manage painful conditions and conduct procedural sedation.
- Consider age-specific factors.
- Discuss medico-legal aspects of care of patients with pain related to emergencies.

Definitions

- Pain
 - An unpleasant sensory and emotional experience
 - Associated with actual or potential tissue damage or described in terms of such damage
 - Personal and subjective experience
 - Can ONLY be described by person experiencing pain
 - Exists whenever the person says it does

Tolerance

- Greatest level of discomfort a person is prepared to endure
- Person requires increased amount of substance to achieve desired effect

Dependence

- Reliance on a substance
- Abrupt discontinuance would cause impairment of function

Addiction

- Behavioral pattern characterized by compulsively obtaining and using a substance
- Results in physical, social, and psychological harm to user

Allodynia

- Pain caused by a stimulus not normally causing pain
- Mechanical:
 - Static mechanical allodynia- pain in response to a light touch/pressure
 - Dynamic mechanical allodynia- pain in response to brushing
- Thermal:
 - (Hot or Cold) allodynia- pain in response to mild skin temperatures in the affected area
- Can be from neuropathy, fibromyalgia, migraines or spinal cord injuries

Pain Management

- Comprehensive approach to patient needs when experiencing problems associated with acute or chronic pain

Pain Threshold

- Least level of stimulus intensity perceived as painful

Suffering

- Physical or emotional reaction to pain
- Feeling of helplessness, hopelessness, or uncontrollability

Pain Physiology

- Emergency nurses need an understanding of basic physiology of pain to effectively assess, intervene, and evaluate patient outcomes.

Physiology

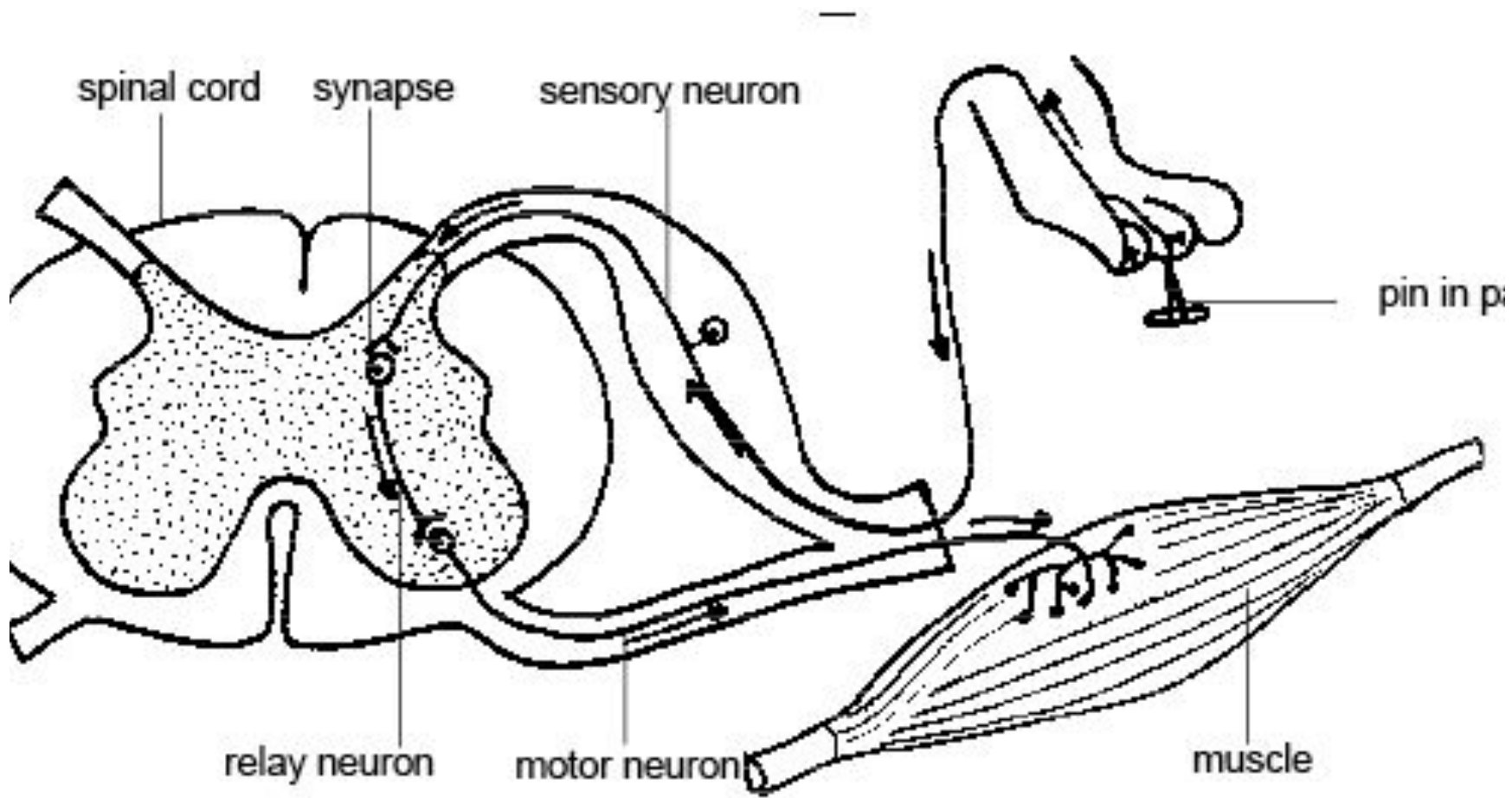
A. Neuroanatomy

1. Afferent pathway

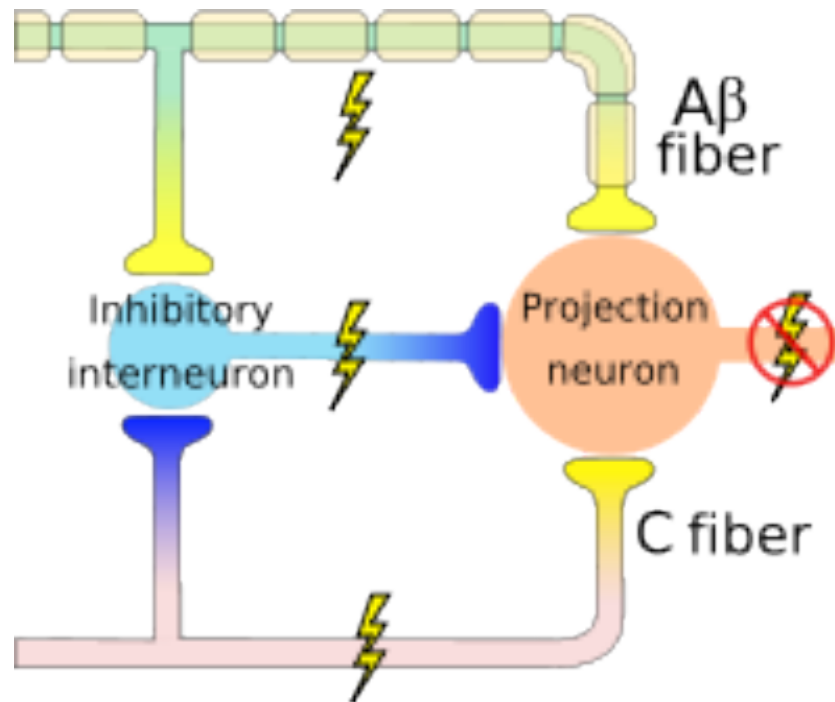
- a) Nociceptors (pain receptors) in the tissues respond to pleasant and painful stimuli
 - 1) Stimulation of nociceptors produces impulse transmission through fibers
 - a) Small C fibers: unmyelinated; transmit burning and aching sensations; relatively slow
 - b) Larger A-delta fibers: myelinated; transmit sharp and well-localized sensations; relatively fast
 - 2) Terminate in the dorsal horn of the spinal cord
 - 3) Modulate pain patterns in the dorsal horn
 - 4) Transmit impulses to the midbrain via the neospinothalamic tract (acute pain) and to the limbic system via the paleospinothalamic tract (dull and burning pain)

Central nervous system (CNS)

- Includes all the limbic system, reticular formation, thalamus, hypothalamus, medulla, and cortex
- Arousal, discrimination, and localization of pain; coping response; release of corticosteroids; cardiovascular response; modulation of spinal pain transmission



C fiber, A delta, dorsal horn



Efferent pathway

- Fibers connecting the reticular formation, midbrain, and substantia gelatinosa in the dorsal horn of the spinal cord
- Afferent fibers stimulate the periaqueductal gray matter in the midbrain, which then stimulates the efferent pathway
- Modulates or inhibits pain impulses

Neuromodulation

- A. Endorphins: A group of neuropeptides that inhibit pain transmission in the brain and spinal cord
 - 1) Beta-Lipotropin: responsible for feeling of well-being
 - 2) Enkephalin: weaker than other endorphins but longer lasting and more potent than morphine
 - 3) Dynorphin: generally impedes pain impulse
 - 4) Endomorphin: very antinociceptive
 - 5) Opiate receptors: mu receptors on the membrane of afferent neurons, inhibit the release of excitatory neurotransmitters; beta receptors react with enkephalins to modulate pain transmission; kappa receptors produce sedation and some analgesia; sigma receptors cause pupil dilation and dysphoria

Effects of medications on modulating pain

- Stimulation of afferent pathways results in activation of circuits in supraspinal and spinal cord levels. Each synaptic link is subject to modulation
- Mechanisms of drug action
 - ASA and Acetaminophen: inhibit prostaglandin synthesis in the CNS
 - NSAIDs: synthesized at the site of injury; inhibit prostaglandin synthesis, which reduces hyperalgesia
 - Opiates: interact with mu and kappa receptors; powerful effect on the brainstem and the periphery
 - Local anesthetics: block sodium channels and thus prevent transmission of nerve impulses

Specific theory

- A specific sensation that is independent of other sensations. Experiments on animals provided clinical evidence of separate spots for heat, cold, and touch

Gate control theory

- Modulations of inputs in the spinal dorsal horns and the brain act as a gating mechanism
- With a stimulus, the following sequence of events occurs:
 - The pain impulse is transmitted via nociceptors fibers in the periphery to the substantia gelatinosa through large A-delta and small C fibers
 - A gating mechanism regulates transmission from the spinal cord to the brain, where pain is perceived
 - Stimulation of large fibers closes the gate and thus decreases transmission of impulses unless persistent
 - Stimulation of small fibers opens the gate and enhances pain perception

..more on the gating mechanism

- The spinal gating mechanism is also influenced by fibers descending from the brain
 - The conducting fibers carry precise information about the nature and location of the stimulus
 - Through efferent pathways the CNS may close, partially close, or open the gate
 - Descending fibers release endogenous opioids that bind to opioid receptor sites that thereby prevent the release of neurotransmitters such as substance P, this inhibiting transmission of pain impulses and producing analgesia
 - Cognitive function can also modulate the pain perception and the individual's pain response

Neuromatrix theory

- A widespread network of neurons consist of loops between the thalamus and cortex and between the cortex and limbic systems; neural processes are modulated by stimuli from the body but can also act in the absence of stimuli
 - Stimuli trigger neural patterns but do not produce them
 - Cyclic processing of impulses produces a characteristic pattern in the entire matrix that leaves a neurosignature
 - Signature patterns are converted to awareness of the experience and activation of spinal cord neurons to produce muscle patterns for action

Neuromatrix theory

- Neural inputs modulate the continuous output of the neuromatrix to produce a wide variety of experiences felt by the individual
 - Awareness of the experience involves multiple dimensions (e.g., sensory, affective, and evaluative) simultaneously
 - Pain qualities are not learned; rather, they are innately produced by the neurosignatures and interpreted by the brain

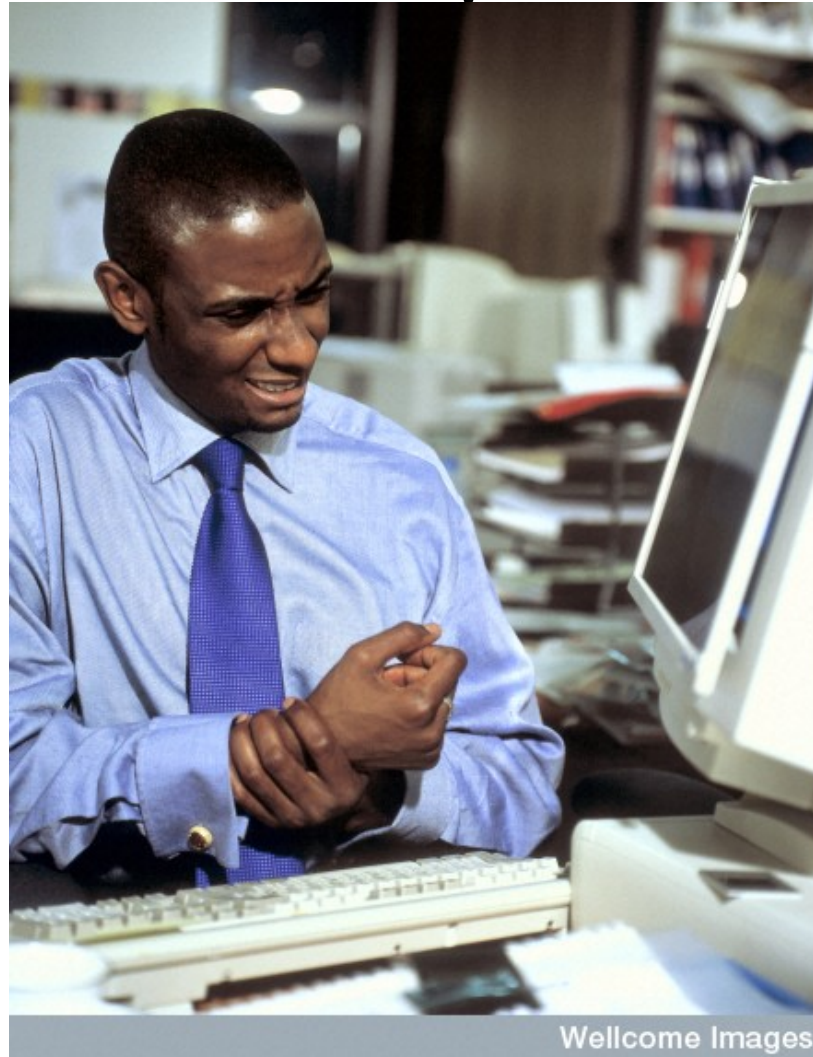
Types of pain

- Acute
- Chronic
- Nociceptive
- Neuropathic

Acute

- Elicited by injury to body tissues
- Typically seen with trauma, acute illness, surgery, burns, or other conditions of limited duration; generally relieved when healing takes place.

Acute pain



Chronic

- Elicited by tissue injury
- May be perpetuated by factors remote from the original cause and extend beyond the expected healing time; generally lasts longer than 3 months

Chronic pain



Nociceptive

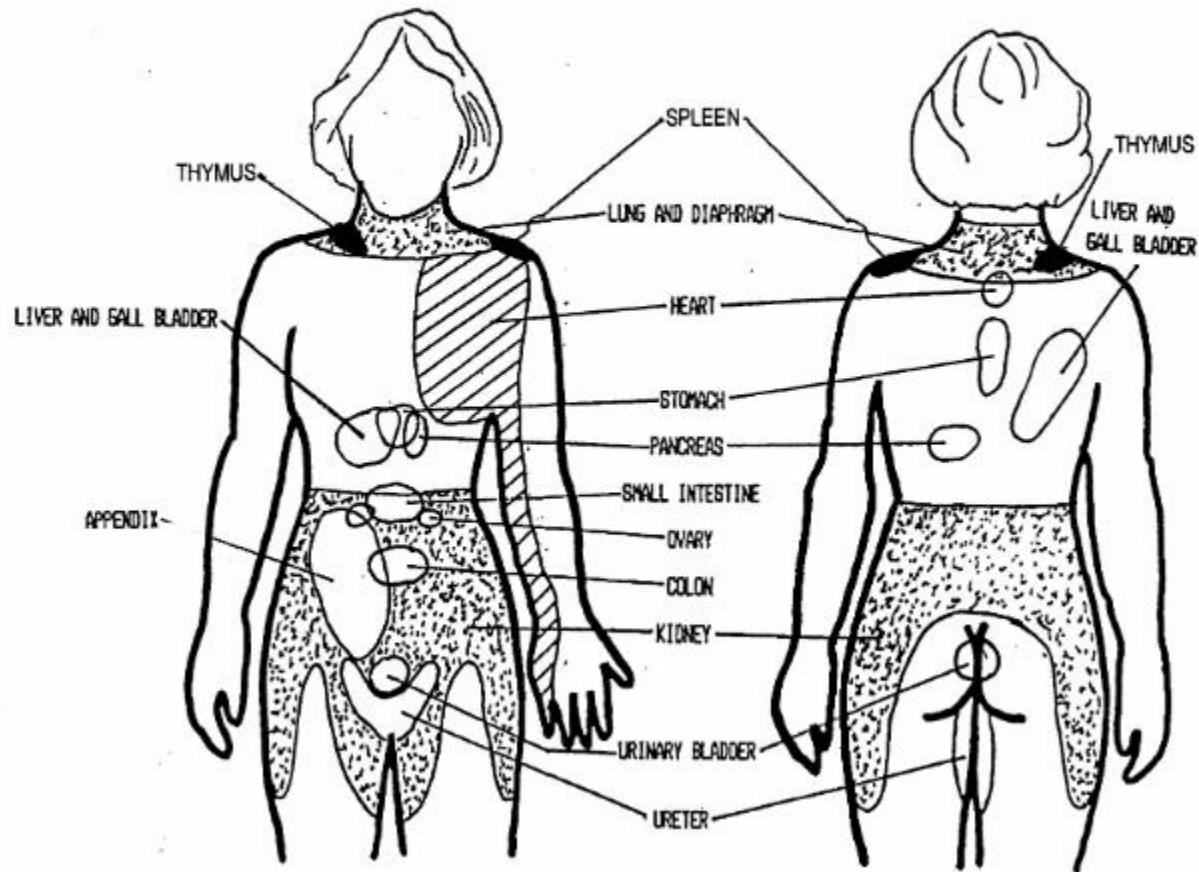
- Elicited by noxious stimuli that damages tissues or has the potential to do so if the stimuli are prolonged.
 - Somatic pain: arises from skin, muscle, joint, connective tissue, or bone; generally well localized and described as aching or throbbing.
 - Visceral pain: arises from internal organs such as the bladder or intestine; poorly localized and described as cramping.

Somatic pain



Visceral pain

VISCERAL REFERRED PAIN (VRP) AREAS



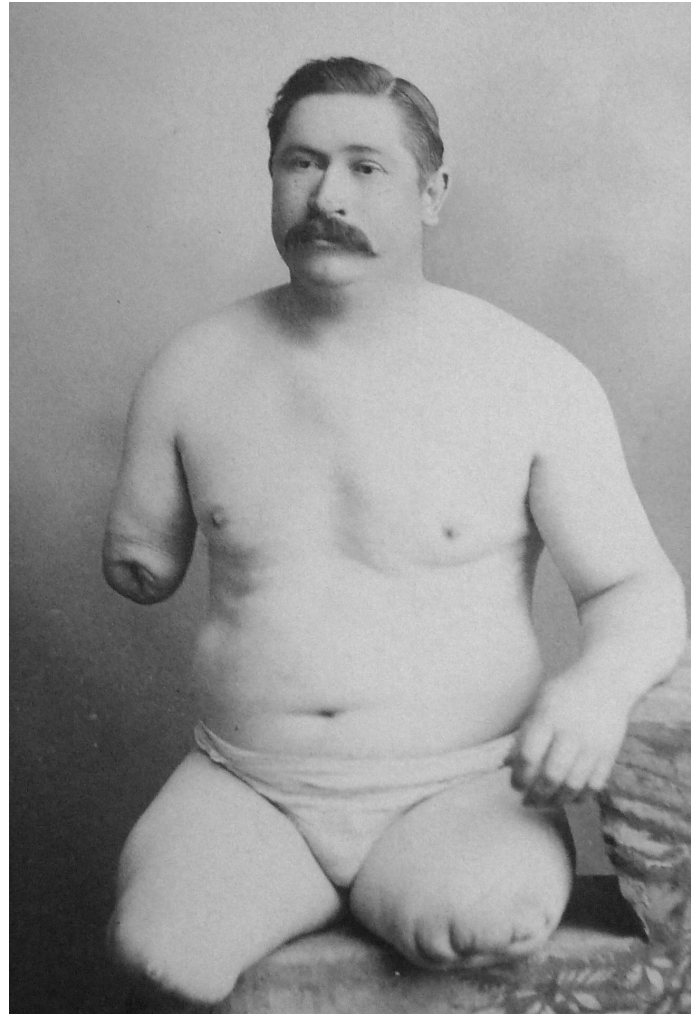
Neuropathic

- Caused by damage to peripheral or central nerve cells
 - Peripheral:
 - Arises from injury to either single or multiple peripheral nerves
 - Felt along nerve distributions
 - Burning, shooting, stabbing or like an electric shock
 - Diabetic neuropathy, herpetic neuralgia, radiculopathy, or trigeminal neuralgia
 - Central:
 - Associated with autonomic nervous system dysregulation
 - Phantom limb pain (peripheral) or complex regional pain syndromes (central)

Peripheral neuropathic pain



Central neuropathic pain



General strategy

- Assessment
- Analysis
- Planning and Implementation/Intervention
- Evaluation and Ongoing monitoring
- Documentation

Assessment

- Primary and secondary assessment
- Focused assessment
 - Subjective data collection
 - Objective data collection

Subjective data

1. HPI (history of present illness/injury) or Chief Complaint

- History of pain (PQRST)
 - Pain
 - Quality
 - Region/Radiation
 - Severity
 - Timing
- Efforts to relieve symptoms

Subjective data

2. Past medical history

- a) Current or preexisting diseases/illness
- b) New or recurring problem
- c) Substance and/or alcohol use/abuse
- d) LNMP
- e) Current medications
- f) Non-pharmacologic interventions
- g) Food or drink
- h) Coping mechanisms
- i) Allergies

Subjective data

3. Psychological/social/environmental factors:
 - a) Anxiety, Depression
 - b) Aggravating or alleviating factors
 - c) Expressions of pain
 - d) Pain behavior is learned, yet adaptive, and it r/t pain threshold and pain tolerance
 - e) Pain expressions can be verbal, behavioral, emotional, and physical

Objective data

1. General appearance

- a) Psychological
- b) Observations of behavior and vital signs should not be used solely in place of self-report
- c) Positioning and movement
- d) Physiologic
- e) Level of distress/discomfort

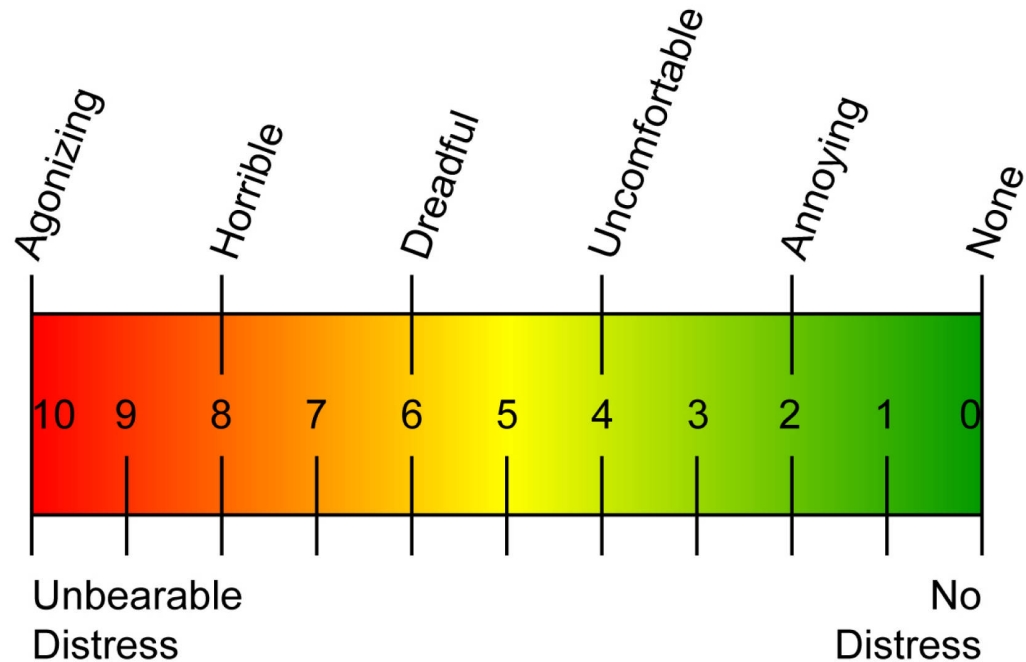
Objective data

2. Obtain pain rating

a) Adults

1. Visual analog scale
2. Numeric rating scale
3. Graphic rating scale
4. Thermometer-like scale

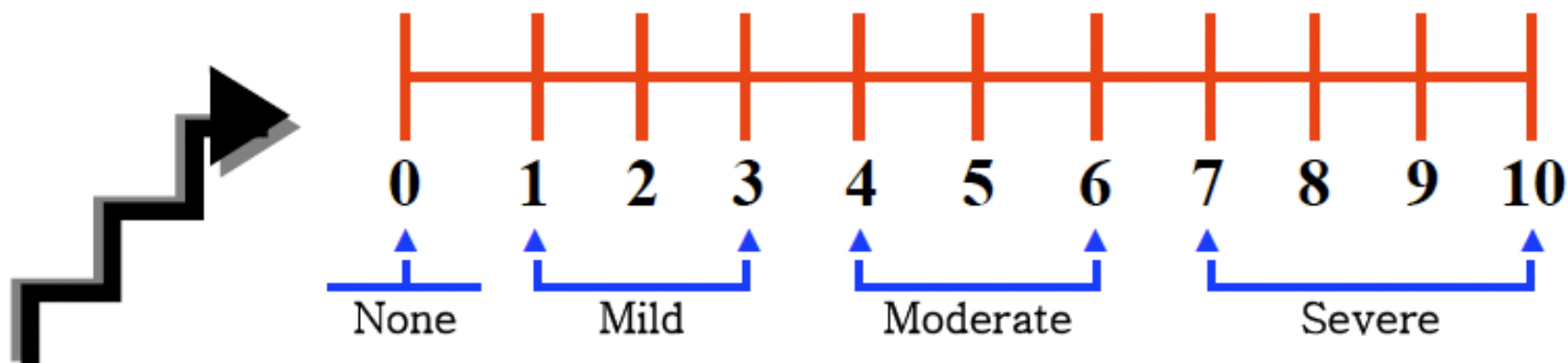
Visual Analog Scale



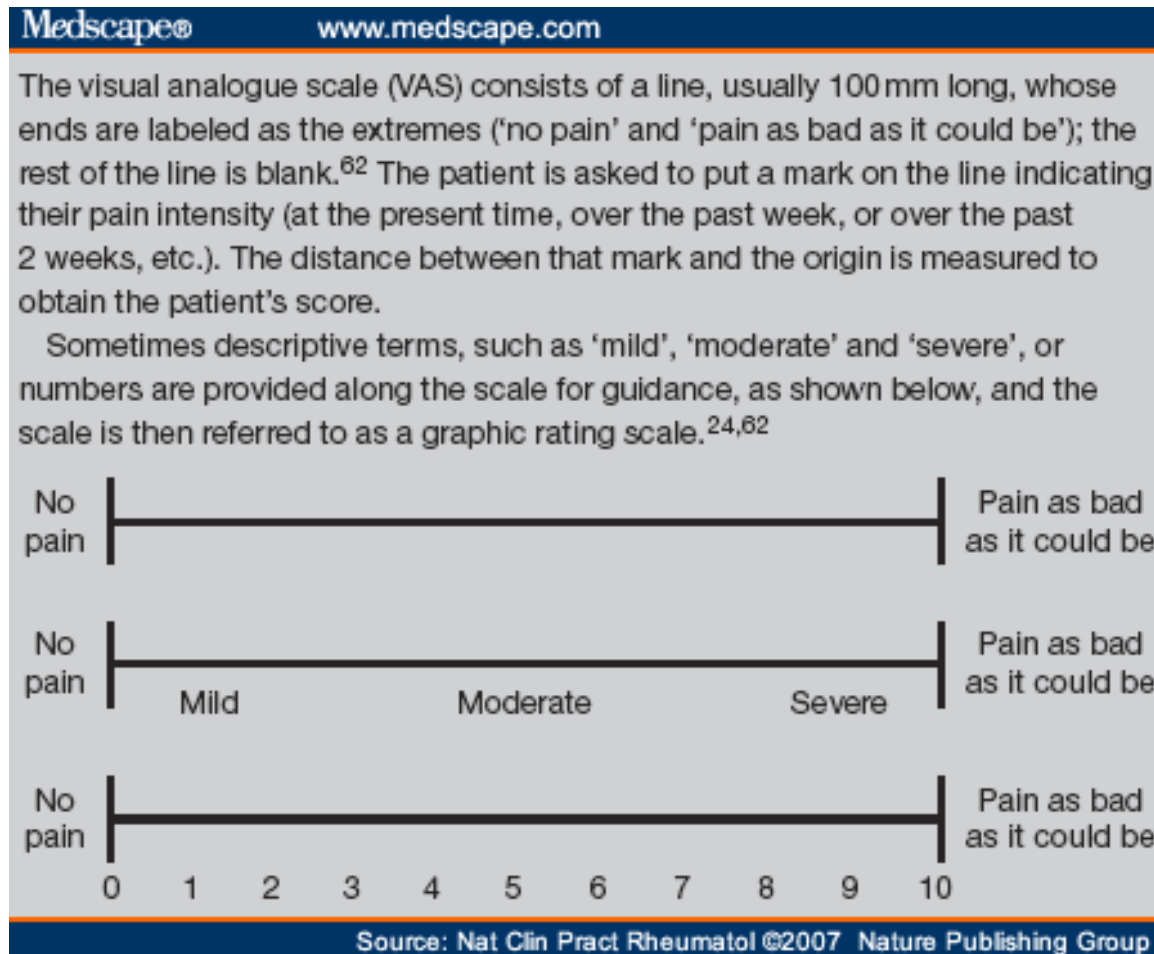
Task _____

Date _____ Start _____ End _____

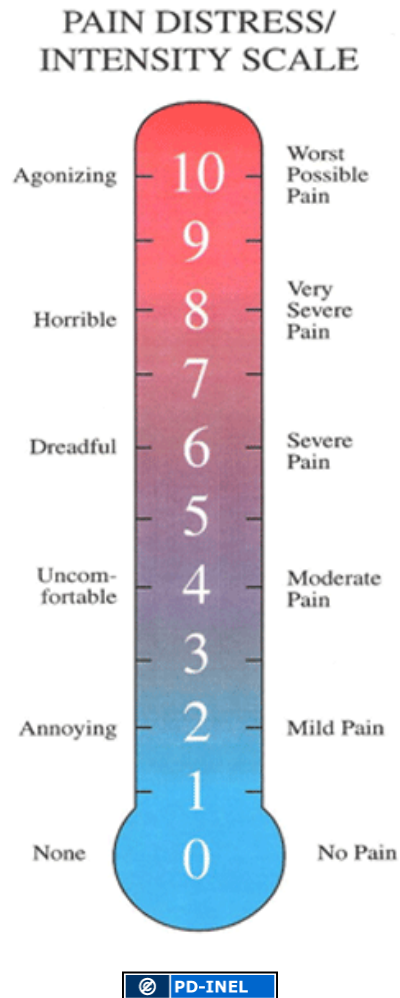
Numeric Rating Scale



Graphic Rating Scale



Thermometer-like Scale



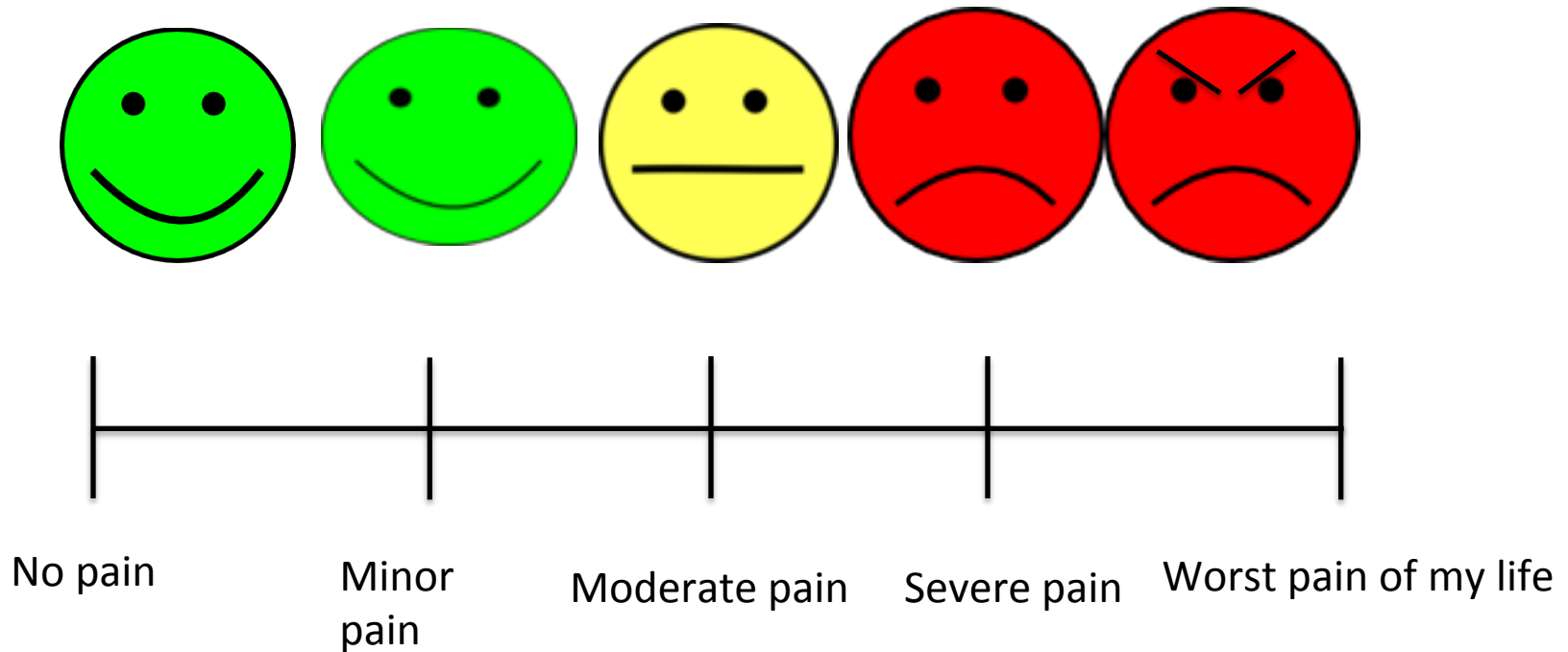
Objective data

2. Obtain pain rating

b) Pediatric

1. FACES scale
2. Poker chip
3. Numeric rating scale
4. Color matching

FACES / Numeric combined



Objective data

2) Obtain a pain rating

c) Infant

1. Neonatal Infant Pain Scale (NIPS)
2. Neonatal Pain, Agitation, and Sedation Scale (NPASS)
3. Pain Assessment Tool (PAT)

NIPS

Neonatal Infant Pain Scale			
NIPS	0 point	1 point	2 points
Facial expression	Relaxed	Contracted	–
Cry	Absent	Mumbling	Vigorous
Breathing	Relaxed	Different than basal	–
Arms	Relaxed	Flexed/stretched	–
Legs	Relaxed	Flexed/stretched	–
Alertness	Sleeping/calm	Uncomfortable	–

Maximal score of seven points, considering pain ≥ 4 .

NPASS

N-PASS: Neonatal Pain, Agitation, & Sedation Scale

Pat Hummel, MA, RNC, NNP, PNP & Mary Puchalski, MS, RNC

Assessment Criteria	Sedation		Normal	Pain / Agitation	
	-2	-1	0	1	2
Crying Irritability	No cry with painful stimuli	Moans or cries minimally with painful stimuli	Appropriate crying Not irritable	Irritable or crying at intervals Consolable	High-pitched or silent-continuous cry Inconsolable
Behavior State	No arousal to any stimuli No spontaneous movement	Arouses minimally to stimuli Little spontaneous movement	Appropriate for gestational age	Restless, squirming Awakens frequently	Arching, kicking Constantly awake or Arouses minimally / no movement (not sedated)
Facial Expression	Mouth is lax No expression	Minimal expression with stimuli	Relaxed Appropriate	Any pain expression intermittent	Any pain expression continual
Extremities Tone	No grasp reflex Flaccid tone	Weak grasp reflex ↓ muscle tone	Relaxed hands and feet Normal tone	Intermittent clenched toes, fists or finger splay Body is not tense	Continual clenched toes, fists, or finger splay Body is tense
Vital Signs HR, RR, BP, SaO₂	No variability with stimuli Hypoventilation or apnea	< 10% variability from baseline with stimuli	Within baseline or normal for gestational age	↑ 10-20% from baseline SaO ₂ 76-85% with stimulation - quick ↑	↑ > 20% from baseline SaO ₂ ≤ 75% with stimulation - slow ↑ Out of sync with vent

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Assessment of Sedation

- Sedation is scored in addition to pain for each behavioral and physiological criteria to assess the infant's response to stimuli
- Sedation does not need to be assessed/scored with every pain assessment/score
- Sedation is scored from 0 → -2 for each behavioral and physiological criteria, then summed and noted as a negative score (0 → -10)
- A score of 0 is given if the infant's response to stimuli is normal for their gestational age
- Desired levels of sedation vary according to the situation
 - "Deep sedation" → score of -10 to -5 as goal
 - "Light sedation" → score of -5 to -2 as goal
- Deep sedation is not recommended unless an infant is receiving ventilatory support, related to the high potential for apnea and hypoventilation
- A negative score without the administration of opioids/ sedatives may indicate:
 - The premature infant's response to prolonged or persistent pain/stress
 - Neurologic depression, sepsis, or other pathology

Pavulon/Paralysis

- It is impossible to behaviorally evaluate a paralyzed infant for pain
- Increases in heart rate and blood pressure may be the only indicator of a need for more analgesia
- Analgesics should be administered continuously by drip or around-the-clock dosing
- Higher, more frequent doses may be required if the infant is post-op, has a chest tube, or other pathology (such as NEC) that would normally cause pain
- Opioid doses should be increased by 10% every 3-5 days as tolerance will occur without symptoms of inadequate pain relief

Premature Pain Assessment

- + 3 if < 28 weeks gestation / corrected age
- + 2 if 28-31 weeks gestation / corrected age
- + 1 if 32-35 weeks gestation / corrected age

Assessment of Pain/Agitation

- Pain assessment is the fifth vital sign - assessment for pain should be included in every vital sign assessment
- Pain is scored from 0 → +2 for each behavioral and physiological criteria, then summed
- Points are added to the premature infant's pain score based on their gestational age to compensate for their limited ability to behaviorally or physiologically communicate pain
- Total pain score is documented as a positive number (0 → +10)
- Treatment/interventions are indicated for scores > 3
- Interventions for known pain/painful stimuli are indicated before the score reaches 3
- The goal of pain treatment/intervention is a score ≤ 3
- More frequent pain assessment indications:
 - Indwelling tubes or lines which may cause pain, especially with movement (e.g. chest tubes) → at least every 2-4 hours
 - Receiving analgesics and/or sedatives → at least every 2-4 hours
 - 30-60 minutes after an analgesic is given for pain behaviors to assess response to medication
 - Post-operative → at least every 2 hours for 24-48 hours, then every 4 hours until off medications

PAT

Categories	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant frown, quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid, or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging, or being talked to; distractible	Difficult to console or comfort

Note: Each of the five categories Face (F), Legs (L), Activity (A), Cry (C), and Consolability (C) is scored from 0-2, which results in a total score between 0 and 10.

From Merkel, Voepel-Lewis, Shayevitz, & Malviya (1997). The FLACC: A behavioral scale for scoring postoperative pain in young children. *Pediatric Nursing*, 23(3) 293-297.

Source: *Pediatr Nurs* © 2003 Jannetti Publications, Inc.

Objective data

- Inspection
 - Position, skin color, external bleeding, skin integrity, obvious deformity, edema
- Auscultation
 - Breath sounds, bowel sounds
- Palpation
 - Areas of tenderness: light, deep
 - Save painful part until last

Diagnostic procedures

- Laboratory studies
 - Imaging
 - Electrocardiogram
-
- Purpose: TO FIND THE CAUSE OF THE PAIN

Analysis: Differential diagnosis

- ACUTE PAIN
- CHRONIC PAIN

Planning and Implementation/ Interventions

1. Determine priorities of care
 - a) Maintain ABC
 - b) Provide supplemental oxygen
 - c) IV access
 - d) Obtain and set up equipment
 - e) Prepare/assist with medical interventions
 - f) Provide measures for pain relief
 - g) Administer pharmacological therapy as ordered

Administer pharmacological therapy as ordered

1. The World Health Organization (WHO) recommends the use of the analgesic ladder as a systematic plan for the use of analgesic medications.
 1. Step 1: use non-opioid analgesics for mild pain
 2. Step 2: adds a mild opioid for moderate pain
 3. Step 3: use of stronger opioids when pain is moderate to severe

Patient-controlled analgesia (PCA)

- Used for patients with acute or chronic pain who are able to communicate, understand explanations, and follow directions
- Assess vital signs and pain level
- Explain the use of the pump
- Collaborate with the physician, patient, and family about dosage, lockout interval, basal rate, and amount of dosage on demand
- Assist the patient to use the PCA pump

Planning and Implementation/ Interventions

2. Relieve anxiety and apprehension
3. Allow significant others to remain with patient if supportive
4. Educate patient and significant others
 - about the efficacy and safety of opioid analgesics

Evaluation and Ongoing Monitoring

1. Continuously monitor and treat as indicated
2. Monitor patient response/outcomes, and modify nursing care plan as appropriate
3. If positive patient outcomes are not demonstrated, reevaluate assessment and/or plan of care

Documentation

- Document vitals and pain score before and after intervention along with patient response

Age-related concerns

1. Pediatrics: Growth or development related

- Children's pain tolerance increases with age
- Children's developmental level influences pain behavior
- Localization of pain begins during infancy
- Preschoolers can anticipate pain
- School age children can verbalize pain and describe location and intensity

Pediatrics “Pearls”

- Children may not admit to pain to avoid injection
- Distraction techniques can aid in keeping the child’s mind occupied and away from pain
- Opioids are no more dangerous for children than for adults

Age Related concerns

2. Geriatrics: Age related

- Pain is not a normal aging consequence
- Chronic pain alters the person's quality of life
- Chronic pain may be caused by a myriad of conditions

Geriatric “Pearls”

- Adequate treatment may require deviation from clinical pathways
- Administer pain relieving medications at lower dose and increase slowly

Barriers to effective pain management

1. Attitudes of emergency health care providers
2. Hidden biases and misconceptions about pain
3. Inadequate pain assessment
4. Failure to accept patients' reports of pain
5. Withholding pain-relieving medication
6. Exaggerated fears of addiction
7. Poor communication

Improving pain management

- Changing attitudes
- Continuing education related to the realities and myths of pain management
- Evidence-based practice
- Cultural sensitivity

Procedural sedation

- The Joint Commission (TJC) has standard definitions for four levels of sedation and anesthesia:
 1. minimal sedation
 2. moderate sedation/analgesia
 3. deep sedation/analgesia (pt not easily aroused)
 4. anesthesia (requires assisted ventilation)

Procedural sedation

- Indications: suturing, fracture reduction, abscess incision and drainage, joint relocation
- Assessment: Allergies, Last oral intake

Procedural Sedation

- Procedure:
 - Baseline VS and LOC
 - Explain procedure to patient and family
 - Obtain venous access
 - Equipment: cardiac monitor, blood pressure monitor, pulse oximeter, suction, oxygen equipment, endotracheal intubation equipment and capnography device, IV supplies, reversal agents.
 - Assist with medications
 - Maintain continuous monitoring during procedure
 - Document vital signs, LOC, and cardiopulmonary status every 15 min.
 - Post procedure discharge criteria

Medication review

- Non-narcotic
- Narcotics
- Sedatives / anesthetics
- Local anesthetics

Non-narcotic

- Acetaminophen
- Salicylates
- NSAIDs

Narcotic

- Codeine
- Fentanyl
- Hydromorphone
- Morphine sulfate
- Oxycodone

Sedatives / Anesthetics

- Diazepam
- Ketamine
- Lorazepam
- Midazolam
- Propofol
- Etomidate

Local anesthetics

- Lidocaine
- Mepivacaine
- Procaine
- Tetracaine
- LET (lidocaine, epinephrine, tetracaine)
- EMLA cream

THE END