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PAIN MANAGEMENT IN CHILDREN

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Goals and objectives

- Definition of pain
- Physiology of pain
- Assessment of pain
- WHO recommendations
- Management of acute postoperative pain
- Management of chronic pain
- Pain management at the end of life
- Management of pain related to medical procedures
- Summary

Pain - definition

- vital function of the nervous system in providing the body with a warning of potential or actual injury
- sensory experience
- emotional experience
  - affected by psychosocial factors: past experiences, beliefs about pain, anxiety, fear

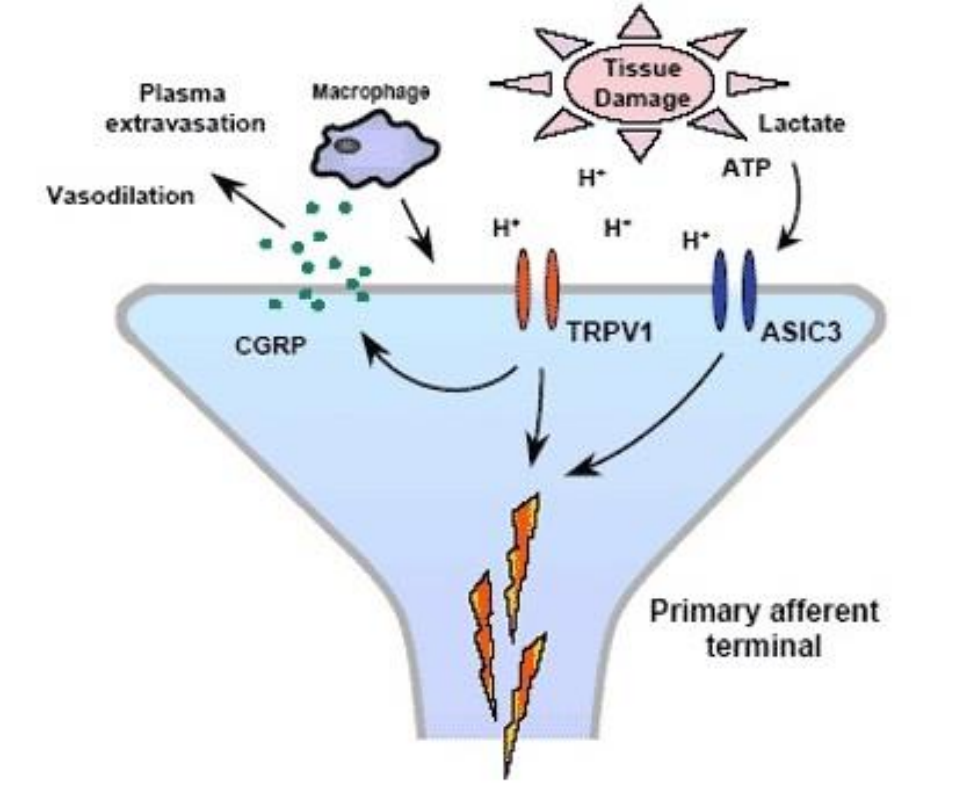
Pathophysiology of pain - nociceptors

- sensory neurons with free nerve endings (dorsal root ganglion)

  noxious stimulus detected – transduced into electrical energy

  when electrical energy reaches a threshold, action potential forms

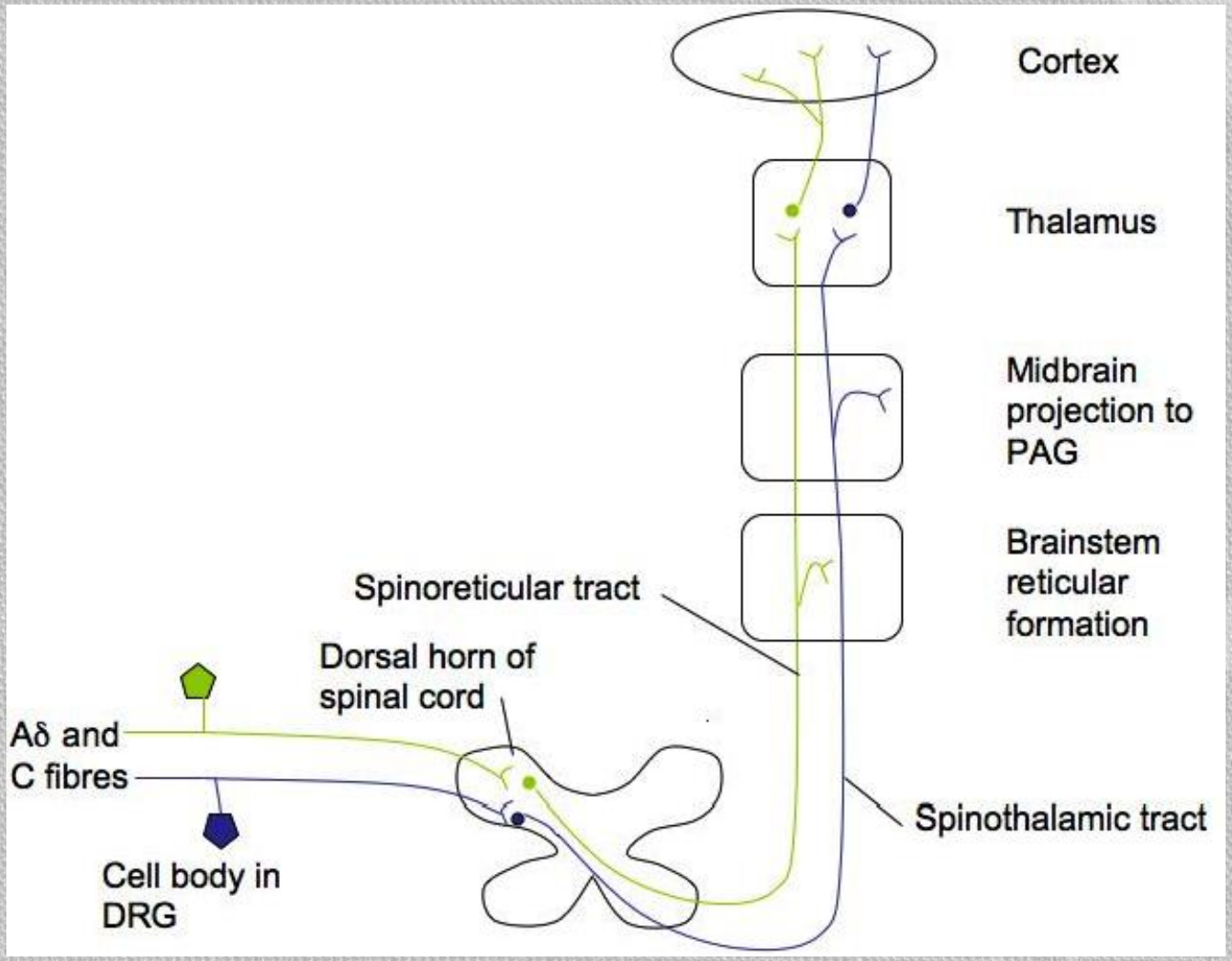
- types of nociceptors
  - thermal
  - mechanical
  - chemical
  - sleeping/silent
  - polymodal



Pathophysiology of pain – primary afferent fibers

	Aβ fibers	Aδ fibers	C fibers
Diameter	large	small 2-5 µm	smallest < 2 µm
Myelination	highly	thinly	unmyelinated
Conduction velocity	> 40 m/s	5-15 m/s	< 2 m/s
Receptor activation threshold	low	high or low	low
Sensation on stimulation	light touch, non-noxious	rapid, sharp, localized pain	slow, diffuse, dull pain

Pathophysiology of pain – dorsal horn and ascending tracts in the spinal cord

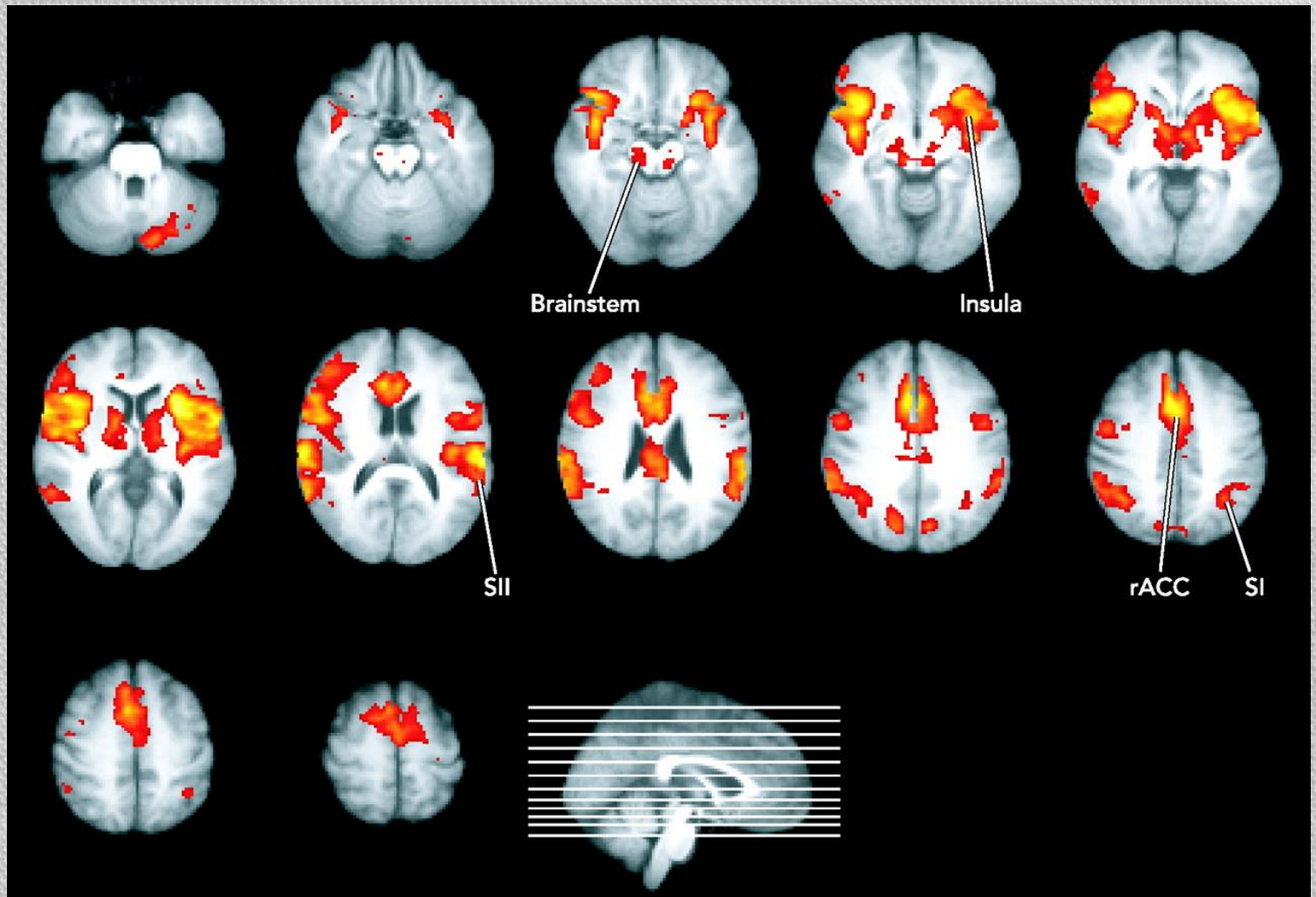


Pathophysiology of pain – pain processing in the brain

- the experience of pain is complex and subjective
- affected by different factors
  - cognition (distraction, catastrophizing)
  - mood
  - beliefs
  - genetics
- localization of the pain -> somatosensory cortex
- brain network activated during an acute pain experience:
  - primary and secondary somatosensory area, prefrontal cortex, anterior cingulate cortex, insula, thalamus
  - amygdala, hippocampus, basal ganglia, brainstem

Pathophysiology of pain – pain processing in the brain

Pain matrix



Pathophysiology of Pain

- Historically, it was thought that neonates did not need pain control
  - Immature nervous system
- Development of pain pathway occurs early in fetal life
  - 8 weeks gestation: reflex responses to somatic stimuli
  - 25 weeks gestation: flexion withdrawal response to noxious stimuli
  - 26-31 weeks: coordinated facial movements in response to heel pricks in premature infants

Pain assessment

- Evidence based guidelines are available for pain assessment
  - History and Physical exam
  - Measurement of pain and distress using validated tools
- Pain is the ‘sixth’ vital sign
- Lack of proper pain assessment is one of the top two reasons for poorly managed pain
- Asking the proper questions:
  - location, duration, severity, characteristics, constant/intermittent, alleviating or aggravating factors
  - What words do the child or the family use for the pain?
  - Is the pain disturbing the child’s sleep/emotional state?
  - Is the pain restricting the child’s ability to perform normal physical activities?
  - Is the pain restricting the child’s ability/willingness to interact with others, and ability to play?

Measuring pain intensity

- Different objective and subjective methods for measuring pain intensity

Physiological monitoring of body processes

- Heart rate, respiratory rate, blood pressure
- No information regarding subjective experience of pain
- Used for non-verbal or sedated patients

Behavior observation

FLACC SCALE

	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant 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, distractable	Difficult to console or comfort

Each of the five categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, which results in a total score between 1-10

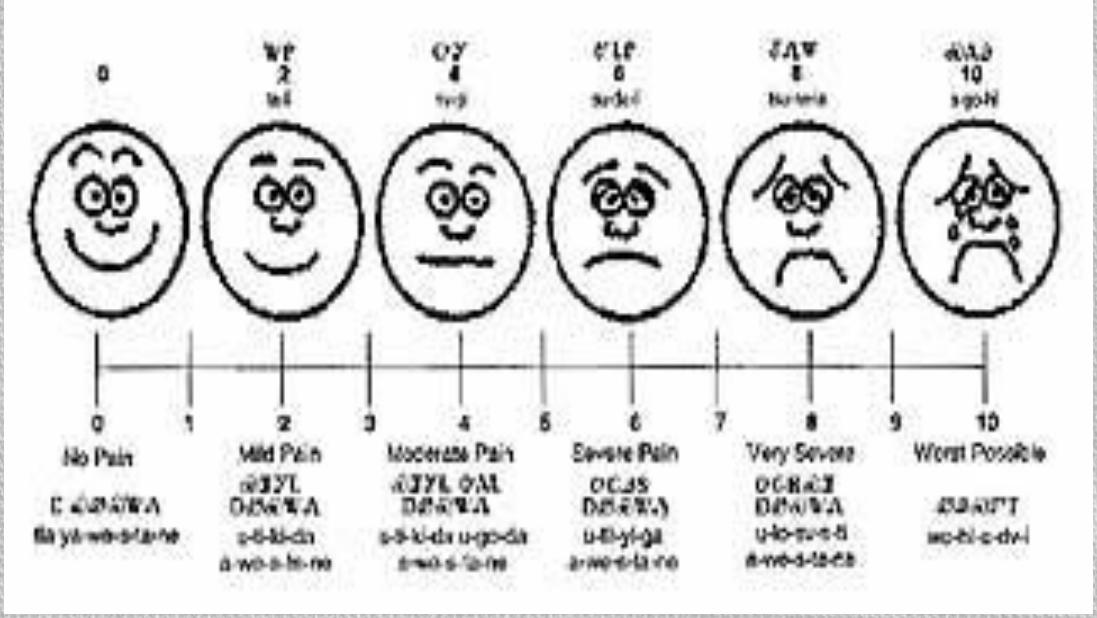
[illegible] The FLACC: a behavioral scale for scoring postoperative pain in young children. Pediatric Nursing 23, p293-297.

Measures how children respond physically to pain
Invaluable for children who cannot rate their pain

Self report tools – FACES and revised FACES scales

- Faces are line drawings with no ethnicity distinctions
- Applicable age range: 4+ years
- Simple, quick to use and requires minimal instructions
- Available in 47 languages, translations are available at

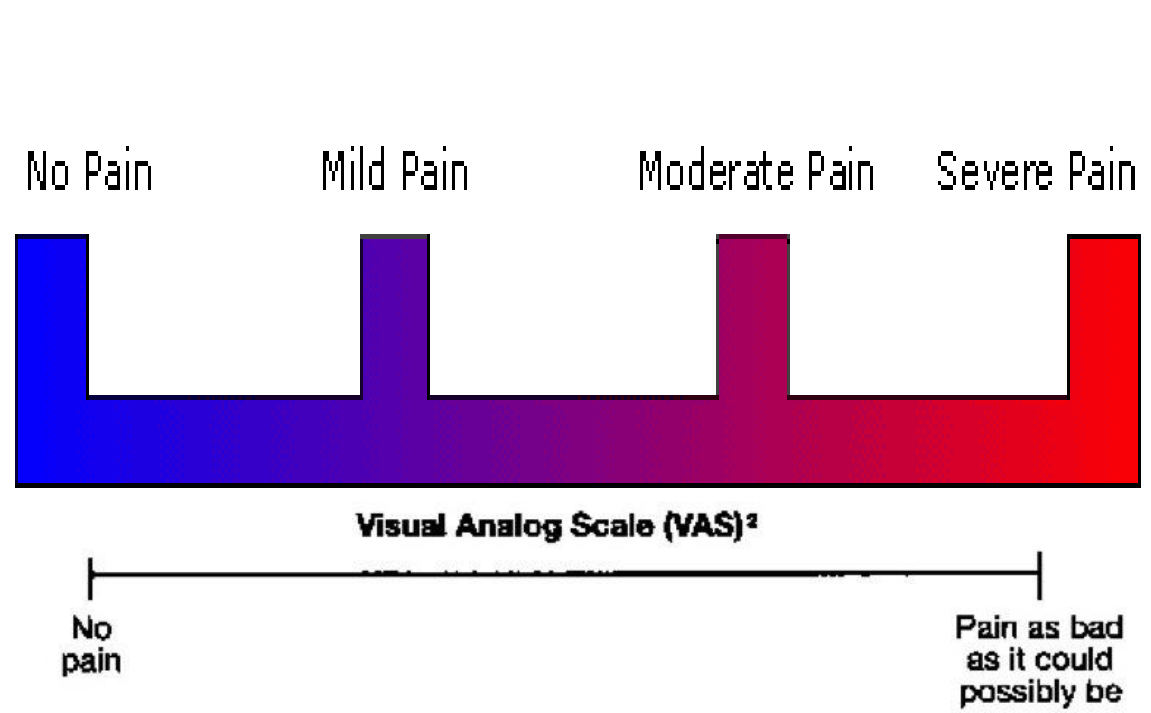
  http://www.iasp-pain.org/fpsr/



Self report tools – Visual analogue scale

- Sensitive to change, correlates significantly with parents'/caretakers' ratings of children's pain
- Retrospective self-report has more recall bias
- Requires a higher degree of abstraction -> 6+ years
- Available in 7 languages:

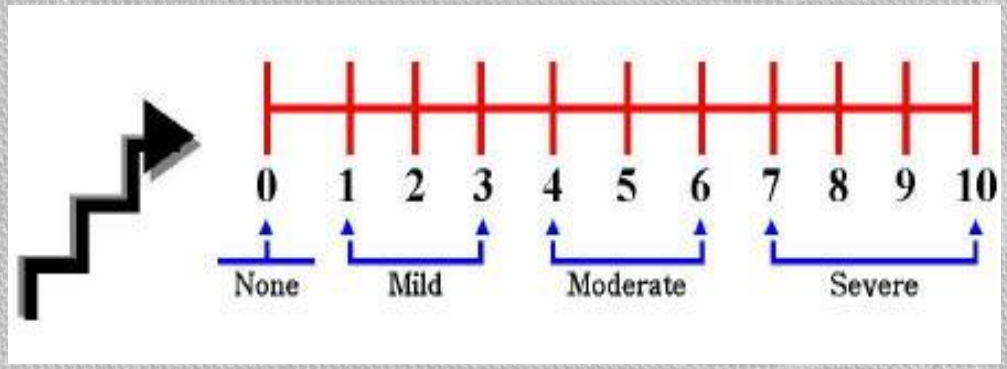
  http://www.partnersagainstpain.com/printouts/A7012AS1.pdf

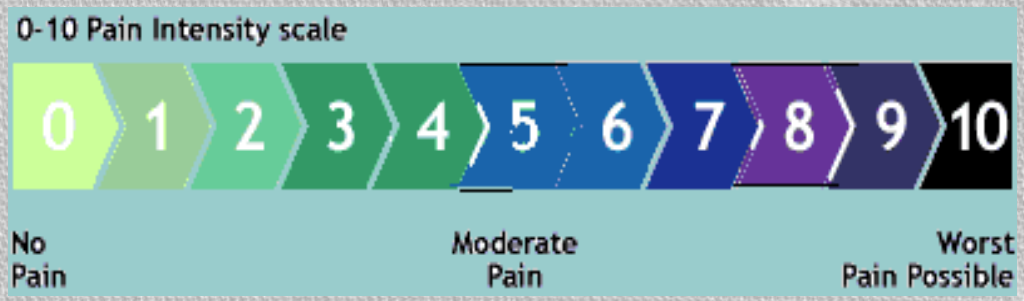


Self report tools – Numerical rating scales

- Color photographic scale of a child's face with different pain expressions for younger children -> 4 versions (8+ years)

  http://www.oucher.org/differences.html
- NRS of 0-10 for older children
- Can be administered verbally





Management Of Pain

SOME FACTS ABOUT PAIN

- Managing pain in pediatric patients can be a daunting task

- In pediatric oncology
  - Pain is rated second in importance to finding the right diagnosis by patients and families
  - Often this pain is severe
  - Persists in about 50% of patients
  - Yet not adequately treated or assessed

BARRIERS TO ADEQUATE PAIN MANAGEMENT

- Myths and misconceptions about pain
  - Children don't feel pain
  - Children don't remember pain
- Personal biases about pain
  - Good for character building
- Under-use of pain assessment tools
- *Inadequate knowledge and training in pain management*
- Lack of recognized standards for pain relief

Common Causes of Pain in Children

Chronic diseases:

- Arthritis, sickle cell disease and rheumatologic disorders
  - Musculoskeletal pain
- Inflammatory bowel disease
  - Recurrent abdominal pain

Trauma:

- Physical, thermal, electrical and chemical injuries (burns, surgery)
  - Phantom pain, lower back pain

Life - threatening diseases:

- Cancer, HIV
  - Simultaneous acute and chronic pain

CANCER PAIN IN CHILDREN

- 14 -100% children with cancer experience pain
  - Tumor invasion
  - Medical procedures
  - Surgery, radiation, chemotherapy
  - Self-perpetuating pain from fear

- Multiple studies have shown that even in patients with advanced cancer, the main source of pain is procedural pain

TYPES OF PAIN IN CHILDREN

1. Nociceptive pain
    - Can be caused by trauma, surgery, inflammation
    - Activates pain receptors from the skin and internal organs
    - Includes somatic and visceral pain
    - Bone metastases, cuts and sprains – somatic pain
    - Compression of an organ from tumor – visceral pain

In a study of 84 pediatric cancer patients, 5-15 years of age, 31% had nociceptive pain

TYPES OF PAIN IN CHILDREN

2. Neuropathic pain
    - Originates from damage to nerves, results in sensory changes
    - Tumor infiltration
    - Metabolic diseases - diabetes
    - Surgery
    - Chemotherapy: alkaloids, platinums
    - Reported as burning, numbing, pins and needles

- 14.3% cancer patients reported neuropathic pain
- 54.8% had mixed pain at baseline

Duration of Pain

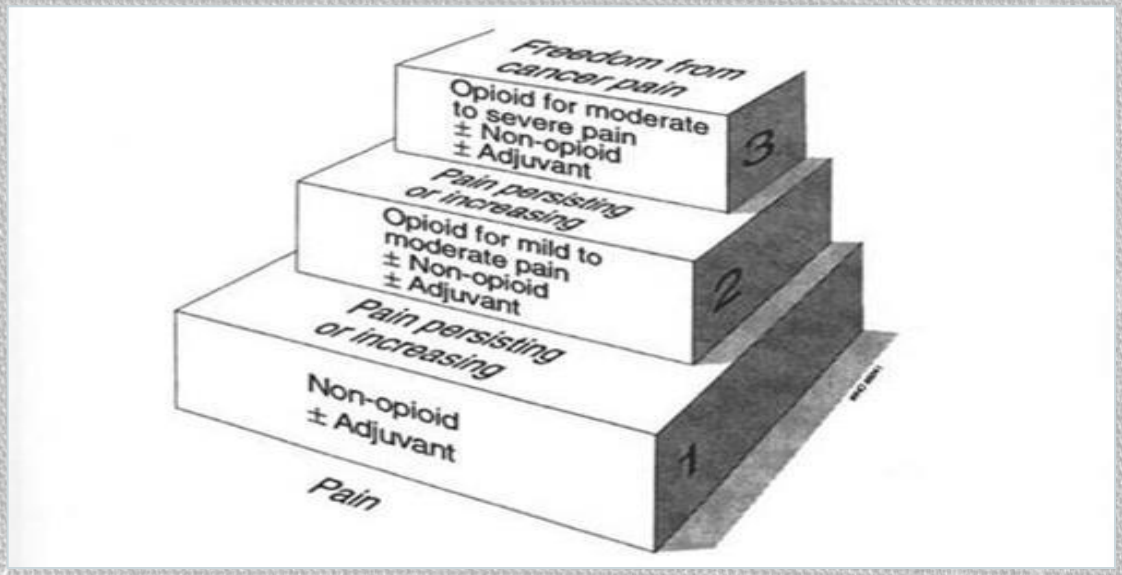
- Acute pain : Sudden in onset, severe, short-lasting
- Chronic pain: Continuous or recurrent pain that persists beyond the expected normal time of healing
- Episodic or recurrent pain: Occurs intermittently over a long period of time and the child can be pain free in between each painful episode
- Breakthrough pain : A temporary increase in the severity of pain over and above the pre-existing baseline pain level
- Incident pain: Pain due to movement, has an identifiable cause
- End of dose pain: Results when the blood level of the medicine falls below the minimum effective level at the end of dosing interval.

WHO Guidelines on The Pharmacological Treatment of Persisting Pain in Children with Medical Illnesses

2012

Cancer Pain Management

- Most commonly used assessment tool
- 80-90% of cancer pain can be relieved relatively simply by WHO guidelines
- 10-20% remains difficult to treat using simple pharmacologic approaches



Clinical Recommendations

- Use the ‘Two Step ‘approach based on the child’s level of pain severity.
- Paracetamol and ibuprofen are the medicines of choice in the first step (mild pain).
- Both paracetamol and ibuprofen need to be made available for treatment in the first step.

Clinical Recommendations

- The use of **strong** opioid analgesics is recommended for the relief of **moderate to severe** persisting pain in children

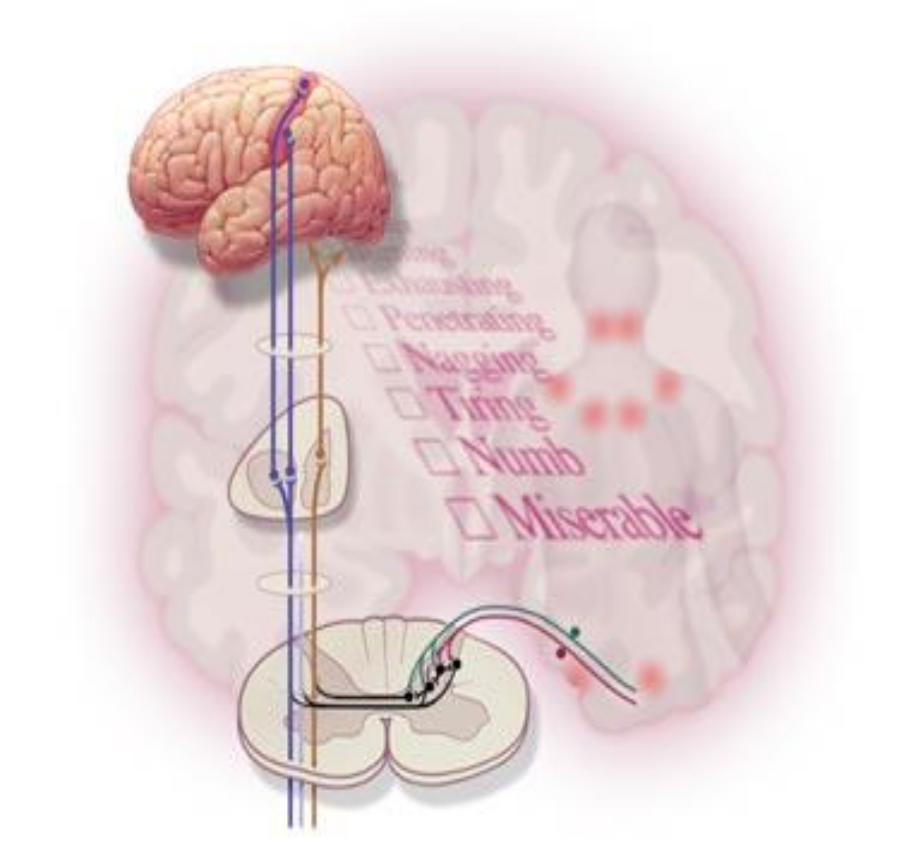
- **Morphine is recommended as the first-line strong opioid for the treatment of persisting moderate to severe pain in children**

Clinical Recommendations

- It is strongly recommended that immediate-release oral morphine formulations be available for the treatment of persistent pain in children with medical illnesses.

- It is also recommended that child-appropriate prolonged-release oral dosage forms be available, if affordable.

ROLE OF OPIOIDS IN PAIN MANAGEMENT



Some Facts About Morphine

- If a country has a supply that includes
  - 30% IR morphine
  - 60% SR morphine
  - 5% parenteral morphine
  - 5% other opioids
- The majority of the patients can be kept reasonably pain free
- Oral morphine solution (generic) is the least expensive opiate available today

Factors Hampering Opioid Usage

- Supply:
  - Central stores not stocking adequately
  - Restrictive control
  - Unreliable stocks
  - Insufficient dispensers
- Legislation:
  - Prohibitive regulations
  - Lack of national policy on opioid use
- Education:
  - Clinicians poorly trained in pain assessment and management
  - ‘opiophobia’
  - Lack of interest in dying patients
- Practical issues:
  - Lack of prescribers
  - Storage requirements

Principles for the pharmacological management of pain

1. Treating pain using a two-step strategy

Two-step pain management based on the child's level of pain severity.

2. Treating pain at regular intervals

For constant pain, analgesics should be administered at regular intervals

By the clock and not on an as needed basis

3. Treating pain by the appropriate route

Pain medicines should be administered to children by the *simplest*, *most effective*, and least painful route

Oral formulations the most convenient and the least expensive route of administration.

4. Tailoring pain treatment to the individual child

The treatment should be tailored *to the individual child*

Opioid analgesics should be titrated *on an individual basis.*

Pharmacological interventions

Sometimes a child needs more to alleviate pain

- Additional opioids
- Other adjuvant agents (anxiolytics)
- Chemotherapy, surgery, radiation

NON-PHARMACOLOGIC INTERVENTIONS FOR CANCER PAIN

- Includes cognitive, behavioral and physical approaches to managing pain
- Best for chronic pain and preparation for procedures
- Fear related pain
- Minimal harmful effects

NON PHARMACOLOGICAL INTERVENTION

- Toys, Interactive books
- Puppets
- Bubbles, Magic wands
- Electronic games
- Music, Videos
- Biofeedback, relaxation techniques, guided imagery, hypnosis

  Effective for chronic pain

Procedural pain

- Procedural pain is real
- No age is exempt from pain
- Every effort should be made to avoid procedural pain in neonates and children
- Proper planning of the procedure can go a long way in reducing procedural anxiety in children

PROCEDURAL PAIN
PLANNING FOR PROCEDURES

- Adopt a ‘child-centered’ not ‘get-the-procedure-over with’ approach
- Make the child and family active participants in planning
- Use the parents for positive assistance, not negative restraint
- Ensure that the procedure being performed is necessary
- Ensure measures to carry out procedure with safety

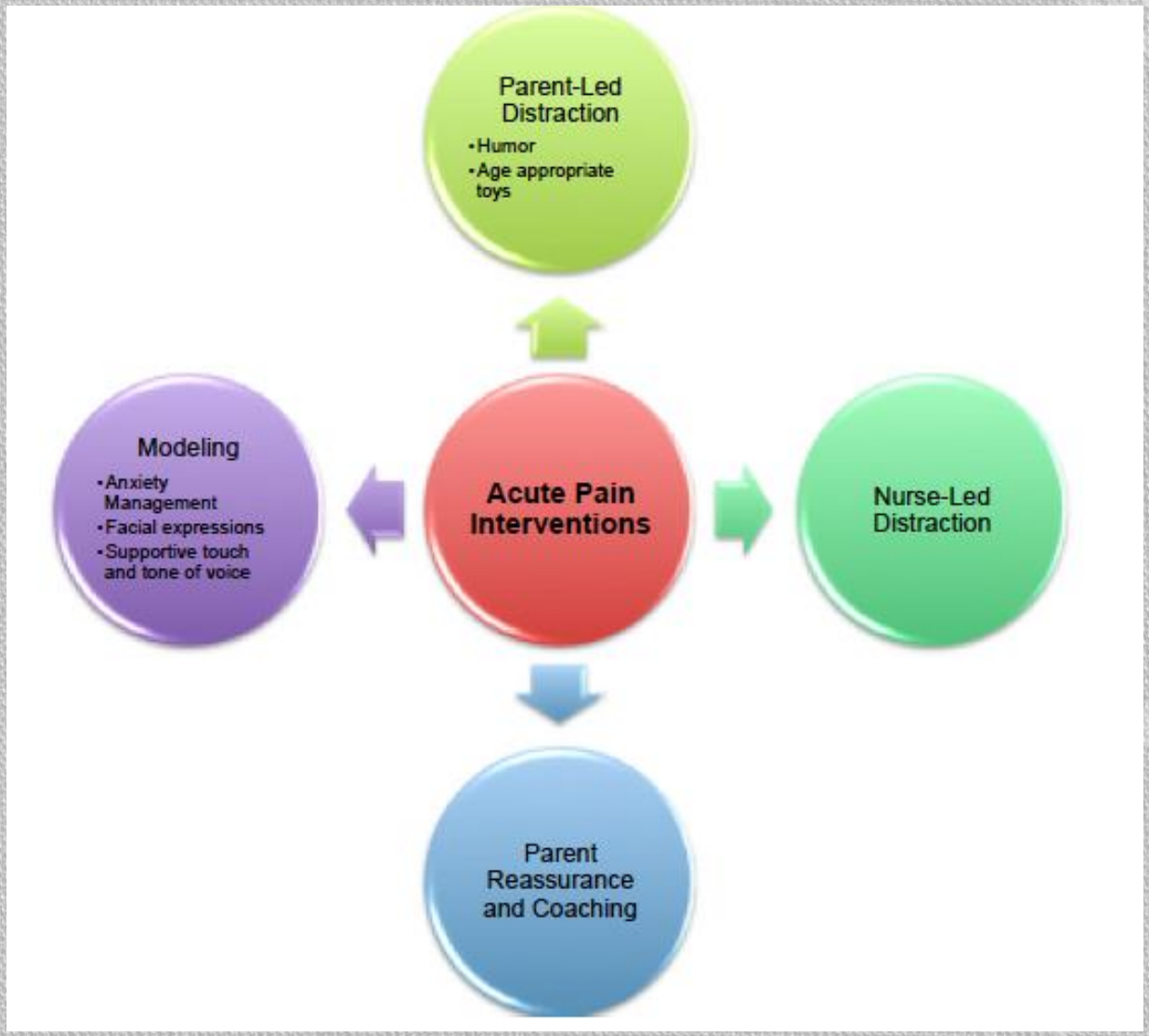
PROCEDURAL PAIN
PLANNING FOR PROCEDURES

- Perform procedures away from the child's bed
- Use a child friendly environment for procedures
- Use pain assessment routinely
- Use the least invasive equipment wherever possible
- Ensure that the person performing the procedure has the technical expertise needed
- Use appropriate combinations of pharmacological and non pharmacological techniques to relieve anxiety and pain – 'integrated approach'
- Minimize waiting time
- Maximize intervention to minimize pain and distress based on procedure
  - IV placement versus bone marrow aspirate and biopsy

PHARMACOLOGICAL AGENTS COMMONLY USED

- Topical preparations
  - EMLA, ELA-MAX
- Local anesthetics
  - Lidocaine
- Agents used for conscious sedation
  - Fentanyl, midazolam, nitrous oxide
- Agents used for deep sedation
  - Propofol, ketamine

Interventions for parents with a child undergoing procedural pain



Health System Recommendations

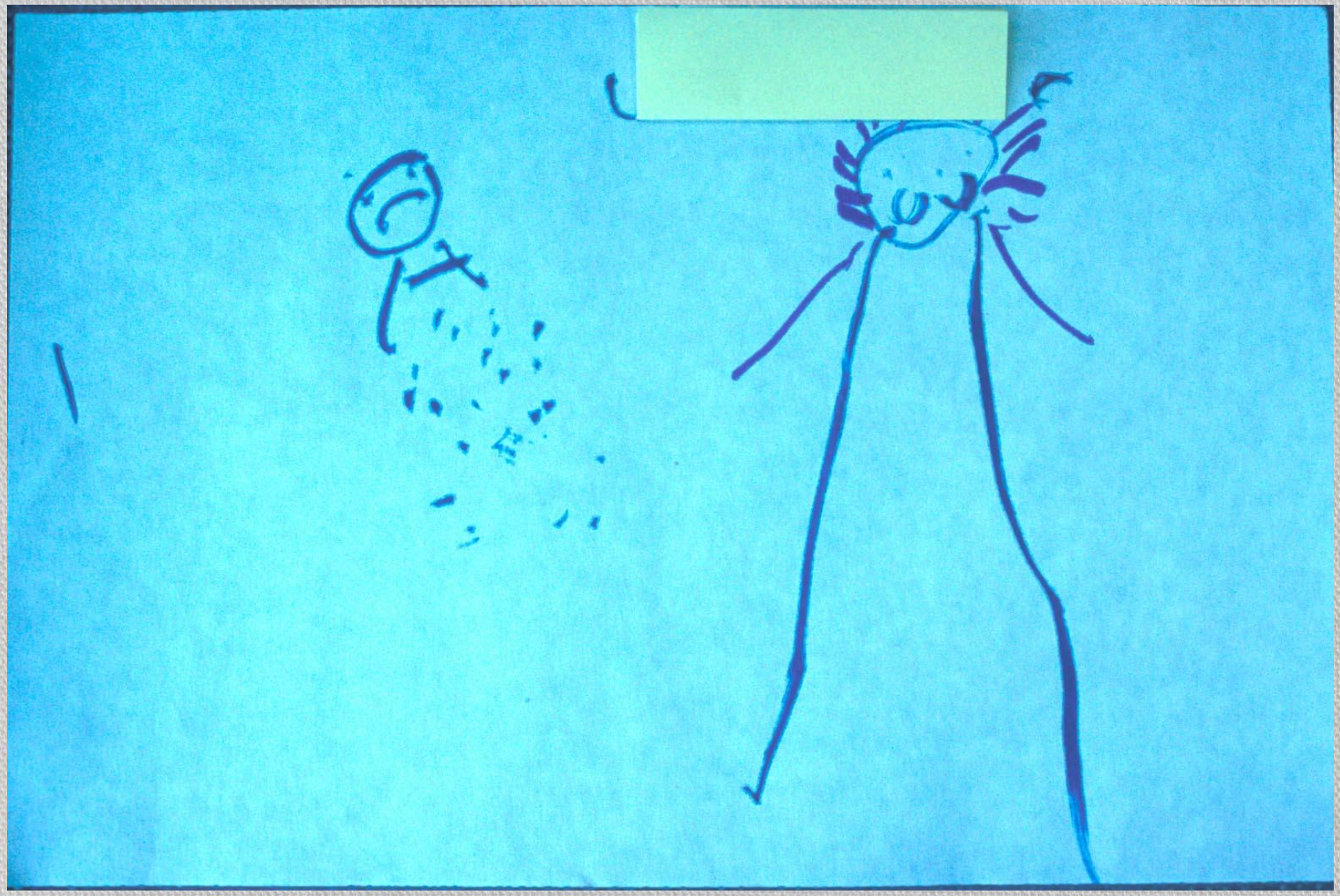
- Education of health professionals in the standardized management of persisting pain in children and in the handling of the necessary medicines, including opioid analgesics.

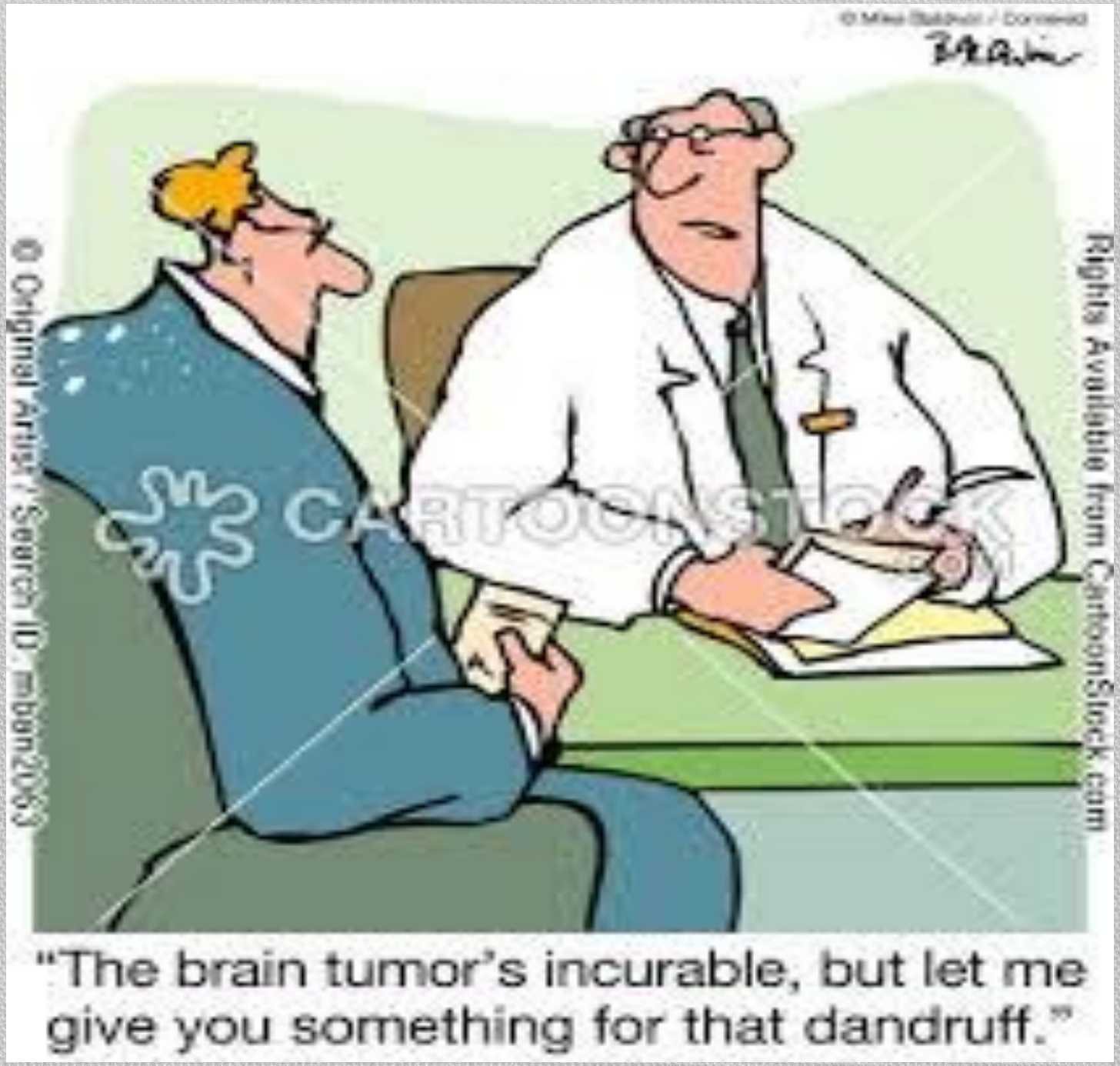
- Health professionals will be allowed to handle opioids within their scope of practice based on their general professional license without any additional licensing requirements.

- The conditions under which such permission is granted should be based on the demonstration of competence, sufficient training, and personal accountability for professional performance.

The Role of Parents in Pain Management

- 1. Education - assessment of pain, side effects
- 2. Drug administration - learning how to give medicine effectively by the clock
- 3. Advocating for the child in pain
- 4. Lobbying the health care system for better access, easy availability, and education of health care professionals
- 5. Participating in research and education of other families

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"The brain tumor's incurable, but let me give you something for that dandruff."