Learning Objectives

- Embrace Multimodal Analgesia: Discuss how multiple agents, interventions, rehabilitation, psychological and integrative ("non-pharmacologic") therapies act synergistically for more effective pediatric pain control with fewer side effects than a single analgesic or modality.

- Appreciate high importance of preventing needle pain in children.

Handout available: http://NoNeedlessPain.org

Stefan J. Friedrichsdorf, MD, FAAP (USA)
Don’t have enough staff for pediatric pain control...?

Funny, how there is always enough staff to restrain a child.

Mathew Crawford, MD, Sydney Children’s Hospital

Positioning

- Use of Restraint Never Supportive: Restraining children for procedures makes them feel ashamed, humiliated, powerless; report having lost right to control his/her own body — Karlson K, Darcy L, Enskär K: The Use of Restraint is Never Supportive (Poster) Nordic Society of Pediatric Hematology/Oncology (NOPHO) 34th Annual meeting 2016 and 11th Biannual Meeting of Nordic Society of Pediatric Oncology Nurses (NOBOS). May 27-31, 2016, Reykjavik, Iceland
Pediatric Pain - Status Quo

- Pain in children’s hospitals is common, under recognized and under treated
- Assumption: everything possible is done
- Parents expect pain to be relieved
- Parents’ greatest distress: failing to protect their child from pain

Inappropriate Analgesia

- Children with persistent pain suffer more physical symptoms in adult life, more anxiety and more depression
- Higher morphine doses = less PTSD in months after major trauma
- NICU: increased morbidity & mortality
- Inadequate analgesia for initial procedures in children diminishes effect of adequate analgesia in subsequent procedures

So, how do we treat the individual pain patient in front of us?

Hmhh...

Spoiler Alert: Crystal-clear answer on 3rd last slide!
Pain Scores
...what exactly are we measuring...?

(1) **Nociceptive Pain:** arises from the activation of peripheral nerve endings (nociceptors) that respond to noxious stimulation. (e.g. localized, sharp, squeezing, stabbing, or throbbing)
  - **Somatic** (for example, muscles, joints)
  - **Chronic somatic pain** typically well localized & often results from degenerative processes (such as arthritis)

(2) **Visceral** (internal organs) [poorly localized, dull, crampy, or achy]

(3) **Psycho-social-spiritual-emotional Pain**

(4) **Neuropathic Pain:** resulting from injury to, or dysfunction of, the somatosensory system. (burning, shooting, electric, or tingling)
  - **Central pain** caused by a lesion or disease of the central somatosensory nervous system

(5) **Persistant (Chronic) Pain**
  - Pain beyond expected time of healing

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**PAIN**

**BRAIN**

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René Descartes (1596-1650)

John Lieff: Are Microglia the Most Intelligent Brain Cells http://jonlieffmd.com/blog/are-microglia-the-most-intelligent-brain-cells

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**Microglia**

**Astrocyte**

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0:00
John Lieff: Are Microglia the Most Intelligent Brain Cells

NOT in female mice (T-cells instead)

PAIN BRAIN

INCREASES

• Stress
• Anxiety
• Catastrophizing
• Depression
• perceived injustice
• disturbed Sleep
• School absentiism

DECREASES

• Distraction
• Active IM modalities
• Rehabilitation
• Psychology
• Social Life
• Sports/Exercise
• Sleep Hygiene
• School attendance

Periaqueductal gray, locus coeruleus, anterior cingulate gyrus, amygdala, hypothalamus:

descending pathways

thousands of neurons
dozens of pathways
dozens of neurochemicals and receptors
hundreds of signal transduction players within each neuron in the circuit
What are children most afraid of when coming to see a doctor?


Needle Pain: A Call for Action

- Up to 25% of adults have fear of needles with most fears developing in childhood; avoidance of health care (including non-adherence with vaccination schedules).
- Needle fear was the primary reason for immunization non-compliance for 7% and 8% of parents and children, respectively.
- AAP: Pain is a common reason for vaccine hesitancy.
Examining Current State

- 2013: We asked staff to weigh in on our current state of pain management...
- Results were reassuring:
  
  "We are doing great! We are already doing everything to treat and prevent pain!"

Pain outcomes in a US children's hospital: A prospective cross-sectional survey

In past 24 hrs, what was cause of worst pain?
- 40% Needle poke
- 34% Trauma/injury/other medical
- 10% Surgery
- 8% Procedure

Changing Culture

Attitudes:
* Needle sticks don't hurt that much.
* The pain of a needle stick is unavoidable…

"Hold them down and do it quick…"
"Just get it the first time!"
“Charlotte, for painful procedures, isn’t it the best just to hold you down and do it quickly…?”

“Charlotte, for painful procedures, isn’t it the best just to hold you down and do it quickly…?”

“It is not rocket surgery”

“How to eliminate or reduce pain caused by needles

“Charlotte, for painful procedures, isn’t it the best just to hold you down and do it quickly…?”

“It is not rocket surgery”

“How to eliminate or reduce pain caused by needles

“We will do everything possible to prevent and treat pain.”

http://vimeo.com/106286508
1. Numb the skin
2. Sugar water or breastfeeding for babies
3. Comfort positioning
4. Distraction

Watch videos at childrensMN.org/comfortpromise.

Results 2014-2018

Continuous auditing revealed that
- wait times for services decreased
- concerns about success rates of venipuncture from 4% lidocaine cream were alleviated, with no reports of venous constriction
- most infants now sleeping through their lab draws
- smaller proportion of children reported pain
- fewer experienced severe pain (score $\geq 7/10$)
- less children identified pain caused by needles as cause of worst pain
- Staff turnover decreased
A hospital-wide initiative to eliminate or reduce needle pain in children using lean methodology

Dietrich Friedrichsdorf, Donna Call, Christian Wehrle, Andrea Postle

PAIN Reports 2018. (3) e671

https://painreports.lww.com/doi/10.1097/01.JPR.0000567507.96819.a3

Multimodal Analgesia
No needle, pain. The Children’s Comfort Promise

https://vimeo.com/20329079

Oww! I didn’t feel it @childrensmn
ComfortPromise: numb the skin, sitting upright & distract
childrensMN.org/comfortpromise
Multimodal Analgesia
“Keeping the Eye on the Ball …?”

Integrative Therapies
- Massage
- Distraction
- Deep Breathing
- Biofeedback
- Aromatherapy
- Hypnosis

Opioids
- Tramadol (“weak”)
- Morphine (“strong”)

WHO-Principles
- “By the clock”

Basic Analgesics
- Acetaminophen / Paracetamol
- NSAIDs

Integrative modalities effective in management of pediatric pain

- Hypnosis
- Guided imagery
- Yoga
- Acupuncture
- Massage
- Biofeedback


Dobson, C.E.; Byrne, M.W. Original research: Using guided imagery to manage pain in young children with sickle cell disease. The American journal of nursing 2014, 114, 26-36; test 37, 47.


Isn’t that Magic…?

Psychology Intervention

- **Postoperative Pain - Systematic Review**
  - Psychological interventions effective in reducing children’s self-reported pain: distraction/imagery interventions effective
  - Psychological Treatments significantly reduce pain intensity reported by children and adolescents with headache, abdominal pain, and fibromyalgia.

- Affective, anxiety, & behavior disorders early risk factors of chronic pain (rather than vice versa).

- Psychological Treatments significantly reduce pain intensity reported by children and adolescents with headache, abdominal pain, and fibromyalgia.

Graded Motor Imagery

- **Process of thinking about moving without actually moving**
  - Cortical reorganization and associated changes in somatosensory cortex activity and anatomy in certain types of chronic pain (e.g. CRPS, lower back pain)
  - Degree of cortical reorganization correlated with pain intensity

- Mirror Therapy for Phantom Limb Pain in a 7-Year-Old Male with Osteosarcoma
Basic Analgesics
- Acetaminophen / Paracetamol
- NSAIDs

Integrative Therapies
- Massage
- Distraction
- Deep Breathing
- Biofeedback
- Aromatherapy
- Hypnosis

Psychology
Rehabilitation
- Exercise, Physical Therapy

Normal Life Spirituality

Opioids
- Tramadol ("weak")
- Morphine ("strong")

4 WHO-Principles
- By the clock

WHO-Adjuvants
- Alpha-Agonists
- Gabapentinoids
- TCA/Antidepressants
- NMDA-Antagonists
- Na-channel blockers
- Antispasmodics
- Benzodiazepines
- Corticosteroids
- Muscle relaxants
- Radiopharmaceuticals
- Bisphosphonates

Regional Anesthesia
- Neuraxial infusion
- Peripheral/Neuro Nerve block
- Neurolytic block
- Intrathecal port/pump

Normal Life Spirituality

LET Anesthesia
- Sitting upright
- Distraction
- Topical Anesthesia
- 3mL LET gel: Lidocaine 4% - Epinephrine 0.18% - Tetracaine 0.5%

Do you remember Marius...?

How about a Plan B?
What’s Plan B?

If adequate procedural analgesia not feasible with the “4 Non-Negotiables” alone, refer patient to:

1. Child Life (shouldn’t have been involved by now?)
2. Needle Phobia: psychology (CBT)
3. Mild sedation: Nitrous gas
4. Moderate/deep sedation (e.g. ketamine, propofol)

Note: A sedative alone (such as a benzodiazepine) can never be a substitute for procedural analgesia.

Procedural Sedation

in 2019 we expect (!) procedural sedation for:
- Lumbar Puncture
- Burns Dressing Changes
- Chest Tube Removal
- Closed Fracture Reduction (Regardless of Location)

IV Access Under Nitrous Gas

22 months old, Lidocaine 4% cream in place, needed IV for radiologic procedure, history of challenging IV access in the past.
So, how do we treat the individual pain patient in front of us?

Crystal clear answer:

“*It Depends*”

- Socrates

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### Conclusions

- **Elective needle Procedures:**
  - Offer to every single child every single time
  - topical anesthesia
  - sucrose / breastfeeding
  - positioning
  - integrative therapies/distraction
  - plus/minus (nitrous gas) sedation

- **Use multimodal analgesia:**
  - Multiple agents, interventions, rehabilitation, psychological and integrative therapies act synergistically for more effective pediatric pain control with fewer side effects than single analgesic or modality
Further Training
Contact: CIPPC@ChildrensMN.org

- Education in Palliative & End-of-life Care (EPEC) Pediatrics: Become a EPEC-Pediatrics Trainer Conference, Minneapolis, MN Dec 5-6, 2019 for updated EPEC/Pediatric Professional Development Workshop, Oct. 3, 2019 EPEC-Pediatrics@childrensMN.org
- EPEC Pediatrics Latinamérica: Curso de Capacitación (en español), Buenos Aires, Argentina, Fri, November 15-16, 2019 EPEC-PediatricsLatinamérica@childrensMN.org
- 13th International Symposium on Pediatric Pain (ISPP) in Auckland, New Zealand, March 25-28, 2021 CIPPC@childrensMN.org

Blog: http://NoNeedlessPain.org