Assessment of Pain and Function in Children and Adolescents

Sabine Kost-Byerly, MD, FAAP
Director, Pediatric Pain Management
Johns Hopkins University, School of Medicine
Baltimore, Maryland
Objectives

- At completion of this session, the learner will be able to list:
  - Factors influencing incidence and presentation of pain in children and adolescents
  - Methods for age-appropriate assessment of pain in children and adolescents
  - Tools for evaluation of pain-associated functional deficits in various domains in children and adolescents
Case Example

• E.K., a 12 yo female presents to your office with swelling and bruising of the right foot

HPI:
– 3 days ago the patient’s 13yo sister accidently stepped on the foot. The sister was wearing cleats at the time. The patient was able to walk, did not really complain about it until later in the evening. The next morning the foot was bruised and had a livid discoloration.
Case : EK

PMH:
- Orthopedic consultation for back pain of several months duration at age 9
  - Tx’ed with NSAIDs and PT – resolved
- Eczema - resolved
- Separation anxiety and c/o persistent abdominal pain at beginning of 2nd grade, possibly related to death of MGM.
  - Worked with counselor for several sessions - resolved

FH:
- Arthritis

SH:
- Living with parents and older sister.
Nociception and Pain

Perception

Transcription

Modulation

Transmission
Pain Assessment

Quantitative - Intensity

“How much does it hurt?”

• Infants and non-communicative children: Behavioral Observational Scales

• Other children: Self-Report Scales

Qualitative -

“What kind of pain is it?”

When, where, why, how does it hurt?

“An unpleasant and emotional experience”
Pain Perception and the Environment

- Age
- Gender
- Ethnic/cultural background
- Parental Expectations
  - Family history of chronic pain
  - “Vulnerable child”
- Secondary gain
  - Increased parental attendance
  - School avoidance
What is Pain? (Or the Language of “Pain”)

Can you ask a 4-year-old:

- What number do you give your pain - on a scale from 0 to 10?
- Is this a burning pain? Or is it dull?
- Does it feel like pins and needles?

The younger child’s behavioral-cognitive development, language development, and personal experience are inadequate to answer these questions.
Pain Assessment

Behavioral Observational Scales

- **CRIES**
  - Crying, oxygen requirement, vital signs, facial expression, sleep
  - Score: 0-2 for each item
  - Age: <1 year

- **NIPS**
  - Facial expression, cry, breathing pattern, arms, legs, arousal state pre and post intervention
  - Score: >3 indicated pain
  - Age: <1 year

- **FLACC**
  - Face, legs, activity crying, consolability
  - Score: 0-2 for each item
  - Age: 2 months – 7 years

- **CHEOPS**
  - Cry, facial expression, verbalization, movement
  - Score: >4 indicated pain
  - Age: 1 - 7 years

February 11, 2014
FLACC Behavioral Pain Assessment:
recommended for acute pain (age 2 months to 7 years)

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

**Behavioral Pain Assessment for Children with Cognitive Impairment**

Malviya S et al. *Pediatr Anaeth* 2006;16;258-65

<table>
<thead>
<tr>
<th>Categories</th>
<th>Scoring 1</th>
<th>Scoring 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Face</strong></td>
<td>No particular expression or smile</td>
<td>Appears sad or worried</td>
</tr>
<tr>
<td><strong>Legs</strong></td>
<td>Usual tone &amp; motion to limbs</td>
<td>Occasional tremors</td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td>Regular, rhythmic respirations</td>
<td>Tense or guarded movements; mildly agitated (e.g. head back and forth, aggression); shallow, splinting respirations, intermittent sighs.</td>
</tr>
<tr>
<td><strong>Cry</strong></td>
<td>No cry, (awake or asleep)</td>
<td>Occasional verbal outburst or grunt</td>
</tr>
<tr>
<td><strong>Consolability</strong></td>
<td>Content, relaxed</td>
<td>Reassured by occasional touching, hugging or being talked to, distractible</td>
</tr>
</tbody>
</table>
Pediatric Pain Assessment Scales

Self Report

Wong-Baker Faces
3 - 7yrs

Visual Analog Scale
>6yrs

Numeric Scale
>6yrs

Pediatric Pain Assessment Scales
Pain Assessment - Self Report Measures

Wong-Baker FACES Pain Rating Scale

Happy-sad face scale
The 12yo patient returns to your office 1 month later. She has worn a boot for the last 4 weeks. An x-ray was actually negative for fracture. She tried to walk without the boot but now c/o excruciating pain in her foot.

The foot is discolored, cool, and very sensitive to touch.
2 months later…

- Pain is intense, touch is unbearable, patient prefers to wear shorts and no shoes
- Patient is using crutches or wheel chair
- Poor sleep
- Poor school attendance
- Parents are stressed and feel helpless
Chronic Neuropathic Pain Syndrome:

Sensory changes
  Allodynia
  Hyperesthesia

Vascular perfusion changes
  Edema
  Red warm extremity
  Cold blue extremity

Sudomotor changes
  Spasms
  Increased perspiration

Trophic changes
  Hair and nail growth

CNS changes
  Representation of the extremity

Neuropathic Pain:
- Pain that originates from a damaged nerve or nervous system
- Pain that outlasts the injury and is associated with nerve and CNS changes
Pain

Persistent or recurrent pain of more than 3 months duration

Acute Pain

Somatic Pain

Visceral Pain

Chronic Pain

Neuropathic Pain

Somatic Pain

Visceral Pain
Pain and Hyperalgesia

**PAIN**

↑Neural Sensitivity

↑Excitation

↑Receptive Field Size

Peripheral Sensitization

Central Sensitization

**OPIOIDS**

Analgesia

Tolerance

Hyperalgesia

NMDA receptor potentiation
Scope of the Problem

• Epidemiology
  – 30 to 40% of children and adolescents complain of pain at least once per week

• Demographics
  – Females > Males
  – Adolescents > younger children

• Risk factors
  – heavy abuse of nicotine, caffeine and alcohol

Protective
  – parent and teacher support
Common Pediatric Pain Conditions

- Headaches (10-28%)
- Abdominal pain (10-20%)
- Back pain (12-30%)
- Limb pain (10%)
“Chronic idiopathic pain in adolescence – high prevalence and disability: the young HUNT study 2008”

Hoftun et al. Pain 2011

- All 10,485 adolescent in a county in the middle of Norway invited to participate

- Chronic pain 44% (1x/week for 3 months)

- Boys were less affected by pain

- Boys experienced pain in fewer locations
“Pain among children and adolescents: restrictions in daily living and triggering factors”

Roth-Isigkeit et al. Pediatrics 2005

• 749 children and adolescents from 3 schools in northern Germany

• Persistent pain (>1x/week): 35%

• Restrictions in daily living due to pain or medication use:
  – No sex difference in pre-adolescence
  – Adolescent boys:
    • less restricted by pain
    • take fewer medications

• Sex differences in reported pain triggers
Boys and Girls in Clinic

- N = 91
- **Gender:** 27.8% male
- **Age:**
  - **Male:** 13.0 (2.9)
    - Preadolescent (7-12y): 10
    - Adolescent (13-19y): 15
  - **Female:** 14.5 (2.4)
    - Preadolescent (7-12y): 12
    - Adolescent (13-19y): 46

**Ethnicity:**
75.3% Caucasian
Persistent and Chronic Pain - Assessment

Pain characteristics:

- Onset
- Intensity
- Location
- Duration
- Quality
- Character
- Radiation
- Accompanying symptoms

McGill Pain Questionnaire

<table>
<thead>
<tr>
<th>PRI: S (1-10)</th>
<th>PRI(T) (17-20)</th>
<th>PPI (1-20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. JUMPING</td>
<td>17. Wretched</td>
<td>18. PIERCING</td>
</tr>
<tr>
<td>8. FLASHING</td>
<td>18. BLINDING</td>
<td>19. SQUEEZING</td>
</tr>
<tr>
<td>9. SHOOTING</td>
<td>19. BENDING</td>
<td>20. TEARING</td>
</tr>
<tr>
<td>10. PRICKING</td>
<td>20. NAGGING</td>
<td></td>
</tr>
<tr>
<td>11. BORING</td>
<td>21. Nauseating</td>
<td></td>
</tr>
<tr>
<td>12. DRILLING</td>
<td>22. AGONIZING</td>
<td></td>
</tr>
<tr>
<td>13. STABBING</td>
<td>23. DREADFUL</td>
<td></td>
</tr>
<tr>
<td>14. STABLING</td>
<td>24. TORTURING</td>
<td></td>
</tr>
<tr>
<td>15. LAMINATING</td>
<td>25. PPY</td>
<td></td>
</tr>
<tr>
<td>16. SHARP</td>
<td>26. NO PAIN</td>
<td></td>
</tr>
<tr>
<td>17. CUTTING</td>
<td>27. MILD</td>
<td></td>
</tr>
<tr>
<td>18. LACERATING</td>
<td>28. DISCOMFORTING</td>
<td></td>
</tr>
<tr>
<td>19. PINching</td>
<td>29. DISTRESSING</td>
<td></td>
</tr>
<tr>
<td>20. PRESSING</td>
<td>30. HORRIBLE</td>
<td></td>
</tr>
<tr>
<td>21. GRASPING</td>
<td>31. EXCRUCIATING</td>
<td></td>
</tr>
<tr>
<td>22. GRASPING</td>
<td>32.PPP</td>
<td></td>
</tr>
</tbody>
</table>

E = EXTERNAL
I = INTERNAL

COMMENTS:
Assessment of Function

• Physical
  – Range of motion
  – Strength
  – Tactile tolerance
  – Gross motor functional mobility
  – Assistive device or DME needs.

Can the patient take care of herself?
  bathing, toileting, eating, drinking

Is the patient mobile?
  home, community, school
### Pain Assessment – Behavioral Characteristics

#### Coping
- Temperament and learned behaviors

#### Function
- Physical activities and limitations
- School attendance
- Sleep

#### Quality of life
- Social activities and limitations

#### Catastrophizing
- Child’s distress
- Parental distress

#### Depression

#### Anxiety
Assessment of Function

• Social
  – School attendance
  – Extracurricular activities
  – Age-appropriate activities

• Psychological
  – Coping skills
  – Depressive symptoms
  – Catastrophizing
Assessment Tools for Children and Adolescents

Pain:
- (Varni-Thompson) Pediatric Pain Questionnaire (PPQ)
- Bath Adolescent Pain Questionnaire*, (BAPQ)
- [http://www.bath.ac.uk/health/pain/newsite/images/BAPQ.pdf](http://www.bath.ac.uk/health/pain/newsite/images/BAPQ.pdf)

Function
- Functional Disability Inventory (FDI)
- Pediatric Evaluation of Disability Inventory (PEDI)
- Child health questionnaire for parents (CHQ-PF 28+50)
- Child health questionnaire for children (CHQ-CF87)

Coping
- Pain Coping Questionnaire (PCQ)
- Quality of life - Peds QL (Varni 1988)
- Brief COPE

Anxiety and Catastrophizing
- Pain Catastrophizing Scale (PCS-C)
- Revised Children’s Manifest Anxiety Scale-2

Depression
Pain Catastrophizing
(Rumination / Magnification / Helplessness)

• Adult chronic pain patients who catastrophize have:
  – More intense pain
  – More disability
  – More psychological distress  *Clin J Pain 2001;17:165-72*

• Pediatric chronic pain patients who catastrophize have – beyond gender and age:
  – More intense pain
  – More disability  *Pain 2003;104:639-646*
“Family pain history predicts child health status in children with chronic rheumatic disease”

- Parents of 100 children in rheumatology clinic:
  - Parental chronic pain conditions on average: 3.5
  - At least 1 chronic pain condition: 90%

- Higher pain level in child associated with:
  - Higher level of current and mean level of pain in parent
  - Higher level of disability of parent
  - More parental use of health care for pain

- Parental and family pain conditions seem to predict child’s use of catastrophizing to cope with pain.

_Pediatrics 2001;108:E47_
Cognitive behavioral therapy

Family therapy

Pharmacological therapy

Interventional therapy

Physical therapy

Interdisciplinary Therapy
Questions?

• **Monitto C, Kost-Byerly S, Yaster M.** Pain Management. In: Smith’s Anesthesia for Infants and Children, Mosby, 8th ed. 2011