The Prevalence and Management of Pain in Pediatric Intensive Care Units
Authors

- Cynthia LaFond
  PhD, RN, CCRN-K

- Kirsten Hanrahan
  DNP, ARNP

- Ann Marie McCarthy
  PhD, RN, FAAN
Background

- Children in PICUs have more severe pain and 6x’s the painful procedures per day than children in general medical-surgical units\(^1-3\)
- Uncontrolled pain 2\(^{nd}\) most frequent adverse event in 15 US PICUs
- Over 80% deemed preventable\(^4\)
Yet, pain in PICUs not adequately studied:

- Limited scope (subpopulation, specific pain type)
- Not specific to PICU (organization-wide)
- Didn’t evaluate practice (assessment frequency/quality)
- Didn’t evaluate characteristics of children with pain
Study Aims

• Describe assessment and intervention practices surrounding pain in PICUs
• Evaluate characteristics of critically ill children that experience more severe or intense pain
• Identify areas of practice in need of intervention
Research Questions

In the PICU:

• What are the most common pain assessment and intervention methods?
• What are the most common characteristics of pain experienced by children?
• Who is able to describe their pain and who is affected by pain?
• What is the variability of pain experienced based on characteristics of the patient?
Methods - Design

Point-prevalence study, cascading adaptive design
Methods

1. Institutional Review Board approval at all sites
2. Content experts reviewed and guided procedures
3. REDCap database developed for data entry
4. Sites trained in data collection and provided materials to facilitate collection (e.g. handbook, data dictionary, source documentation guide)
5. Sites chose a 24-hour time period to collect data on all patients in the unit and to survey nurses regarding patients’ ability to communicate pain
Methods

• During 24-hour time period
  – Identified eligible patients
  – Surveyed nurses regarding child’s ability to communicate pain

• At close of 24-hours
  – Reviewed health record for demographics, pain assessments, painful procedures, pharmacological and non-pharmacological interventions, sedatives and neuromuscular blockade provided
Inclusion/Exclusion Criteria

- All patients receiving care in a PICU or specialty ICU at 4 children’s hospitals
- In ICU for entire 24-hour time period
- Excluded:
  - Admissions, transfers, discharges
  - Patients in neonatal, intermediate, or step-down units
Instruments

Nurse Questionnaire: Child’s Ability to Communicate Pain

• Based on Hill et al’s\textsuperscript{6} instrument
• 4 items regarding child’s ability to communicate pain
Instruments

REDCap electronic data capture

- Demographics
- Pain assessments
- Sedatives and neuromuscular blockade
- Pharmacological and non-pharmacological interventions
- Painful procedures
Analysis

• Descriptive statistics
• Categorized patients by pain score
  – Pain score 4 or greater x 2
  – Pain scores < 4
  – All pain scores = 0
• Kruskal-Wallis to evaluate difference in groups
Demographics

Total Patients N = 77

- Site 1
  - N = 6, 8%
- Site 2
  - N = 13, 17%
- Site 3
  - N = 45, 58%
- Site 4
  - N = 13, 17%

### Gender

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>42</td>
<td>55</td>
</tr>
<tr>
<td>Female</td>
<td>35</td>
<td>45</td>
</tr>
</tbody>
</table>

### Race/Ethnicity

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>40</td>
<td>53.3</td>
</tr>
<tr>
<td>African-American/Black</td>
<td>16</td>
<td>21.3</td>
</tr>
<tr>
<td>Unknown</td>
<td>17</td>
<td>22.7</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Multi-racial</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>15</td>
<td>19.5</td>
</tr>
</tbody>
</table>
Reason for admission

1. Respiratory \((n = 29, 38\%)\)
2. Post-operative \((n = 16, 21\%)\)
3. Neurological \((n = 11, 14\%)\)
4. Cardiovascular \((n = 7, 9\%)\)
5. Trauma \((n = 7, 9\%)\)
6. Other \((n = 4, 5\%)\)
7. Oncology \((n = 3, 4\%)\)

<table>
<thead>
<tr>
<th>PICU Diagnosis</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>61</td>
<td>79</td>
</tr>
<tr>
<td>Surgical</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Combined</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Mechanically Ventilated</td>
<td>30</td>
<td>39</td>
</tr>
</tbody>
</table>
Assessment methods

Behavioral/Non-verbal Pain Scales

Self-Report Pain Scales

FLACC  rFLACC  Assume Pain Present

Bieri FPSR  Wong-Baker  Verbal Numeric

Numeric Rating  Descriptor Scale
Intervention methods

Pharmacological Interventions

- Opioid: 201
- Non-opioid/Other: 110
- Combo: 3
- Local: 2

Non-pharmacological Interventions

- Decrease environmental stimuli: 96
- Other: 66
- Music: 56
- Distraction: 29
- Reposition: 25
- Swaddle: 19
- Caregiver: 11
- Non-nutritive suck: 10
Pain Experienced

Highest pain score of patients

Pain Characteristics

<table>
<thead>
<tr>
<th>Pain Characteristic</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurting</td>
<td>39</td>
</tr>
<tr>
<td>Aching</td>
<td>2</td>
</tr>
<tr>
<td>Head</td>
<td>4</td>
</tr>
<tr>
<td>Neck</td>
<td>4</td>
</tr>
<tr>
<td>Abdomen</td>
<td>6</td>
</tr>
<tr>
<td>Throat</td>
<td>6</td>
</tr>
<tr>
<td>Buttocks</td>
<td>11</td>
</tr>
<tr>
<td>Back</td>
<td>4</td>
</tr>
<tr>
<td>Disease process</td>
<td>0</td>
</tr>
<tr>
<td>Trauma</td>
<td>0</td>
</tr>
<tr>
<td>Procedure</td>
<td>1</td>
</tr>
</tbody>
</table>
Who can describe their pain?

This patient is able to communicate effectively about her/his pain to me and other health care providers

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>13</td>
<td>16.88</td>
</tr>
<tr>
<td>Agree</td>
<td>21</td>
<td>27.27</td>
</tr>
<tr>
<td>Neither agree nor disagree</td>
<td>13</td>
<td>16.88</td>
</tr>
<tr>
<td>Disagree</td>
<td>13</td>
<td>16.88</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>17</td>
<td>22.08</td>
</tr>
</tbody>
</table>
## Variability of Practice by Pain Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Pain scores 0</th>
<th>N</th>
<th>Pain scores &lt; 4</th>
<th>N</th>
<th>2 or more pain scores ≥ 4</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of stay</td>
<td>38</td>
<td>51.8 ± 127.2</td>
<td>25</td>
<td>12.1 ± 18.2</td>
<td>13</td>
<td>37.6 ± 94.2</td>
<td>.03*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1–752)</td>
<td></td>
<td>(1–86)</td>
<td></td>
<td>(2–348)</td>
<td></td>
</tr>
<tr>
<td>Length of stay, outliers</td>
<td>33</td>
<td>17.3 ± 19.5</td>
<td>25</td>
<td>12.1 ± 18.2</td>
<td>12</td>
<td>11.8 ± 13.7</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1–69)</td>
<td></td>
<td>(1–86)</td>
<td></td>
<td>(2–43)</td>
<td></td>
</tr>
<tr>
<td>Intermittent Opioid Doses*</td>
<td>22</td>
<td>2.7 ± 4.1</td>
<td>20</td>
<td>1.1 ± 1.8</td>
<td>13</td>
<td>5.2 ± 5.9</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0-13)</td>
<td></td>
<td>(0-7)</td>
<td></td>
<td>(0-18)</td>
<td></td>
</tr>
<tr>
<td>Non-opioid doses</td>
<td>38</td>
<td>0.5 ± 0.9</td>
<td>25</td>
<td>1.7 ± 1.8</td>
<td>13</td>
<td>3.4 ± 3.1</td>
<td>&lt;.001 **</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0-3)</td>
<td></td>
<td>(0-5)</td>
<td></td>
<td>(0-11)</td>
<td></td>
</tr>
<tr>
<td>Painful procedures</td>
<td>38</td>
<td>9.9 ± 8.6</td>
<td>25</td>
<td>4.7 ± 6.0</td>
<td>13</td>
<td>7.9 ± 7.9</td>
<td>.04*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0-31)</td>
<td></td>
<td>(0-20)</td>
<td></td>
<td>(1-24)</td>
<td></td>
</tr>
<tr>
<td>Non-pharm interventions</td>
<td>38</td>
<td>2.9 ± 5.8</td>
<td>25</td>
<td>4.2 ± 7.1</td>
<td>13</td>
<td>7.5 ± 9.7</td>
<td>.02*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0-24)</td>
<td></td>
<td>(0-28)</td>
<td></td>
<td>(0-32)</td>
<td></td>
</tr>
</tbody>
</table>

* Significant < .05  **Significant < .001

*a enteral and parenteral routes
### Variability of Practice by Pain Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pain score 0</th>
<th>Pain score &lt; 4</th>
<th>2 or more pain scores 4 or more</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Non-opioid analgesics</td>
<td>12</td>
<td>31.6</td>
<td>17</td>
<td>68</td>
</tr>
<tr>
<td>Decrease environmental stimuli</td>
<td>5</td>
<td>13.2</td>
<td>12</td>
<td>48</td>
</tr>
</tbody>
</table>

No significant difference by:
- Admitting diagnosis category
- Ability to communicate pain
- Mechanical ventilation
- Intravenous opioid method, sedative, or neuromuscular blockade administration
- Other types of non-pharmacological intervention
Conclusions

• Pain was assessed regularly, mostly with behavioral pain scales
• More than half of the patients had pain
  – Scored moderate/severe in 17% of patients
• Painful procedures commonly occurred, but only noted to be cause of pain for 1 patient
Limitations

• Retrospective review of patient records
• Charting practices likely do not capture full patient experience
• Not all painful procedures documented, especially fingerstick or heelstick
• 24-hour timeframe
Implications for Practice

• Daily procedures likely not recognized as painful by many nurses—or not recorded as such because fleeting pain
• Appropriate increases in non-pharmacological interventions with higher pain scores—need to further assess whether practices are evidence-based
Next Steps

- Pilot 3 data collection underway
  - 14 hospitals, 16 ICUs
  - Data collected on 189 patients to date
Acknowledgements

• Research Team:
  – Katie Miceli, Research Assistant
  – Yelena Perkhounkova, Statistician
  – Maria Hein, Data Manager

• Pilot 1 & 2 Data Collectors:
  – Jennifer Erdahl, Nicole Nastanski, Monica Gonzalez, Ana Avila, Amanda El-Char, Diane Bottarri, Darcy Brodecki, Beth Ely, Jamie Biagioni, Kelly Brandt, Mei Lin Chen-Lim, Kimberly Wittmayer

• Content Experts:
  – Kathy Clark, Elizabeth Ely, Renee Manworren, Neethi Pinto, Sharmeen Roy
Acknowledgements

• With support from:
  • Mayday Fund
  • Pain and Associated Symptoms: Nurse Research Training [NINR/NIH, T32 NR011147]


