

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





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# Background

- Children in PICUs have more severe pain and 6x's the painful procedures per day than children in general medical-surgical units<sup>1-3</sup>
- Uncontrolled pain 2<sup>nd</sup> most frequent adverse event in 15 US PICUs
- Over 80% deemed preventable<sup>4</sup>



# 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

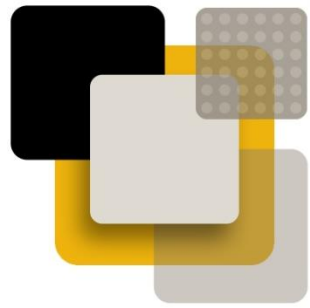




# Study Aims

- 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



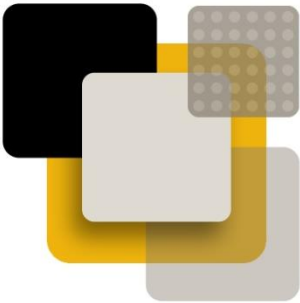


# Research Questions

In the PICU:

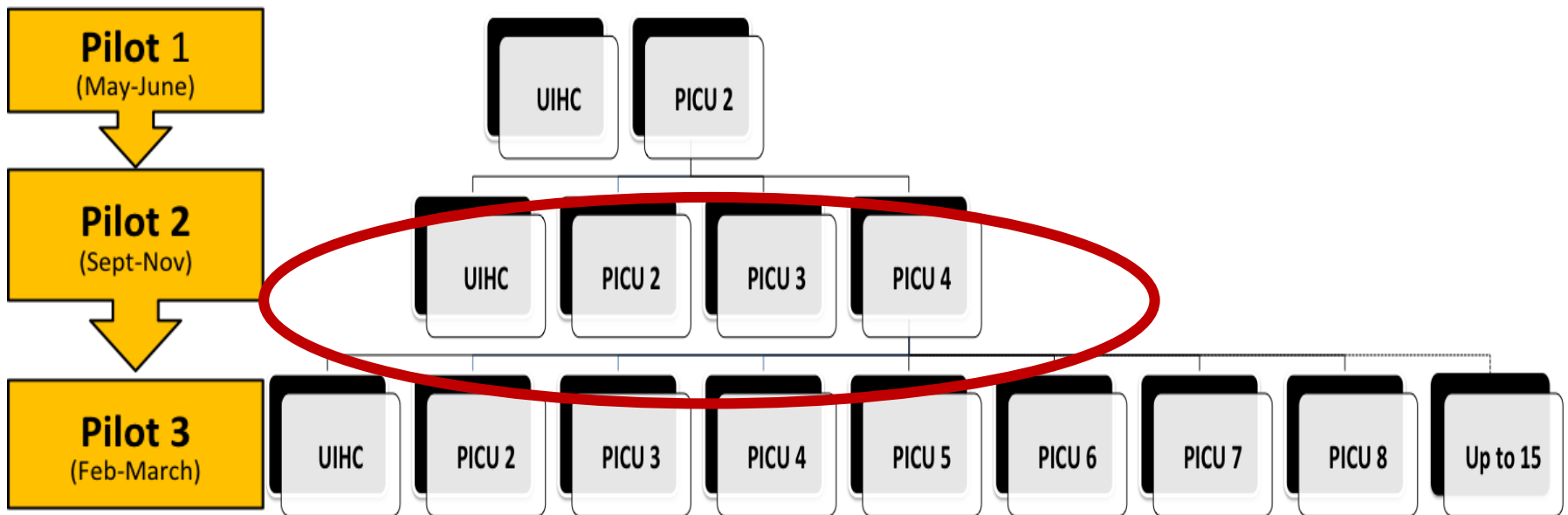
- What are the most common pain assessment and intervention methods?
- What are the most common characteristics of pain experienced by children?
- Who is able to describe their pain and who is affected by pain?
- What is the variability of pain experienced based on characteristics of the patient?

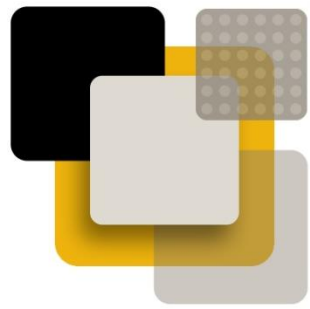




# Methods - Design

Point-prevalence study, cascading adaptive design



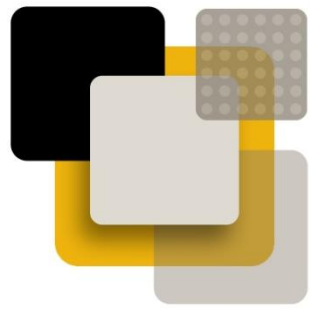


# Methods

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

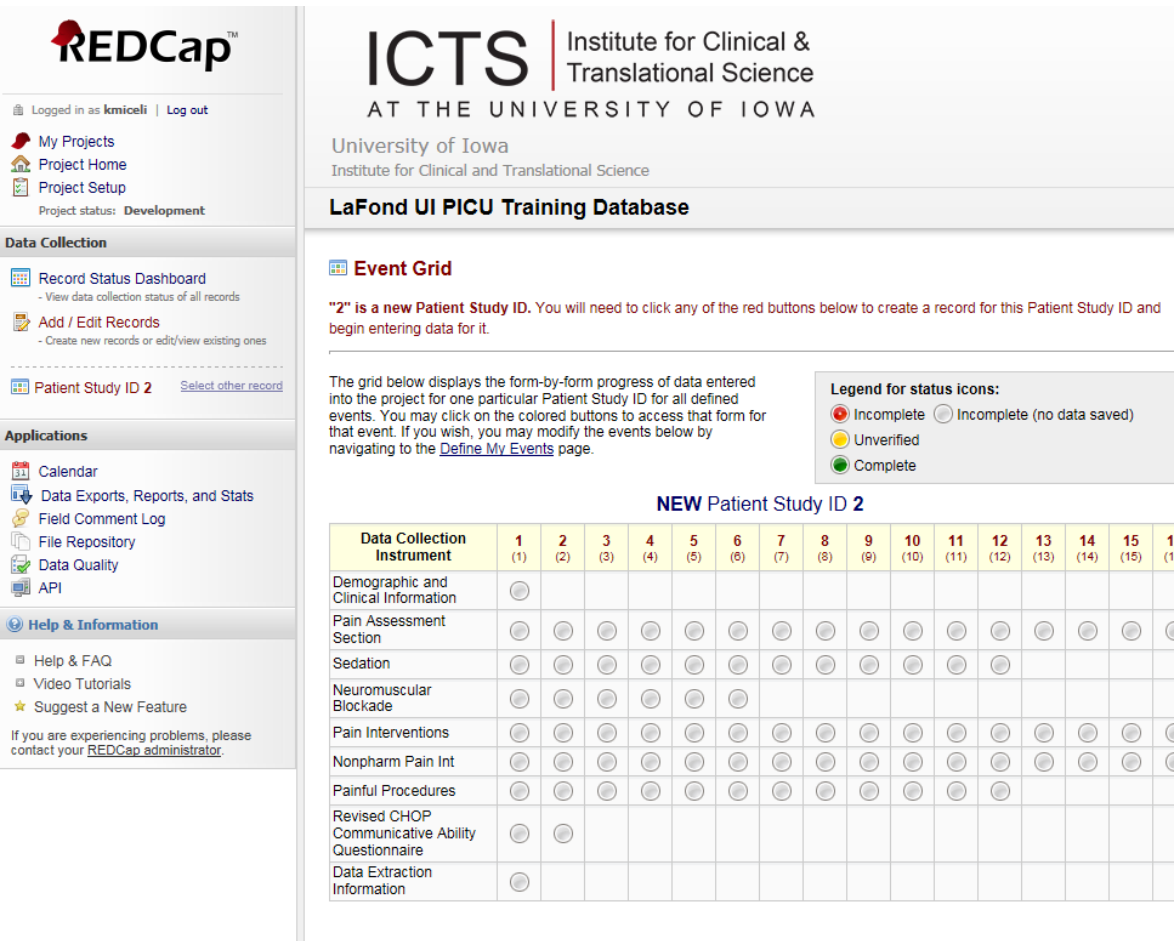
- Based on Hill et al's<sup>6</sup> instrument
- 4 items regarding child's ability to communicate pain

### Nurse Questionnaire: Ability to Communicate and Pain Management

Patient Study ID \_\_\_\_\_ Date \_\_\_\_\_

1. Please pick the sentence below that best describes this patient today:
  - a. The patient can communicate clearly, using words in full sentences
  - b. The patient can say some simple ideas using words, but does not speak in full sentences
  - c. The patient cannot use words, but can effectively communicate other ways (sounds, gestures, facial expressions, in writing or using facilitative technology)
  - d. The patient is not able to communicate effectively (using words, sounds, gestures, facial expressions, or facilitative technology)
2. Please pick any of the following challenges to communication you have experienced with this patient today:
  - a. The patient can communicate in full sentences or simple words, but speaks language I do not speak
  - b. The patient can communicate in full sentences or simple words, but prefers to communicate with parents or family members over hospital staff (e.g. shy, uncomfortable)
  - c. The patient is pre-verbal, too young to effectively communicate
  - d. The patient has cognitive impairments that prevent him/her from effectively communicating
  - e. The patient is receiving pharmacological treatment(s) that prevent him/her from effectively communicating (e.g. sedative infusion, neuromuscular blockade)
  - f. Other \_\_\_\_\_
  - g. Not applicable, no challenges to communication present

# Instruments



REDCap™

Logged in as kmiceli | Log out

My Projects  
Project Home  
Project Setup  
Project status: Development

**Data Collection**

Record Status Dashboard  
- View data collection status of all records

Add / Edit Records  
- Create new records or edit/view existing ones

Patient Study ID 2 [Select other record](#)

**Applications**

Calendar  
Data Exports, Reports, and Stats  
Field Comment Log  
File Repository  
Data Quality  
API

**Help & Information**

Help & FAQ  
Video Tutorials  
Suggest a New Feature

If you are experiencing problems, please contact your [REDCap administrator](#).

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Institute for Clinical and Translational Science

**LaFond UI PICU Training Database**

**Event Grid**

"2" is a new Patient Study ID. You will need to click any of the red buttons below to create a record for this Patient Study ID and begin entering data for it.

The grid below displays the form-by-form progress of data entered into the project for one particular Patient Study ID for all defined events. You may click on the colored buttons to access that form for that event. If you wish, you may modify the events below by navigating to the [Define My Events](#) page.

**Legend for status icons:**

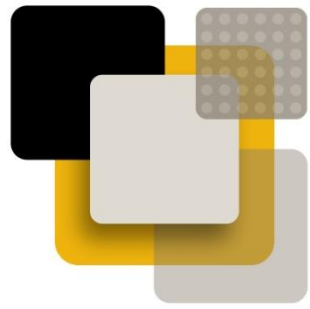
- Incomplete
- Incomplete (no data saved)
- Unverified
- Complete

**NEW Patient Study ID 2**

Data Collection Instrument	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	11 (11)	12 (12)	13 (13)	14 (14)	15 (15)	16 (16)
Demographic and Clinical Information																
Pain Assessment Section																
Sedation																
Neuromuscular Blockade																
Pain Interventions																
Nonpharm Pain Int																
Painful Procedures																
Revised CHOP Communicative Ability Questionnaire																
Data Extraction Information																

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%

Variable	N	%
Gender		
Male	42	55
Female	35	45
Race/Ethnicity		
White	40	53.3
African-American/ Black	16	21.3
Unknown	17	22.7
American Indian/ Alaskan Native	1	1.3
Multi-racial	1	1.3
Hispanic or Latino	15	19.5





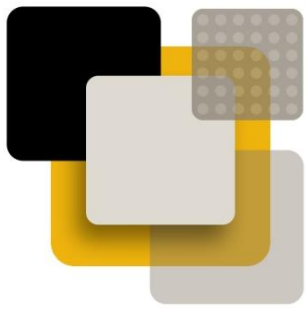
# Reason for PICU Admission

	N	%
PICU Diagnosis		
Medical	61	79
Surgical	11	14
Combined	5	7
Mechanically Ventilated	30	39

## Reason for admission

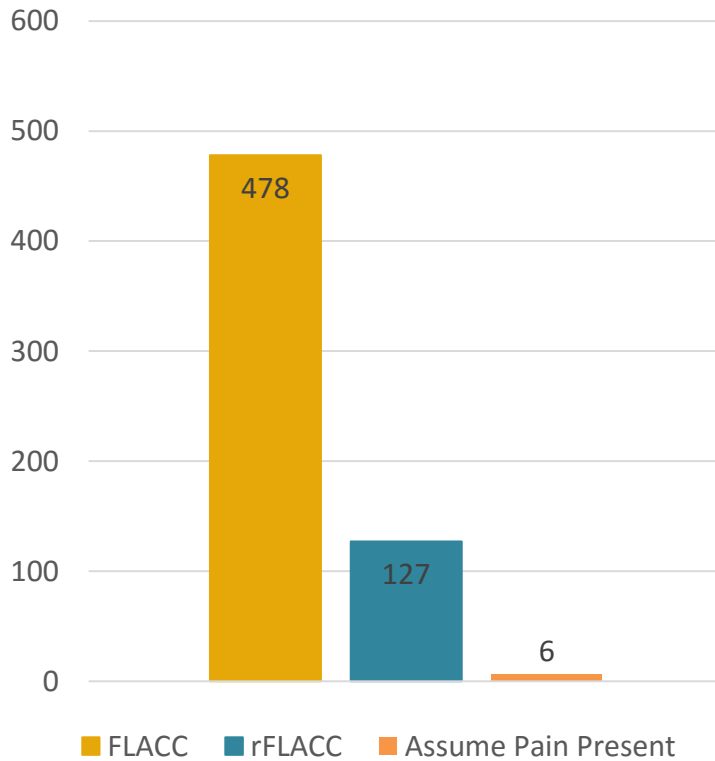
1. Respiratory (n = 29, 38%)
2. Post-operative (n = 16, 21%)
3. Neurological (n = 11, 14%)
4. Cardiovascular (n = 7, 9%)
5. Trauma (n = 7, 9%)
6. Other (n = 4, 5%)
7. Oncology (n = 3, 4%)



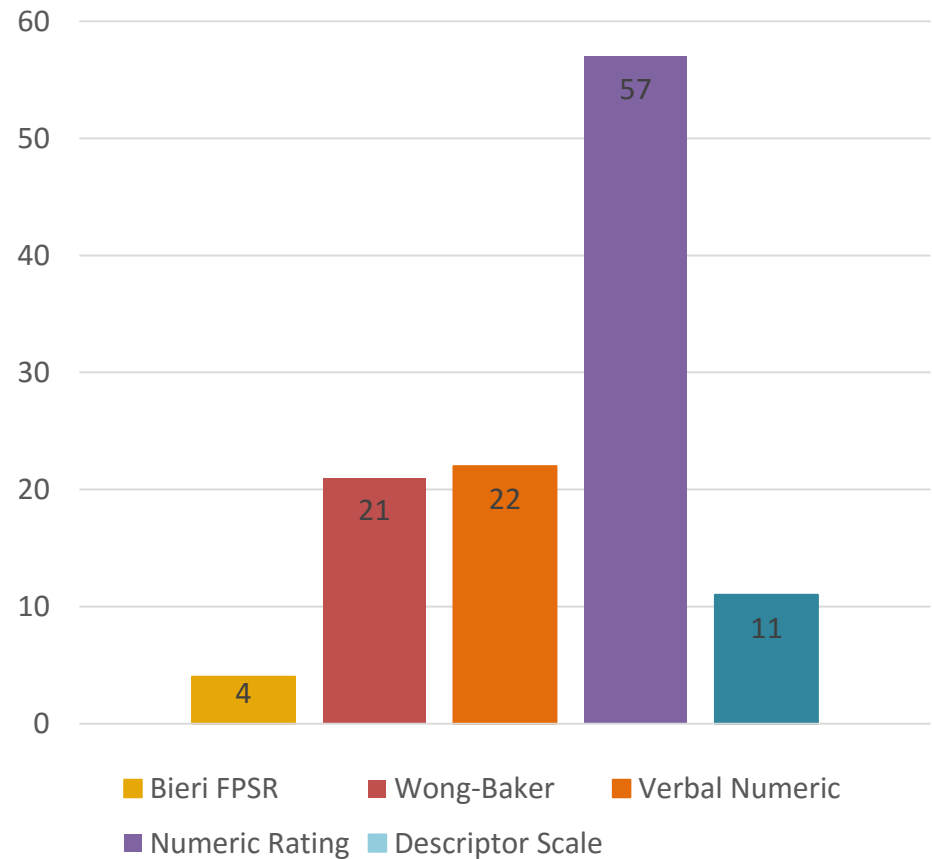


# Assessment methods

## Behavioral/Non-verbal Pain Scales

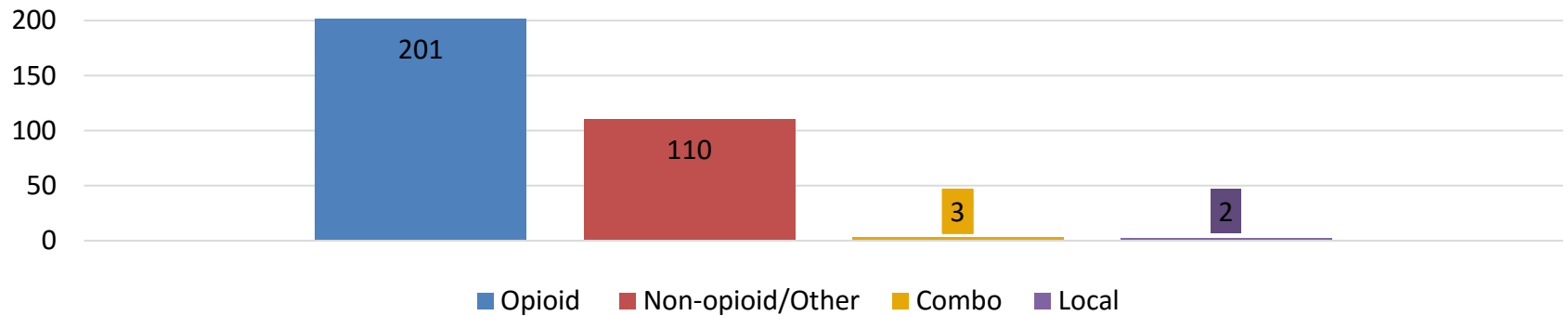


## Self-Report Pain Scales

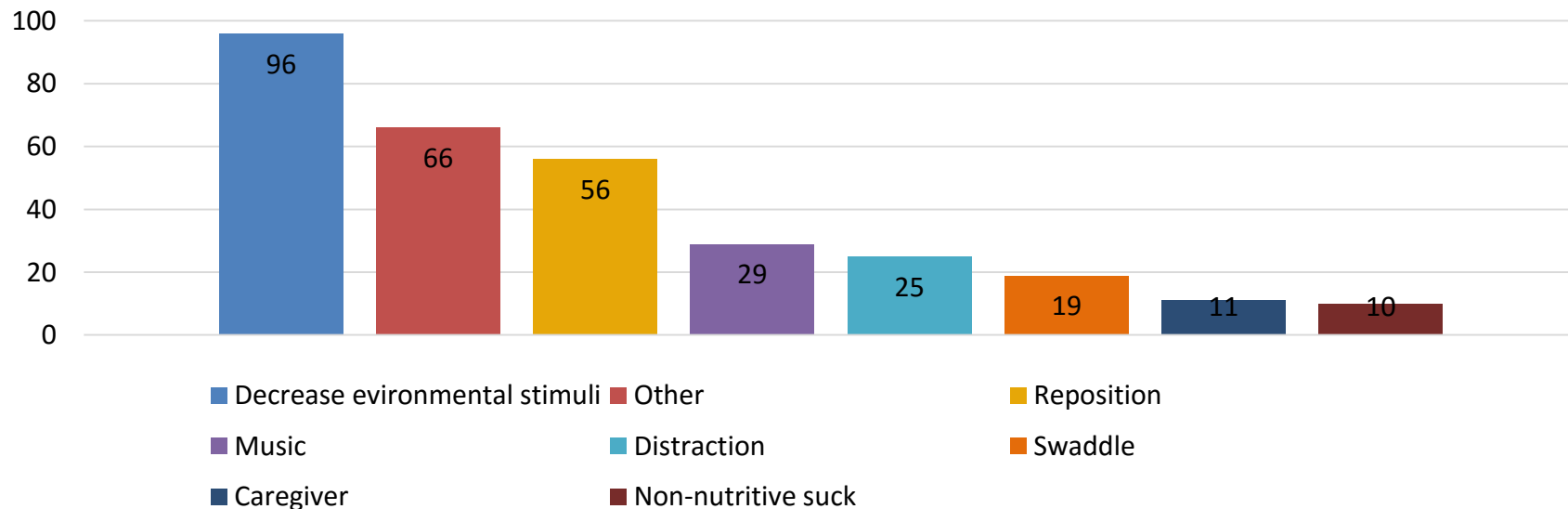


# Intervention methods

## Pharmacological Interventions

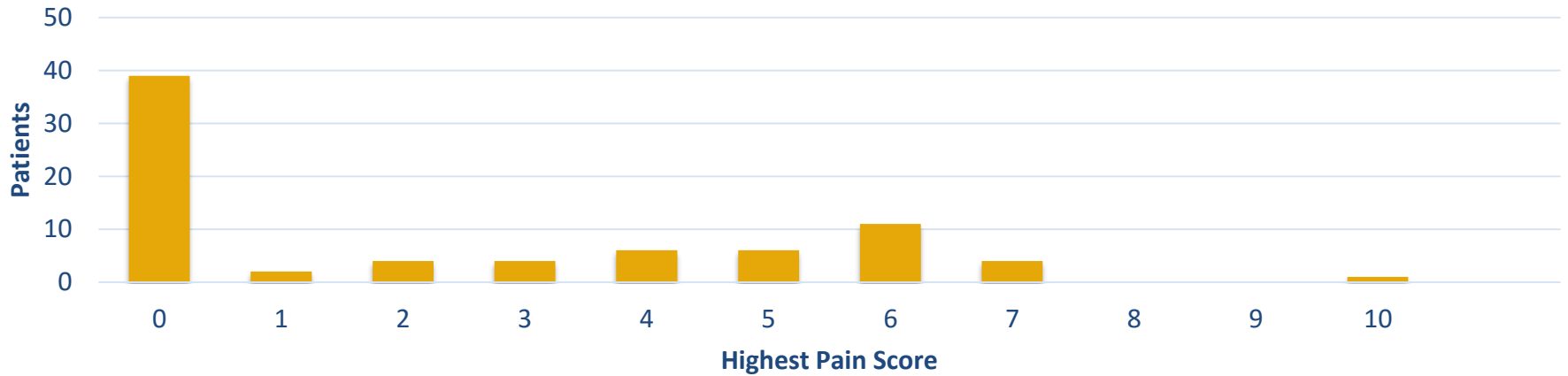


## Non-pharmacological Interventions

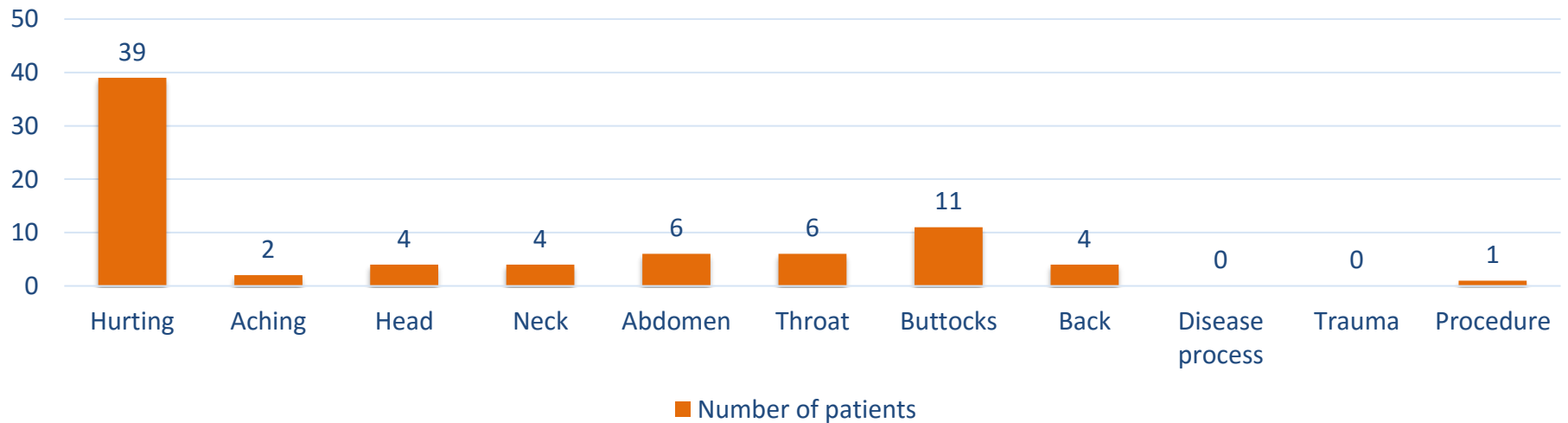


# Pain Experienced

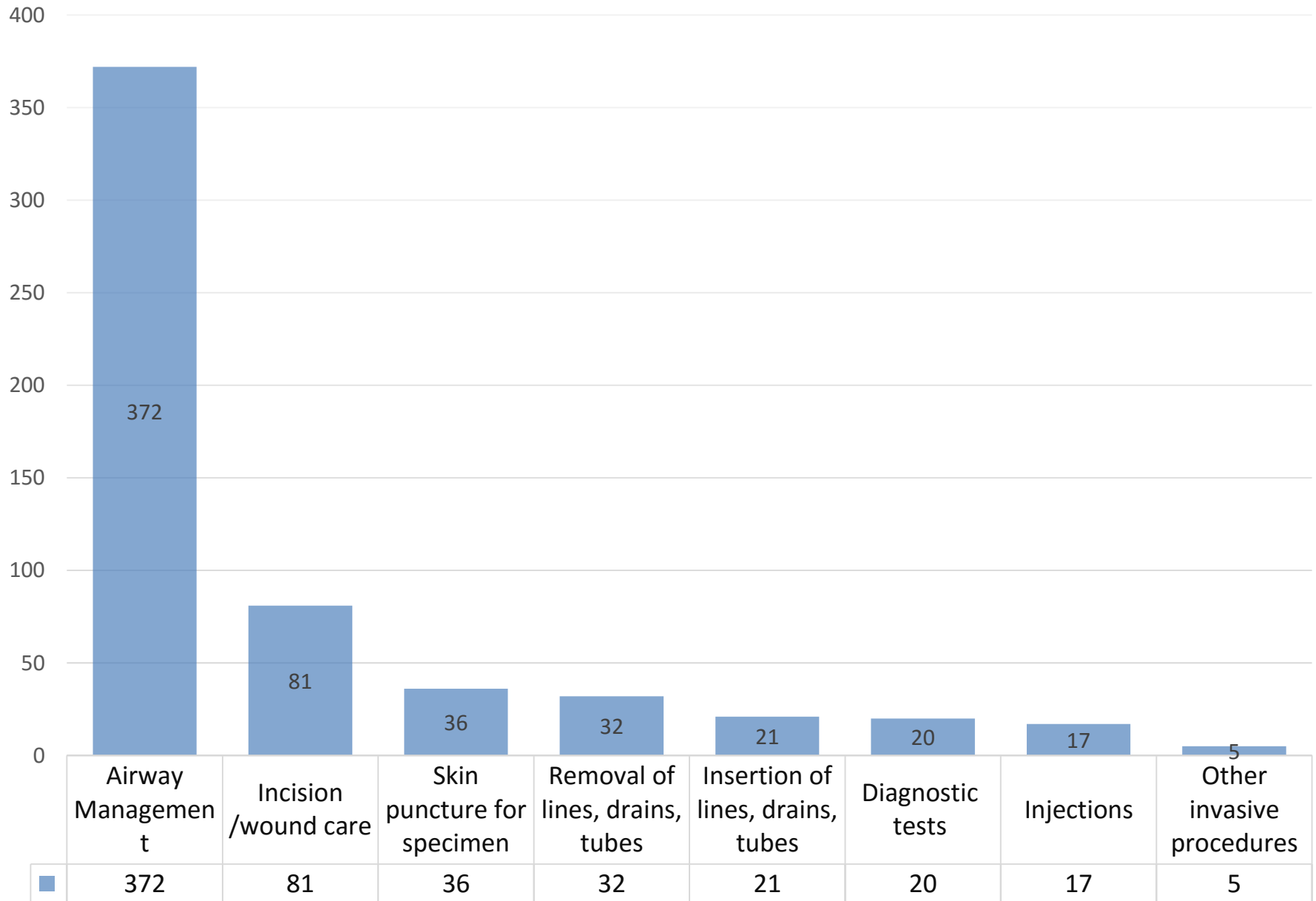
## Highest pain score of patients

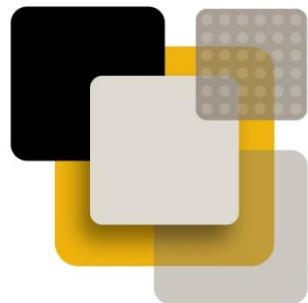


## Pain Characteristics



## PAINFUL PROCEDURES RECORDED





# Who can describe their pain?

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

	N	%
Strongly agree	13	16.88
Agree	21	27.27
Neither agree nor disagree	13	16.88
Disagree	13	16.88
Strongly Disagree	17	22.08

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# Variability of Practice by Pain Score

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

\* Significant < .05 \*\*Significant < .001

<sup>a</sup> enteral and parenteral routes

# Variability of Practice by Pain Score

Variable	Pain score 0		Pain score < 4		2 or more pain scores 4 or more		P
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Non-opioid analgesics	12	31.6	17	68	10	76.9	.003*
Decrease environmental stimuli	5	13.2	12	48	10	76.9	<.001**

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

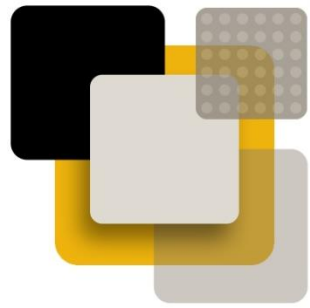


# Conclusions



- 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

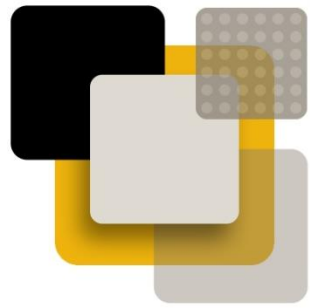




# Limitations

- 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

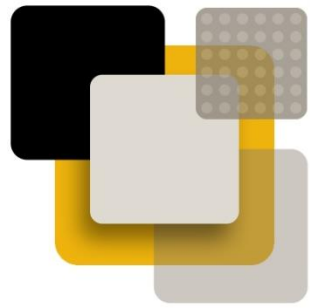




# Implications for Practice

- 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





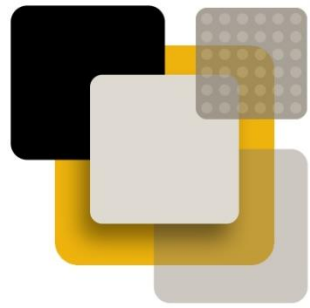
# Next Steps



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







# Acknowledgements

- **Research Team:**
  - Katie Miceli, Research Assistant
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  - Maria Hein, Data Manager
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THE  
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