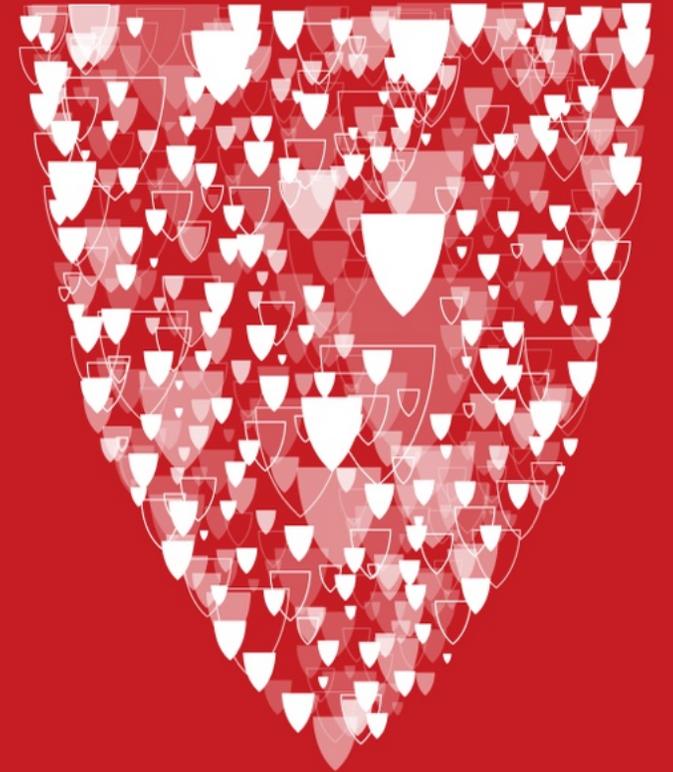


# DRUMMER

Developing **R** Real World **U** Understanding of  
**M** Medical **M** Music Therapy **U** Using the  
**E** Electronic Health **R** Record

**Samuel N. Rodgers-Melnick, MPH, MT-BC** <sup>1,2</sup>

1. Connor Whole Health, University Hospitals of Cleveland
2. Department of Population and Quantitative Health Sciences,  
Case Western Reserve University School of Medicine



# What is Music Therapy?



*(None of the Above)*



# Music Therapy

- “The clinical and evidence-based use of music interventions...
- to accomplish individualized goals...
- within a therapeutic relationship...
- by a credentialed professional (MT-BC)...
- who has completed an approved music therapy program.”<sup>1</sup>







**MARYALICE RYAN &  
SAMUEL RODGERS-MELNICK**

**PAPPERT CENTER  
APRIL 14 - 5PM**



## Mary Pappert School of Music

### Degree (2012)

- Bachelor of Science
- Music therapy major
- Psychology minor

### Practicum

- UPMC Children's
- Western Psychiatric Hospital
- UPMC Mercy Behavioral Health
- Senior living community
- School for children with disabilities

Psychology  
Coursework

Musicianship

MT Courses

Ensembles

Instrument  
Lessons

Electives



# Music Therapy Internship (6 months)





certification board  
for music therapists

In recognition of professional competence in clinical music therapy and  
having met the standards established by The Certification Board for Music Therapists

**Samuel Newton Rodgers-Melnick**

has been granted the credential of

**Music Therapist – Board Certified**

this 1st day of July in the year 2013.

In witness whereof, under the seal of this Board, the signatures of its duly authorized  
officers grant this certificate subject to the rules and regulations of the Board.

ACCREDITED  
CERTIFICATION PROGRAM



*Sarah Laing*

*Ellen Drap*





GABRIELLE'S  
ANGEL FOUNDATION  
FOR CANCER RESEARCH



# UH Music Therapy Documentation

## Paper Narrative (1980s – 2014)

Doe, John  
Seidman 4024  
MRN: 12345678  
Admit Date: January 1, 2013

Music Therapy Note January 10, 2013  
Patient found in bed, awake, alert, displaying flat affect. Patient c/o 8/10 pain in his abdomen. Patient rated his stress level at 9/10 and his anxiety level at 7/10 upon assessment. Patient expressed stressors related to the length of his hospitalization and the severity of his prognosis. Patient expressed preference for Classic Rock music from the 1970's and discussed previous experience playing the keyboard. MT engaged patient in active music making as a means of pain management and stress reduction. During music intervention, patient participated by singing and improvising notes on iPad keyboard as MT provided live music on guitar and voice. Patient shared positive experience of his hometown during song "Country Bumps." Patient responded to music intervention by displaying brightened affect and expressing benefit of music intervention for improving his mood. Following music intervention, patient rated his pain at 4/10, stress at 2/10 and anxiety at 0/10. Will continue to follow during patient's admission.

James J. Kelly, MT-BC  
pg. 12345

## Electronic Narrative (2014 – 2016)

Doe, Jane  
Seidman 3014  
MRN: 12345679  
Admit Date: February 4, 2015

Follow up from previous session. Patient found in bed, awake, alert, displaying appropriate affect. Patient c/o fatigue related to her cancer treatment as well as feelings of isolation. Patient c/o back pain and rated her pain at 2/10. Patient rated her stress at 5/10 and anxiety 4/10 prior to music intervention. Patient expressed desire to create something for her children this afternoon. MT engaged patient in songwriting as a means of coping and stress reduction. During music intervention, patient participated by creating a beat on GarageBand for iPad and contributing thoughts and feelings to songwriting process as MT provided guitar accompaniment and facilitated songwriting intervention. Patient created three verses dedicated to her children as well as the chorus "You know I'll be home soon." Patient responded to music intervention by displaying brightened affect and moving her body to the beat of the music. Following music intervention, patient rated her pain at 0/10, stress at 2/10, and her anxiety at 1/10. MT will f/u later this week to record song.





# KULAS

---

# FOUNDATION







# 2016: Increasing Documentation Burden ☹️

## (1) Narrative Note

MRN: 18430742 Visit: 184030742 Age: 68y (18-May-1953)	<b>CALIFORNIA, VALERIE</b> Gender: Female
---	--

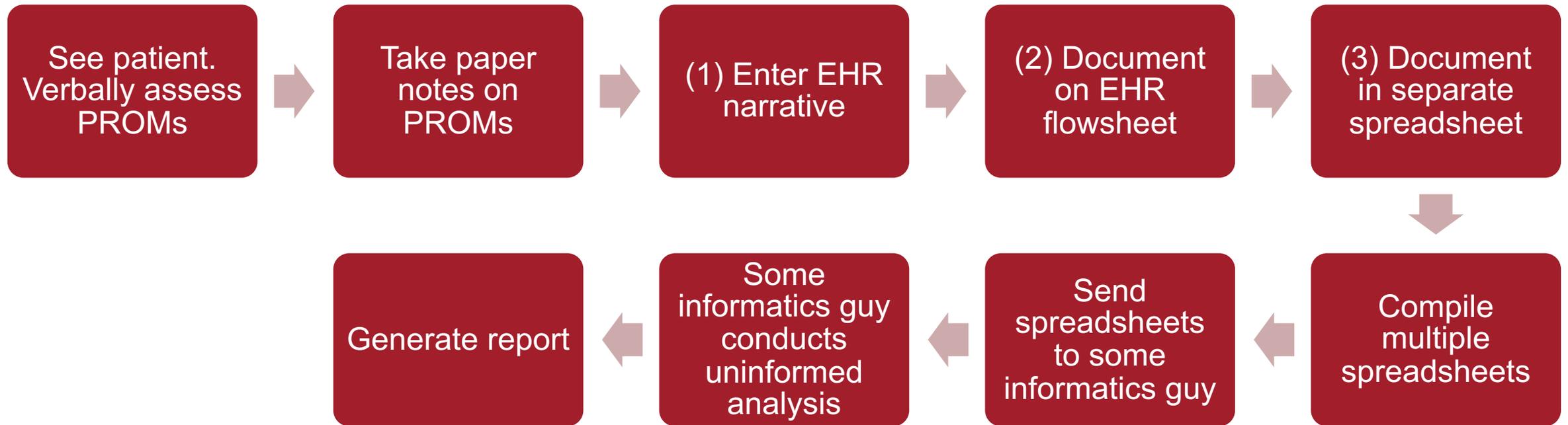
[Narrative Note - Inpatient-Music Therapy \[Charted Location: CMC  
\[Date of Service: 31-Aug-2021 10:17, Authored: 31-Aug-2021 10:17  
Complete, Entered, Signed in Full, General](#)

<b>Narrative Note:</b>	
<b>Discipline</b>	Music Therapy
<b>Topic</b>	Music Therapy
<b>Description</b>	
This is a narrative note	

## (2) Flowsheets

		04-Jun-2020 9:00
<b>Communication</b>		
Communication	Provider Communication Change in Condition Additional Notes	
<b>Reassessment</b>		
<b>Pain/Comfort/Sleep</b>		
<b>RASS/CAM/ABCDEF</b>		
<b>Coping/Psychosocial</b>		
Coping	Observed Emotional State Verbalized Emotional State	
<input type="checkbox"/> Music Therapy	Minutes of Assessment Assessment Detail Minutes of Treatment Treatment Detail	

# How Not to Collect Data



# Problems

- Frustrating!
- Triple documentation = waste
- Every hour spent in a spreadsheet is an hour taken from patient care
- Prone to user error
- Uninformed analysis misses impact, nuance, and steps in data cleaning



# A Better Way



# Narrative Note Template Allscripts®

- Developed to solve the triple documentation problem (narrative + flowsheets + Excel)
- Created fields based on meaningful data from narrative
- Pilot at academic medical center in 2017 → gradually expanded to community medical centers

Session Basics	
Session Date	<input type="text" value="dd - MMM - yyyy"/>   
Session Begin Time	<input type="text" value="hh : mm"/>   
Session End Time	<input type="text" value="hh : mm"/>   
Session Goal	<input type="text"/>
Interventions	<input type="text"/>
Conflict of Service	<input type="radio"/> yes <input type="radio"/> no <input type="text"/>

Quantitative - Pre

Wellbeing	<input type="radio"/> 0 <input type="radio"/> 10	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
Pain Rating (Intensity)	<input type="radio"/> 0 = None <input type="radio"/> 10 = Severe	<input type="radio"/> 1 = Mild <input type="radio"/> paralyzed	<input type="radio"/> 2 = Mild <input type="radio"/> sedated	<input type="radio"/> 3 = Mild <input type="radio"/> unable to assess	<input type="radio"/> 4 = Moderate	<input type="radio"/> 5 = Moderate	<input type="radio"/> 6 = Moderate	<input type="radio"/> 7 = Severe	<input type="radio"/> 8 = Severe	<input type="radio"/> 9 = Severe
Tiredness	<input type="radio"/> 0 <input type="radio"/> 10	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
Anxiety	<input type="radio"/> 0 <input type="radio"/> 10	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
Depression	<input type="radio"/> 0 <input type="radio"/> 10	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
Coping - Observed Emotional State	<input type="checkbox"/> afraid/fearful <input type="checkbox"/> denial	<input type="checkbox"/> agitated <input type="checkbox"/> flat	<input type="checkbox"/> angry <input type="checkbox"/> pleasant	<input type="checkbox"/> anxious <input type="checkbox"/> restless	<input type="checkbox"/> attention-seeking behavior <input type="checkbox"/> tearful/crying	<input type="checkbox"/> calm <input type="checkbox"/> uncooperative	<input type="checkbox"/> cooperative <input type="checkbox"/> withdrawn	<input type="checkbox"/> crying continuous/inconsolable	<input type="text"/>	
Coping - Verbalized Emotional State	<input type="checkbox"/> acceptance <input type="checkbox"/> hopefulness	<input type="checkbox"/> anger <input type="checkbox"/> hopelessness	<input type="checkbox"/> anxiety <input type="checkbox"/> loneliness	<input type="checkbox"/> depression <input type="checkbox"/> powerlessness	<input type="checkbox"/> disbelief <input type="checkbox"/> relief	<input type="checkbox"/> fear <input type="checkbox"/> sadness	<input type="checkbox"/> frustration <input type="checkbox"/> suicidal thoughts	<input type="checkbox"/> grief	<input type="checkbox"/> guilt	<input type="checkbox"/> happiness <input type="text"/>

Quantitative - Post

Wellbeing	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 10
Pain	<input type="radio"/> 0 = None	<input type="radio"/> 1 = Mild	<input type="radio"/> 2 = Mild	<input type="radio"/> 3 = Mild	<input type="radio"/> 4 = Moderate	<input type="radio"/> 5 = Moderate	<input type="radio"/> 6 = Moderate	<input type="radio"/> 7 = Severe	<input type="radio"/> 8 = Severe	<input type="radio"/> 9 = Severe	<input type="radio"/> 10 = Severe
Pain Limitation	<input type="checkbox"/> Functional mobility limited due pain <input type="checkbox"/> ADLs/IADLs limited due to pain <input type="checkbox"/> Participation limited by pain <input type="checkbox"/> RN or team was notified of limitations due to pain <input type="checkbox"/> Educated patient on positioning to reduce pain <input type="checkbox"/> Educated patient on rest/activity routine to address increas... <input type="checkbox"/> Adjusted/adapted ADLS/IADLs to reduce pain with these activities <input type="checkbox"/> Patient trained for proper mobility/transfer techniques to d... <input type="checkbox"/> Deep breathing techniques to reduce pain <input type="checkbox"/> Relaxation techniques to reduce pain <input type="text"/>										
Tiredness	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 10
Anxiety	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 10
Depression	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9	<input type="radio"/> 10
Observed Emotional State	<input type="checkbox"/> afraid/fearful <input type="checkbox"/> agitated <input type="checkbox"/> angry <input type="checkbox"/> anxious <input type="checkbox"/> attention-seeking behavior <input type="checkbox"/> calm <input type="checkbox"/> cooperative <input type="checkbox"/> crying continuous/inconsolable <input type="checkbox"/> denial <input type="checkbox"/> flat <input type="checkbox"/> pleasant <input type="checkbox"/> restless <input type="checkbox"/> tearful/crying <input type="checkbox"/> uncooperative <input type="checkbox"/> withdrawn <input type="text"/>										
Verbalized Emotional State	<input type="checkbox"/> acceptance <input type="checkbox"/> anger <input type="checkbox"/> anxiety <input type="checkbox"/> depression <input type="checkbox"/> disbelief <input type="checkbox"/> fear <input type="checkbox"/> frustration <input type="checkbox"/> grief <input type="checkbox"/> guilt <input type="checkbox"/> happiness <input type="checkbox"/> hopefulness <input type="checkbox"/> hopelessness <input type="checkbox"/> loneliness <input type="checkbox"/> powerlessness <input type="checkbox"/> relief <input type="checkbox"/> sadness <input type="checkbox"/> suicidal thoughts <input type="text"/>										

Music Therapy Narrative

Assessment Detail

Treatment Detail

Expressive Therapy Education

Expressive Therapy EducationTopic	<input type="checkbox"/> pain management	<input type="checkbox"/> focal points	<input type="checkbox"/> regiments	<input type="checkbox"/> relaxation	<input type="checkbox"/> coping strategies	<input type="checkbox"/> resources	<input type="text"/>		
Learner	<input type="checkbox"/> patient	<input type="checkbox"/> parent/guardian	<input type="checkbox"/> family member	<input type="checkbox"/> significant other	<input type="text"/>				
Barriers to Learning	<input type="checkbox"/> none	<input type="checkbox"/> acuteness of illness	<input type="checkbox"/> cognitive limitations	<input type="checkbox"/> communication limitations	<input type="checkbox"/> hearing problems	<input type="checkbox"/> learning disabilities	<input type="checkbox"/> literacy	<input type="checkbox"/> physical limitations	<input type="text"/>
Method	<input type="checkbox"/> audio	<input type="checkbox"/> computer	<input type="checkbox"/> demonstration	<input type="checkbox"/> verbal	<input type="checkbox"/> video	<input type="checkbox"/> written	<input type="text"/>		
Outcome Evaluation	<input type="checkbox"/> 0=unable to meet; needs instruction	<input type="checkbox"/> 1=partially meets; needs review	<input type="checkbox"/> 2=meets goals/outcomes	<input type="checkbox"/> R=reinforced previously met goal	<input type="checkbox"/> NA=not applicable	<input type="checkbox"/> teach back	<input type="checkbox"/> return demonstration <input type="text"/>		

Patient Comments

Patient Comments

# UH Connor Whole Health Expressive Therapies Program

## 2023

- 12 MT-BCs
- 3 MT interns
- 3 art therapists

- 9 hospitals
- 3 health centers

**12,350 patient encounters**



# Effectiveness of **M**edical **M**usic Therapy **P**ractice: **I**ntegrative **R**esearch using the **E**lectronic Health Record



# EMMPIRE

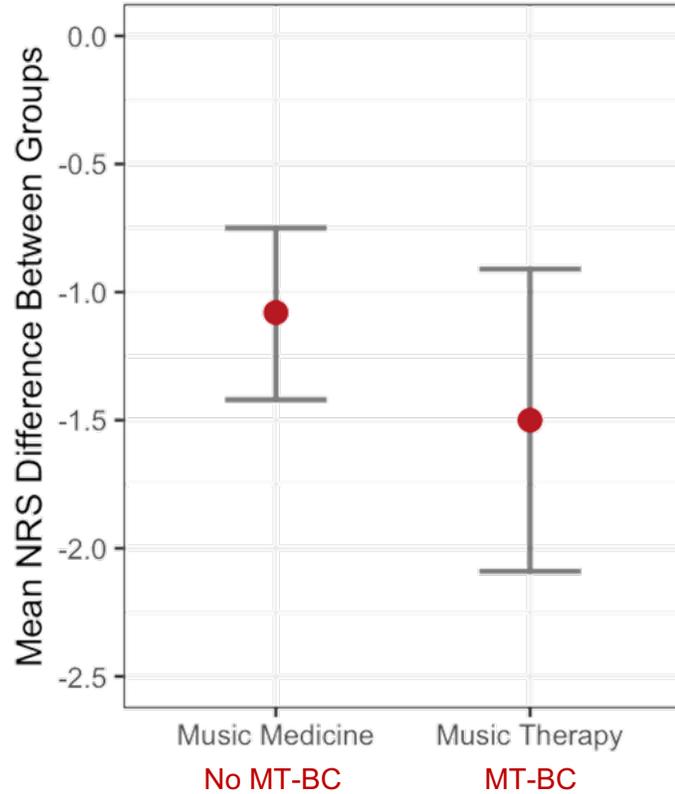
Retrospective January 2017 – July 2020

<https://www.pinterest.es/pin/859202435135584519/?autologin=true>

# Background: MT's Efficacy for pain ↓ established in RCTs<sup>4-6</sup>

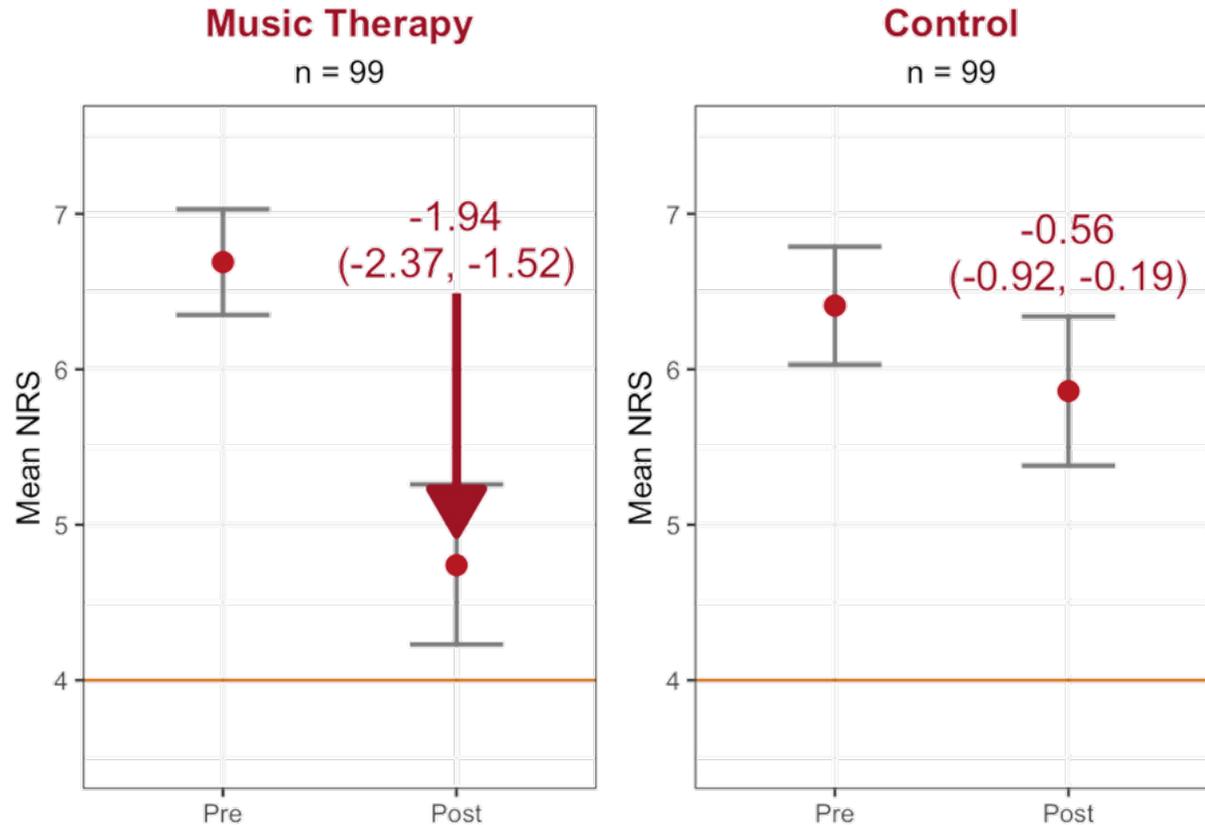
### Lee 2016 Meta-Analysis

n = 6430



### Gutgsell 2013 RCT in Palliative Care

Mean difference: -1.39 [-1.95, -0.83]



Abbreviations: NRS, numeric rating scale

# Few Studies on Real-World Clinical Effectiveness

## The effects of inpatient music therapy on self-reported symptoms at an academic cancer center: a preliminary report

Gabriel Lopez<sup>1</sup>  • Aimee J. Christie<sup>2</sup> • Catherine Powers-James<sup>2</sup> • Mi Sun Bae<sup>3</sup> • Seyedeh S. Dibaj<sup>4</sup> • Telma Gomez<sup>2</sup> • Janet L. Williams<sup>2</sup> • Eduardo Bruera<sup>2</sup>

**Results** Data were evaluable for 96 of 100 consecutive initial, unique patient encounters. 55% were women, average age 50, and majority with hematologic malignancies (47%). Reasons for music therapy referral included anxiety/stress (67%), adjustment disorder/coping (28%), and mood elevation/depression (17%). The highest (worst) symptoms at baseline were sleep disturbance (5.7) and well-being (5.5). We observed statistically and clinically significant improvement (means) for anxiety ( $-2.3 \pm 1.5$ ), drowsiness ( $-2.1 \pm 2.2$ ), depression ( $-2.1 \pm 1.9$ ), nausea ( $-2.0 \pm 2.4$ ), fatigue ( $-1.9 \pm 1.5$ ), pain ( $-1.8 \pm 1.4$ ), shortness of breath ( $-1.4 \pm 2.2$ ), appetite ( $-1.1 \pm 1.7$ ), and for all ESAS subscales (all  $ps < 0.02$ ). The highest clinical response rates were observed for anxiety (92%), depression (91%), and pain (89%).

**Conclusions** A single, in-person, tailored music therapy intervention as part of an integrative oncology inpatient consultation service contributed to the significant improvement in global, physical, and psychosocial distress. A randomized controlled trial is justified.



# EMMPIRE Methods: Data Extraction and Cleaning

# No template? Use Regular Expressions in Studio®

## Step 1: Look for patterns

**comb\_text**

ENTERED TIME: 11:29:00 AM : Pt referred to me for anxiety reduction. Pt in bed, greets me with, "I'm very musical!" and tells me about her participation in a choir. She reported **3/10 pain** and **3/10 stress level**. Pt is very tangential, but redirectable. Pt's son was present in the room briefly. I facilitated live pt preferred music to decrease pain and stress. During the music pt lay back, closed her eyes, and sang along. Afterwards pt expressed gratitude: "I feel about four inches taller and five years younger!" She reported **0/10 pain** and **1/10 stress** and requested follow-up tomorrow. Will follow.

**comb\_text**

ENTERED TIME: 11:02:57 AM : Pt in bed, as I come in she is saying to herself, "What will become of me? What will become of me?" Upon my introduction pt reports feeling "weepy" and anxious today. She is able to rank her **stress level at 7.5/10**. I facilitated live pt preferred music with themes of positivity and at a slow tempo to decrease stress. During the music pt maintained eye contact with me and sang along with brightening affect. Afterwards pt expressed gratitude with a smile: "You really cheered me up." She reported decreased **stress level (5.5/10)**. I educated pt on music channels via TV and pt chose a "Golden Oldies" station to listen to. Will follow.

# Finding PROMs with Regular Expressions in Studio®

## Step 2: Write code to detect patterns: `library(tidyverse)`

### `comb_text`

ENTERED TIME: 11:29:00 AM : Pt referred to me for anxiety reduction. Pt in bed, greets me with, "I'm very musical!" and tells me about her participation in a choir. She reported 3/10 pain and **3/10 stress level**. Pt is very tangential, but redirectable. Pt's son was present in the room briefly. I facilitated live pt preferred music to decrease pain and stress. During the music pt lay back, closed her eyes, and sang along. Afterwards pt expressed gratitude: "I feel about four inches taller and five years younger!" She reported 0/10 pain and **1/10 stress** and requested follow-up tomorrow. Will follow.

### # Find StressRaw

```
StressRaw <- stringr::str_extract_all(mt_train$comb_text,  
"[:digit:]+\\. *[:digit:]]*/10( *)[Ss]tress|[Ss]tress( +[^ ]+){1,5}(\\()?[[:digit:]]+\\. *[:digit:]]*/10",  
simplify = TRUE)
```

### # Join Stress RAW to Table

```
mt_train <- cbind.data.frame(mt_train, StressRaw)
```

### # CleanStressPre

```
StressPre <- as.numeric(stringr::str_extract(mt_train$StressPreRaw,  
"[:digit:]+\\. *[:digit:]]*"))  
mt_train$StressPre <- StressPre
```

### # CleanStressPost

```
StressPost <- as.numeric(stringr::str_extract(mt_train$StressPostRaw,  
"[:digit:]+\\. *[:digit:]]*"))  
mt_train$StressPost <- StressPost
```

# Finding PROMs with regular expressions in R Studio®

## Step 3: Validate output and prepare for analysis

comb_text	StressPre Raw	StressPost Raw	StressPre	StressPost	PainPre Raw	PainPost Raw	PainPre Score	PainPost Score
<p>ENTERED TIME: 11:29:00 AM : Pt referred to me for anxiety reduction. Pt in bed, greets me with, "I'm very musical!" and tells me about her participation in a choir. She reported <b>3/10 pain and 3/10 stress level</b>. Pt is very tangential, but redirectable. Pt's son was present in the room briefly. I facilitated live pt preferred music to decrease pain and stress. During the music pt lay back, closed her eyes, and sang along. Afterwards pt expressed gratitude: "I feel about four inches taller and five years younger!" <b>She reported 0/10 pain and 1/10 stress</b> and requested follow-up tomorrow. Will follow.</p>	3/10 stress	1/10 stress	3	1	3/10 pain	0/10 pain	3	0

# Finding Goals/Interventions

## comb\_text

ENTERED TIME: 11:29:00 AM : Pt referred to me for anxiety reduction. Pt in bed, greets me with, "I'm very musical!" and tells me about her participation in a choir. She reported 3/10 pain and 3/10 stress level. Pt is very tangential, but redirectable. Pt's son was present in the room briefly. I facilitated **live pt preferred music** to **decrease pain and stress**. During the music pt lay back, closed her eyes, and sang along. Afterwards pt expressed gratitude: "I feel about four inches taller and five years younger!" She reported 0/10 pain and 1/10 stress and requested follow-up tomorrow. Will follow.

### # Dig for intervention

```
m <- regmatches(mt_train$comb_text, gregexpr("([Ff]acilitated|[Ff]acilitate|[Ff]acilitating|[Ee]ngaged pt in) ( [^ ]+){0,30})? to", mt_train$comb_text))
```

intervention

### # Delete the verbs

```
t <- gsub("([Ff]acilitated|[Ff]acilitate|[Ff]acilitating|[Ee]ngaged pt in) ( [^ ]+){0,30})? to |([Ff]acilitated|[Ff]acilitate|[Ff]acilitating|[Ee]ngaged pt in) ", "", m)
```

### # Delete "to"

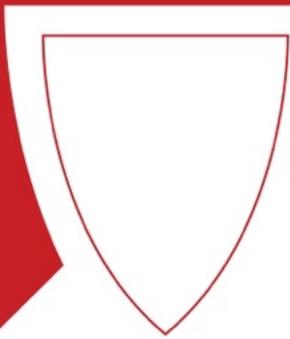
```
Interventions <- gsub(" to", "", t)
```

### # Add intervention to table

```
mt_train$Interventions <- Interventions
```

# Finding Goals/Interventions

comb_text	Interventions	SessionGoals
<p>ENTERED TIME: 11:29:00 AM : Pt referred to me for anxiety reduction. Pt in bed, greets me with, "I'm very musical!" and tells me about her participation in a choir. She reported 3/10 pain and 3/10 stress level. Pt is very tangential, but redirectable. Pt's son was present in the room briefly. I facilitated <b>live pt preferred music</b> to <b>decrease pain and stress</b>. During the music pt lay back, closed her eyes, and sang along. Afterwards pt expressed gratitude: "I feel about four inches taller and five years younger!" She reported 0/10 pain and 1/10 stress and requested follow-up tomorrow. Will follow.</p>	live pt preferred music	decrease pain and stress



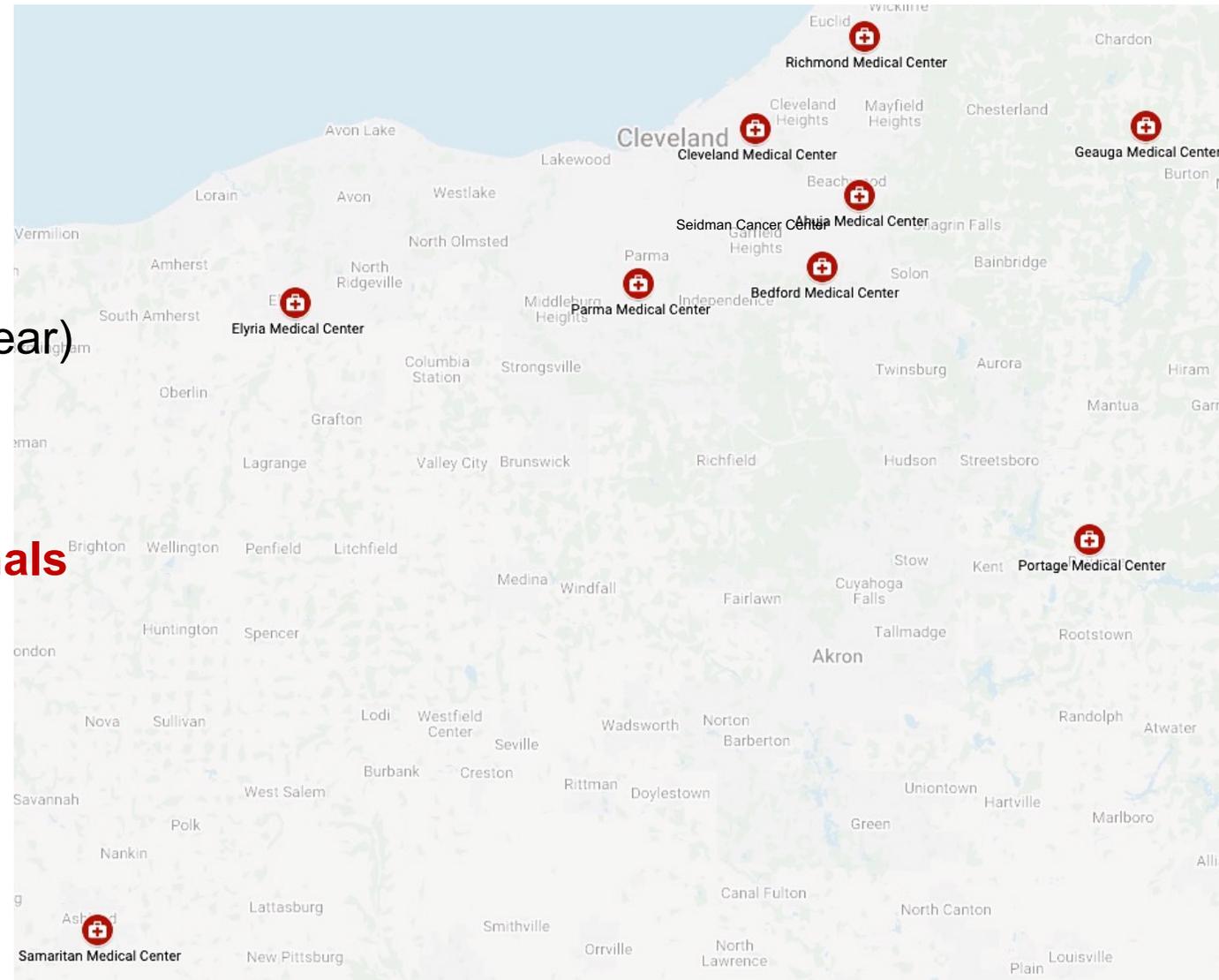
## EMMPIRE Results

# Delivery + Integration<sup>8</sup>

January 2017 – July 2020

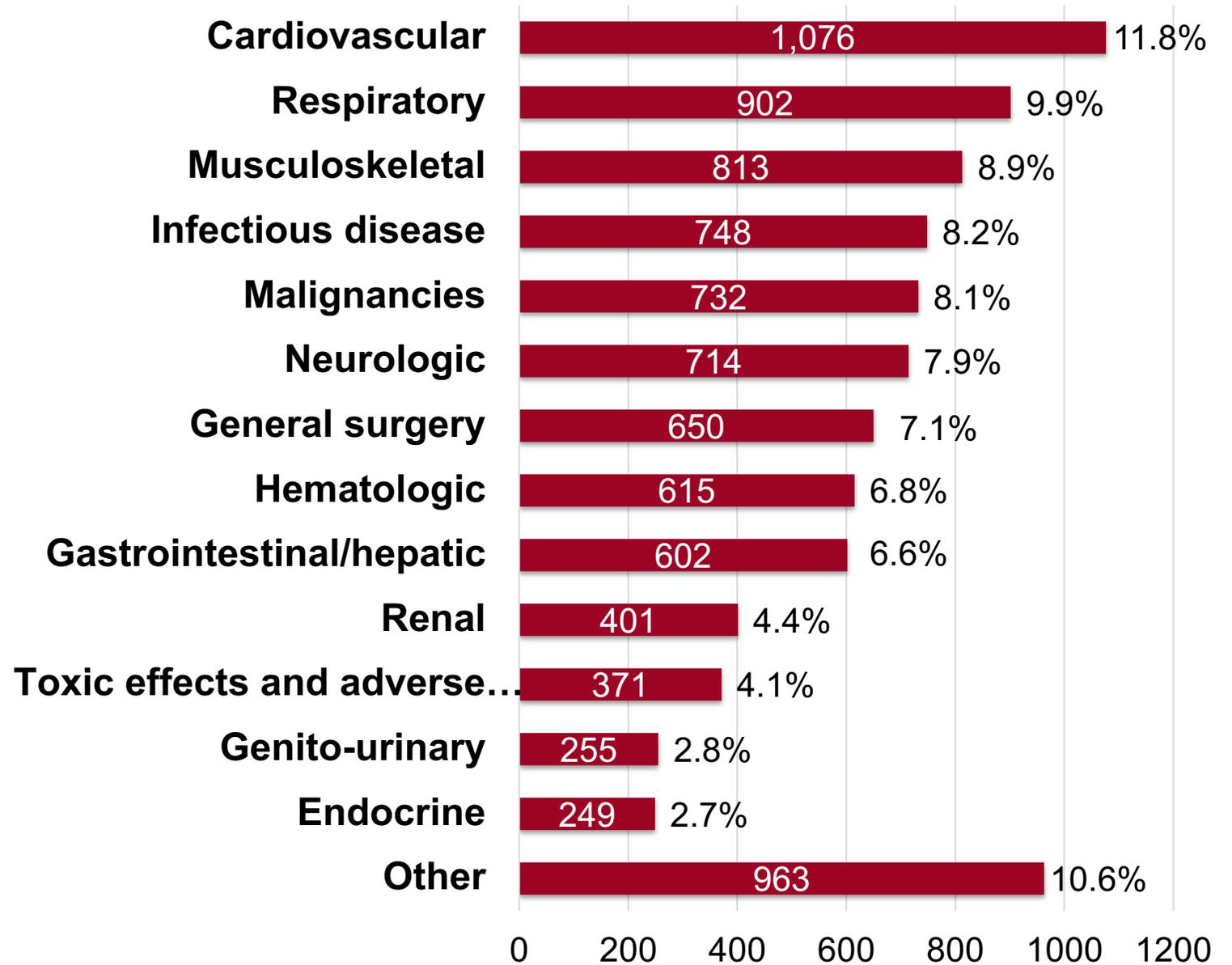
Music therapists (average 11.6 clinical FTE/year)

- provided **14,261 sessions**
- to **7,378 inpatients**
- referred by **1,169 healthcare professionals**
- during **9,091 hospital admissions**
- across **77 hospital floors**
- within **10 medical centers**
- spanning **5 counties**
- over **3.5 years**



# Primary Diagnoses<sup>8</sup>

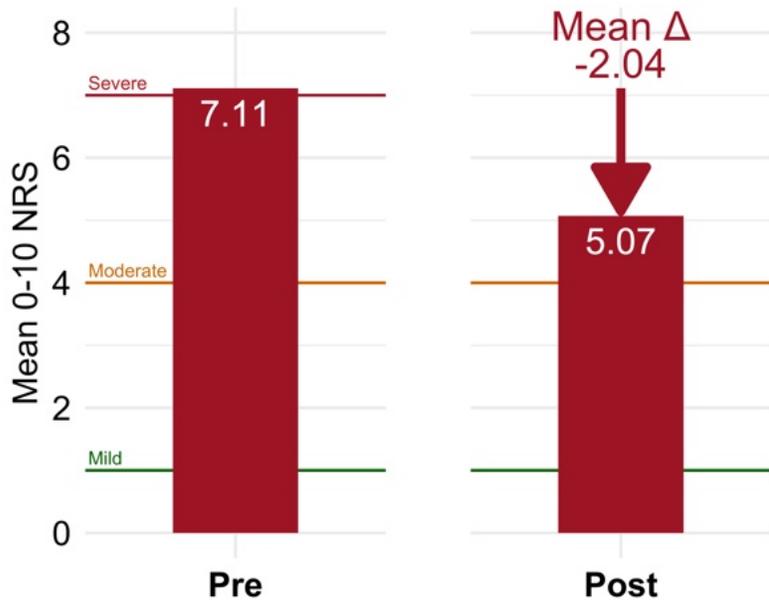
N = 9,091 admissions



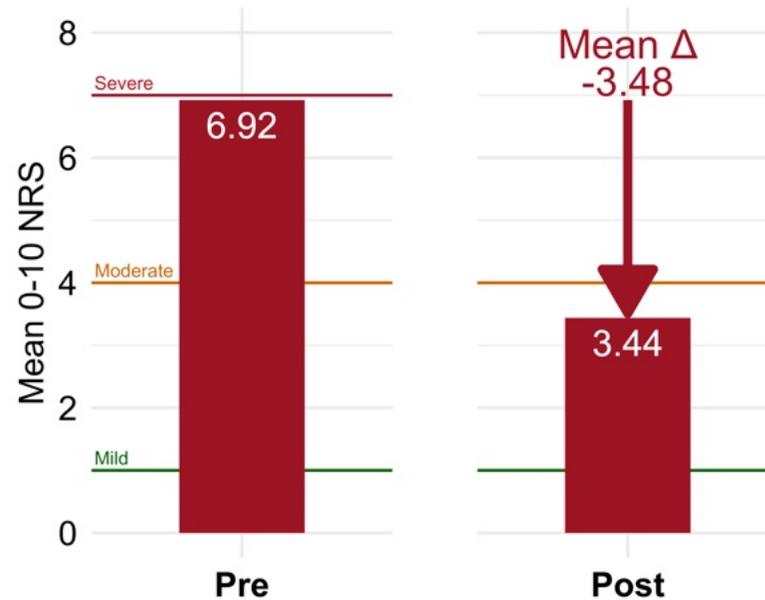
# Effectiveness in Community Hospitals<sup>9</sup>

Among patients with moderate-to-severe PROMs  $\geq 4/10$

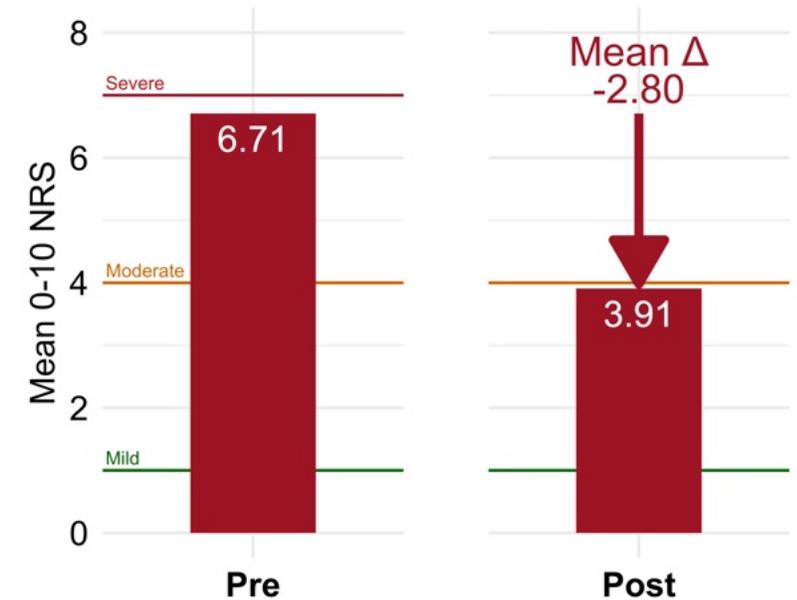
**Pain  $\geq 4$**   
(n = 756)



**Stress  $\geq 4$**   
(n = 153)



**Anxiety  $\geq 4$**   
(n = 185)



**Abbreviations:** NRS, numeric rating scale;  $\Delta$ , change

# Effectiveness in Hematology/Oncology<sup>10</sup>

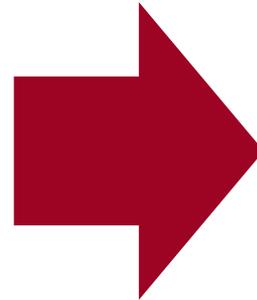
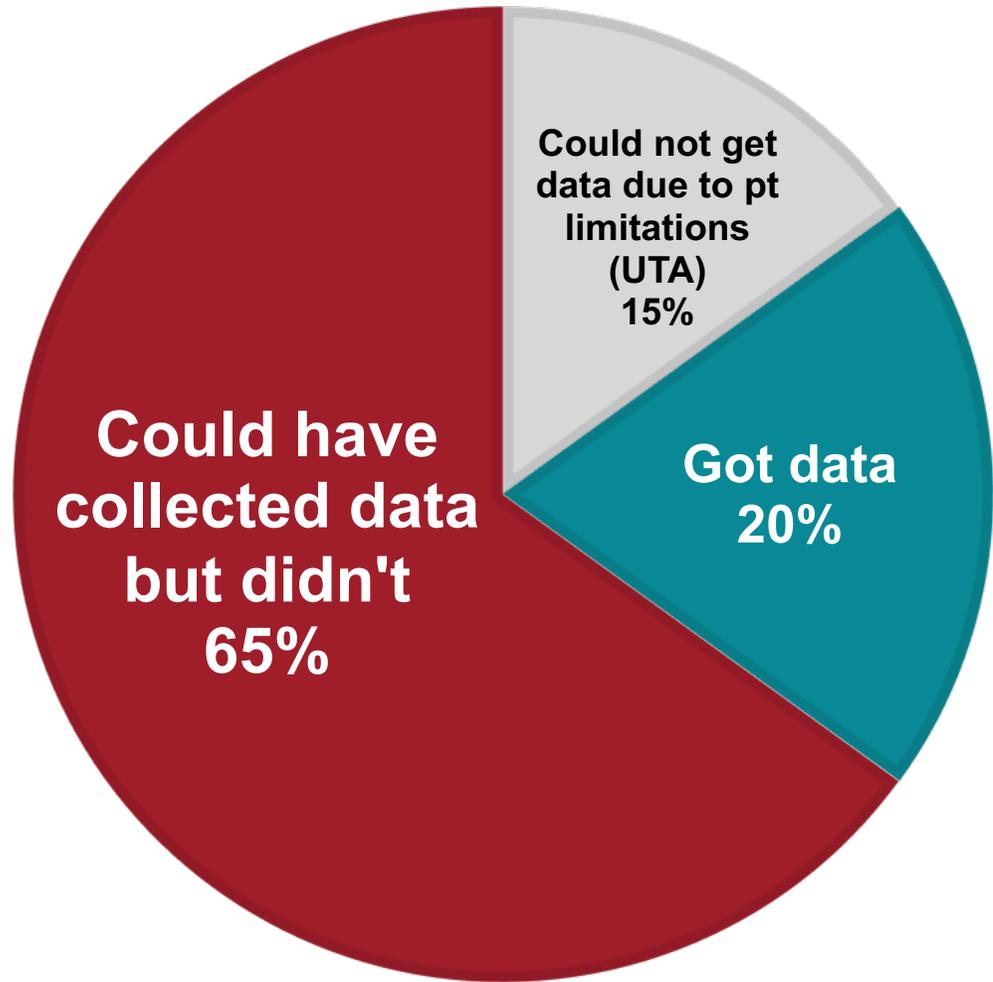
Measure		HemOnc		SCD		p-value
		n sessions <sup>a</sup> (patients)	mean <sup>b</sup> (%)	n sessions <sup>a</sup> (patients)	mean <sup>b</sup> (%)	
<b>Pain</b>	Pre ≥ 1	268 (158)	5.81	518 (112)	7.22	<b>&lt;.001</b>
	Post		4.36		5.70	
	Change		<b>-1.44</b>		<b>-1.51</b>	
	% patients reporting $\Delta \leq -1$		(61.9%)		(65.1%)	
<b>Anxiety</b>	Pre ≥ 1	327 (175)	5.17	326 (82)	6.11	<b>&lt;.001</b>
	Post		2.91		3.18	
	Change		<b>-2.23</b>		<b>-2.89</b>	
	% patients reporting $\Delta \leq -1$		(99.4)		(100%)	
<b>Fatigue</b>	Pre ≥ 1	90 (54)	6.22	41 (21)	5.54	
	Post		5.61		4.14	
	Change		<b>-0.61</b>		<b>-1.34</b>	
	% patients reporting $\Delta \leq -1$		(25.6%)		(53.7%)	

Items in bold represent statistically significant changes as determined by paired samples t-test

<sup>a</sup> n = number of sessions (patients) for which complete (pre- and post-session) outcomes were provided for pre-session measures ≥ 1

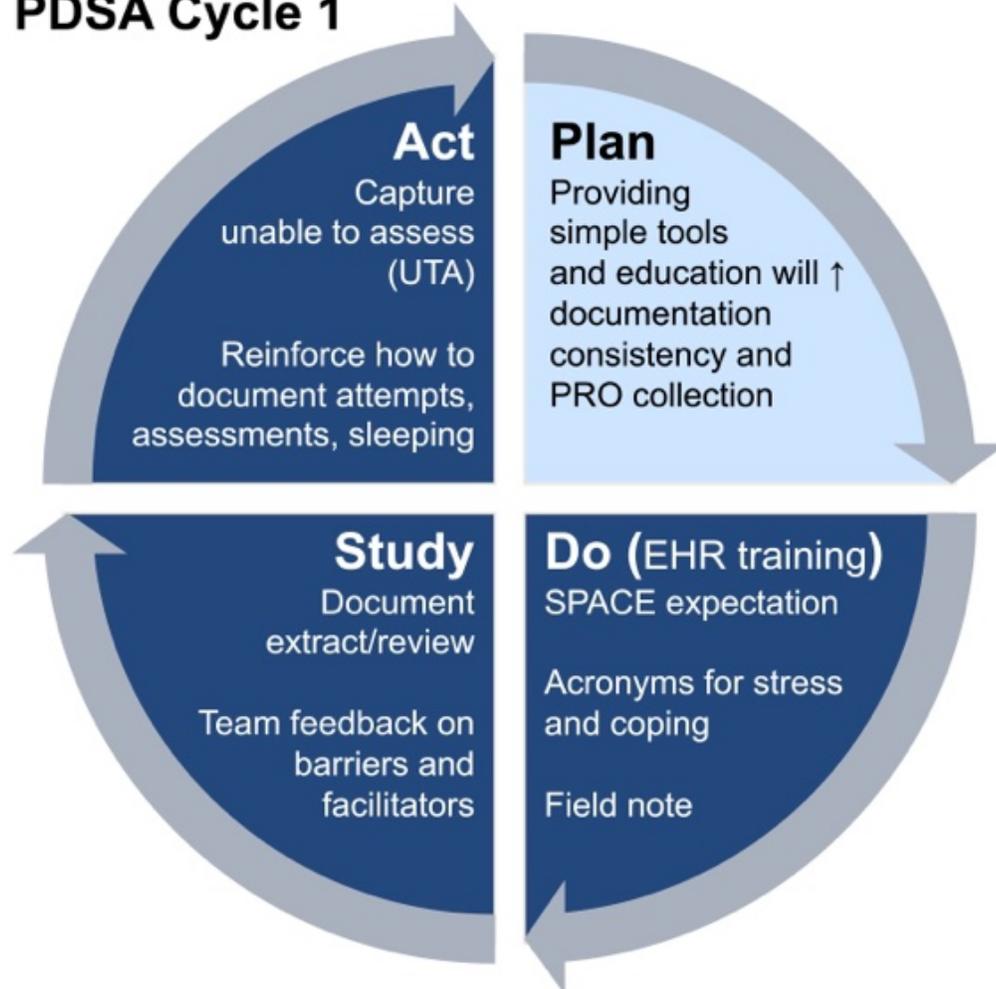
<sup>b</sup> Mean adjusted in mixed model to account for random effect of patient

# EMMPIRE PROMs Problem

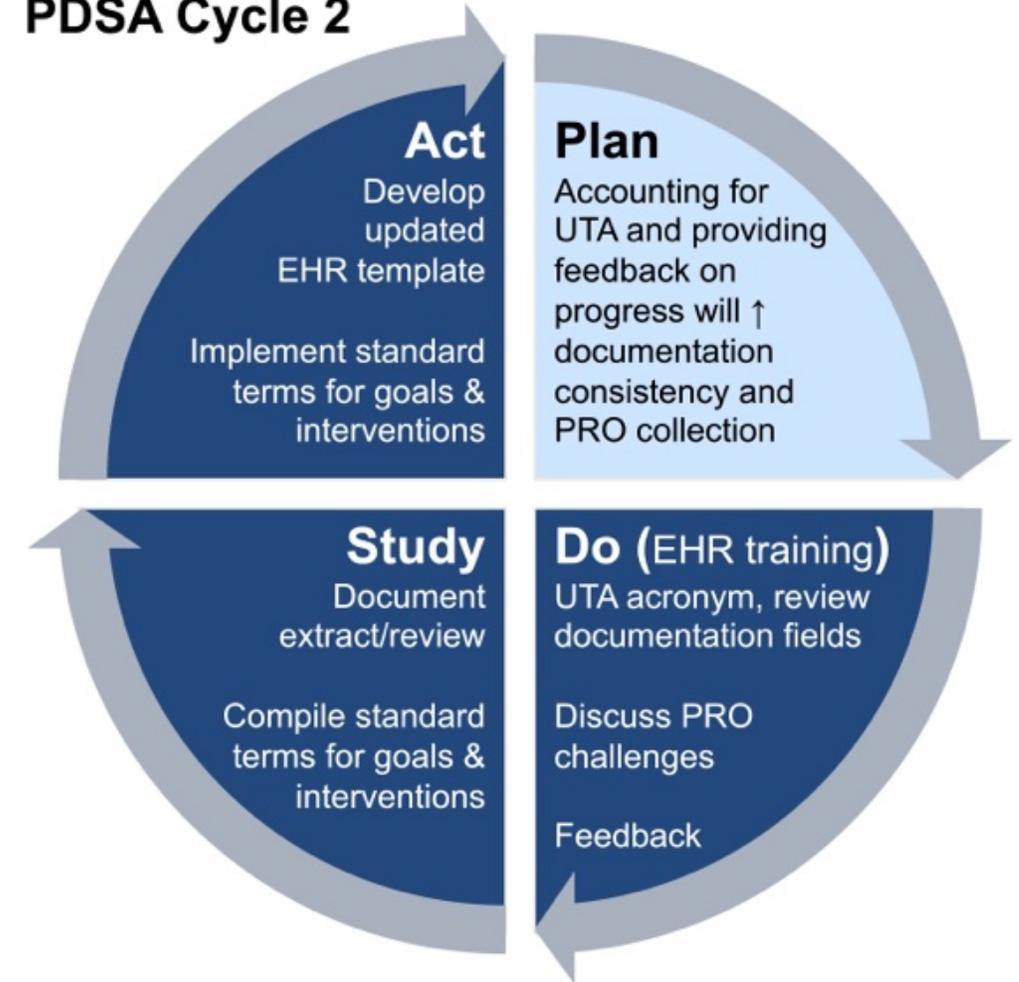


# EMMPIRE Quality Improvement Initiative<sup>11</sup>

## PDSA Cycle 1



## PDSA Cycle 2



# Field Notes and Patient Forms

## Expressive Therapy Healing SPACE Assessment

<b>STRESS</b> (unpleasant reaction to situation) How much stress are you having right now? 0 = no stress at all. 10 = worst possible stress.	<b>Patient</b>	<b>Room</b>
<b>PAIN</b> How much pain are you having right now? 0 = no pain at all. 10 = worst possible pain.	<b>Referral Type</b> new previous pain	<b>Begin</b> ____:____
<b>ANXIETY</b> (fear, worry, or nervousness) How much anxiety are you having right now? 0 = no anxiety at all. 10 = worst possible anxiety.	<b>Session Date</b>	<b>End</b> ____:____
<b>COPING</b> (ability to deal with difficult situation) How well are you coping right now? 0 = not coping well at all. 10 = coping very well.	<b>Visit Type</b> new follow up	<b>Delivery</b> in-person
	<b>Session Type</b> 1:1 group behavioral	tele-session
	<b>Family Centered Care</b>	
	# Staff ____	

PRE	EDUCATION	POST
UTA cognitive emotional NA left out declined phys		UTA cognitive no int emotional left out NA declined sleeping phys interrupted
Stress		Stress
Pain		Pain
Anxiety		Anxiety
Coping		Coping
Depression		Depression
FLACC _____	GOALS	FLACC _____
Nausea		Nausea
Tiredness		Tiredness
Wellbeing (0 = best; 10 = worst)	INTERVENTIONS	Wellbeing (0 = best; 10 = worst)
Mood/Affect		Mood/Affect
Verbalized		Verbalized



PRE

## Expressive Therapies Patient-Reported Outcomes

Please circle the number that best describes how you are feeling NOW:

### Wellbeing (how you feel overall)

Worst possible 0 1 2 3 4 5 6 7 8 9 10 Best possible

### Coping (ability to deal with difficult situation)

Not well at all 0 1 2 3 4 5 6 7 8 9 10 Very well

### Pain

None 0 1 2 3 4 5 6 7 8 9 10 Worst possible

### Tiredness (less energy, fatigue)

None 0 1 2 3 4 5 6 7 8 9 10 Worst possible

### Anxiety (worry or being nervous)

None 0 1 2 3 4 5 6 7 8 9 10 Worst possible

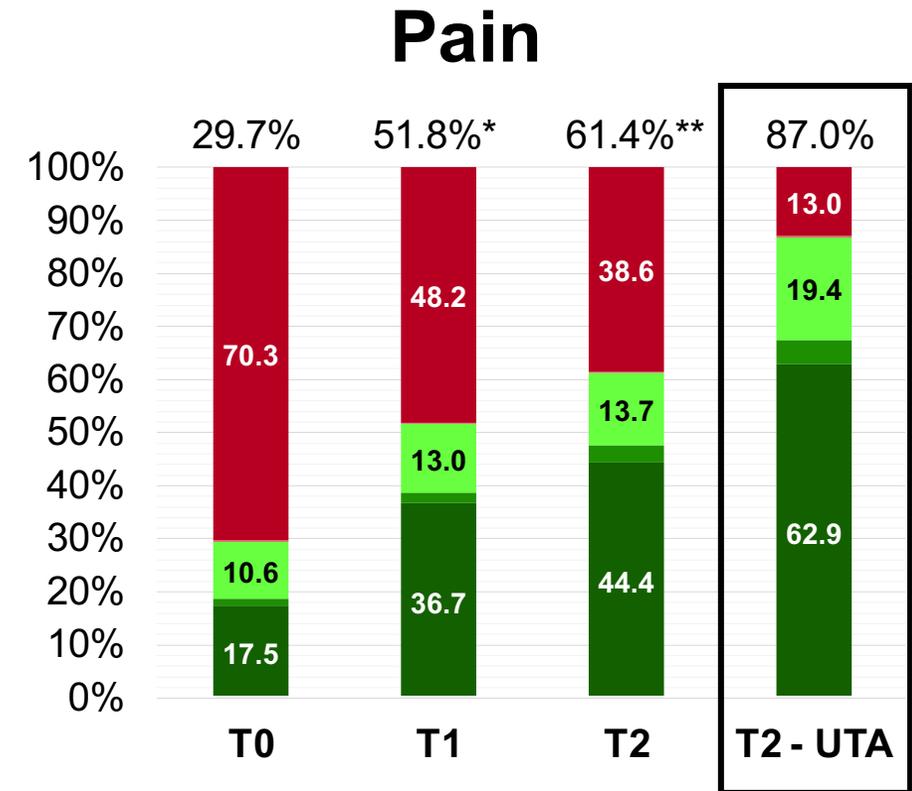
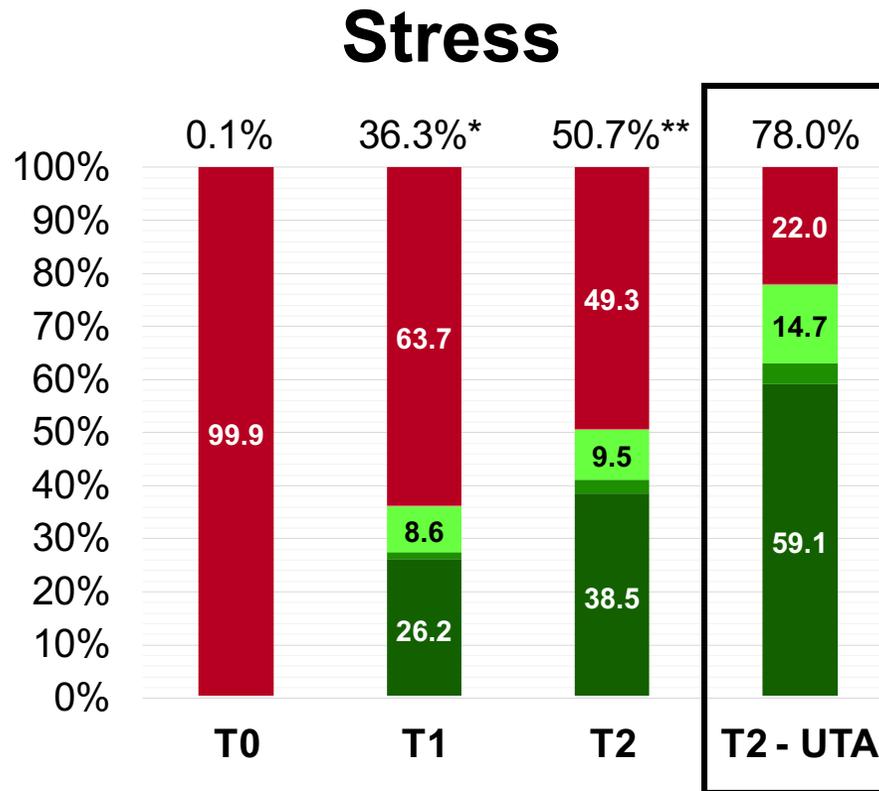
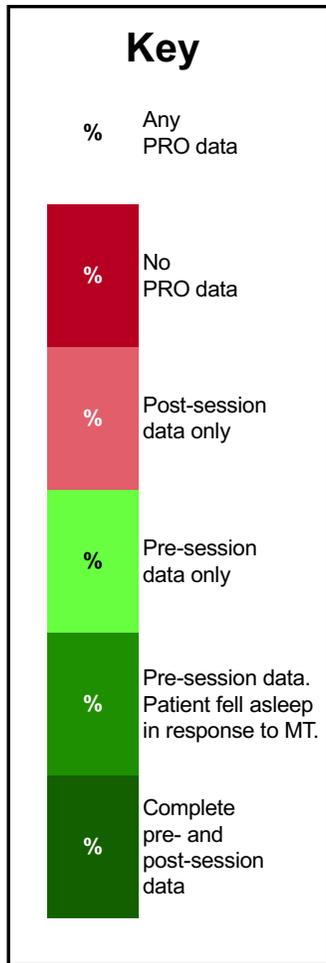
### Depression (feeling sad or blue)

None 0 1 2 3 4 5 6 7 8 9 10 Worst possible

### Stress (unpleasant reaction to situation)

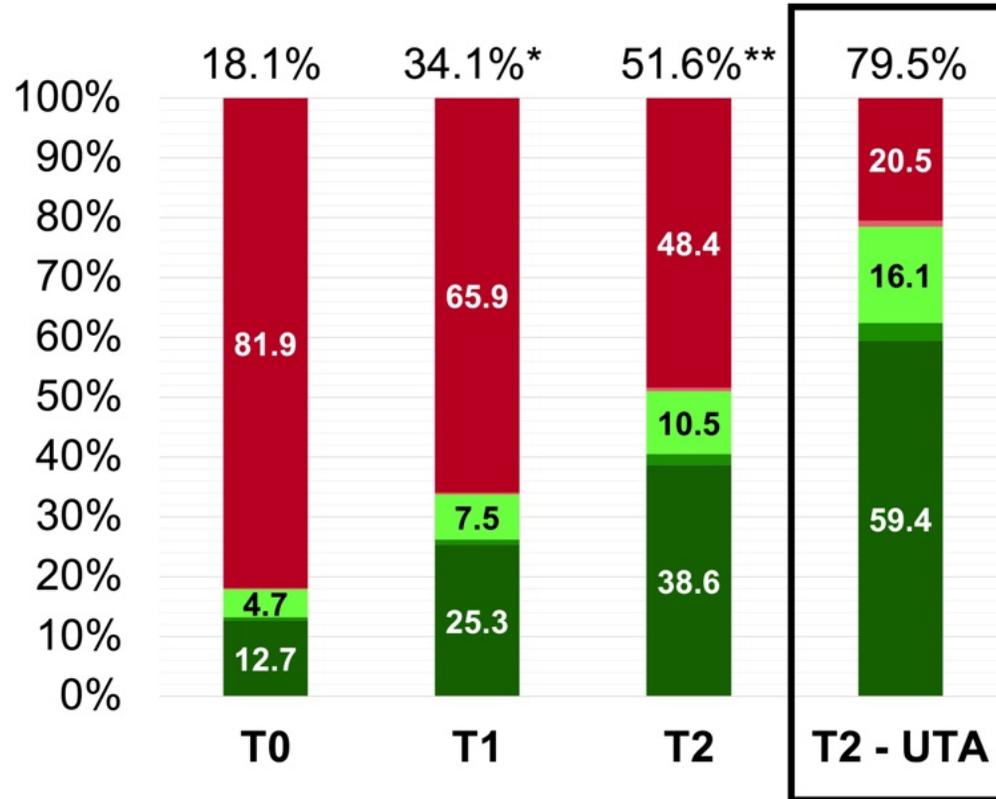
None 0 1 2 3 4 5 6 7 8 9 10 Worst possible

# QI ↑ PROMs Collection

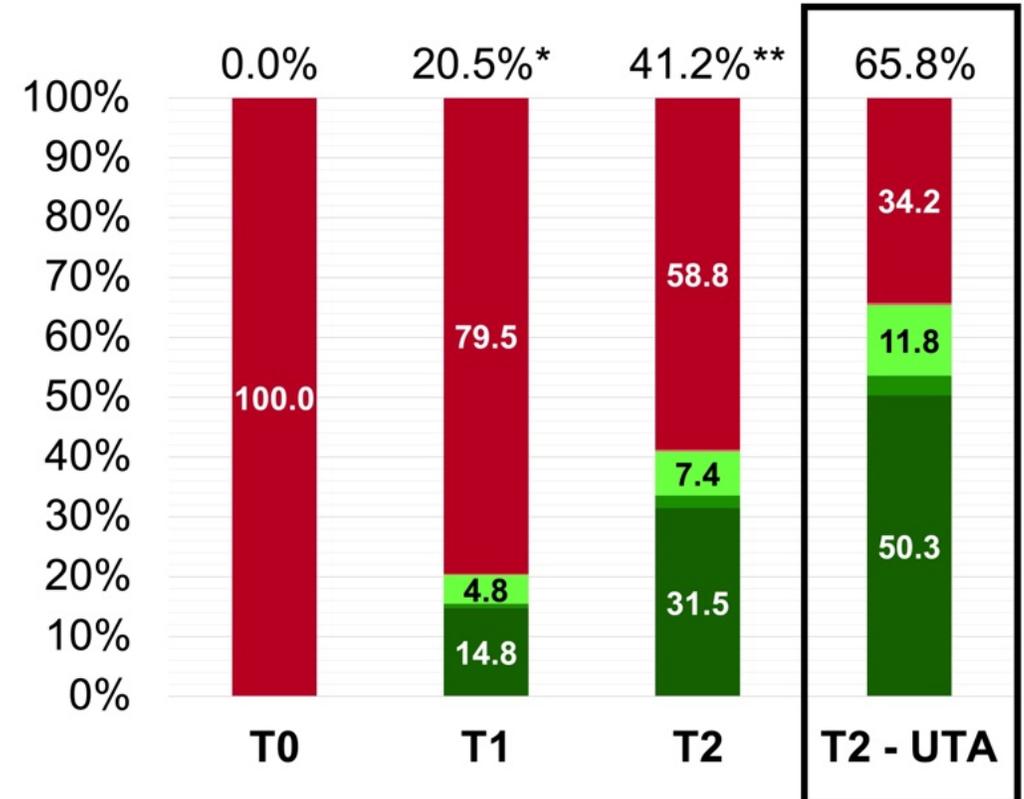


# QI ↑ PROMs Collection continued

## Anxiety



## Coping



EXPRESSIVE THERAPY		
<b>Discipline</b> <input type="radio"/> Art Therapy <input checked="" type="radio"/> Music Therapy		
<b>Referral Type</b> <input type="radio"/> new referral this admission <input type="radio"/> referral from previous admission <input type="radio"/> pain rounds		
SESSION BASICS		
<b>Session Date</b> <input type="text"/> - <input type="text"/> - <input type="text"/>	<b>Session Begin Time</b> <input type="text"/> :~:~:~	<b>Session End Time</b> <input type="text"/> :~:~:~
<b>Visit Type</b> <input type="radio"/> new visit <input type="radio"/> follow up visit	<b>Session Type</b> <input type="radio"/> one on one <input type="radio"/> group <input checked="" type="radio"/> group - Behavioral Health	<b>Intervention Delivery</b> <input type="radio"/> in person <input type="radio"/> tele-session
TREATMENT		
<b>Session Goals</b>		
<input type="checkbox"/> agitation reduction <input type="checkbox"/> cognitive functioning improvement <input type="checkbox"/> end of life support <input type="checkbox"/> fatigue reduction <input type="checkbox"/> locus of control <input type="checkbox"/> nausea reduction <input type="checkbox"/> physiological functioning improvement <input type="checkbox"/> self-expression <input type="checkbox"/> spiritual support	<input type="checkbox"/> anxiety reduction <input type="checkbox"/> coping <input type="checkbox"/> family bonding <input type="checkbox"/> isolation reduction <input type="checkbox"/> mood modification <input type="checkbox"/> normalization <input type="checkbox"/> procedural support <input type="checkbox"/> socialization <input type="checkbox"/> stress reduction	<input type="checkbox"/> arousal stimulation orientation <input type="checkbox"/> emotional support <input type="checkbox"/> family/caregiver support <input type="checkbox"/> life review <input type="checkbox"/> motor skills improvement <input type="checkbox"/> pain management <input type="checkbox"/> relaxation <input type="checkbox"/> speech production
<b>Music Therapy Interventions</b>		
<input type="checkbox"/> active music making <input type="checkbox"/> listening/supportive presence <input type="checkbox"/> music-assisted life review <input type="checkbox"/> recorded music listening <input type="checkbox"/> songwriting <input type="checkbox"/> therapeutic music video	<input type="checkbox"/> assessment <input type="checkbox"/> live music listening <input type="checkbox"/> music-assisted relaxation and imagery (MARI) <input type="checkbox"/> song dedication <input type="checkbox"/> termination	<input type="checkbox"/> iso-principle <input type="checkbox"/> lyric analysis <input type="checkbox"/> neurologic techniques <input type="checkbox"/> song recording <input type="checkbox"/> therapeutic instrumental instruction
<b>Co-treatment</b>		
<input type="checkbox"/> acupuncture <input type="checkbox"/> OT	<input type="checkbox"/> art therapy <input type="checkbox"/> PT	<input type="checkbox"/> dance/movement therapy <input type="checkbox"/> SLP <input type="checkbox"/> massage therapy <input type="checkbox"/> spiritual care <input type="checkbox"/> music therapy <input type="checkbox"/> yoga
<b>Session Interruption</b> <input type="checkbox"/> caregiver <input type="checkbox"/> family <input type="checkbox"/> patient <input type="checkbox"/> staff	<b>Interruption Duration (minutes)</b> <input type="text"/>	<b>Interruption Outcome</b> <input type="radio"/> session ended <input type="radio"/> session resumed
<b>Patient Fell Asleep</b> <input type="radio"/> yes <input type="radio"/> no		

QUANTITATIVE - PRE			
<b>Unable to Assess Pre Reason</b>	<input type="checkbox"/> cognitive limitation <input type="checkbox"/> outcomes left out of assessment	<input type="checkbox"/> emotional distress <input type="checkbox"/> patient declined to answer	<input type="checkbox"/> outcomes not applicable <input type="checkbox"/> physical limitation
<b>Stress - Pre</b>	<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10		
<b>Pain - Pre</b>	<input type="radio"/> 0 = None <input type="radio"/> 3 = Mild <input type="radio"/> 6 = Moderate <input type="radio"/> 9 = Severe <input type="checkbox"/> unable to assess (specify)	<input type="radio"/> 1 = Mild <input type="radio"/> 4 = Moderate <input type="radio"/> 7 = Severe <input type="radio"/> 10 = Severe	<input type="radio"/> 2 = Mild <input type="radio"/> 5 = Moderate <input type="radio"/> 8 = Severe <input type="checkbox"/> sleeping
<b>Anxiety - Pre</b>	<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10		
<b>Coping - Pre</b>	<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10		
<b>Other Outcomes Assessed</b>	<input checked="" type="checkbox"/> depression <input checked="" type="checkbox"/> FLACC <input checked="" type="checkbox"/> nausea <input checked="" type="checkbox"/> tiredness <input checked="" type="checkbox"/> wellbeing		
<b>Depression - Pre</b>	<input type="radio"/> 0 <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/> 10		
<b>FLACC Face - Pre</b> <input type="radio"/> (0) no particular expression or smile <input type="radio"/> (1) occasional grimace or frown, withdrawn, disinterested <input type="radio"/> (2) frequent to constant frown, clenched jaw, quivering chin	<b>FLACC Legs - Pre</b> <input type="radio"/> (0) normal position or relaxed <input type="radio"/> (1) uneasy, restless, tense <input type="radio"/> (2) kicking, or legs drawn up		
<b>FLACC Activity - Pre</b> <input type="radio"/> (0) lying quietly, normal position, moves easily <input type="radio"/> (1) squirming, shifting back and forth, tense <input type="radio"/> (2) arched, rigid or jerking	<b>FLACC Cry - Pre</b> <input type="radio"/> (0) no cry (awake or asleep) <input type="radio"/> (1) moans or whimpers; occasional complaint <input type="radio"/> (2) crying steadily, screams or sobs, frequent complaint		
<b>FLACC Consolability - Pre</b> <input type="radio"/> (0) content, relaxed <input type="radio"/> (1) reassured by occasional touch, hug or being talked to <input type="radio"/> (2) difficult to console or comfort	<b>FLACC Score - Pre</b> <input type="text"/>		

# EMMPIRE Conclusions

- Music therapy (MT) can be integrated across a large health system.
- EHR data can be used for large observational MT research.
- **Single MT session** clinically effective for symptom management in community hospitals.
- **Single MT session** clinically effective for symptom management in hematology/oncology.
  - Patients with SCD have ↑ symptom burden.
- Quality improvement initiative successful at ↑ rates of PROMs collection in medical MT team

# Resulted in 4 Publications + NCCIH F31 Fellowship

Journal of Integrative and Complementary Medicine > Ahead of Print > Open Access

## Effectiveness of Medical Music Therapy Practice: Integrative Research Using the Electronic Health Record: Rationale, Design, and Population Characteristics

Samuel N. Rodgers-Melnick, Rachael L. Rivard, Seneca Block, and Jeffery A. Dusek

Published Online: 11 Jul 2023 | <https://doi.org/10.1089/jicm.2022.0701>

 **General Section**  
Research Paper

OPEN

JMIR Human Factors | Journal Information | Browse Journal

Published on 27.7.2023 in Vol 10 (2023)

Preprints (earlier versions) of this paper are available at <https://preprints.jmir.org/preprint/46528>, first published February 2023.



### Optimizing Patient-Reported Outcome Collection and Documentation in Medical Music Therapy: Process-Improvement Study

Samuel N Rodgers-Melnick<sup>1,2</sup>; Seneca Block<sup>1,3</sup>; Rachael L Rivard<sup>1,4</sup>; Jeffery A Dusek<sup>1,5</sup>

**PAIN**  
REPORTS

## Effectiveness of music therapy within community hospitals: an EMMPIRE retrospective study

Samuel N. Rodgers-Melnick<sup>a,b,\*</sup>, Rachael L. Rivard<sup>a,c</sup>, Seneca Block<sup>a,b</sup>, Jeffery A. Dusek<sup>a,b</sup>

Research Article

### Clinical Delivery and Effectiveness of Music Therapy in Hematology and Oncology: An EMMPIRE Retrospective Study

Integrative Cancer Therapies  
Volume 21: 1-14  
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DOI: 10.1177/15347254221142538  
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SAGE

Samuel N. Rodgers-Melnick, MPH, MT-BC<sup>1,2</sup>, Rachael L. Rivard, MPH<sup>1,3</sup>, Seneca Block, MA, MT-BC<sup>1,2</sup>, and Jeffery A. Dusek, PhD<sup>1,2</sup>

## University Hospitals Researcher Receives NIH Award to Study Real-World Effectiveness of Music Therapy in Medical Care

September 20, 2023  
By Carly Belsterling

Share      





**After EMMPIRE, where do we go from here?**

# Gaps

Socio-demographic, clinical, and MT intervention characteristics associated with changes in PROMs

Difference in outcomes between patients receiving MT and similar patients receiving usual care

- Medication use
- Length of stay
- Pain intensity

Longitudinal effects on PROMs beyond initial MT session



**DRUMMER**

# DRUMMER Aims

## Aim 1

Investigate which patient and/or MT session characteristics are associated with  $\Delta$  in PROMs

## Aim 2

Use propensity score methods to compare outcomes between inpatients receiving MT and inpatients receiving usual care

## Aim 3

Examine longitudinal effects on PROMs among patients receiving MT



# Data Strategy



## SQL Extracts → Rows of Data

MT documents +  
demographics,  
care setting,  
LOS

Diagnosis code  
(ICD-10)

Drug  
administered

Patient-  
controlled  
analgesia dose  
recorded

MT referral

Pain score  
collected by  
nurses

Note from other  
service (e.g.,  
social work)

Patient + SDOH

# MT Document Data August 2020 → July 2023

Aug 2020 – Mar 2021

Quantitative - Pre										
Wellbeing	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
	<input type="radio"/> 10									
Pain Rating (Intensity)	<input type="radio"/> 0 = None	<input type="radio"/> 1 = Mild	<input type="radio"/> 2 = Mild	<input type="radio"/> 3 = Mild	<input type="radio"/> 4 = Moderate	<input type="radio"/> 5 = Moderate	<input type="radio"/> 6 = Moderate	<input type="radio"/> 7 = Severe	<input type="radio"/> 8 = Severe	<input type="radio"/> 9 = Severe
	<input type="radio"/> 10 = Severe	<input type="radio"/> paralyzed	<input type="radio"/> sedated	<input type="radio"/> unable to assess						
Tiredness	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
	<input type="radio"/> 10									
Anxiety	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
	<input type="radio"/> 10									
Depression	<input type="radio"/> 0	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6	<input type="radio"/> 7	<input type="radio"/> 8	<input type="radio"/> 9
	<input type="radio"/> 10									
Coping - Observed Emotional State	<input type="checkbox"/> afraid/fearful	<input type="checkbox"/> agitated	<input type="checkbox"/> angry	<input type="checkbox"/> anxious	<input type="checkbox"/> attention-seeking behavior	<input type="checkbox"/> calm	<input type="checkbox"/> cooperative	<input type="checkbox"/> crying continuous/inconsolable		
	<input type="checkbox"/> denial	<input type="checkbox"/> flat	<input type="checkbox"/> pleasant	<input type="checkbox"/> restless	<input type="checkbox"/> tearful/crying	<input type="checkbox"/> uncooperative	<input type="checkbox"/> withdrawn			
Coping - Verbalized Emotional State	<input type="checkbox"/> acceptance	<input type="checkbox"/> anger	<input type="checkbox"/> anxiety	<input type="checkbox"/> depression	<input type="checkbox"/> disbelief	<input type="checkbox"/> fear	<input type="checkbox"/> frustration	<input type="checkbox"/> grief	<input type="checkbox"/> guilt	<input type="checkbox"/> happiness
	<input type="checkbox"/> hopefulness	<input type="checkbox"/> hopelessness	<input type="checkbox"/> loneliness	<input type="checkbox"/> powerlessness	<input type="checkbox"/> relief	<input type="checkbox"/> sadness	<input type="checkbox"/> suicidal thoughts			

+

Mar 2021 – Jul 2023

EXPRESSIVE THERAPY		TREATMENT		
<p style="color: red; font-weight: bold; font-size: 1.2em;">Mar 2021 – Jul 2023</p>		<p style="font-weight: bold;">Session Goals</p>		
<p>Referral Type</p> <input type="radio"/> new referral this admission <input type="radio"/> referral from previous admission		<input type="checkbox"/> agitation reduction <input type="checkbox"/> anxiety reduction <input type="checkbox"/> arousal stimulation orientation		
<p style="text-align: center;">SESSION BASICS</p>		<input type="checkbox"/> cognitive functioning improvement <input type="checkbox"/> coping <input type="checkbox"/> emotional support		
<p>Session Date</p>	<p>Session Begin Time</p>	<input type="checkbox"/> end of life support <input type="checkbox"/> family bonding <input type="checkbox"/> family/caregiver support		
<p>Visit Type</p> <input type="radio"/> new visit <input type="radio"/> follow up visit	<p>Session Type</p> <input type="radio"/> one on one <input type="radio"/> group <input checked="" type="radio"/> group - Behavioral Health	<input type="checkbox"/> fatigue reduction <input type="checkbox"/> isolation reduction <input type="checkbox"/> life review <input type="checkbox"/> motor skills improvement <input type="checkbox"/> pain management <input type="checkbox"/> relaxation <input type="checkbox"/> speech production		
<p>Music Therapy Interventions</p>		<input type="checkbox"/> self-expression <input type="checkbox"/> socialization <input type="checkbox"/> stress reduction		
<p>Music Therapy Interventions</p>		<input type="checkbox"/> active music making <input type="checkbox"/> assessment <input type="checkbox"/> iso-principle <input type="checkbox"/> listening/supportive presence <input type="checkbox"/> live music listening <input type="checkbox"/> lyric analysis <input type="checkbox"/> music-assisted life review <input type="checkbox"/> music-assisted relaxation and imagery (MARI) <input type="checkbox"/> neurologic techniques <input type="checkbox"/> recorded music listening <input type="checkbox"/> song dedication <input type="checkbox"/> song recording <input type="checkbox"/> songwriting <input type="checkbox"/> termination <input type="checkbox"/> therapeutic instrumental		

Raw notes from UH EDW

Cleveland, Ohio | 53

## 3 Types of MT Documents

Conflicts of  
service  
(no session  
occurred)

Assessment  
Education

MT  
intervention



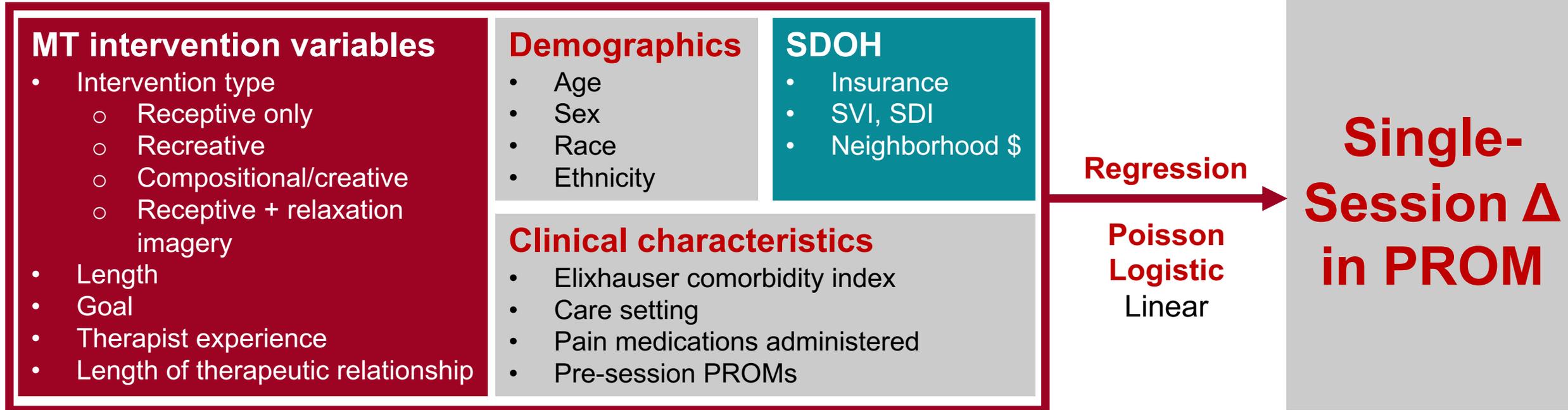
# DRUMMER Methods

# Aim 1

Investigate which patient and/or MT session characteristics are associated with  $\Delta$  in PROMs.

Among patients with pre-session PROM NRS (i.e., pain, stress, anxiety)  $\geq 4$  + complete outcome data

Covariates  $\rightarrow$  Impute for missing  $\rightarrow$  LASSO to refine



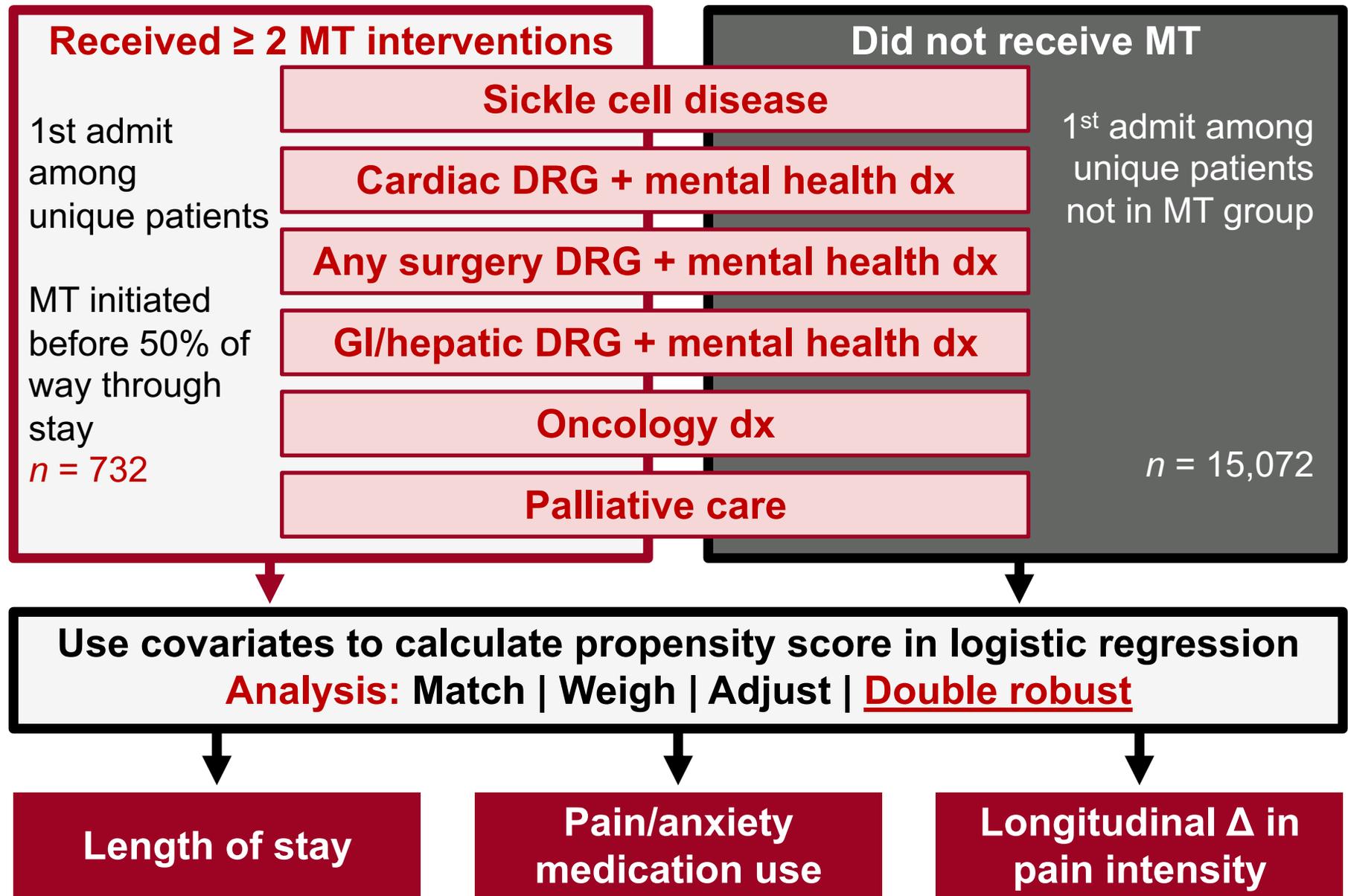
Bootstrap Validation | ROC analyses | Interpret with clinical guidance

# Aim 2

Use propensity score methods to compare outcomes between inpatients receiving MT and inpatients receiving usual care

## Inclusion criteria:

- Hospital admissions
- Adults 18+
- LOS  $\geq$  72hrs
- Admitted where MT services are offered.
- Mean pain NRS  $\geq$ 4 or received opioid in first 24 hours
- Excluding inpatient psychiatry



# Building the Propensity Score

## Covariates

### Demographics

- Age
- Sex
- Race
- Ethnicity
- Marital status
- Primary insurance

### SDOH

- Neighborhood-level
- Median income
  - Insurance mix
  - Social vulnerability index
  - Social deprivation index

### Pain

- Indicator in first 24hr
- Mean pain intensity
  - Opioid receipt
  - PCA receipt

### Clinical characteristics

- Elixhauser comorbidities
- Mental health + substance use disorders
- Major expanded diagnosis clusters (MEDC)

### Care setting

- First floor admitted where MT offered
- Days since study period start

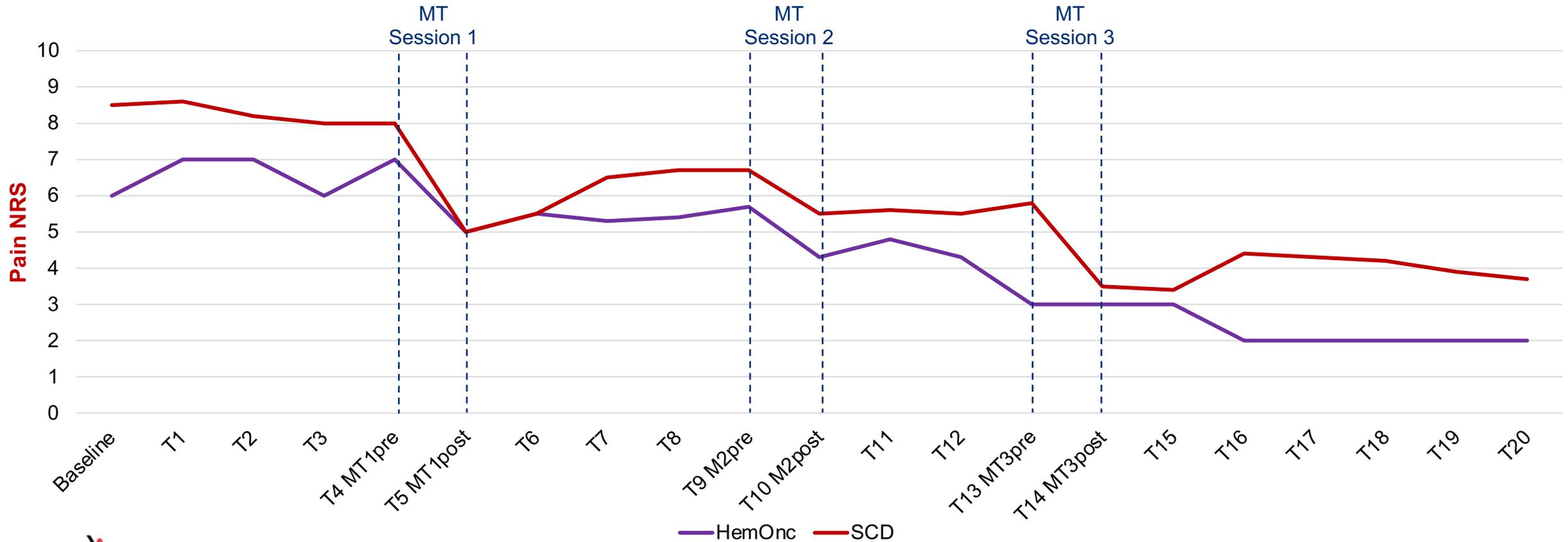
**Received  
≥ 2 MT  
interventions  
(Y/N)**

# Aim 3

## Examine longitudinal effects on PROMs among patients receiving MT.

Among patients reporting PROMs over  $\geq 2$  MT sessions during admission  $\rightarrow$  Linear mixed effects model

1. Is there a dose-response relationship between # MT sessions and  $\Delta$  in PROMs?
2. Do  $\Delta$  in PROMs vary between subgroups of medical populations (i.e., SCD vs. HemOnc)?



# Conclusion

- Methods set precedent for how to collect, organize, extract, clean, and analyze real-world data on medical music therapy.
- Results derived from this work will strengthen the evidence base for integrative therapies and guide implementation of nonpharmacologic pain management modalities.
- Addresses crucial gaps in understanding music therapy's clinical effectiveness
  - Which interventions work best?
  - Who responds most?
  - Effectiveness on important clinical outcomes (e.g., LOS and medication use)
  - What are the effects over the course of patients' hospital admissions?
- Important for understanding the real-world impact of integrative health and medicine modalities and improving evidence-based patient care.

# Acknowledgements

## Mentoring Team

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Harry Menegay, PhD

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National Center for  
Complementary and  
Integrative Health



CLEVELAND  
INSTITUTE FOR  
COMPUTATIONAL  
BIOLOGY



**KULAS**  
FOUNDATION

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