Activity Based Therapy and Chronic AFM

Courtney Porter, PT, DPT

Kennedy Krieger Institute

Objectives

- Define ABRT
  - Including considerations for AFM
- Describe functional outcomes
- Case Study

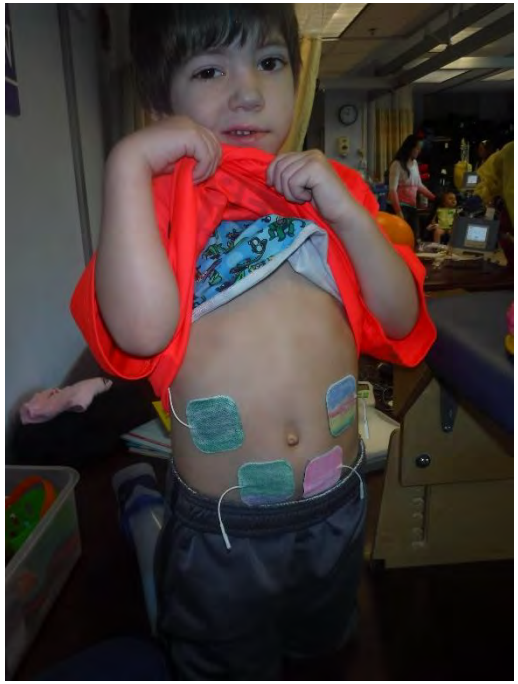
Activity Based Restorative Therapy (ABRT)

- Five key principles
  - Functional Electrical Stimulation
  - Weight Bearing
  - Locomotor Training
  - Task Specific Practice
  - Massed Practice
- Plus:
  - Aquatic Therapy
  - Vibration
  - Home based/community integration

Functional Electrical Stimulation (FES)

- Goal of regeneration of activity
- Can assist in decreasing atrophy
- Used in combination with other components of ABRT
- Modifications for AFM
  - Parameter selection

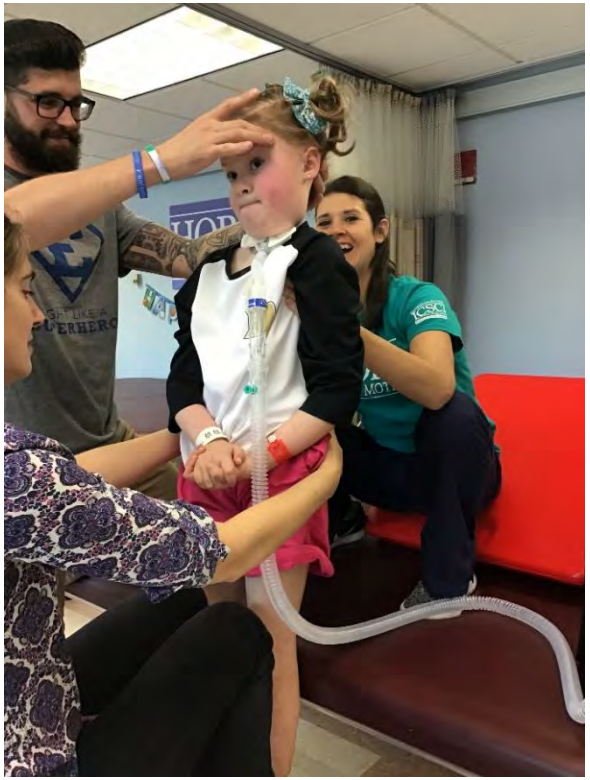
FES



Weight Bearing

- Loading across a joint while promoting proper joint alignment and muscle co-contraction surrounding the joint
- Upper Extremities:
  - Forearms or extended arms
  - Side-lying, sitting, prone, quadruped
- Lower Extremities
  - Standing, kneeling, quadruped
- Modifications for AFM:
  - Shoulder subluxations
  - Scoliosis
  - Decreased head control
  - Proximal vs distal strength

Weight Bearing

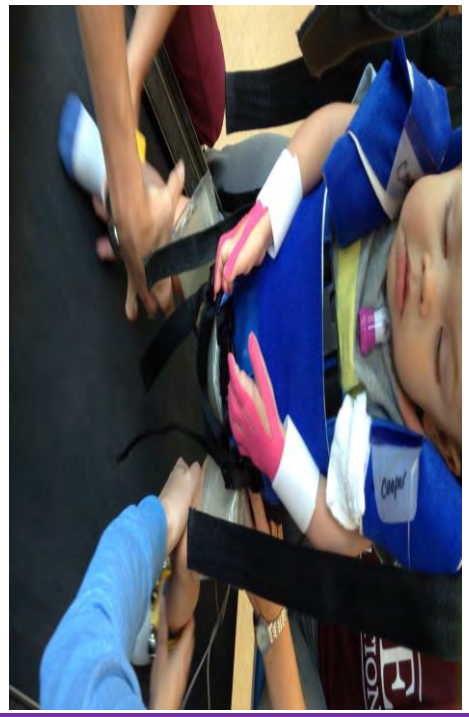


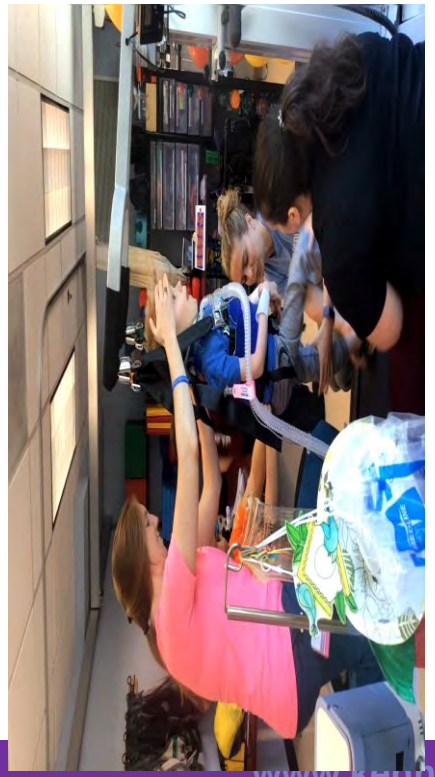
Weight Bearing

Weight Bearing

Locomotor Training

- Retraining neural patterns during treadmill training
- Focus is on proper gait mechanics, full joint loading, and avoiding compensatory motions or devices



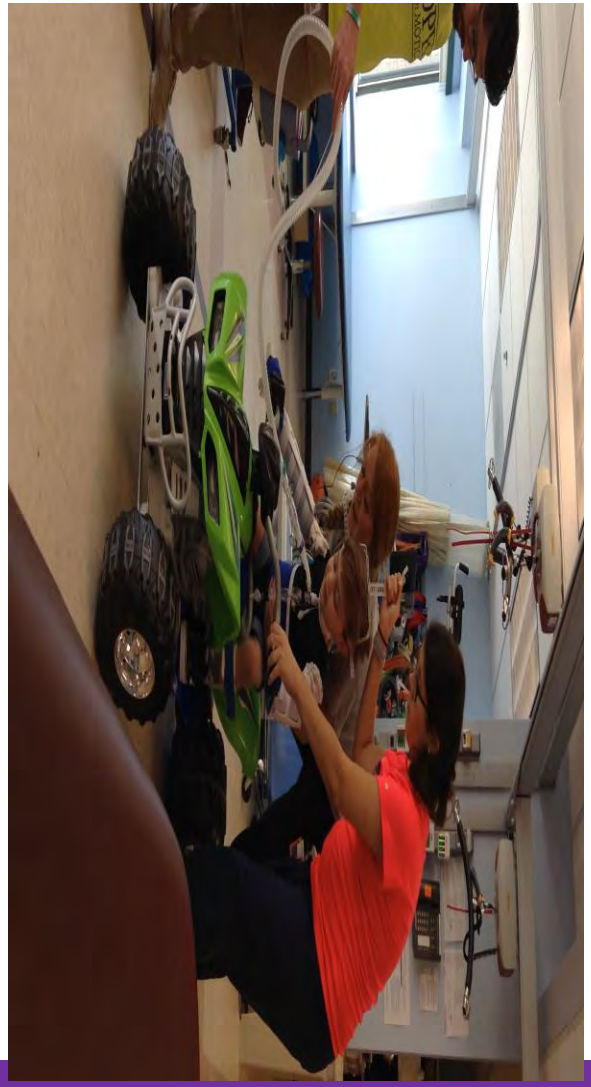


Task Specific Practice

- Completion of a specific motor tasks to improve motor learning

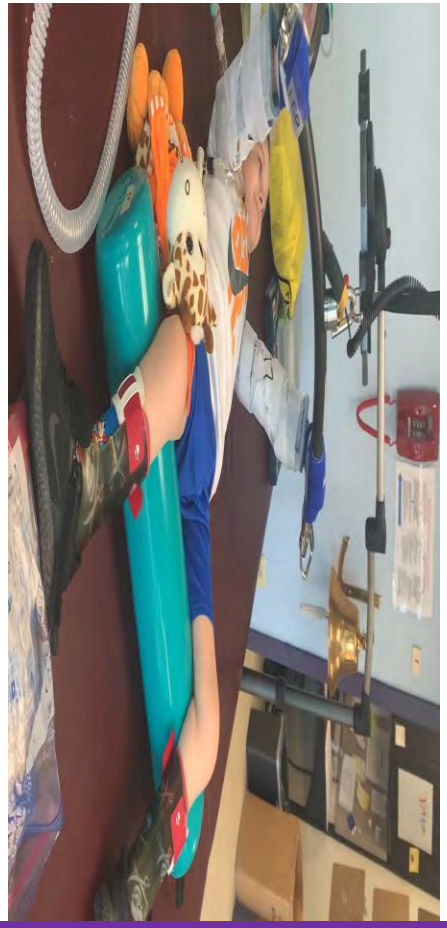
Task Specific Practice

Task Specific Practice

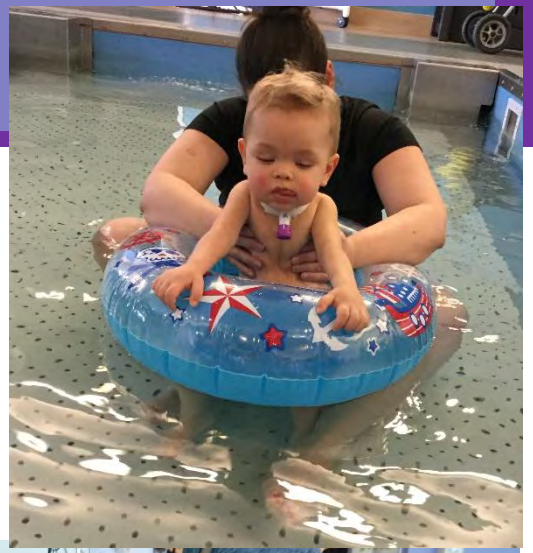


Massed Practice

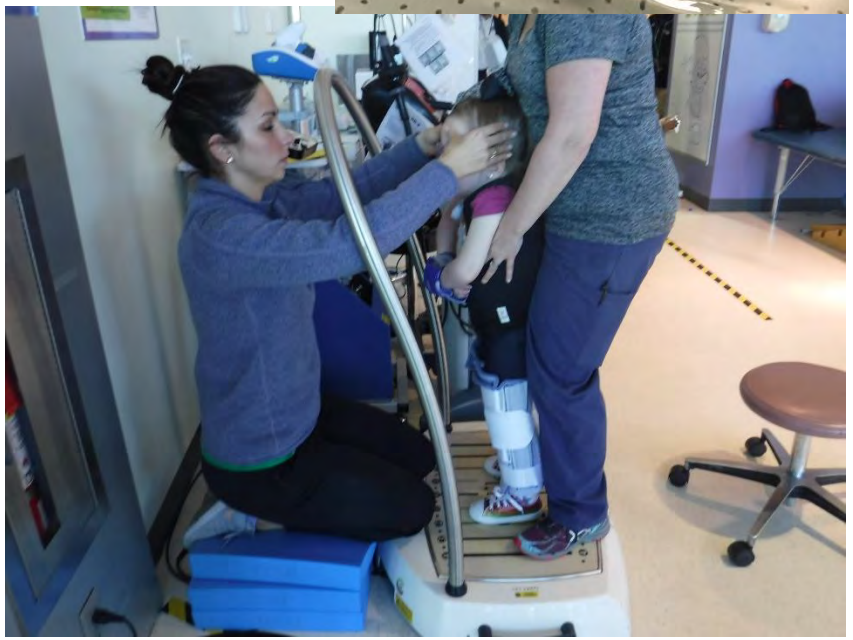
- Repetitive task specific and non-task specific activities



Additional Interventions

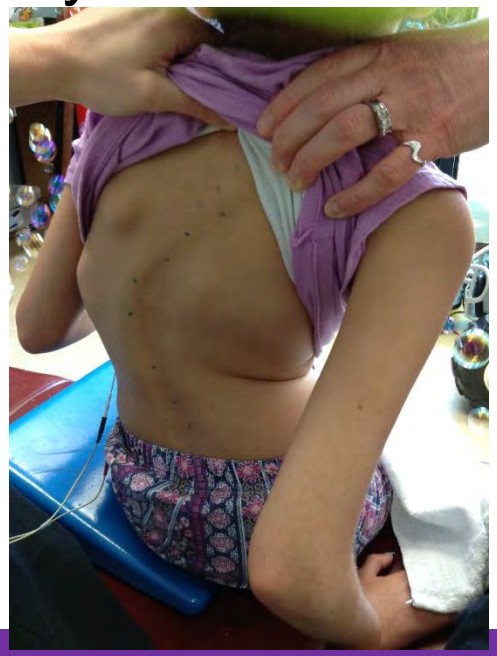


- Aquatics
- Vibration
- Home Rehabilitation Program



Considerations for AFM

- Positioning
- Subluxations
- Scoliosis
- Sensation
- Anxiety



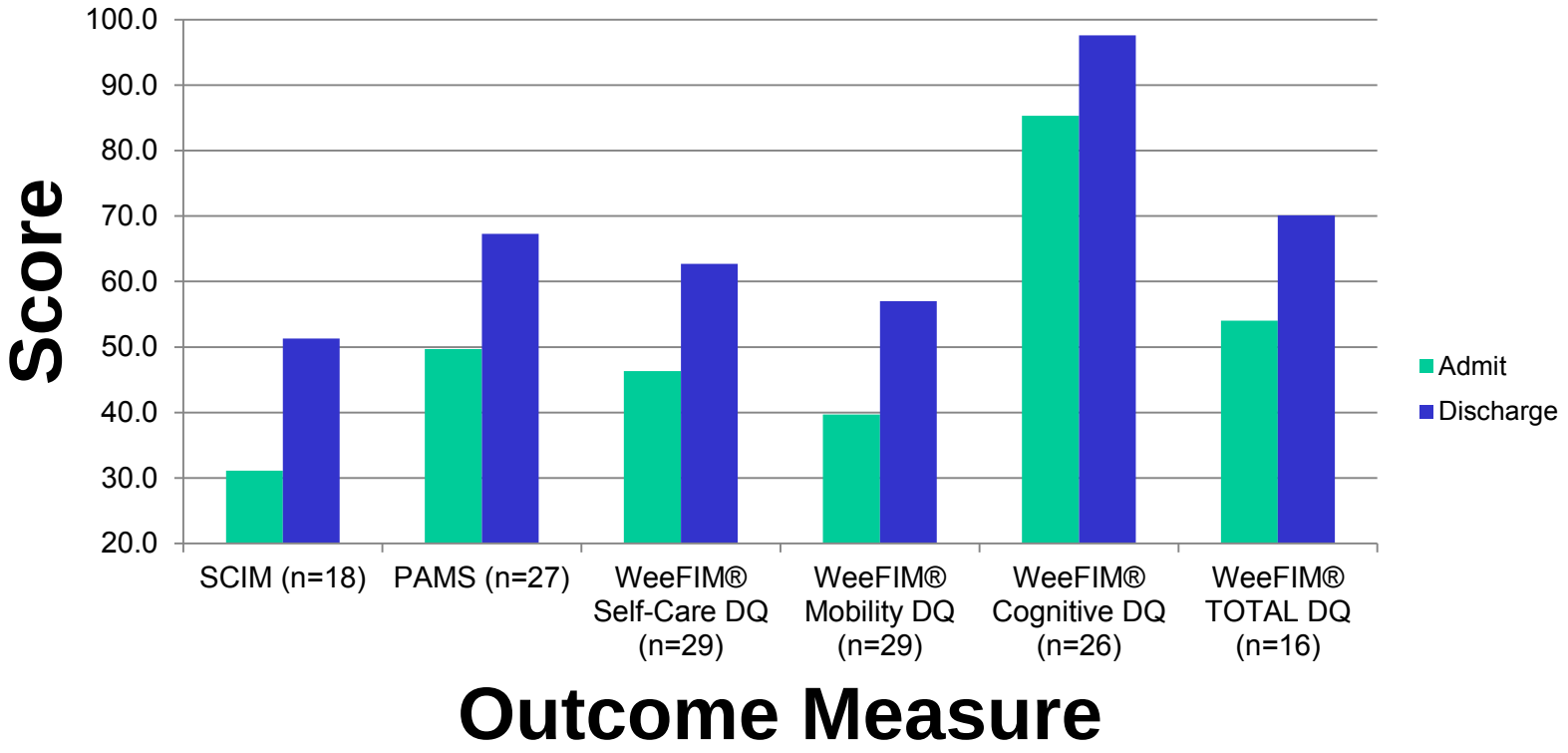
Results

Table 2: Change from Inpatient Admission to Discharge on Outcome Measures

	Admission		Discharge			
	M	SD	M	SD	t-test	*d*
SCIM (n=18)	31.1	26.4	51.3	29.0	-3.91***	-0.92
PAMS (n=27)	49.7	22.4	67.3	20.5	-7.21***	-1.39
WeeFIM® Self-Care DQ (n=29)	46.3	24.1	62.7	24.7	-5.54***	-1.03
WeeFIM® Mobility DQ (n=29)	39.7	26.9	57.0	23.6	-5.71***	-1.06
WeeFIM® Cognitive DQ (n=26)	85.3	36.5	97.6	54.0	-2.18*	-0.43
WeeFIM® TOTAL DQ (n=16)	54.0	24.3	70.1	25.8	-11.87***	-1.54

*p<.05, **p<.01, ***p<.001

Results


Score
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
SCIM (n=18)
PAMS (n=27)
WeeFIM® Self-Care DQ (n=29)
WeeFIM® Mobility DQ (n=29)
WeeFIM® Cognitive DQ (n=26)
WeeFIM® TOTAL DQ (n=16)
Admit
Discharge
Outcome Measure

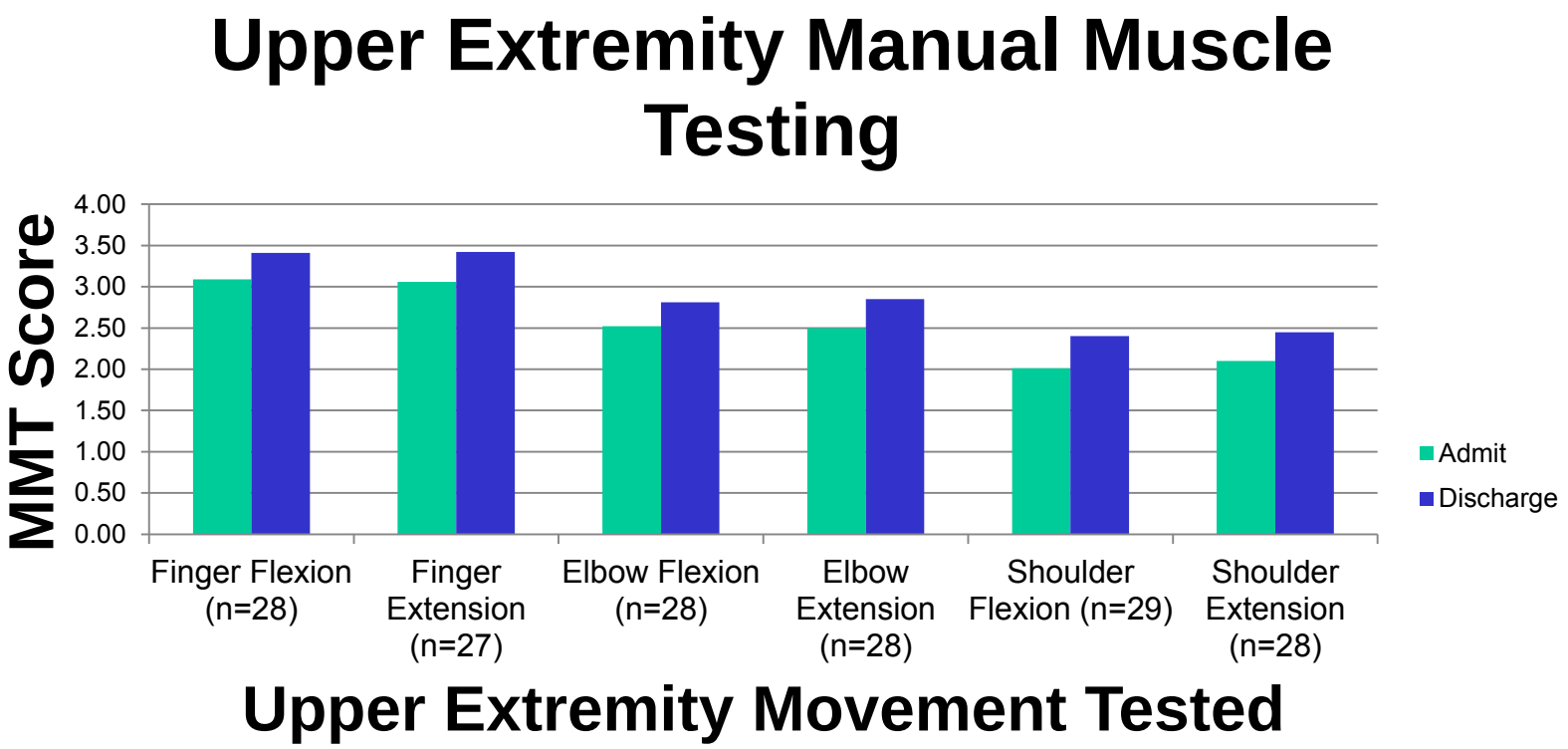
Manual Muscle Test (MMT) Results

Table 3: Change from Inpatient Admission to Discharge on MMT by muscle group

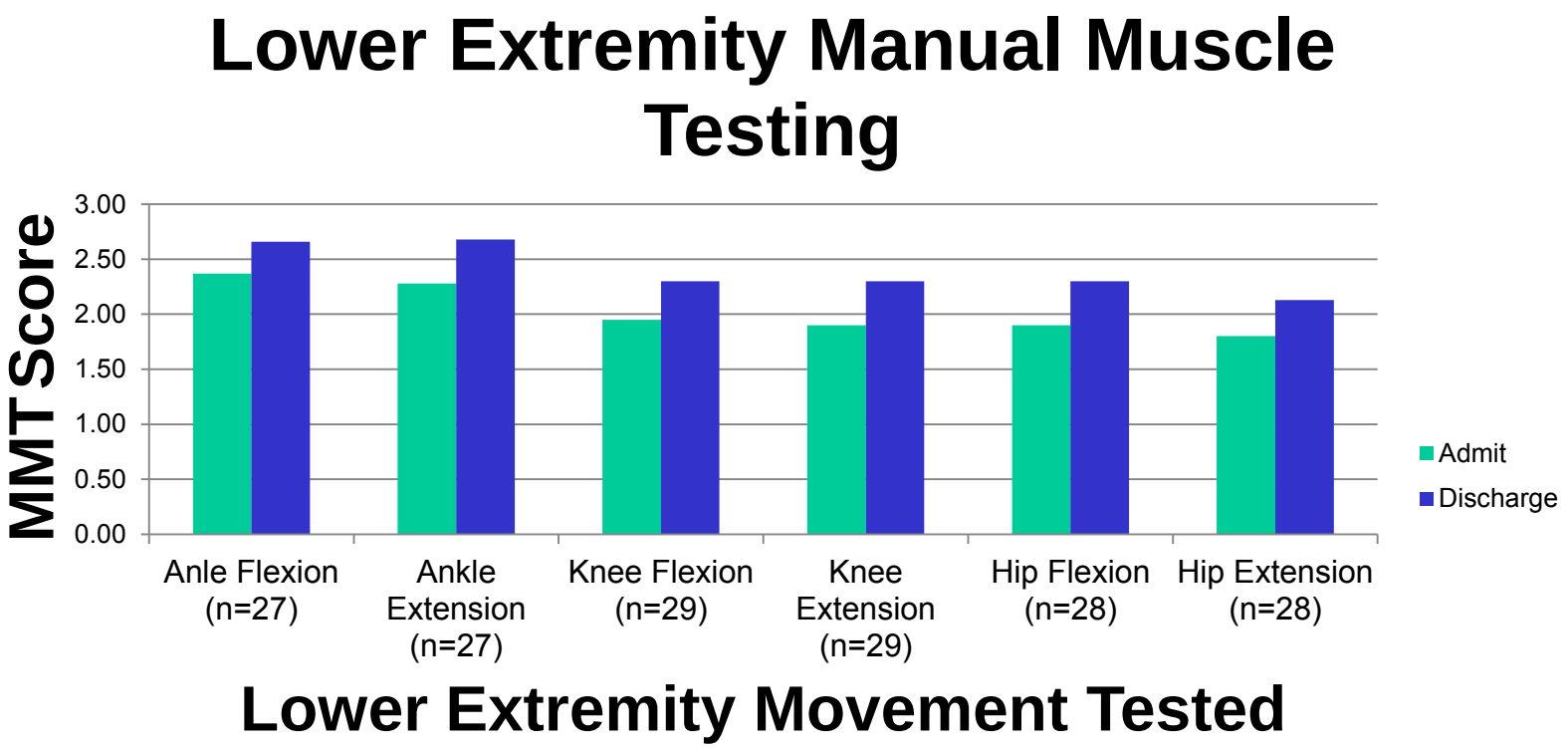
	Admission		Discharge			
	M	SD	M	SD	t-test	*d*
Ankle Flexion (n=27)	2.37	1.50	2.66	1.65	-2.46*	-0.47
Ankle Extension (n=27)	2.28	1.53	2.68	1.74	-2.90**	-0.56
Knee Flexion (n=29)	1.95	1.60	2.30	1.64	-4.10***	-0.76
Knee Extension (n=29)	1.90	1.60	2.30	1.60	-2.63*	-0.49
Hip Flexion (n=28)	1.90	1.60	2.30	1.50	-3.14**	-0.59
Hip Extension (n=28)	1.80	1.53	2.13	1.46	-3.17**	-0.60
Finger Flexion (n=28)	3.09	1.70	3.41	1.50	-3.17**	-0.60
Finger Extension (n=27)	3.06	1.69	3.42	1.40	-3.35**	-0.64
Elbow Flexion (n=28)	2.52	1.69	2.81	1.70	-4.53***	-0.86
Elbow Extension (n=28)	2.50	1.72	2.85	1.75	-3.76***	-0.71
Shoulder Flexion (n=29)	2.01	1.56	2.40	1.73	-3.24**	-0.60
Shoulder Extension (n=28)	2.10	1.66	2.45	1.65	-3.55***	-0.67

*p<.05, **p<.01, ***p<.001

Upper Extremity MMT



Lower Extremity MMT



Case Study - JH

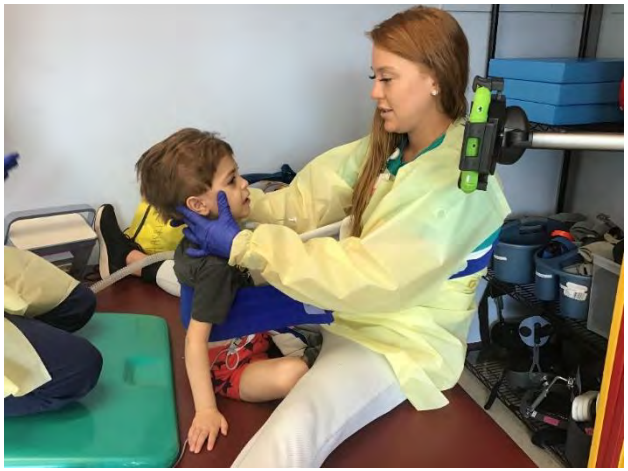
- 4yo male diagnosed with AFM, onset 10/5/2018 (2 years old)
- Ventilator and g-tube dependent
- KKI Admissions:
  - 11/20/2018 – 3/20/2019
  - 8/20/2019 – 10/19/2019
  - 2/11/2020 – 4/2/2020

Strength Changes

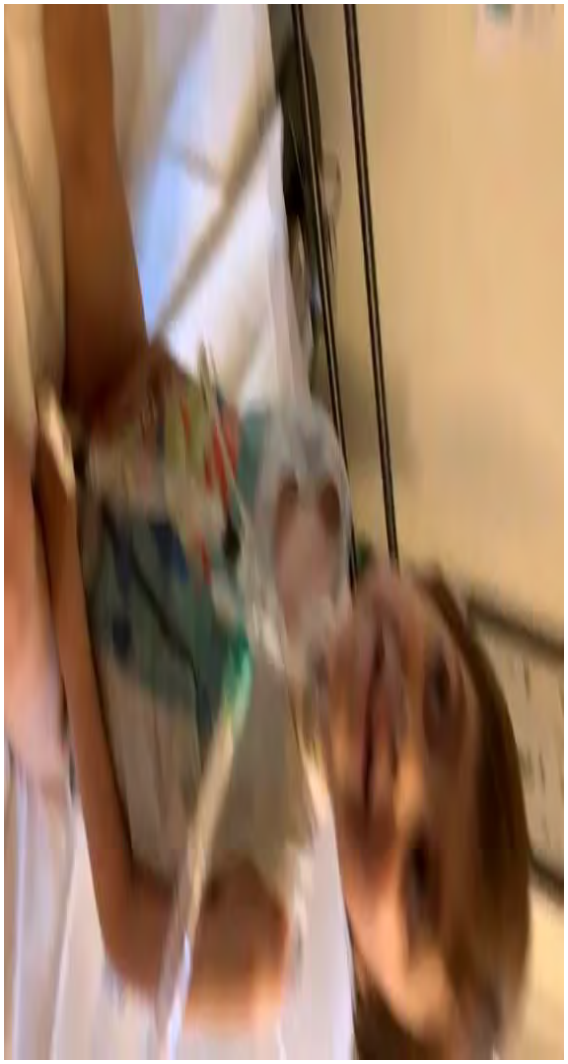
- First admission:
  - Right upper extremity:0/5; left upper extremity1/5 finger flexion, otherwise 0/5
  - Right lower extremity: 3/5; left lower extremity: 2-/5
- Last admission:
  - Right upper extremity: 0/5; left upper extremity: wrist flexion/extension and grip: 3/5, otherwise 0/5
  - Right lower extremity: 4/5; left lower extremity: 3-4/5

Sitting Balance

- First admission: Dependent at trunk and head
- Last admission: sitting with maximal assistance at trunk and independent at head for up to 60 seconds



Today

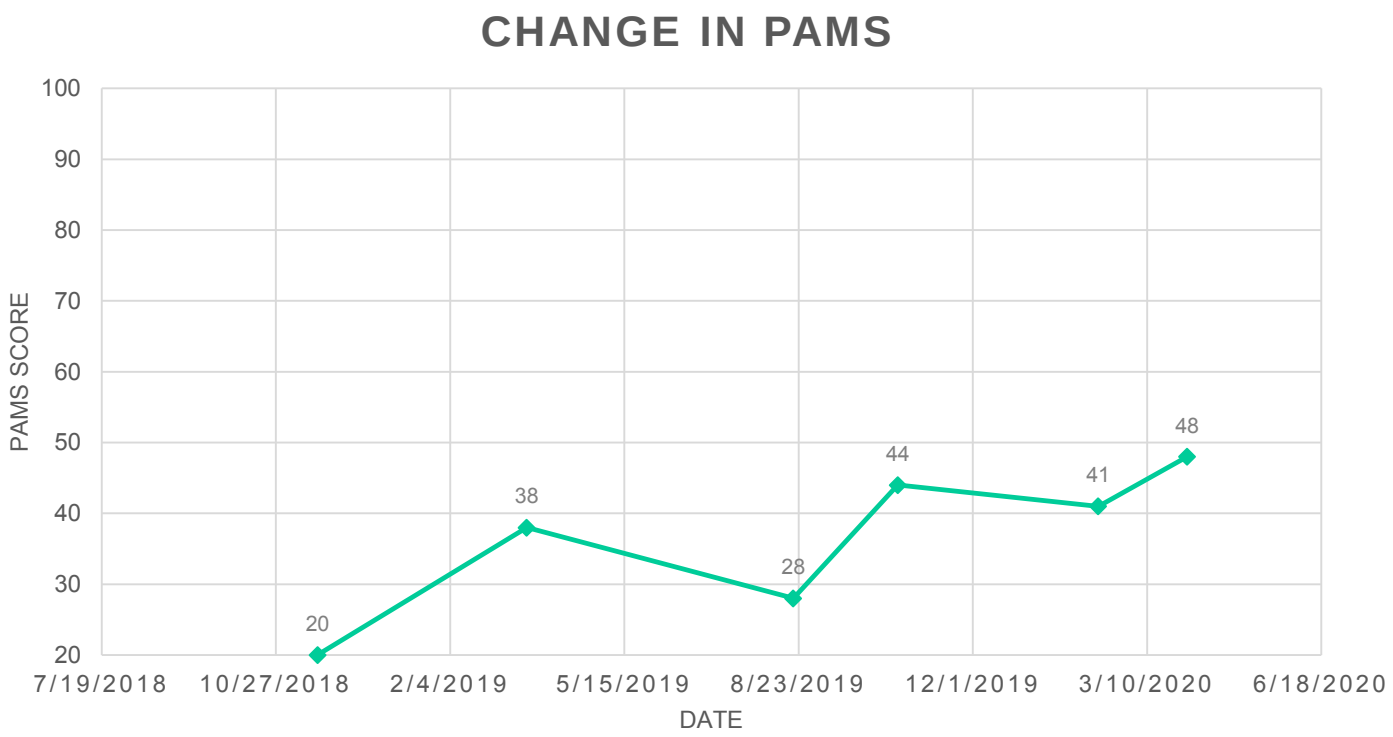


Standing Activities

- First admission: dependent x2
- Last admission: dependent assistance at head, minimal to moderate assistance at hips and lower extremities

Standing

PAMS Scores


CHANGE IN PAMS
PAMS SCORE
100
90
80
70
60
50
40
30
20
20
38
28
44
41
48
7/19/2018
10/27/2018
2/4/2019
5/15/2019
8/23/2019
12/1/2019
3/10/2020
6/18/2020
DATE

Thank you!

- PorterC@kennedykrieger.org

Managing low bone mineral density in AFM

Mahim Jain , MD, PhD.

Director, Osteogenesis Imperfecta Clinic
Director, Department of Bone and OI
Kennedy Krieger Institute
Assistant Professor, Department of Pediatrics
Johns Hopkins School of Medicine

Cristina L. Sadowsky MD

Assistant Professor Physical Medicine and Rehabilitation
Johns Hopkins School of Medicine
Director, Paralysis Restoration Clinic
International Center for Spinal Cord Injury
Kennedy Krieger Institute