



JOHNS HOPKINS
M E D I C I N E

Part II: Critical Care Management of AFM Early Mobility in the ICU

Amy Bayliss, MS, OTR/L

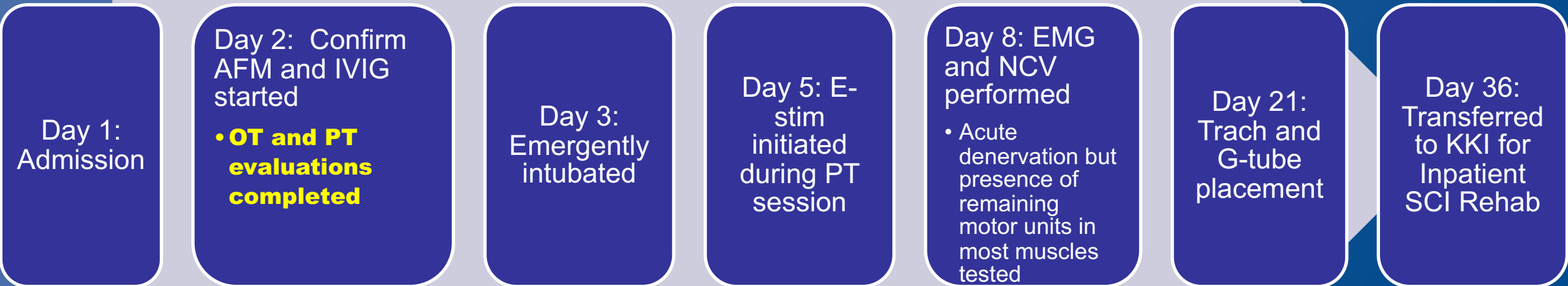
Meghan Moore, PT, DPT, NCS

Meet our kids with AFM



- ~5 days prior to admission, pt with complaints of congestion, fever and cough
 - Seen by PMD who prescribed antibiotics for sinus infection
 - Symptoms resolve briefly
- After 4 days, symptoms return and worsen
 - Severe fatigue and unable to get OOB
- 1 day later, continued progressive weakness
 - Unable to sit unsupported and difficulty holding head up
- Parents take pt. to local ED where they are transferred to JHH PICU for higher level of care

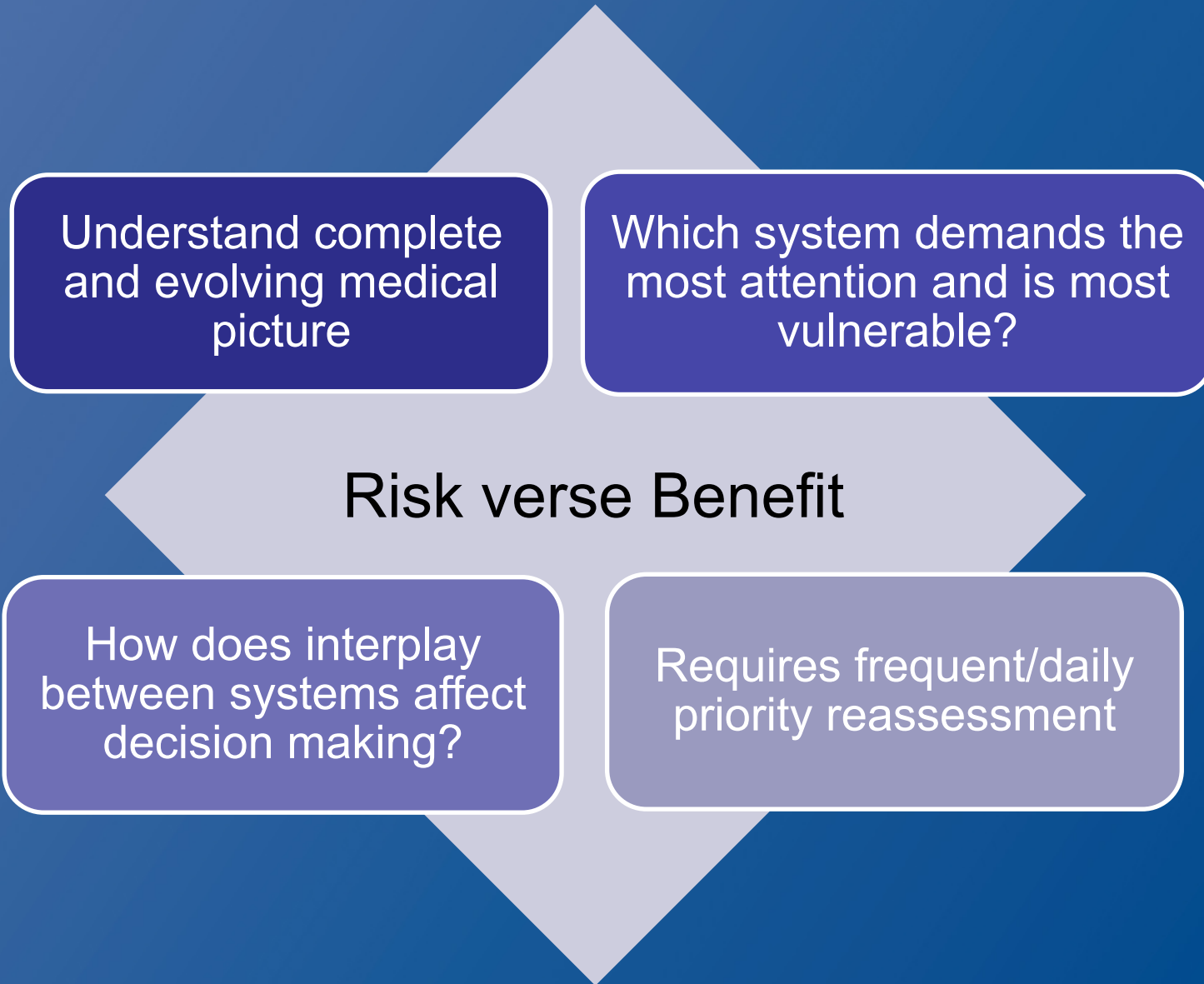
Example Hospital Course



MRI – Diffuse T2 hyperintensity involving the posterior pons, medulla oblongata and extending along the whole length of the spinal cord

CSF – lymphocytic pleocytosis with monocytic dominance
+ Enterovirus D68 on nasal swab

Where do we BEGIN



Evidence to Support Mobility



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J Pediatr Intensive Care. 2015 ; 2015: 129–170. doi:10.1055/s-0035-1563386.

Early mobilization in the pediatric intensive care unit: a systematic review

Beth Wiecezorek^a, Christopher Burke^a, Ahmad Al-Harbi^b, and Sapna R. Kudchadkar^{c,*}

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Pediatric Mobility

The Development of Standard Assessments and Interventions for Pediatric Patients for Safe Patient Handling and Mobility

Tonie Owens, MSN, RN; Christopher Tapley, MS, PT

Development and implementation of an early mobility program for mechanically ventilated pediatric patients



Kristina A. Betters, MD^{a,b,*}, Kiran B. Hebbar, MD, FCCM^{a,b}, David Farthing, OTR/L^b, Brittany Griego, DPT^b, Tricia Easley, OTR/L^b, Hartley Turman, MPT^b, Lauren Perrino, BSN^b, Stephanie Sparacino, RRT^b, Mary L. deAlmeida, MD^{a,b}

AFM Acute Care Rehab Interventions survey results from 12/4/2018



- Sent to directors of children's hospitals in US via a Listserve
- Sent to AFM workgroup Listserve

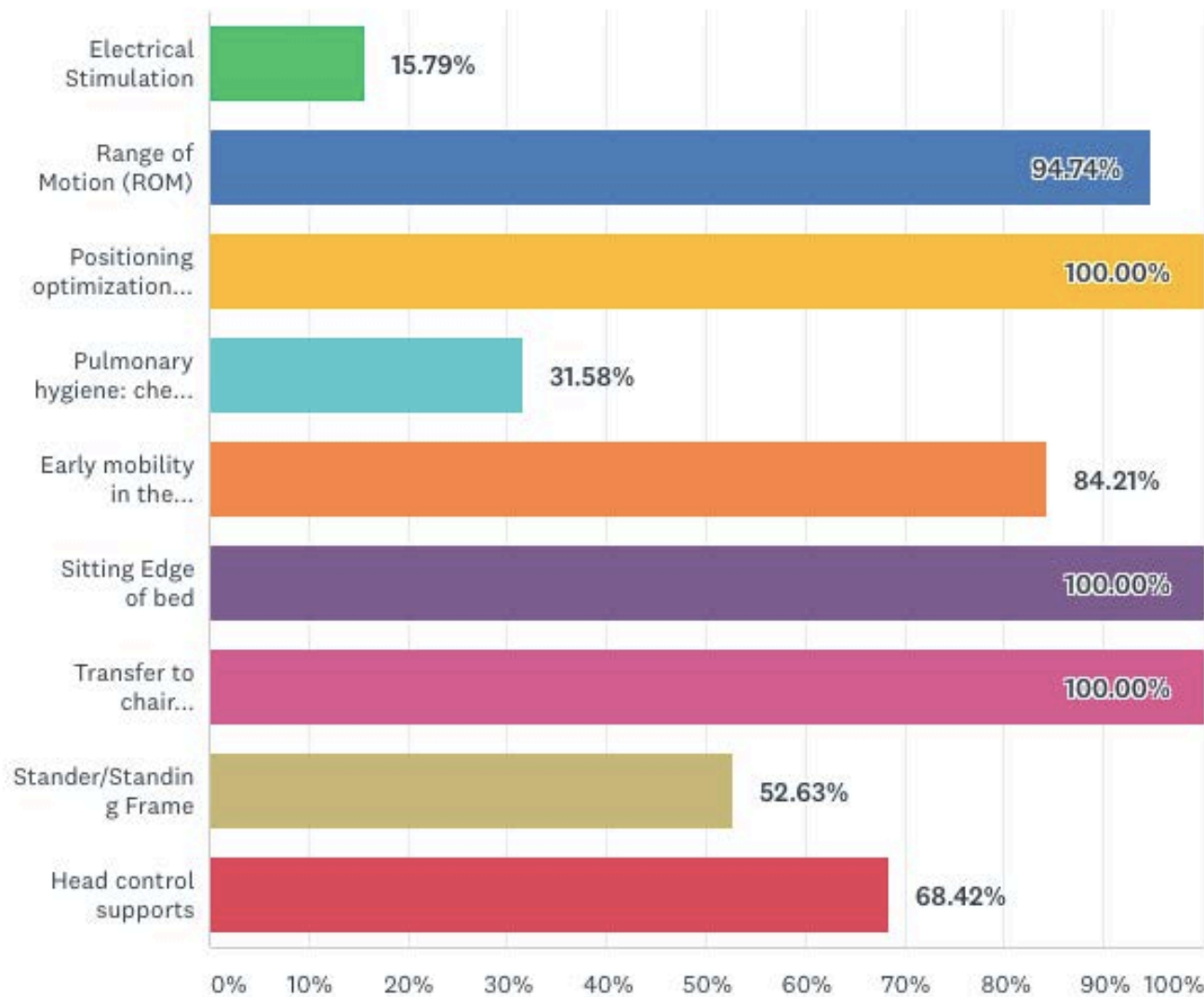
- Goal: to determine what the current clinical practice for children with AFM in the acute care setting including the PICU

Basic Survey Details

- 29 people responded
 - Most were PT/OTs
 - 8 excluded due to being inpatient rehab focused/ outpatient.
- 9 different institutions were represented
- Most responders had between 2 to 4 patients with AFM, one with 5, one with 7, and two with 30
- Age ranged from 6 mo. to 17 years old, with the majority 2-6 years old (5 to 7 responders)

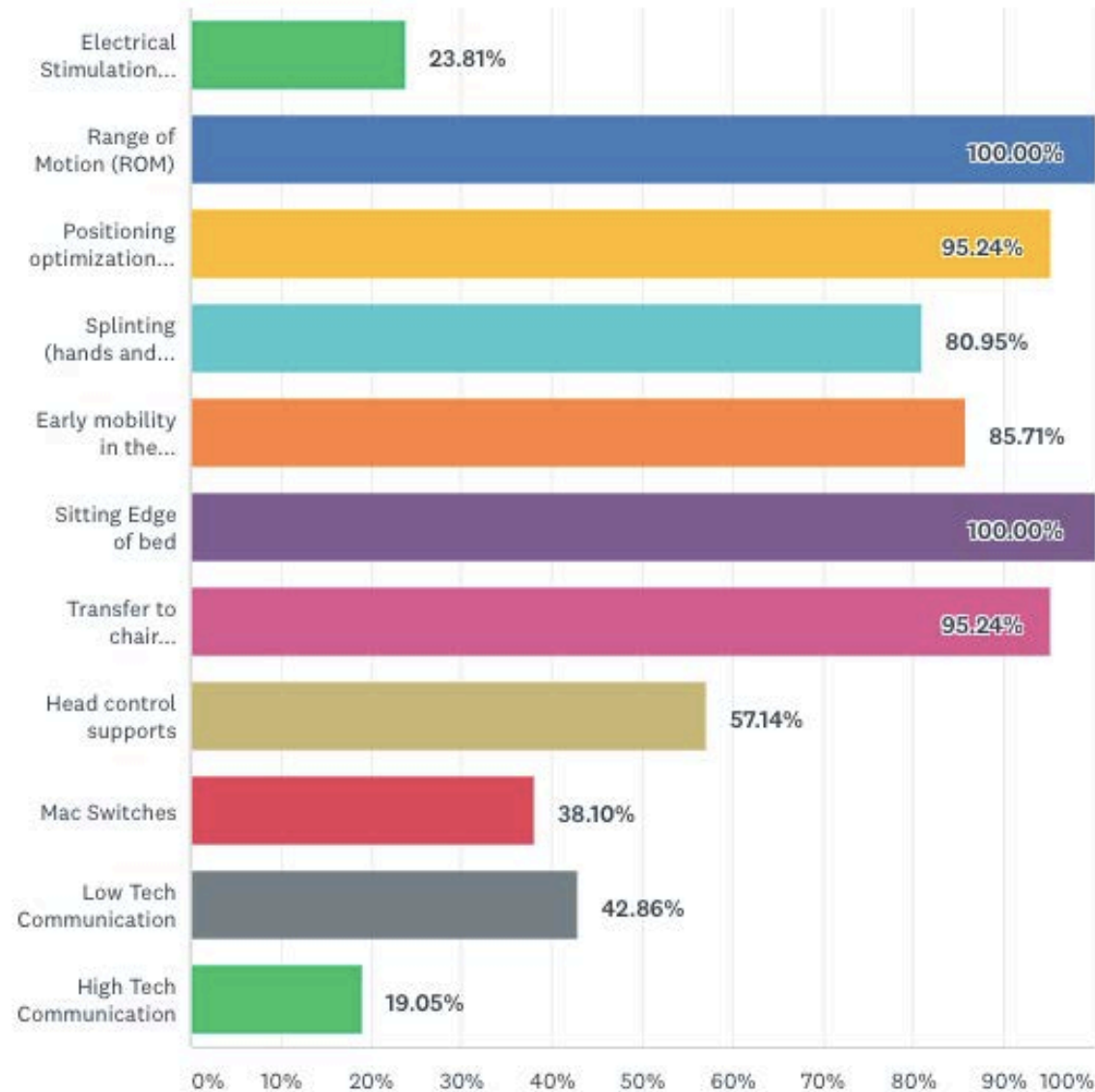
What Physical Therapy interventions have you performed in the acute care setting? (if not a PT, can click what colleagues do if you know)

Answered: 19 Skipped: 2



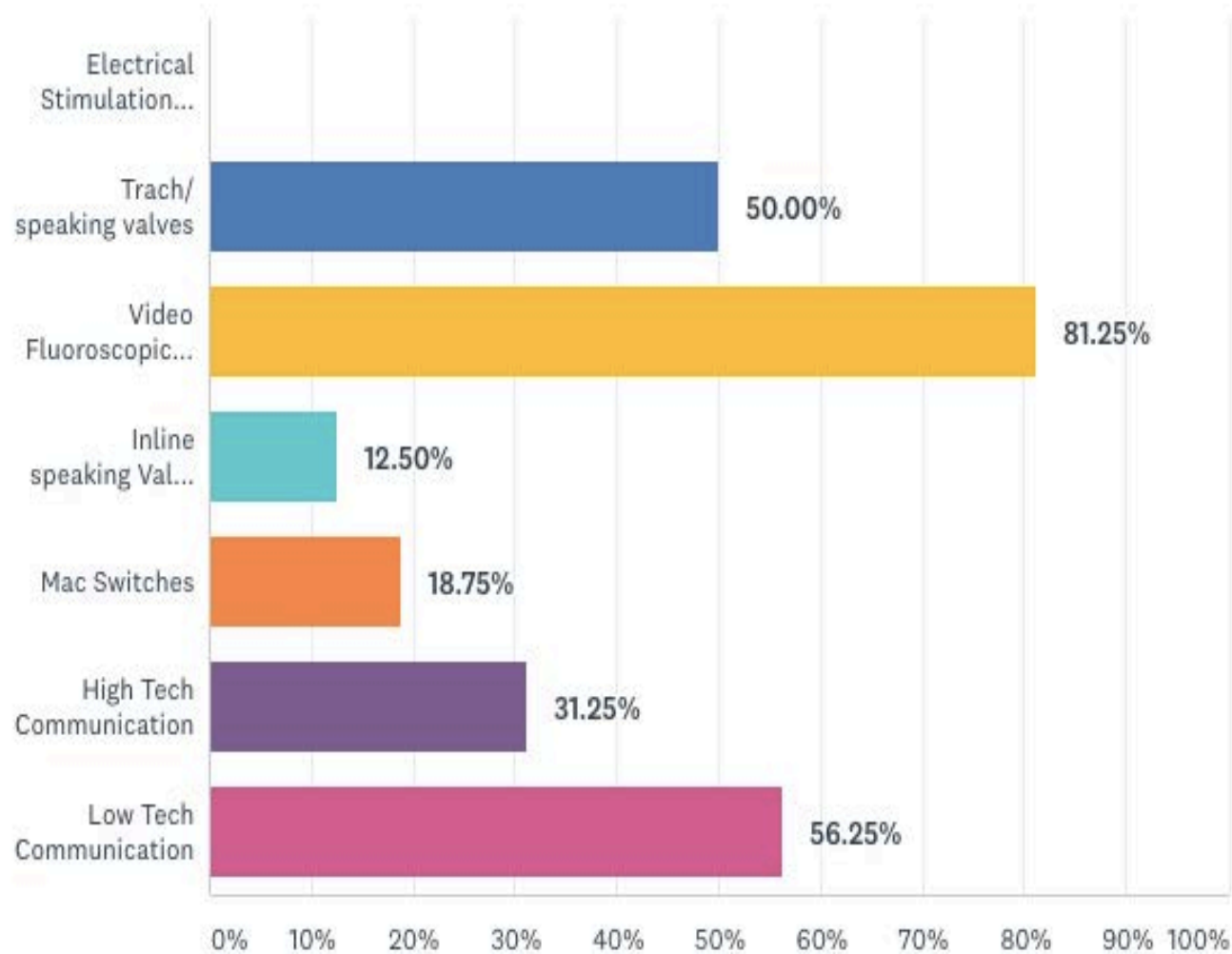
What Occupational Therapy interventions have you performed in the acute care setting? (if not a OT, can click what colleagues do if you know)

Answered: 21 Skipped: 0



What Speech Language Pathologist interventions have you performed in the acute care setting? (if not a SLP, can click what colleagues do if you know)

Answered: 16 Skipped: 5



Additional Interventions suggested by survey participants

PT	OT	SLP
Gait training/ trainer	Fine motor exercises	**None provided However most recipients were PT/OT
Balance Re-education	Commode transfers	
Use of Abdominal Binder	Safe Bathing techniques for caregivers	
Bracing/ splinting	AROM, gravity eliminated movements	
Developmental sequence movements (rolling, short sitting, tall kneeling)	KT/ Rigid tape for subluxation	
Use of floor mat	OOB to floor mat for functional play	
Family Education	Providing HEP for families	

Overall Impressions from Survey

Physical Therapy

- Overall consensus is the same
- Low number of acute care therapists are initiating electrical stimulation early on in course

Occupational Therapy

- Overall consensus is the same
- Low use of electrical stimulation
- Low use of switches for communication/play

Speech Language Pathologist

- Overall limited use of communication devices for these kids whether high tech or low tech → important due to possibly being intubated/ trached.

Barriers to Mobilization in the PICU

Medical stability/fragility

Decreased tolerance to position changes

Staff/Family/Patient comfort

Sedation/Medication

Lines/Tubes/Drains

PICU UP! Levels and Activities

Level 1

- Intubated w/ FiO₂ > 60% or PEEP > 8
- Intubated DART
- Newly trach'd
- Acute neuro event
- Sedated and SBS -3 to -2
- Vasopressors

Level 2

- Intubated or trach'd with:
 - FiO₂ < 60% +/- PEEP < 8
- SBS -1 to +3
- Non-invasive support w/ FiO₂ > 60%
- Dialysis
- Femoral lines

Level 3

- Non-invasive Support with FiO₂ <60%
- Baseline Pulmonary Support
- EVD cleared by NSG
- State Behavioral Scale (SBS) -1 to +3

- Lights on/shades up by 9
- Bed, bath and weight by 2300
- Limit TV to 30 minutes & <2 hrs./day for <2 years
- HOB > 30 degrees
- Turn Q2hr am and Q4hr PM
- Developmental appropriate positioning
- OT/PT consult by PICU day 3

Level 1 activities plus:

- Positive touch for infants and toddlers
- TID sitting up in bed
- Team discussion for OOB to chair/ ambulation
- Assess for comm, swallowing, or phonation → consult SLP
- Assess for need for daily schedule

All of Level 1 and 2 plus:

- OOB TID to chair if appropriate seating available
- Walk BID if trunk control present

Criteria to PAUSE PICU UP!

PICU065 Appendix B: Criteria to Pause PICU UP! Activity, Rest and Reassess

- Change in baseline HR by 20%
- Change in baseline BP by 20%
- Change in baseline RR by 20%
- Decrease in baseline SaO₂ by 15%
- Increase in baseline FiO₂ by 20%
- Increase in baseline ETCO₂ by 20%
- Ventilator asynchrony
- CPAP/BiPAP asynchrony
- Respiratory distress
- New arrhythmia
- Hemodynamic concerns
- Change in mental status
- Concern for airway device, vascular access or EVD integrity
- Behavior interfering with safe activity



ADDRESSING BARRIERS: MEDICAL STABILITY/FRAGILITY

Start SLOW

Working on PROM
and positioning

Setting
expectations/building
trust with patient and
family

Initiate electrical
stimulation

Progress to sitting

Transfer to sitting
EOB while intubated

Gradually increase
length of time,
decrease support

Work trunk rotation/
strengthening,
cervical rotation/
strengthening, B UE
AAROM/
strengthening

OOB to chair

Once tolerating at
least 30 minutes EOB
then can progress

Work on table top
activities

Standing

Progress to standing
after working toward
2-3 hours of sitting in
chair daily

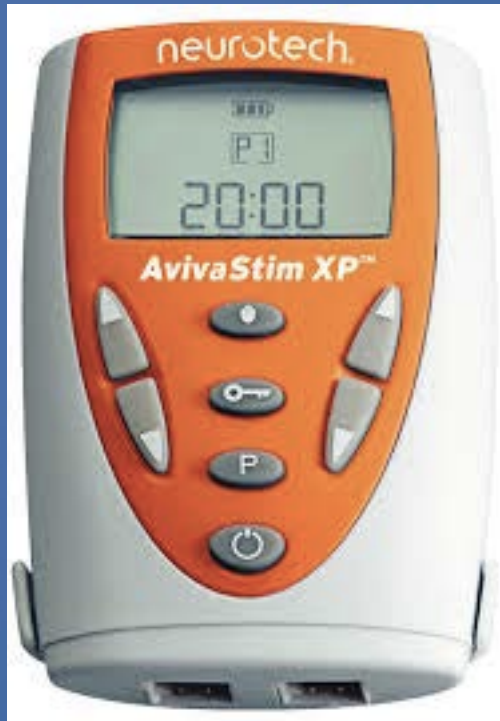
Start SLOW

Working on PROM and positioning

Setting expectations/building trust with patient and family

Initiate electrical stimulation

- Electrical Stimulation
 - Prevents muscle atrophy
 - Assists with muscle recruitment



What if we can't do anything?

- Positioning
 - Optimize neutral hips, neck, and shoulders
- Splints
 - Zanni et al 2010:
 - ROM limitation occurred predominantly in the LE
 - Goals
 - Promote range of motion
 - Protect the wound
 - Gain function



Progress to sitting

Transfer to sitting EOB while intubated

Gradually increase length of time, decrease support

Work trunk rotation/
strengthening, cervical rotation/
strengthening, B UE AAROM/
strengthening

OOB to chair

Once tolerating at least 30
minutes EOB then can
progress

Work on table top activities



Standing

Progress to
standing after
working toward 2-3
hours of sitting in
chair daily

Provider Beliefs Regarding Early Mobilization in the Pediatric Intensive Care Unit



Christine L. Joyce ^{a,*}, Cosme Taípe ^b, Brittany Sobin ^a, Marissa Spadaro ^a, Batsheva Gutwirth ^a, Larissa Elgin ^a, Gabrielle Silver ^c, Bruce M. Greenwald ^d, Chani Traube ^d

- N = 112 participants, 71% responses
 - 10% attendings
 - 6% fellows
 - 6% physician assistants
 - 61% registered nurses
 - 17% rehabilitation therapists
- Results:
 - Benefits: 87% believed decreased length of stay
 - Barriers:
 - 71% risk of ETT dislodgement (mostly RNs and MDs)
 - 59% risk of losing central line
 - 48% increased work load (mostly therapists)

“A multicomponent and interdisciplinary approach to early mobilization of children admitted to the PICU is feasible and resulted in no adverse events.” Wieczorek, et al. 2016

ADDRESSING BARRIERS: PATIENT/FAMILY/STAFF COMFORT

- Provide opportunity for family to be involved
 - Hugs on EOB
 - Be your second set of hands if you need help with head/trunk when adjusting
 - Have them help distract
 - When safe learn how to do transfer with RN staff when patient level 2/3
- Allow the patient to communicate

Receptive



Expressive



ADDRESSING BARRIERS: LINES/TUBES/DRAINS

Mobilization of intensive care patients: a multidisciplinary practical guide for clinicians

Green et al, 2016

Transforming PICU Culture to Facilitate Early Rehabilitation

Ramona O. Hopkins^{1,2,3} Karen Choong⁴ Carleen A. Zebuhr⁵ Sapna R. Kudchadkar⁶

“Invasive mechanical ventilation, whether through an endotracheal or tracheostomy tube, should not be a barrier for mobilization and has been shown to be safe and feasible”

- Plan for mobilization with ETT or tracheostomy with team approach utilizing the RTs, RNs, and rehab staff to be successful
- Mobilization and functional movements in combination with pulmonary hygiene is **IDEAL**
- Hawkins and Jones 2015: CPT is the focus of physiotherapy intervention in PICU for mechanically ventilated patients, and supports its use for secretion clearance in the PICU.

ADDRESSING BARRIERS: LINES/TUBES/DRAINS

- Things to Monitor during mobility:
 - SpO₂ (pulse oximetry)
 - ETCO₂ (ideal, if available)
 - Heart Rate
 - Respiratory Mechanics
 - Respiratory rate
 - Work of breathing
 - Tidal volume
 - Minute ventilation
 - Mean or peak airway pressures
 - Patient's comfort

ADDRESSING BARRIERS: LINES/TUBES/DRAINS



ADDRESSING BARRIERS: SEDATION/PAIN

Think of the type of medication:
Sedative-Analgesic-Hypnotic

Consider what the role of the medication is for

Assessing if it is critical

SEDATION SCORING IS KEY! Avoids over/undersedation

Curley, M. A. Q., Harris, S. K., Fraser, K. A., Johnson, R. A., & Arnold, J. A. (2006). State behavioral scale (SBS). A sedation assessment instrument for infants and young children supported on mechanical ventilation. *Pediatric Critical Care Medicine*, 7(2), 107-114.

State Behavioral Scale (SBS) ¹ Score as patient's response to voice then touch then noxious stimuli (Planned ETT suctioning or <5 seconds of nail bed pressure)		
Score	Description	Definition
-3	Unresponsive	No spontaneous respiratory effort No cough or coughs only with suctioning No response to noxious stimuli Unable to pay attention to care provider Does not distress with any procedure (including noxious) Does not move
-2	Responsive to noxious stimuli	Spontaneous yet supported breathing Coughs with suctioning/repositioning Responds to noxious stimuli Unable to pay attention to care provider Will distress with a noxious procedure Does not move/occasional movement of extremities or shifting of position
-1	Responsive to gentle touch or voice	Spontaneous but ineffective non-supported breaths Coughs with suctioning/repositioning Responds to touch/voice Able to pay attention but drifts off after stimulation Distresses with procedures Able to calm with comforting touch or voice when stimulus removed Occasional movement of extremities or shifting of position
0	Awake and Able to calm	Spontaneous and effective breathing Coughs when repositioned/Occasional spontaneous cough Responds to voice/No external stimulus is required to elicit response Spontaneously pays attention to care provider Distresses with procedures Able to calm with comforting touch or voice when stimulus removed Occasional movement of extremities or shifting of position/increased movement (restless, squirming)
+1	Restless and difficult to calm	Spontaneous effective breathing/Having difficulty breathing with ventilator Occasional spontaneous cough Responds to voice/ No external stimulus is required to elicit response Drifts off/ Spontaneously pays attention to care provider Intermittently unsafe Does not consistently calm despite 5 minute attempt/unable to console Increased movement (restless, squirming)
+2	Agitated	May have difficulty breathing with ventilator Coughing spontaneously No external stimulus required to elicit response Spontaneously pays attention to care provider Unsafe (biting ETT, pulling at lines, cannot be left alone) Unable to console Increased movement (restless, squirming or thrashing side-to-side, kicking legs)

Pain Assessment Tools

Self Report

- Gold standard, can be used in ages ≥ 3 yrs.

- Numeric Rating Scale (NRS)
- Pediatric Pain Assessment Tool (PPAT)
- Wong Baker FACES Pain Scale
- Adolescent Pediatric Pain Tool (APPT)

Behavioral

- Preverbal or non-verbal children, an indirect measure

- COMFORT Behavioral Scale
- Faces, Legs, Activity, Cry, and Consolability Observational Tool (FACES)
- Individualized Numeric Rating Scale (INRS)
- Neonatal Infant Pain Scale (NIPS)

Physiologic

- May aid pain assessment, not always specific to pain

- Tachycardia, hypertension, tachypnea

Ultimate Goal: Transitioning to Inpatient rehab

- Early mobility and consistent therapy while in acute care ideal.
- Allows for:
 - Increased tolerance once at inpatient rehab
 - Better management of expectations
 - Possible improved progress
 - Improved QOL due to being able to get OOB and out of room

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The neurophysiology of AFM



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